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FINAL TECHNICAL MEMORANDUM POST-MILCON ACTION EVALUATION FOR SOLID WASTE MANAGEMENT UNIT 7B (SWMU7B) SMALL BOATS SANDBLAST YARD DESERT COVE NAB LITTLE CREEK VA

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Final Technical Memorandum

Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)

Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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Post-MILCON Action Evaluation, SWMU 7b – Small Boats Sandblast Yard (Desert Cove), Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

PREPARED FOR: JEB Little Creek Tier I Partnering Team

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DATE: July 20, 2012

1.0 Introduction

This technical memorandum (TM) summarizes the field activities, analytical results, and data evaluation of the post-military construction (MILCON) action sediment investigation activities at Solid Waste Management Unit (SWMU) 7b, the Small Boats Sandblast Yard (Desert Cove), at Joint Expeditionary Base (JEB) Little Creek, Virginia Beach, Virginia. The investigation activities were preformed to evaluate site conditions following sediment dredging activities associated with the MILCON action and assess potential ecological risks in sediment remaining onsite. A qualitative human health risk evaluation also was conducted. This TM was prepared for the Department of the Navy (Navy), Naval Facilities Engineering Command Mid-Atlantic, under the Comprehensive Long-term Environmental Action, Navy (CLEAN) Contract N62470-08-D-1000, Contract Task Order WE32, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan.

2.0 Facility Background

On October 1, 2009, Hampton Roads' first Department of Defense Joint Base was established. This new installation comprises the former Naval Amphibious Base Little Creek and Army post of Fort Story; its new name is JEB Little Creek-Fort Story. With the forming of this new command, the Navy assumes responsibility for management of both properties and will now merge meetings regarding its ongoing Environmental Restoration Programs (ERPs). However, separate records will be maintained to ensure the integrity of ongoing efforts at both properties. When required for public notices and distributions, the former bases will be identified as JEB Little Creek-Fort Story. For ERP documents, the bases will be referred to separately as JEB Little Creek and JEB Fort Story.

JEB Little Creek is primarily an industrial and training facility located in the northwest corner of Virginia Beach, Virginia (**Figure 1**). It provides logistic facilities and support services for local commands, organizations, home-ported ships, and other U.S. and allied units to meet the amphibious warfare training requirements of the U.S. Armed Forces.

The 2,215-acre base is low-lying and relatively flat, with several freshwater lakes (Chubb Lake, Lake Bradford, Little Creek Reservoir/Lake Smith, and Lake Whitehurst) on or adjacent to the Base. JEB Little Creek centers around four saltwater bodies: Little Creek Harbor, Little Creek Cove, Desert Cove, and Little Creek Channel, which connects the coves and harbor with the Chesapeake Bay. Land development surrounding the Base is residential, commercial, and industrial. Little Creek Reservoir/Lake Smith, upgradient of the Base, serves as a secondary drinking water supply for parts of the city of Norfolk.

JEB Little Creek was placed on the National Priorities List in May 1999 (U.S. Environmental Protection Agency [USEPA] ID #VA5170022482). The Federal Facilities Agreement for JEB Little Creek was signed in November 2003 (Navy, 2003).

3.0 SWMU 7 Description and History

SWMU 7 is located at the intersection of Intercove Road and Signal Point Road in the north- central portion of the Base (**Figure 2**). The SWMU was used to sandblast and paint ships until 1996, when sandblasting activities were moved to an indoor facility (CB-125). Approximately 4,000 cubic yards (yd^3) of spent abrasive blast material (ABM) generated between 1960 and 1982 was stored in open piles in the construction footprint of CB-125 and in the area of CB-317 and CB-318. No release controls were identified at SWMU 7; therefore, spent ABM was historically released to soils and Desert Cove.

The ground surface at SWMU 7 is covered primarily with buildings, concrete, asphalt, and hard-packed gravel. Precipitation runs off to Desert Cove or is discharged through outfalls surrounding the cove with very little infiltration to groundwater. Almost the entire shoreline of SWMU 7 is bulkheaded and currently used to moor small ships. Desert Cove is a tidal marine environment connected to the Chesapeake Bay via the Connector and Little Creek Channels. All drainage to the cove is from on-Base areas, consisting mainly of buildings and asphalt parking areas. Prior to a MILCON action at Desert Cove completed in 2008, the area was last dredged in 1953 to a depth of 10 feet below mean low water. As part of the recent MILCON action, a pre-dredge survey was conducted in January 2008. Results indicate the deposition rate for the cove is relatively low. The current and reasonably anticipated future land use of the SWMU 7 area is not expected to change.

In 2008, a MILCON action to demolish and replace Piers 44-51, construct a new quaywall along the eastern and southern edges of the cove, and dredge limited areas surrounding the former piers was completed. The new quaywall was constructed approximately 32 feet outboard of the former knee wall. Sheet piling was installed to a depth of 24 feet below sediment surface (bss), and all material between the sheet pile and knee wall was left in place. The roadway adjacent to the shoreline was demolished, and debris was allowed to fall in place. A new concrete roadway was constructed along the edge of the new quaywall. Following demolition and before construction of the new piers, the area around the former piers was dredged to a depth of 10 feet below mean low water (**Figure 2**). A closed clamshell dredge, maneuvered by a crane staged on a barge, was used to remove sediments. Before disposal, sediments were staged on a separate barge with open slots on the bottom to allow surface water to drain from the material. During use, the sediment barge was located close to the piers; however, it was moved out into the cove while awaiting disposal. A turbidity curtain was used periodically during dredging to encircle the area in which the clamshell was operating. On occasion, debris captured in the clamshell would prevent complete closure of the clamshell, allowing sediments to run out of the shell. **Figure 3** displays the conceptual site model for SWMU 7b, the aquatic portion of the site.

4.0 Environmental History

A Site Investigation (SI) (CH2M HILL, 2001) and Remedial Investigation/Human Health Risk Assessment/Ecological Risk Assessment (RI/HHRA/ERA) (CH2M HILL, 2004) were conducted to evaluate the nature and extent of contamination and potential human health and ecological risks associated with exposure to soil, groundwater, and sediment at the site. SWMU 7 was separated by media for investigation purposes. The terrestrial portion of the site (SWMU 7a) is composed of the soil and groundwater media investigated as part of SWMU 7. The aquatic portion of the site (SWMU 7b) is composed of Desert Cove and the Connector Channel sediment and surface water. Following an Interim Removal Action in September 2004 to remove lead-contaminated soils, the Navy, in partnership with USEPA and the Virginia Department of Environmental Quality (VDEQ), agreed no further action was required for SWMU 7a, and a Record of Decision was signed in June 2005 (Navy, 2005).

During the RI/HHRA/ERA, SWMU 7b was divided into three areas—the Connector Channel, Cove, and Pier Areas—to better evaluate potential risks where exposures could vary because of differences in the magnitude of contaminant concentrations. Some ABM was observed in sediment throughout the Connector Channel and Cove Areas, with greater ABM concentrations noted in the Pier Area adjacent to Pier 53. Metals and polycyclic aromatic hydrocarbons (PAHs) were detected in sediment at concentrations above human health and ecological screening values in all three areas. However, the quantitative HHRA identified no unacceptable human health risks from exposure to sediment. An ERA (through Step 3A) was conducted as part of the RI. Potentially unacceptable ecological risks were identified for lower trophic level organisms from exposure to metals (arsenic, copper, lead, mercury, selenium, silver, tin, and zinc) and PAHs in sediment. Exceedances of conservative screening values were

noted in all three areas, although the COCs varied from area to area. In general, COC concentrations were highest in the Pier Area and lowest in the Connector Channel (**Figure 4 and Figure 5**). The RI recommended that further investigation of SWMU 7b sediment be conducted following completion of the scheduled MILCON action.

During the November 2008 partnering meeting, in preparation for post-MILCON action site evaluations, the Navy, USEPA, and VDEQ re-evaluated existing site data to refine the existing conceptual site model. The partnering team agreed that potential ecological risks associated with PAHs in sediment are not unacceptable and do not require further investigation, based on the following:

- PAHs are not likely attributable to the CERCLA activities (sandblasting) at SWMU 7b. PAHs are not typically associated with sandblasting residues. PAHs are likely to be primarily attributable to the nineteen (19) storm water outlets which convey storm water runoff from various locations within the facility, including numerous parking areas.

Although arsenic, selenium, and silver may have been components of ship hull paint historically sandblasted at SWMU 7b (Navy, 2006), potential risks associated with these COCs in sediment are considered not unacceptable based upon the following:

- Arsenic was identified as a COC in the Cove Area and Pier Area during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum hazard quotient (HQ) for arsenic, based upon the effects range-low (ER-L), in surface sediment is 1.54 and the site-wide mean HQ is less than 1. Arsenic was detected in 41 of 41 surface sediment samples collected; however, the maximum detected concentration of arsenic (12.6 mg/kg) is below the probable effects level (PEL) (41.6 mg/kg) and effects range-median (ER-M) (70 mg/kg). Although arsenic was not measured as part of the background sediment investigation (see Section 5.1.2, Background Data), the similarity of the mean (8.00 mg/kg) and maximum (12.6 mg/kg) concentrations suggests that this chemical is present at levels representative of the urban nature of the water body rather than historic sandblasting activities. Additionally, copper, lead, mercury, tin, and zinc do not show similar uniform distributions.
- Selenium was identified as a COC in the Channel, Cove, and Pier Areas during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum HQ for selenium, based upon the apparent effects threshold (AET), in surface sediment is 2.50 and the site-wide mean HQ is less than 1. All detected concentrations of selenium (maximum of 2.5 mg/kg) exceed the AET (1 mg/kg); however selenium was only detected in 10 of 41 (about 25 percent) of the surface samples.
- Silver was identified as a COC in the Pier Area during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum HQ for silver, based upon the ER-L, in surface sediment is 7.80 and the site-wide mean HQ is less than 1. Silver was detected in 7 of 41 (about 15 percent) of surface sediment samples and was not detected in subsurface sediment. The four sample locations that exceeded screening values (ER-L, ER-M, TEL, and/or PEL) are located within the area since removed by the MILCON action.

5.0 Project Objectives and Investigation Activities

The overall objectives of the post-MILCON Action Evaluation at SWMU 7b are to evaluate site conditions following sediment dredging activities associated with the MILCON action, assess potential risks in sediment remaining onsite, and determine whether further investigation, action, or no action is required at the site. The evaluation of post-MILCON action site conditions was conducted as part of a two-phase investigation. Investigation activities were performed in accordance with the *Final SWMU 7b - Desert Cove Revised Ecological Risk Assessment Work Plan and Sampling and Analysis Plan* (CH2M HILL, 2009) and the *Final SWMU 3 – Pier 10 Sandblast Yard and SWMU 7b – Desert Cove Benthic Invertebrate Sediment Sampling Work Plan and Sampling and Analysis Plan* (CH2M HILL, 2011) in order to meet the project quality objectives outlined in the work plans and discussed below. As documented in the 2010 sampling and analysis plan (SAP) (CH2M HILL, 2011), the primary objective of the SWMU 7b investigation was to assess the existing benthic invertebrate community at SWMU 7b in order to

identify any site-related impacts from ABM and/or the metal COCs on this community, and to determine if further investigation, action, or no action is warranted.

5.1 Data Management and Evaluation

Data management and tracking, from the time of field collection to receipt of validated electronic analytical results, is of primary importance and reflects the overall quality of analytical results. Field samples and their corresponding analytical tests were recorded on chain-of-custody forms, which were submitted with the samples to the offsite laboratory. Chain-of-custody entries were checked against the site-specific project instructions and work plans to verify that all designated field samples were collected and submitted for the appropriate analysis. Upon receipt of the samples by the laboratories, a comparison to the field information was conducted to verify that each sample was analyzed for the correct parameters and appropriate quality assurance/quality control (QA/QC) samples were collected.

5.1.1 Data Qualifiers

Analytical data reports for sediment samples analyzed for select metals, total organic carbon (TOC), and acid-volatile sulfide/simultaneously extracted metals (AVS/SEM) were submitted in hardcopy and electronic format for internal data validation. Procedures used for validation were *Region III Modifications to the National Functional Guidelines for Organic Data Review, Multi-media, Multi-concentration* (USEPA, 1994) and *Region III Modifications to Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analysis* (USEPA, 1993). Analytical data are provided in **Attachment A,** and the data validation summaries are provided in **Attachment B**.

The data validation qualifiers, or flags, used for the post-MILCON action data are the following:

- Data qualified with a “B” flag by the data validator indicates the analytes have also been detected in a field, equipment, or trip blank or in a laboratory QA/QC sample. The concentration of a B-qualified result is less than 10 times the concentration of the constituent for an associated QA/QC result. If the sample concentration is less than 10 times the associated blank concentration, the conclusion is that the parameter was not detected. Potential sources of blank contamination are discussed below.
- Data qualified with a “J” flag indicates the analyte is present, but the value is estimated.
- Data qualified with an “L” flag indicates the analyte is present, but the reported value may be biased low and the actual value is expected to be higher.
- Data qualified with an “N” flag indicates the analyte was detected; however, special analytical methods may be needed to confirm its presence or absence in future sampling efforts.
- Data qualified with a “U” flag indicated the analyte was not detected above the reported laboratory detection limit.

Grain size and pH data underwent an internal QC analysis by the project chemist. Benthic invertebrate data (**Attachment C**) underwent an internal QC check by the project senior ecological risk assessor.

5.1.2 Comparison Criteria

Some of the organic and metal constituents detected in sediment may be attributed to non-site-related conditions or sources, such as laboratory contaminants, anthropogenic non-site release sources, and naturally occurring (background) concentrations of constituents.

Laboratory and Sample Blank Contamination

In some instances, constituents detected in samples may have been introduced during field sampling, transportation to the analytical laboratory, or during laboratory procedures. A variety of blank samples were analyzed and used in the QA/QC process to determine which of the constituents may or may not have been attributed to the field sample.

Field blanks were collected to account for ambient conditions during sample collection. Equipment/rinsate blanks were collected to determine if the equipment used to collect the samples (e.g., Ponar dredges, sample containers) was adequately clean. In addition, the laboratory analyzed method blanks in each batch of 20 samples to verify instrument cleanliness and function. Common phthalate compounds can be introduced during the analytical process and are often considered laboratory contaminants.

To determine if a "B" qualifier should be assigned to a solid sample, a unit conversion was performed, whereby solid sample concentrations relative to laboratory blank concentrations were calculated by dividing the solid concentration by the fraction of moisture, then dividing the result by 5. When blank samples were found to contain common laboratory contaminants, each of the solid field samples associated with that blank that contained up to 10 times the concentrations in the blanks were qualified during data validation with a "B" for that compound. A "B" qualifier means that the compound may not be attributed to the site at that sample location. When a sampling or laboratory blank contained constituents other than the common laboratory contaminants, each of the solid field samples associated with that blank that contained up to five times the concentration was qualified during data validation with a "B" for that compound.

Background Data

In June 2007, the Navy, in partnership with USEPA and VDEQ, agreed to collect background sediment samples from an urban cove area unaffected by sandblasting activities for use in developing remediation goals for SWMU 3. Following a review of historical data (see **Attachment D, Table D-12**), the northern portion of Little Creek Cove was identified as a potentially suitable area for this purpose. Similar to SWMU 7b, Little Creek Cove receives storm water runoff from various locations within the facility, including other CERCLA sites within the ER Program.

A traditional, statistically-based work plan was not developed for the collection of urban background sediment samples. In July 2007, surface sediment grab samples were collected along a series of transects and visually inspected for grain size and ABM content. Based upon these observations, eight surface sediment samples (and one field duplicate) were collected (**Figure 6**) and analyzed for the SWMU 3 COCs (copper, lead, mercury, nickel, tin, and zinc), TOC, pH, and grain size. Three of the samples were also analyzed for AVS/SEM. The data from this background sampling are provided in **Attachment D, Table D-13**. The background sediment samples were broadly similar in terms of physical characteristics to site samples (see **Attachment D, Table D-14**) but tended to be higher in TOC and composed of a higher percentage of fines (silt/clay). In addition, the range of concentrations in the background sediment samples was narrow (low variability), which suggests that these samples represent urban background for this geographical area.

During the scoping of the post-MILCON investigation, the use of these urban background sediment data in the evaluation of SWMU 7b was considered. Following the risk management decision for PAHs, arsenic, selenium, and silver, it was determined that the background sediment investigation analyte list was now inclusive of all remaining SWMU 7b sediment COCs and suitable for comparison against site data. The approach for using these background data is documented in the 2009 and 2010 SAPs (CH2M HILL, 2009; 2011) and consists primarily of a comparison of the maximum value from the background data set with site-specific concentrations. The uncertainties associated with the use of these background data are discussed in **Attachment D**.

Risk-Based Screening Values

Sediment metals results were compared to ecological risk-based screening values: threshold effect level[1] (TEL), effects range-low (ER-L), ER-M, and PEL. There is no available TEL, ER-L, ER-M, or PEL for tin, so tin results were compared to the National Oceanic and Atmospheric Administration AET value (Buchman, 2008), and TBT and tin concentrations adjusted to the TBT fraction were also compared with an equilibrium partitioning-based TEL (Buchman, 2008). Sediment metals results were also compared to USEPA's Regional Screening Levels (RSLs) for residential soil (November 2010).

[1] TEL values are equal to the Region 3 Biological Technical Assistance Group (BTAG) marine screening values for the primary COCs, with the exception of tin, which does not have a Region 3 BTAG marine screening value.

5.2 2009 Post-MILCON Action Investigation

The primary objective of this investigation was to quantify potential ecological risks associated with the presence of ABM and the primary COCs in SWMU 7b sediment following completion of the MILCON action. Activities associated with the MILCON action may have resulted in removal of the most contaminated sediments, likely resulting in lower exposure levels for ecological receptors. However, the MILCON action did not establish preliminary remediation goals; no post-dredge confirmation sampling was conducted; and precautions to prevent the re-deposition of sediments were not consistently implemented. The action may have resulted in the mobilization of contaminants associated with the sediments in the dredged areas and their deposition to adjacent portions of the Pier Area or to the Cove or Connector Channel Areas, thereby altering the contaminant exposure scenario. The environmental questions to be answered were:

- Are potential ecological risks in sediment from the Connector Channel and Cove Areas acceptable?
- Has the 2008 MILCON dredging action mitigated unacceptable risks in the Pier Area?

5.2.1 Field Investigation Activities

Phase 1 post-MILCON action sediment sampling was conducted in November 2009 in accordance with the SAP (CH2M HILL, 2009). Twenty-eight discrete surface sediment samples were collected from 0 to 4 inches bss using a 6-inch by 6-inch petite Ponar dredge (**Table 1**). Eleven of these surface sediment samples were collected from the 2002 RI discrete sampling locations in the Cove and Connector Channel Areas (**Figure 7**); seven samples were collected from locations within the dredged portion of the Pier Area; eight samples were collected from the Pier Area, outside of known dredging limits, in the vicinity of two 2002 RI sample locations identified as high concentration areas; and two samples were collected in the vicinity of two 2002 RI sample locations identified as low concentration areas.

Before samples were collected, surface water quality parameters (dissolved oxygen [DO], oxidation reduction potential [ORP], pH, temperature, conductivity, turbidity, and salinity) were collected from the top, middle, and bottom of the water column at each sample location using a Horiba-U22 water quality meter (**Table 2**). A portion of the surface sediment samples from the interior of the Ponar dredge were placed in a disposable metal pan for homogenization. Following sample homogenization, the percent volume of ABM was visually estimated by decanting the fines and comparing the remaining material to the color index charts for estimating composition by volume (Robert R. Compton, 1985). Following visual examination, surface sediment samples were collected from the remaining sediment from the interior of the Ponar dredge for analysis of select metals (copper, lead, mercury, tin, and zinc), TOC, pH, grain size, and AVS/SEM. Additionally, a subset of samples (13 total) were analyzed for tributyltin. All samples were collected in laboratory-supplied bottleware and submitted to a pre-approved subcontracted laboratory. Appropriate QA/QC sampling was conducted according to procedures outlined in the work plan and Navy CLEAN and CH2M HILL protocols, including duplicates, field blanks, equipment blanks, and matrix spike/matrix spike duplicates. Analytical data are provided in **Attachment A**.

Excess surface sediments were returned to the water body. Disposable sampling equipment was rinsed with site water before disposal as solid waste. All non-disposable equipment, such as the Ponar dredge, was rinsed with site water between sample locations, ensuring no visible sediment remained.

5.2.2 Results Summary

Analytical results are presented in **Table 3** and summary statistics are provided on **Table 4**. Exceedances of screening values are depicted on **Figure 5**. Sediment concentrations detected in the Connector Channel, Cove, and Pier Areas were compared to concentrations detected during the 2002 RI to evaluate the impacts of the MILCON action on site conditions. Additionally, as outlined in the SAP, 2009 detections of COCs were compared to ecological screening values (TEL, ER-L, PEL, and ER-M [AET for tin]) and maximum background values to assess whether potentially unacceptable ecological risks remain at SWMU 7b following the MILCON action.

Connector Channel

Maximum and mean 2009 COC concentrations were similar to, or lower than, 2002 COC concentrations in the Connector Channel Area. Exceedances of ecological screening values (primarily the TEL and ER-L) were identified for several COCs in the Connector Channel Area. However, with the exception of mercury in two of five sample locations, detected concentrations in 2009 were all below maximum background concentrations. The maximum mercury concentration detected (0.236 mg/kg) was only slightly elevated in comparison to the maximum background value (0.20 mg/kg) and the mean concentration (0.15 mg/kg) was comparable to the mean background value (0.15 mg/kg).

Cove

Maximum and mean 2009 COC concentrations were similar to, or lower than, 2002 COC concentrations in the Cove Area. Exceedances of ecological screening values (primarily the TEL and ER-L) were identified for all COCs in one or more samples. Mercury was detected (maximum concentration of 0.381 mg/kg) above maximum background values at each sample location. Lead, tin, and/or zinc were detected slightly above maximum background at only two locations, LW07-K3 and LW07-L2, with maximum concentration to background ratios of 1.13 for lead, 1.51 for tin, and 1.11 for zinc. Copper was not detected above maximum background within the Cove Area.

Pier

In general, 2009 COC concentrations in the non-dredged portion of the Pier Area were similar to 2002 COC concentrations in these areas. Concentrations of COCs detected within the dredged portion of the Pier Area were similar to, or lower than, those previously detected, with the exception of the northeastern corner of the Pier Area. Concentrations detected within this area were greater than the 2002 surface sediment concentrations and are comparable to what was detected in the 2002 subsurface samples collected from this area. This is likely the result of the MILCON dredge action exposing the subsurface surface sediment in this area. Exceedances of all ecological screening values (except the ER-M for copper) were identified in samples collected within the Pier Area. In the southern and eastern portion of the Pier Area, concentrations of COCs were below maximum background levels, with the exception of mercury in three of seven locations (maximum concentration of 0.309 mg/kg) and zinc in one of seven locations (maximum concentration of 659 mg/kg). Maximum background values were exceeded for all COCs in the northern portion of the Pier Area, with maximum COC concentrations detected in the area surrounding sample station LW07-M1.

5.2.3 Conclusions

Although precautions to prevent the re-deposition of sediments were not consistently implemented during dredging, the 2009 surface sediment data indicate that MILCON activities did not adversely affect sediment conditions within the Connector Channel and Cove Areas. Potentially unacceptable risks remain in sediment, primarily the northeastern corner of the Pier Area, following completion of the MILCON action. Based on the results of the 2009 Post-MILCON evaluation, the Navy, in partnership with VDEQ and USEPA, agreed that further investigation and ecological risk evaluation was warranted, as presented in the subsequent section.

5.3 2010 Post-MILCON Action Investigation

As discussed previously, potentially unacceptable risks and exceedances of maximum background values were identified at SWMU 7b following the 2009 investigation; therefore, the JEB Little Creek Tier I Partnering Team agreed that further investigation was warranted. The primary objectives of the Phase 2 investigation were to evaluate the condition of the existing benthic invertebrate community at SWMU 7b, assess the impacts of ABM and COCs on this community, and determine if further investigation, action, or no action is required at the site. The environmental questions to be answered were:

- What is the composition and condition of the existing benthic invertebrate community at SWMU 7b and how does it vary spatially throughout the site?

- Is the composition and condition of the existing benthic invertebrate community at SWMU 7b correlated with the concentration of the COCs and/or the presence of ABM?
- Is further investigation or action required for the Cove, Connector Channel, and/or Pier Area at SWMU 7b?

Potential risks to human health were also reevaluated for the SWMU 7b sediment during this investigation because the 2009 sediment data indicated that conditions have changed in the sediments as a result of the MILCON action.

5.3.1 Field Investigation Activities

Phase 2 post-MILCON action sediment sampling was conducted in August/September 2010 in accordance with the SAP (CH2M HILL, 2011). Composite surface sediment samples were collected at 19 stations within the Connector Channel, Cove, and Pier Areas from 0 to 6 inches bss using a 6-inch by 6-inch petite Ponar dredge (**Table 1**). Where insufficient penetration or evidence of significant disturbance (e.g., washouts) was observed, a larger (9-inch by 9-inch) clamshell grab sampler was deployed and a 6-inch by 6-inch subset of that sample was retained. Surface sediment samples were collected from 11 stations coinciding with previous 2002 RI/2009 post-MILCON action sample locations within the Connector Channel and Cove Areas (**Figure 8**); 4 sample stations coinciding with 2002 RI/2009 post-MILCON action Pier Area sample locations; and 4 stations outside of the dredged portion of the Pier Area not previously sampled.

Before samples were collected, surface water quality parameters (DO, ORP, pH, temperature, conductivity, turbidity, and salinity) were collected from the top, middle, and bottom of the water column at each sample location using a YSI water quality meter (**Table 5**). Two surface sediment grab samples were collected from 3 locations (6 total) surrounding each of the 19 sample stations. While still in the Ponar sampler, each grab sample was examined for an oxidation-reduction boundary (**Table 5**). Sediment from one grab sample was placed directly in a sample container for AVS/SEM analysis. One grab sample from each location was designated for estimating ABM content and analytical sample collection and was placed in a disposable aluminum pan for homogenization. Following sample homogenization, ABM content was estimated using approximately 250 milliliters (ml) of the composited sediment. Fines were decanted from the sample, and the percent volume of ABM was visually estimated. Following visual examination, 19 composite surface sediment samples were collected and analyzed for select metals (copper, lead, mercury, tin, and zinc), TOC, pH, grain size, and AVS/SEM.

The second grab sample from each location was designated for benthic invertebrate sieving and was placed directly into a 500-micrometer mesh sieve bucket. Benthic invertebrate grab samples surrounding 3 of the 19 sample stations were evaluated separately as replicate samples. Sediment reserved in the sieve bucket was gently washed with site water to remove fine-grained material. Material remaining on the sieve was rinsed with site water into 2,000-ml polyethylene sample containers. To allow for an adequate volume of preservative to be added, each container was only half filled with the sieved material. Additional site water and approximately 200 ml of buffered formalin was added to each sample. A cardstock label was placed inside each container, and the sample was capped and gently shaken to ensure even distribution of the preservative. Twenty-five (16 composite and 9 replicate) samples were collected for benthic invertebrate enumeration.

Excess surface sediments were returned to the water body. Disposable sampling equipment was rinsed with site water before disposal as solid waste. All non-disposable equipment, such as the Ponar dredge, was rinsed with site water between sample locations.

5.3.2 Results Summary

Human Health Risk Evaluation

A baseline HHRA was performed as part of the SWMU 7 RI in 2004 and included sediment data collected between 2000 and 2002 for PAHs, metals, cyanide, total tin, and pesticides/ polychlorinated biphenyls (PCBs). The risk assessment indicated that there were no unacceptable risks to potential human receptors associated with exposure to sediment. However, since that risk assessment was completed, additional investigation of sediment has been completed. Although the additional investigation was completed to evaluate post-MILCON action

conditions as they relate to potential ecological risks associated with exposure to COCs in sediment, data collected as part of the 2009 and 2010 post-MILCON action investigations were reviewed to confirm the current concentrations of ecological COCs would not change the results of the 2004 HHRA.

The maximum concentrations of the ecological COCs detected in the 2009/2010 sediment samples (the only analytes sampled for) were compared to the maximum detected concentrations from the sediment samples evaluated in the 2004 HHRA, and to current human health screening levels (November 2010 EPA RSLs). Sediment concentrations were compared with 10 times the adjusted (non-carcinogenic constituent divided by 10) residential soil RSLs. The 2009/2010 detected concentrations were similar (slightly lower or slightly higher) than the concentrations of those constituents analyzed in the 2004 HHRA, and all were below their respective screening levels (**Table 3**). Therefore, the additional sediment data collected in 2009/2010 for the ecological COCs do not change the results or conclusions of the 2004 HHRA performed for sediment at SWMU 7b, and no further investigation or action is warranted for sediment for the protection of human health.

Ecological Risk Evaluation

This section summarizes the results of post-MILCON action update to the 2004 ERA (CH2M HILL, 2004). The complete ERA is contained in **Attachment D**. This baseline (Step 7) ERA evaluated the 2009 and 2010 post-MILCON action data, together with the previously collected (historical) data from the RI and SI, to identify and document changes in ecological risks in the context of the current post-MILCON conditions at the site.

This evaluation was limited to the sediments of the Desert Cove system (Connector Channel, Cove, and Pier Area) and to the primary COCs identified in the RI (copper, lead, mercury, tin, and zinc). As described in **Section D.1.1 of Attachment D**, there were no unacceptable ecological risks associated with the terrestrial portion of the site due to the lack of significant exposure pathways and because groundwater is not a significant transport route from the site to the Desert Cove system for ABM-related constituents. Ecological exposures via food webs were not recalculated in this ERA because the surface sediment concentrations of the primary COCs, all of which have the potential for significant bioaccumulation, were similar between 2000/2002 (where ecological risks from this pathway were found to be acceptable during the 2004 RI) and subsequent 2009 and 2010 sampling events. The focus of this ERA was to address the project objective (see Section 5.0) and to answer the environmental questions presented in Section 5.3 for the 2010 sampling event.

The process to be followed for risk screening and risk acceptability was developed through a series of discussions at a number of Tier 1 partnering team meetings, including September 2008, October 2008, November 2008, March 2010, and December 2010. These discussions and the data evaluation approach are summarized in the SAP (CH2M HILL, 2011).

Risk Characterization

The lines of evidence evaluated in this ERA were: (1) a comparison of site COC sediment concentrations with literature-based sediment screening values; (2) a comparison of site COC sediment concentrations with facility-specific background sediment concentrations; and (3) a quantitative statistical evaluation of benthic invertebrate survey data collected in 2010.

Comparison with Sediment Screening Values and Background: In surface sediment, mean HQs based upon the PEL and ER-M did not exceed 1 for any of the metal COCs in the Connector Channel (see **Attachment D, Table D-17**). Although the mean HQs based upon the TEL and ER-L exceeded 1 for copper, mercury, and zinc (the mean HQ for lead [1.02] also exceeded 1 based upon the TEL), the magnitude was low (ER-L mean HQs of 1.53, 1.03, and 1.18, respectively), copper and zinc did not exceed background, and the maximum background ratio for mercury was just 1.74 (the mean ratio was just below 1). Except for one 2002 sample, for which AVS was below the detection limit, all SEM/AVS ratios in the Connector Channel were less than 1 and only trace amounts of ABM were found in this area. Based upon these comparisons, risks within the Connector Channel are acceptable.

In the Cove, the mean PEL-based HQ exceeded 1 only for zinc (all sampling events), but was less than 1.5 in 2009 and 2010, and less than 2.0 in 2002. Relative to the ER-M, the mean HQ for zinc did not exceed 1 in 2009 or 2010, and the 2002 mean HQ was less than 1.3. Mean HQs based upon the TEL and ER-L exceeded 1 for all of the COCs,

except TBT (based upon the AET), with the ER-L HQs about 2.5 or less. Copper, however, did not exceed background and the maximum background ratio for tin was just 1.51 (the mean ratio was less than 1). Based upon calculated total tin to TBT ratios, "adjusted" tin concentrations did not exceed the AET or the more-conservative equilibrium partitioning-based TEL. Except for one 2010 sample (LW07-K4), all zinc concentrations were less than 1.5 times background and 18 of 22 were less than background. Except for one 2009 sample for which AVS was below the detection limit, the SEM/AVS ratio was less than 1 for all samples for which zinc exceeded background. Only trace amounts (≤1 percent) of ABM were found in the Cove based upon 2010 quantitative measurements. Based upon these comparisons, risks within the Cove are generally acceptable.

In the Pier Area, the mean HQ exceeded 1 based on the PEL for zinc (all events) and mercury (2002 only), but the zinc HQ did not exceed 2 and the mercury HQ did not exceed 1.25. The mean HQ exceeded 1 based on the ER-M for zinc (all events) and mercury (2002 only), but the zinc HQ did not exceed 1.3 and the mercury HQ did not exceed 1.25. Mean HQs based upon the TEL and ER-L exceeded 1 for all of the COCs, except TBT (based upon the AET), with the ER-L HQs about 3.5 or less. Copper exceeded background in only one sample at a maximum ratio of 1.37 (the mean ratio was less than 1). Based upon calculated total tin to TBT ratios, "adjusted" tin concentrations did not exceed the AET or the equilibrium partitioning-based TEL. The SEM/AVS ratio was less than 1 for all samples except LW07-H5 (2002), LW07-301 (2009), LW07-304 (2009), LW07-M1-302 (2009), and LW07-M1-304 (2009). Except for the northeast corner of the Pier Area, only trace amounts (≤1 percent) of ABM were found in the Pier Area based upon 2010 quantitative measurements. In 2010, ABM in the northeast corner was 1.5 to 2.5 percent but was qualitatively estimated at up to 10 percent in 2009. The northeast corner of the Pier Area (sample locations LW07-M1, LW07-301, LW07-403, and LW07-404) consistently had the highest COC concentrations outside of the area affected by the 2008 MILCON action and also consistently had the highest concentrations of ABM.

Subsurface sediment samples were only collected in 2002 and were generally from the 6-inch depth increment immediately below the extent of visible ABM. Subsurface sediments in the Connector Channel and Cove do not appear to have been affected by site activities. In the Pier Area, except for the samples within the area affected by the MILCON action, only the sample from location LW07-M1 appeared to be significantly affected by site activities. The maximum concentrations of all COCs occurred in this sample, and the concentrations were higher at this location in subsurface sediments relative to surface sediments.

Benthic Invertebrate Surveys: Benthic invertebrate surveys were conducted in 2002 at 19 locations and again in 2010 at 19 locations (15 of which overlapped 2002). In both 2002 and 2010, the benthic invertebrate community at SWMU 7b was dominated by polychaetes, most of which are pollution tolerant. Polychaetes accounted for 84 percent of the total benthic invertebrate community in 2002 and 78 percent in 2010. Mollusks (bivalves such as clams and gastropods such as snails) were the next most numerous group in both 2002 and 2010. In 2010, mollusks comprised about 12 percent of the total community and about 5 percent in 2002. The three most numerous taxa observed in 2002 and 2010 (all polychaetes) were the same: (1) *Streblospio benedicti* was the most numerous, comprising 59 percent of the total community in 2002 and 29 percent of the total community in 2010; (2) *Paraprionospio pinnata,* comprising 11 percent of the total community in 2002 and 6 percent of the total community in 2010; and (3) *Mediomastus spp*., comprising 10 percent of the total community in 2002 and 18 percent of the total community in 2010. These three taxa combined accounted for 80 percent of the total community in 2002 and 53 percent in 2010.

The benthic invertebrate community at SWMU 7b appears to be temporally stable on a gross scale, showing a large degree of consistency between 2002 and 2010. The same taxonomic groups (polychaetes, followed by mollusks) dominated the community in both 2002 and 2010, and the three most dominant taxa (all polychaetes) were the same between 2002 and 2010.

Correlation Between Benthic Metrics and Physical/Chemical Parameters: A statistical evaluation of the 2010 benthic invertebrate survey data was conducted using the following 10 metrics: (1) number of taxa (taxa richness); (2) total density; (3) percent contribution of the dominant taxon; (4) density of the dominant taxon; (5) percent Spionid polychaetes; (6) percent *Mediomastus* and *Capitella* polychaetes; (7) density of pollution-tolerant organisms; (8) percent pollution-tolerant organisms; (9) density of pollution-sensitive organisms; and (10) percent

pollution-sensitive organisms. As discussed in Appendix D, Section D.5.2, the final list of metrics was agreed to at the December 2010 partnering meeting with BTAG concurrence. The metrics were selected based on professional judgment and represent both "general" community metrics (such as number of taxa and total density) and more specific metrics relevant to the community at SWMU 7B (such as percent Spionid polychaetes and percent *Mediomastus* and *Capitella* polychaetes). Most of the metrics focused on evaluating pollution- and disturbance-related community factors (e.g., density of pollution sensitive organisms). These metrics were examined for correlations with physical and chemical parameters, including, for surface sediment, the concentrations of the COCs, grain size, TOC, pH, SEM/AVS ratio, and percent ABM, and, for the water column (measured just above the sediment surface), DO, ORP, salinity, temperature, specific conductivity, turbidity, and pH. Both statistical and observational methods were used to identify chemical and/or physical parameters that were potentially associated (correlated) with differences in the values of the benthic invertebrate metrics.

The following categories were used to describe the relative strength of the resulting correlations (R^2 values): (1) weak: < 0.50; (2) moderate: 0.50 to 0.80; and (3) strong: >0.80. Six of the benthic metrics (number of taxa, total density, percent contribution of the dominant taxon, percent *S*pionid polychaetes, percent pollution-tolerant organisms, and density of pollution-sensitive organisms) had 5 or more statistically significant correlations (out of 23 possibilities; see **Attachment D, Table D-23**) with the physical and chemical parameters. These correlations, although statistically significant, were typically weak, with very few R^2 values (these values indicate the proportion of the variability explained, a measure of the strength of the relationship) above 0.50. Bottom DO had the most (6 out of a possible 10) statistically significant correlations and generally the strongest correlations (maximum R^2 of 0.532). TOC and percent fine sand were significantly correlated (statistically) with 5 of the 10 benthic metrics. Among the chemicals, copper was significantly correlated (statistically) with 6 of the 10 benthic metrics, and tin and zinc were each significantly correlated (statistically) with 4, although the strength of the correlations were higher for tin than zinc. Percent ABM was only significantly correlated (statistically) with 1 of the 10 benthic metrics (density of dominant taxon) and this correlation was weak (R^2 of 0.233).

Based on the results of the individual correlations, multiple regression analysis was conducted for the six benthic metrics with the highest number of statistically significant correlations with the individual physical and chemical parameters. The physical and chemical parameters (copper, tin, total organic carbon, fine sand, and bottom DO) with the highest number of statistically significant correlations with the individual benthic invertebrate metrics were used in the analysis. Bottom DO was the best predictor of the benthic invertebrate metrics but predictive ability was generally poor. Only the Spionid polychaete model, with bottom DO and fine sand, was a reasonable predictor (adjusted R^2 value of 0.638), although fine sand was not statistically significant in the final model ($p = 0.066$). The metal COCs were not statistically significant components in any of the multiple regression models.

Spatial Analysis: For each of the 10 benthic metrics, parametric and non-parametric analyses of variance were conducted to identify differences among 2010 area (Channel, Cove, and Pier Area) means (see **Attachment D**, **Section D.5.2.2**). The spatial analysis was designed to test if the mean values for the benthic metrics differed among the three spatial areas that define the site (Channel, Cove, and Pier Area). Since there is an associated spatial gradient for the concentrations of the COCs (lowest in the Channel and highest in the Pier Area), this analysis was designed to see if there is a comparable trend associated with the benthic metrics, as well as to compare the values of the benthic metrics between the Channel (used as reference) and the Cove, and between the Channel (used as a reference) and Pier Area.

Five of the benthic metrics differed between the Channel and the Pier Area. Because risks in the Channel are considered acceptable, the Channel samples can be considered representative of reference conditions in this system (the Tier 1 partnering team agreed to the use of the Connector Channel as reference at the December 2010 partnering meeting). Values for three of the five metrics were consistently outside the range of values found in the Channel. Therefore, some impacts to the benthic community in portions of the Pier Area are evident. However, the portion of the Pier Area with the highest metals concentrations and ABM (northeast corner) was not consistently the most affected. Based on the correlation analysis, physical factors (particularly bottom DO) were most strongly correlated with the benthic metrics. Bottom DO was significantly higher (statistically) in the Channel than in the Cove or Pier Area. In the Cove, there were no statistically significant differences in the benthic

metrics with the Channel based on the non-parametric test, but three metrics differed for the parametric test. Of these, all Cove samples were within the range of values found in the Channel for two, and one-third of samples were in range for the third. Therefore, on balance, the benthic community in the Cove is not significantly affected and risks are generally acceptable (which is a similar conclusion reached for the comparison to screening values and background). Although the benthic community in the Pier Area differed from that in the Channel for some metrics, the lower DO concentrations, rather than elevated COC concentrations in sediment, is most likely the primary contributor to the difference in community characteristics. Based upon the regression analyses, bottom DO was the best (and often only) statistically significant predictor of the benthic invertebrate metrics. Site-related factors, such as the concentrations of the COCs and ABM, were not important predictors, although several of these parameters (particularly copper and tin) were significantly correlated (statistically) with some of the benthic invertebrate metrics (based upon individual comparisons). However, SEM/AVS ratios, which were all less than 1 in 2010, suggest that the metals have low bioavailability.

Risk Evaluation

The MILCON action generally removed the ABM from those portions of the Pier Area initially identified as having the highest concentrations of ABM. Based on the relative consistency in metal concentrations between 2002 (pre-action) and 2009 and 2010 (post-action) in the Cove and Channel, the MILCON action did not have any negative impacts (i.e., no evidence of sediment migration) to these areas. Based on the comparison to screening values and background, risks in the Channel are acceptable, and the benthic community inhabiting this portion of the site can generally be considered representative of the Desert Cove system, absent significant site influences. Based on the comparison to screening values and background, risks in the Cove are generally acceptable. A similar conclusion was reached for the Cove based on the 2010 benthic community data relative to the community found in the Channel.

The northeast corner of the Pier Area (sample locations LW07-M1, LW07-SD301, LW07-SD403, and LW07-SD404) consistently had the highest COC concentrations outside of the area affected by the MILCON action and also consistently had the highest concentrations of ABM. Of note, the 2004 interim removal action that occurred in the upland portion of SWMU 7a was adjacent to this area. This area was also near the boundary of the MILCON action. Of interest, the 2002 results from LW07-M1 were generally lower than in 2009 and 2010, and the 2002 concentrations in subsurface sediments at LW07-M1 were higher than in surface sediments. This suggests that the MILCON action may have encroached upon this area to some extent and exposed some of the more contaminated subsurface sediments (which then became surface sediments during the 2009 and 2010 sampling events). Five of the benthic metrics differed statistically between the Channel and the Pier Area. Values for three of the five metrics in the Pier Area were outside of the range of values found in the Channel. As a result, the benthic community in portions of the Pier Area may be impacted. However, the portion of the Pier Area with the highest metals concentrations and ABM (northeast corner) was not consistently the most affected for these benthic metrics.

Based on the correlation analysis, physical factors not related to the CERCLA activities (sandblasting), particularly bottom DO, were most strongly correlated with the benthic metrics. Bottom DO was significantly higher (statistically) in the Channel than in the Cove or Pier Area. Copper and tin were the site-related parameters most significantly correlated (statistically) with the benthic invertebrate metrics, although the strength of these correlations was weak. However, copper exceeded background in only one Pier Area sample and tin did not exceed screening values when adjusted to the tributyltin fraction, suggesting that they are not responsible for any impacts to the benthic community and that physical factors are as or more important. In addition, routine Navy operations in the Desert Cove system (which include activities such as boat traffic, where prop wash may disturb the bottom of the cove especially near the piers during mooring operations), which are focused in the Pier Area, may have direct physical impacts to the benthic community at the site, as may storm water inputs (which enter the system in the Pier Area).

Because ABM is inert (essentially is coarse sand) and the paint residue has little, if any, organic content, site-related parameters will not induce any sediment oxygen demand and will not contribute to depressed DO levels. The most common cause of lower DO concentrations at the bottom of a water body is high organic loading (of nitrogen and

phosphorous, typically from urban and agricultural runoff, wastewater systems, and atmospheric deposition) which induces a large biomass of phytoplankton/algae which, when it dies and drops to the bottom of the water column, is decomposed by bacteria which use of much of the available oxygen. This is typically most acute in July/August, when high water temperatures enhance decomposition while retaining the minimum amount of DO (since warmer water holds less DO at saturation than colder water).

6.0 SWMU 7b Conclusions

Concentrations of COCs in sediment do not exceed human health screening criteria, so no further investigation or action for the protection of human health from exposure to sediment is warranted at the site. Ecological risks in the Connector Channel and Cove Area are not unacceptable, so no further action is warranted for these areas for the protection of the environment. The available data suggest that some impacts to the benthic community are occurring in portions of the Pier Area. The northeast corner of the Pier Area (sample locations LW07-M1, LW07-SD301, LW07-SD403, and LW07-SD404) consistently had the highest COC concentrations outside of the area affected by the MILCON action and also consistently had the highest concentrations of ABM. The potentially affected area is relatively small (about one acre) relative to the size of the Desert Cove system and non-site-related physical factors (particularly bottom DO) were most strongly correlated with the values of the benthic metrics. The existing benthic community in this area was frequently within the range of values found in the Channel for many (7 of 10) of the metrics (including total density, density of pollution sensitive taxa, and number of taxa).

7.0 References

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Tables

Table 1
Sample Summary
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	Sample ID[1, 3]	Sample Collection Date	Sample Collection Time	Easting (X)	Northing (Y)	Water Depth (feet)	Water Elevation (feet NAVD88)	Sediment Surface Elevation (feet NAVD88)	*Analyses*					
									SWMU 7B Metals[2] (SW-846 6010B/SOP105 and SW-846 7471A/SOP104)	pH (SW-846 9045C/ SOP187)	TOC (Lloyd Kahn/ SOP 221)	AVS/SEM (EPA 821-R-91-100/AVS/SEM)	Grainsize (ASTM D422)	Benthic Invertebrates (SOP IZ-06)
2009 Sediment Sampling														
LW07-B5	***LW07-B5-SD301-00-09D***	11/24/2009	8:49	3502995.26	12162991.84	NA	NA	NA	X	X	X	X	X	
	LW07-B5-SD301P-00-09D	11/24/2009	8:54						X					
LW07-B7	***LW07-B7-SD301-00-09D***	11/24/2009	8:20	3502622.79	12162999.88	NA	NA	NA	X	X	X	X	X	
LW07-D5	***LW07-D5-SD301-00-09D***	11/24/2009	9:00	3502982.90	12163429.16	NA	NA	NA	X	X	X	X	X	
LW07-F3	***LW07-F3-SD301-00-09D***	11/24/2009	10:10	3503346.03	12163847.09	NA	NA	NA	X	X	X	X	X	
LW07-F5	***LW07-F5-SD301-00-09D***	11/24/2009	9:10	3502931.62	12163869.88	NA	NA	NA	X	X	X	X	X	
LW07-H1	***LW07-H1-SD301-00-09D***	11/24/2009	14:11	3503867.81	12164289.15	NA	NA	NA	X	X	X	X	X	
LW07-H3	***LW07-H3-SD301-00-09D***	11/24/2009	10:31	3503384.77	12164296.58	NA	NA	NA	X	X	X	X	X	
LW07-J4	***LW07-J4-SD301-00-09D***	11/24/2009	10:33	3503179.58	12164510.06	NA	NA	NA	X	X	X	X	X	
LW07-K1	***LW07-K1-SD301-00-09D***	11/24/2009	13:29	3503752.12	12164724.78	NA	NA	NA	X	X	X	X	X	
	LW07-K1-SD302-00-09D	11/24/2009	13:41	3503819.88	12164830.75	NA	NA	NA	X	X	X	X	X	
	LW07-K1-SD303-00-09D	11/24/2009	13:50	3503848.84	12164779.90	NA	NA	NA	X	X	X	X	X	
	LW07-K1-SD304-00-09D	11/24/2009	14:07	3503842.92	12164643.15	NA	NA	NA	X	X	X	X	X	
LW07-K3	***LW07-K3-SD301-00-09D***	11/24/2009	13:15	3503501.43	12164803.38	NA	NA	NA	X	X	X	X	X	
LW07-K4	***LW07-K4-SD301-00-09D***	11/23/2009	10:15	3503176.14	12164830.90	NA	NA	NA	X	X	X	X	X	
LW07-K5	***LW07-K5-SD301-00-09D***	11/23/2009	10:51	3502919.75	12164774.00	NA	NA	NA	X	X	X	X	X	
LW07-L2	***LW07-L2-SD301-00-09D***	11/24/2009	12:48	3503603.56	12164932.67	NA	NA	NA	X	X	X	X	X	
	LW07-L2-SD301P-00-09D	11/24/2009	12:50						X					
LW07-L5	***LW07-L5-SD301-00-09D***	11/23/2009	12:44	3502976.25	12164921.29	NA	NA	NA	X	X	X	X	X	
LW07-M1	***LW07-M1-SD301-00-09D***	11/24/2009	11:34	3503798.97	12165186.44	NA	NA	NA	X	X	X	X	X	
	LW07-M1-SD302-00-09D	11/24/2009	11:50	3503852.76	12165275.22	NA	NA	NA	X	X	X	X	X	
	LW07-M1-SD303-00-09D	11/24/2009	12:06	3503871.27	12165178.67	NA	NA	NA	X	X	X	X	X	
	LW07-M1-SD304-00-09D	11/24/2009	12:25	3503923.09	12165113.41	NA	NA	NA	X	X	X	X	X	
LW07-SD301	***LW07-SD301-00-09D***	11/23/2009	14:05	3503818.19	12165272.85	NA	NA	NA	X	X	X	X	X	
	LW07-SD301P-00-09D	11/23/2009	14:10						X					
LW07-SD302	***LW07-SD302-00-09D***	11/23/2009	14:32	3503315.93	12165219.42	NA	NA	NA	X	X	X	X	X	
LW07-SD303	***LW07-SD303-00-09D***	11/23/2009	15:00	3503155.82	12165190.27	NA	NA	NA	X	X	X	X	X	
LW07-SD304	***LW07-SD304-00-09D***	11/23/2009	12:06	3502921.73	12165004.93	NA	NA	NA	X	X	X	X	X	
LW07-SD305	***LW07-SD305-00-09D***	11/23/2009	11:40	3502666.78	12164903.64	NA	NA	NA	X	X	X	X	X	
LW07-SD306	***LW07-SD306-00-09D***	11/23/2009	11:16	3502776.15	12164675.74	NA	NA	NA	X	X	X	X	X	
LW07-SD307	***LW07-SD307-00-09D***	11/23/2009	15:30	3502848.42	12164280.99	NA	NA	NA	X	X	X	X	X	
2010 Sediment Sampling														
LW07-B5	***LW07-B5-SD401-00-10C***	9/12/2010	7:50	12162988.37	3502994.54	14.8	-1.1	-13.7	X	X	X	X	X	X
	LW07-B5-SD401P-00-10C	9/12/2010	7:55						X					
	LW07-B5-SD401-01-10C	--	--	12162989.07	3503025.62	14.8	-1.1	-13.7						
	LW07-B5-SD401-02-10C	--	--	12163018.17	3502966.30	15.4	-1.1	-14.3						
	LW07-B5-SD401-03-10C	--	--	12162960.49	3502965.35	14.2	-1.1	-13.0						
LW07-B7	***LW07-B7-SD401-00-10C***	9/12/2010	8:30	12162997.88	3502621.22	13.7	-0.6	-13.1	X	X	X	X	X	X
	LW07-B7-SD401-01-10C	--	--	12162971.49	3502650.18	14.5	-0.6	-13.9						
	LW07-B7-SD401-02-10C	--	--	12163027.10	3502650.53	14.3	-0.6	-13.8						
	LW07-B7-SD401-03-10C	--	--	12162998.35	3502600.13	12.0	-0.6	-11.4						
LW07-D5	***LW07-D5-SD401-00-10C***	9/11/2010	16:05	12163429.99	3502981.11	13.2	-0.7	-12.5	X	X	X	X	X	X
	LW07-D5-SD401-01-10C	--	--	12163401.30	3502953.44	13.1	-0.7	-12.4						
	LW07-D5-SD401-02-10C	--	--	12163457.19	3502953.14	12.8	-0.7	-12.1						
	LW07-D5-SD401-03-10C	--	--	12163429.11	3503012.08	14.7	-0.7	-14.0						
LW07-F3	***LW07-F3-SD401-00-10C***	9/11/2010	14:35	12163844.56	3503349.45	13.3	0.2	-13.5	X	X	X	X	X	X
	LW07-F3-SD401-01-10C	--	--	12163844.35	3503377.75	12.8	0.2	-13.0						
	LW07-F3-SD401-02-10C	--	--	12163871.67	3503318.32	13.3	0.2	-13.5						
	LW07-F3-SD401-03-10C	--	--	12163817.76	3503319.72	13.2	0.2	-13.4						
LW07-F5	***LW07-F5-SD401-00-10C***	9/11/2010	15:15	12163870.60	3502934.21	10.9	-0.5	-10.4	X	X	X	X	X	X
	LW07-F5-SD401-01-10C	--	--	12163841.68	3502963.32	12.9	-0.5	-12.4						
	LW07-F5-SD401-02-10C	--	--	12163899.06	3502964.01	12.6	-0.5	-12.0						
	LW07-F5-SD401-03-10C	--	--	12163870.56	3502905.70	7.3	-0.5	-6.7						
LW07-H1	***LW07-H1-SD401-00-01-10C***	9/10/2010	8:05	12164307.16	3503874.43	13.6	0.6	-14.2	X	X	X	X	X	
	LW07-H1-SD401-01-10C	9/10/2010	8:05	12164279.87	3503844.99	14.5	0.6	-15.1						X
	LW07-H1-SD401-02-10C	9/10/2010	8:05	12164338.34	3503844.85	13.3	0.6	-13.9						X
	LW07-H1-SD401-03-10C	9/10/2010	8:05	12164308.37	3503904.34	13.4	0.6	-14.0						X

Table 1
Sample Summary
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	Sample ID[1, 3]	Sample Collection Date	Sample Collection Time	Easting (X)	Northing (Y)	Water Depth (feet)	Water Elevation (feet NAVD88)	Sediment Surface Elevation (feet NAVD88)	*Analyses*					
									SWMU 7B Metals[2] (SW-846 6010B/SOP105 and SW-846 7471A/SOP104)	pH (SW-846 9045C/ SOP187)	TOC (Lloyd Kahn/ SOP 221)	AVS/SEM (EPA 821-R-91-100/AVS/SEM)	Grainsize (ASTM D422)	Benthic Invertebrates (SOP IZ-06)
LW07-H3	***LW07-H3-SD401-00-10C***	9/11/2010	13:55	12164296.19	3503384.37	15.3	1.2	-16.5	X	X	X	X	X	X
	LW07-H3-SD401-01-10C	--	--	12164297.06	3503355.56	15.3	1.2	-16.5						
	LW07-H3-SD401-02-10C	--	--	12164266.63	3503414.06	13.7	1.2	-14.9						
	LW07-H3-SD401-03-10C	--	--	12164325.53	3503414.28	14.7	1.2	-15.9						
LW07-J4	***LW07-J4-SD401-00-10C***	9/11/2010	13:20	12164510.49	3503179.72	16.2	1.3	-17.5	X	X	X	X	X	X
	LW07-J4-SD401-01-10C	--	--	12164508.95	3503208.35	16.3	1.3	-17.6						
	LW07-J4-SD401-02-10C	--	--	12164480.53	3503149.56	16.5	1.3	-17.8						
	LW07-J4-SD401-03-10C	--	--	12164538.79	3503149.02	16.2	1.3	-17.5						
LW07-K1	***LW07-K1-SD401-00-10C***	9/10/2010	8:55	12164760.50	3503838.22	14.3	1.3	-15.6	X	X	X	X	X	X
	LW07-K1-SD401-01-10C	--	--	12164760.36	3503809.65	14.3	1.3	-15.6						
	LW07-K1-SD401-02-10C	--	--	12164787.54	3503868.48	14.1	1.3	-15.4						
	LW07-K1-SD401-03-10C	--	--	12164731.00	3503867.39	14.3	1.3	-15.6						
LW07-K3	LW07-K3-SD401-00-10C	9/11/2010	9:15	12164803.74	3503502.07	14.5	1.2	-15.7	X	X	X	X	X	X
	LW07-K3-SD401-01-10C	--	--	12164804.15	3503530.27	14.2	1.2	-15.4						
	LW07-K3-SD401-02-10C	--	--	12164776.36	3503473.06	15.4	1.2	-16.6						
	LW07-K3-SD401-03-10C	--	--	12164830.80	3503473.36	15.7	1.2	-16.9						
LW07-K4	***LW07-K4-SD401-00-10C***	9/11/2010	10:25	12164831.75	3503174.86	16.0	1.9	-17.9	X	X	X	X	X	X
	LW07-K4-SD401-01-10C	--	--	12164802.76	3503145.88	16.3	1.9	-18.2						
	LW07-K4-SD401-02-10C	--	--	12164830.79	3503205.29	16.3	1.9	-18.2						
	LW07-K4-SD401-03-10C	--	--	12164858.33	3503147.67	16.8	1.9	-18.6						
LW07-K5	***LW07-K5-SD401-00-10C***	9/11/2010	12:20	12164793.28	3503000.21	16.3	2.2	-18.5	X	X	X	X	X	X
	LW07-K5-SD401-01-10C	--	--	12164792.12	3503028.16	16.4	2.2	-18.6						
	LW07-K5-SD401-02-10C	--	--	12164819.51	3502969.18	16.3	2.2	-18.5						
	LW07-K5-SD401-03-10C	--	--	12164762.46	3502969.31	16.0	2.2	-18.2						
LW07-L2	***LW07-L2-SD401-00-10C***	9/11/2010	8:35	12164932.80	3503603.58	14.8	1.0	-15.7	X	X	X	X	X	
	LW07-L2-SD401-01-10C	9/11/2010	8:35	12164931.83	3503574.49	14.8	1.0	-15.7						X
	LW07-L2-SD401-02-10C	9/11/2010	8:35	12164961.67	3503632.38	14.8	1.0	-15.7						X
	LW07-L2-SD401-03-10C	9/11/2010	8:35	12164904.52	3503632.05	14.6	1.0	-15.5						X
LW07-L5	***LW07-L5-SD401-00-10C***	9/11/2010	11:25	12164903.97	3503005.30	16.5	2.2	-18.7	X	X	X	X	X	X
	LW07-L5-SD401-01-10C	--	--	12164875.49	3503035.77	16.7	2.2	-18.9						
	LW07-L5-SD401-02-10C	--	--	12164931.92	3503034.36	16.3	2.2	-18.5						
	LW07-L5-SD401-03-10C	--	--	12164903.70	3502976.67	16.7	2.2	-18.9						
LW07-M1	***LW07-M1-SD401-00-10C***	9/10/2010	9:50	12165210.33	3503808.60	14.4	1.5	-15.9	X	X	X	X	X	X
	LW07-M1-SD401-01-10C	--	--	12165211.51	3503839.61	14.5	1.5	-16.0						
	LW07-M1-SD401-02-10C	--	--	12165182.17	3503779.78	16.8	1.5	-18.2						
	LW07-M1-SD401-03-10C	--	--	12165240.07	3503780.79	14.7	1.5	-16.1						
LW07-SD401	***LW07-SD401-00-10C***	9/11/2010	13:00	12164494.30	3502967.84	16.6	2.0	-18.6	X	X	X	X	X	X
	LW07-SD401-01-10C	--	--	12164465.53	3502996.99	16.1	2.0	-18.1						
	LW07-SD401-02-10C	--	--	12164521.62	3502996.11	16.2	2.0	-18.2						
	LW07-SD401-03-10C	--	--	12164492.93	3502939.44	15.8	2.0	-17.9						
LW07-SD402	***LW07-SD402-00-10C***	9/11/2010	9:50	12164985.44	3503394.84	14.9	1.5	-16.5	X	X	X	X	X	X
	LW07-SD402P-00-10C	9/11/2010	9:55						X					
	LW07-SD402-01-10C	--	--	12164986.19	3503364.79	16.1	1.5	-17.6						
	LW07-SD402-02-10C	--	--	12164958.67	3503423.46	16.1	1.5	-17.6						
	LW07-SD402-03-10C	--	--	12165013.52	3503424.95	14.8	1.5	-16.4						
LW07-SD403	***LW07-SD403-00-10C***	9/11/2010	7:50	12165134.82	3503673.31	13.3	0.5	-13.8	X	X	X	X	X	
	LW07-SD403-01-10C	9/11/2010	7:50	12165135.22	3503645.01	13.4	0.5	-13.9						X
	LW07-SD403-02-10C	9/11/2010	7:50	12165165.39	3503702.99	14.1	0.5	-14.5						X
	LW07-SD403-03-10C	9/11/2010	7:50	12165107.40	3503701.43	14.1	0.5	-14.5						X
LW07-SD404	***LW07-SD404-00-10C***	9/10/2010	10:30	12165053.80	3503787.02	16.4	1.6	-18.0	X	X	X	X	X	X
	LW07-SD404-00-10C-MS	9/10/2010	10:30						X	X	X	X		
	LW07-SD404-00-10C-SD	9/10/2010	10:30						X	X	X	X		
	LW07-SD404-01-10C	--	--	12165082.05	3503759.29	16.4	1.6	-18.0						
	LW07-SD404-02-10C	--	--	12165026.61	3503758.28	16.1	1.6	-17.6						
	LW07-SD404-03-10C	--	--	12165054.01	3503816.75	15.8	1.6	-17.4						

Notes:
1. ***Bold, italic*** font indicates sample IDs for physical and/or chemical analyses. Sample IDs shown in plain font identify locations where grabs were collected for composition.
2. SWMU 7b metals include copper, lead, mercury, tin, and zinc.
3. Water quality parameters were collected from the mid-point of each grid cell. The sample ID used for the composite samples is associated with the center of the each sampling grid.

Table 2
2009 Surface Water Quality Field Parameters
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-B5-SD301			LW07-B7-SD301			LW07-D5-SD301			LW07-F3-SD301			LW07-F5-SD301			LW07-H1-SD301			LW07-H3-SD301		
Sample Depth	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**
Sample Date	**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**		
Field Parameters																					
ABM (%)	<1	--	--	<1	--	--	<1	--	--	1	--	--	<1	--	--		--	--	1	--	--
Dissolved Oxygen (mg/L)	9.46	8.73	8.06	8.87	8.71	8.28	9.33	8.67	8.14	9.28	9.14	9.14	9.23	8.43	8.07	9.29	8.89	7.57	9.55	8.82	7.84
Oxidation Reduction Potential (mV)	155	156	139	16.2	16.2	16.2	147	147	49	140	140	146	126	126	125	77	82	174	140	140	25
pH (pH)	7.4	7.7	7.8	6.3	6.9	7.3	7.90	7.90	7.9	7.9	7.9	7.9	8.2	7.9	7.9	7.9	7.90	7.9	7.9	7.9	7.9
Salinity (%)	1.2	2	2.3	1.8	2	2.1	1.7	2.1	2.2	1.6	1.6	1.6	1.7	2	2.1	1.8	2.1	2	4.3	2	2.3
Specific Conductance (ms/cm)	26.3	32	36.4	29.2	30.4	32	27.5	31.9	35.6	25.8	25.8	25.8	27.5	32.3	33.7	29.4	31.4	34.7	26.2	32.4	35.4
Temperature (ºC)	13.5	13.8	14.1	13.5	13.8	14.1	13.30	13.90	14.1	13.3	13.3	13.3	13.4	13.9	14	13.7	14.1	14.6	13.4	13.8	14.3
Turbidity (NTU)	0	0	257	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135

Station ID	LW07-J4-SD301			LW07-K1-SD301			LW07-K1-SD302			LW07-K1-SD303			LW07-K1-SD304			LW07-K3-SD301			LW07-K4-SD301		
Sample Depth	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**
Sample Date	**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/23/2009**		
Field Parameters																					
ABM (%)	1	-	--	1	--	--	<1	--	--	<1	--	--	1	--	--	5	--	--	5	--	--
Dissolved Oxygen (mg/L)	9.45	8.73	8.03	9.23	8.60	7.89	9.53	9.03	8.49	9.38	8.88	8.49	9.36	8.83	7.73	9.59	13.8	14.4	9.28	8.77	7.51
Oxidation Reduction Potential (mV)	117	118	82	139	140	130	132	135	135	141	141	142	141	144	216	149	149	129	140	13.7	12.8
pH (pH)	7.90	8	7.9	7.9	7.90	7.9	8.2	8	7.9	8	7.9	7.9	7.9	7.9	7.9	8	8	7.9	5	7	7.3
Salinity (%)	1.6	2.1	2.2	1.9	2.1	2.1	1.6	2	2.1	1.4	2	2.1	1.8	2.1	2.1	1.7	2	2.1	2.1	2.2	2.3
Specific Conductance (ms/cm)	26.2	33.4	35.6	39.7	33.6	34.8	27.8	31.6	32.1	30.0	31.7	32.8	29.8	31.4	34.5	26	32.1	32.6	34	34.9	37.3
Temperature (ºC)	13.3	13.9	14.2	13.70	14.2	14.3	13.60	13.8	14.1	13.80	13.8	14.4	13.7	14.10	14.5	13.50	13.8	14.4	13.7	13.8	14.5
Turbidity (NTU)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.5	140

Station ID	LW07-K5-SD301			LW07-L2-SD301			LW07-L5-SD301			LW07-M1-SD301			LW07-M1-SD302			LW07-M1-SD303			LW07-M1-SD304		
Sample Depth	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**
Sample Date	**11/23/2009**			**11/24/2009**			**11/23/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**			**11/24/2009**		
Field Parameters																					
ABM (%)	1	--	--	5	--	--	1	--	--	5	--	--	5	--	--	5	--	--	7	--	--
Dissolved Oxygen (mg/L)	9.02	8.8	7.3	9.5	9.50	8.45	9.49	9.21	7.34	9.42	8.42	7.18	9.41	8.81	8.44	4.19	8.82	8.57	9.38	8.81	8.35
Oxidation Reduction Potential (mV)	222	216	133	141	142	143	131	131	-109	139	139	108	150	129	127	133	133	133	139	139	137
pH (pH)	7.7	7.6	7.4	8.1	7.9	7.9	7.8	7.6	7.3	8.2	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Salinity (%)	2.1	2.1	2.3	1.6	2	2.2	2.1	2.2	2.3	1.5	1.9	2.1	1.5	1.9	1.9	1.6	2	2	1.7	2	2.7
Specific Conductance (ms/cm)	34	34.5	36.8	27.1	31.7	32.7	34.4	35.6	36.6	24.9	30.5	35.2	24.6	30.9	37.4	26.6	29.4	31.84	26.8	31.6	26.7
Temperature (ºC)	13.7	13.7	14.5	13.50	13.8	14.4	13.8	13.9	14.8	13.4	13.8	14.2	13.8	13.8	13.8	13.5	13.8	13.9	13.5	13.8	14.3
Turbidity (NTU)	1.3	0	181	0	0	0	4.5	2.2	0	0	0	370	0	0	0	0	0	0	0	0	0

Station ID	LW07-SD301			LW07-SD302			LW07-SD303			LW07-SD304			LW07-SD305			LW07-SD306			LW07-SD307		
Sample Depth	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**	**Top**	**Middle**	**Bottom**
Sample Date	**11/23/2009**			**11/23/2009**			**11/23/2009**			**11/23/2009**			**11/23/2009**			**11/23/2009**			**11/23/2009**		
Field Parameters																					
ABM (%)	10	--	--	3	--	--	5	--	--	5	--	--	3	--	--	8	--	--	5	--	--
Dissolved Oxygen (mg/L)	9.18	9	8.46	8.82	8.42	8.07	9.28	8.68	7.42	9.4	9.26	8.81	9.31	8.99	8.31	9.44	8.75	8.26	9.42	8.97	7.89
Oxidation Reduction Potential (mV)	132	132	137	191	187	141	159	158	120	124	124	125	144	145	22	159	159	113	148	150	140
pH (pH)	7.5	7.6	7.6	7.4	7.5	7.6	7.3	7.5	7.5	7.6	7.6	7.6	7.8	7.6	7.5	7.4	7.6	7.5	7.7	7.6	7.6
Salinity (%)	2.2	2.2	2.3	2.2	2.3	2.3	2.1	2.2	2.3	2.1	2.1	2.3	2	2.2	2.2	2	2.1	2.3	3	2.2	2.3
Specific Conductance (ms/cm)	35.6	35.7	37.2	35.1	36	36.5	34.7	35.3	36.9	34	34	36.3	32.4	34.2	35.9	32.3	34.3	36.3	32.5	33.1	36.5
Temperature (ºC)	13.9	14	14.7	13.9	14.1	14.4	13.8	14	14.6	13.7	13.7	14.3	13.7	13.7	14.2	13.5	13.6	14.2	13.7	13.9	14.5
Turbidity (NTU)	3.2	2.3	6.3	0.8	0.7	0	4	2.9	87.3	47.6	42.4	25	2.2	0.6	0	1.6	0	8.8	4.2	2.4	4

Notes:
°C - Degrees Celsius
mg/L - milligram per liter
mm - millimeter
ms/cm - Milliseimens per centimeter
mV - millivolts
NTU - Nephelometric turbidity units
ph - pH units
ppt - parts per trillion

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-B5			
Sample ID			**Ecological Screening Values**					LW07-B5-SD201-00-02C	LW07-B5-SD202-00-02C	LW07-B5-SD301-00-09D*	LW07-B5-SD401-00-10C*
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Channel	Channel	Channel	Channel
Sample Date								09/27/02	09/27/02	11/24/09	9/12/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name											
Total Metals (mg/kg)											
Copper	184	3,100	19	--	34	108	270	48.9	53.5	70.1 J	43.7
Lead	67.6	400	30.2	--	46.7	112	218	27.9	28.4	27.3 J	21.5
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.13 J	0.15	0.122	0.159
Tin[1]	9.8	47,000	--	--	--	--	--	1.4 U	2.1 J	5.06 B	3.72
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000238 U	0.000357 J	0.000860 B	0.000632
Zinc	421	23,000	124	--	150	271	410	149	174	160	173
AVS/SEM (µmol/g)											
Acid Volatile Sulfide	--	--	--	--	--	--	--			0.000051 U	157
Cadmium	--	--	--	--	--	--	--	0.0014 J	NA	0.0041	0.00413 J
Copper	--	--	--	--	--	--	--	0.35 J	NA	0.36	0.513
Lead	--	--	--	--	--	--	--	0.073 J	NA	0.075	0.0905
Mercury	--	--	--	--	--	--	--	3.40E-05 B	NA	NS	
Nickel	--	--	--	--	--	--	--	0.036 J	NA	0.026	0.0399 J
Silver	--	--	--	--	--	--	--			0.0047 U	
Zinc	--	--	--	--	--	--	--	1.4 J	NA	1.8	2.16
Other Parameters											
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	4.3	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	16,830	24,160	14,100 N	17,200
pH	--	--	--	--	--	--	--	7.94	7.85	7.77	7.99

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
B - Analyte not detected above the level reported in blanks
J - Analyte present. Value may or may not be accurate or precise
L - Analyte present. Value may be biased low. Value may be highe
N - Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling effor
U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-B7				LW07-D5			
Sample ID			**Ecological Screening Values**					LW07-B7-SD201-00-02C	LW07-B7-SD202-00-02C	LW07-B7-SD301-00-09D	LW07-B7-SD401-00-10C	LW07-D5-SD201-00-02C	LW07-D5-SD202-00-02C	LW07-D5-SD301-00-09D	LW07-D5-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel
Sample Date								09/27/02	09/27/02	11/24/09	9/12/10	09/27/02	09/27/02	11/24/09	9/11/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name															
Total Metals (mg/kg)															
Copper	184	3,100	19	--	34	108	270	9.2	68.7	70.2	45.8	72.5	70.3	70.7	82.4
Lead	67.6	400	30.2	--	46.7	112	218	5.7	37.8	34.2 J	24.8	38.1	38.5	36.6 J	40.7
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.04 U	0.16	0.103	0.125	**0.25**	**0.23**	**0.236**	**0.267**
Tin[1]	9.8	47,000	--	--	--	--	--	1 J	1.6 J	4.88 B	3.61	3 J	2.5 J	6.27 B	5.64
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000170 J	0.000272 J	0.000830 B	0.000614	0.000510 J	0.000425 J	0.001066 B	0.000959
Zinc	421	23,000	124	--	150	271	410	34.8	223	206	190	223	222	241	283
AVS/SEM (µmol/g)															
Acid Volatile Sulfide	--	--	--	--	--	--	--			3.2	386			4.1	130
Cadmium	--	--	--	--	--	--	--	3.60E-04 J	NA	0.0048	0.0035 J	0.0023 J	NA	0.0061	0.00186 J
Copper	--	--	--	--	--	--	--	0.093 J	NA	0.5	0.435	0.51 J	NA	0.7	0.223
Lead	--	--	--	--	--	--	--	0.033 J	NA	0.11	0.0847	0.092 J	NA	0.14	0.0779
Mercury	--	--	--	--	--	--	--	1.50E-05 B	NA	0.000042 U		8.50E-05 J	NA	0.000064 U	
Nickel	--	--	--	--	--	--	--	0.01 B	NA	0.031	0.0414 J	0.056 J	NA	0.044	0.0205 J
Silver	--	--	--	--	--	--	--			0.0039 U				0.006 U	
Zinc	--	--	--	--	--	--	--	0.59 J	NA	2.3	1.91	2 J	NA	3	1.59
Other Parameters															
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	3,125	18,670	20,300 N	13,600	29,330	30,490	28,000 N	15,500
pH	--	--	--	--	--	--	--	8.18	7.86	8.22	8.19	7.78	7.69	7.45	7.73

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
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[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
B - Analyte not detected above the level reported in blanks
J - Analyte present. Value may or may not be accurate or precise
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U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-F3				LW07-F5			
Sample ID			**Ecological Screening Values**					LW07-F3-SD201-00-02C	LW07-F3-SD202-00-02C	LW07-F3-SD301-00-09D	LW07-F3-SD401-00-10C	LW07-F5-SD201-00-02C	LW07-F5-SD202-00-02C	LW07-F5-SD301-00-09D	LW07-F5-SD401-00-10C-01
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel
Sample Date								09/27/02	09/27/02	11/24/09	9/11/10	09/27/02	09/27/02	11/24/09	9/12/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name															
Total Metals (mg/kg)															
Copper	184	3,100	19	--	34	108	270	42.7	55.9	71.1	59	37.6	47.7	19.8	24.7
Lead	67.6	400	30.2	--	46.7	112	218	30.1	38.1	50.4 J	45.6	36.2	32.9	18.6 J	14.9
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.12 J	0.19	**0.229**	**0.347**	0.12	0.14	0.0581	0.0463
Tin[1]	9.8	47,000	--	--	--	--	--	1.6 J	1.7 J	5.72 B	3.69	1.8 J	2.3 J	4 B	2.5
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000272 J	0.000289 J	0.000972 B	0.000627	0.000306 J	0.000391 J	0.000680 B	0.000425
Zinc	421	23,000	124	--	150	271	410	146	212	277	246	142	162	85.4	92.7
AVS/SEM (µmol/g)															
Acid Volatile Sulfide	--	--	--	--	--	--	--			7.9	573			0.74	545
Cadmium	--	--	--	--	--	--	--	0.0015 J	NA	0.0031	0.00474 J	0.0012 J	NA	0.0011 J	0.00342 J
Copper	--	--	--	--	--	--	--	0.34 J	NA	0.26	0.516	0.26 J	NA	0.031	0.191
Lead	--	--	--	--	--	--	--	0.084 J	NA	0.069	0.153	0.06 J	NA	0.012	0.181
Mercury	--	--	--	--	--	--	--	6.00E-05 J	NA	0.000041 U		1.20E-04 J	NA	0.000034 U	
Nickel	--	--	--	--	--	--	--	0.029 J	NA	0.012	0.0356 J	0.027 J	NA	0.0096	0.021 J
Silver	--	--	--	--	--	--	--			0.0038 U				0.0032 U	
Zinc	--	--	--	--	--	--	--	1.9 J	NA	1.3	2.99	1.2 J	NA	0.24	1.5
Other Parameters															
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	12,900	22,230	13,300 N	12,400	24,170	8,024	13,300 N	7,250
pH	--	--	--	--	--	--	--	8.05	8.06	7.83	8.36	8.14	7.96	8.07	7.05

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

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Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-H3				LW07-J4			
Sample ID			**Ecological Screening Values**					LW07-H3-SD201-00-02C	LW07-H3-SD202-00-02C	LW07-H3-SD301-00-09D	LW07-H3-SD401-00-10C	LW07-J4-SD201-00-02C	LW07-J4-SD202-00-02C	LW07-J4-SD301-00-09D	LW07-J4-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Cove	Cove	Cove	Cove	Cove	Cove	Cove	Cove
Sample Date								09/27/02	09/27/02	11/24/09	9/11/10	09/28/02	09/28/02	11/24/09	9/11/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name															
Total Metals (mg/kg)															
Copper	184	3,100	19	--	34	108	270	90	83.5	87.8	84.8	65.7	55	101	86.3
Lead	67.6	400	30.2	--	46.7	112	218	56.9	50.8	57.9 J	52.6	50.7	46.9	53.4 J	**131**
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.27**	**0.76**	**0.261**	**0.28**	**0.66**	**0.24**	**0.315**	**0.271**
Tin[1]	9.8	47,000	--	--	--	--	--	2.5 J	2.1 J	6.38 B	5.53	4.8 J	6.6 J	7.5 B	5.43
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000425 J	0.000357 J	0.001085 B	0.000940	0.000816 J	0.001122 J	0.001275 B	0.000923
Zinc	421	23,000	124	--	150	271	410	328	310	343	366	308	299	366	**479**
AVS/SEM (µmol/g)															
Acid Volatile Sulfide	--	--	--	--	--	--	--			7.4 N	720			13.5	706
Cadmium	--	--	--	--	--	--	--	0.0031 J	NA	0.0075	0.0103	0.0023 J	NA	0.0026	0.00699 J
Copper	--	--	--	--	--	--	--	0.68 J	NA	0.62	0.755	0.34 J	NA	0.29	0.678
Lead	--	--	--	--	--	--	--	0.14 J	NA	0.78	0.217	0.09 J	NA	0.073	0.148
Mercury	--	--	--	--	--	--	--	1.00E-04 J	NA	0.00011 UN		6.00E-05 J	NA	0.000054 U	
Nickel	--	--	--	--	--	--	--	0.061 J	NA	0.13	0.0613 J	0.051 J	NA	0.018	0.0475 J
Silver	--	--	--	--	--	--	--			0.011 U				0.005 U	
Zinc	--	--	--	--	--	--	--	3 J	NA	12	4.33	2 J	NA	1.4	3.75
Other Parameters															
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	3.4	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	22,280	23,260	10,800 N	18,100	14,950	15,900	20,600	15,500
pH	--	--	--	--	--	--	--	8.08	8.13	7.82	8.33	8	7.86	8.22	8.06

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

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TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

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Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-K3				LW07-K4			
Sample ID			**Ecological Screening Values**					LW07-K3-SD201-00-02C	LW07-K3-SD202-00-02C	LW07-K3-SD301-00-09D	LW07-K3-SD401-00-10C	LW07-K4-SD201-00-02C	LW07-K4-SD202-00-02C	LW07-K4-SD301-00-09D	LW07-K4-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Cove	Cove	Cove	Cove	Cove	Cove	Cove	Cove
Sample Date								09/28/02	09/28/02	11/24/09	9/11/10	09/28/02	09/28/02	11/23/09	9/11/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name															
Total Metals (mg/kg)															
Copper	184	3,100	19	--	34	108	270	65	63.2	70.4	96.1	70.1	58.6	65.2	75.4
Lead	67.6	400	30.2	--	46.7	112	218	**255**	40.1	**76.4 J**	**88.6**	**152**	49.5	42.1	52.6
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.15	**0.25**	**0.244**	**0.426**	0.19 J	0.19	**0.236**	0.191
Tin[1]	9.8	47,000	--	--	--	--	--	5.8 J	5.2 J	**10.1**	**10.7**	9.4 J	5 J	5.78 B	8.39
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000986 J	0.000884 J	0.001717	0.001819	0.001598 J	0.000850 J	0.000983 B	0.001426
Zinc	421	23,000	124	--	150	271	410	402	283	321	**615**	303	299	304	**974**
AVS/SEM (µmol/g)															
Acid Volatile Sulfide	--	--	--	--	--	--	--			1.4 N	255			3.6	260
Cadmium	--	--	--	--	--	--	--	0.002 J	NA	0.0073	0.0074	0.0023 J	NA	0.0021	0.00699
Copper	--	--	--	--	--	--	--	0.51 J	NA	0.49	0.993	0.39 J	NA	0.15	1.13
Lead	--	--	--	--	--	--	--	0.14 J	NA	0.18	0.354	0.24 J	NA	0.12	0.382
Mercury	--	--	--	--	--	--	--	3.80E-05 B	NA	0.000089 UN		6.00E-05 J	NA	0.000021 UN	
Nickel	--	--	--	--	--	--	--	0.072 J	NA	0.053	0.174	0.048 J	NA	0.012	0.0605 J
Silver	--	--	--	--	--	--	--			0.0083 U				0.002 U	
Zinc	--	--	--	--	--	--	--	2.8 J	NA	5.6	7.73	2.7 J	NA	1.4	5.35
Other Parameters															
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	10,780	10,800	11,300	20,500	13,870	13,940	20,600 N	17,300
pH	--	--	--	--	--	--	--	7.89	7.8	7.26	7.87	7.8	7.79	8.15	8.04

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
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mg/kg- Milligrams per kilogram
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Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-K5				LW07-L2		
Sample ID			**Ecological Screening Values**					LW07-K5-SD201-00-02C	LW07-K5-SD202-00-02C	LW07-K5-SD301-00-09D	LW07-K5-SD401-00-10C	LW07-L2-SD201-00-02C	LW07-L2-SD301-00-09D*	LW07-L2-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Cove	Cove	Cove	Cove	Cove	Cove	Cove
Sample Date								09/28/02	09/28/02	11/23/09	9/11/10	10/01/02	11/24/09	9/11/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4	0 - 6
Chemical Name														
Total Metals (mg/kg)														
Copper	184	3,100	19	--	34	108	270	90	103	91.3	93.9	117	101.0	78.7
Lead	67.6	400	30.2	--	46.7	112	218	51.1	59.3	48.5	**109**	**83.9**	58.4 L	37.4
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.29**	**0.33**	**0.381**	**0.271**	**0.43**	**0.214**	**0.234**
Tin[1]	9.8	47,000	--	--	--	--	--	6.6 J	8.8 J	7.21 B	5.59	7.1 J	**14.8**	**13.6**
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.001122 J	0.001496 J	0.001226 B	0.000950	0.001207 J	0.002516	0.002312
Zinc	421	23,000	124	--	150	271	410	336	305	381	401	**491**	**466**	294
AVS/SEM (µmol/g)														
Acid Volatile Sulfide	--	--	--	--	--	--	--			2.4 J	887		0.72 UN	615
Cadmium	--	--	--	--	--	--	--	0.0028 J	NA	0.0032	0.00687 J	0.0039 J	0.0039 J	0.00502
Copper	--	--	--	--	--	--	--	0.56 J	NA	0.18	0.841	0.67 J	0.45	0.79
Lead	--	--	--	--	--	--	--	0.16 J	NA	0.073	0.184	0.15 J	0.13	0.25
Mercury	--	--	--	--	--	--	--	4.10E-05 B	NA	0.000026 UN		6.00E-04 J	0.00009 UN	
Nickel	--	--	--	--	--	--	--	0.063 J	NA	0.016	0.0482 J	0.083 J	0.074	0.123
Silver	--	--	--	--	--	--	--			0.0024 U			0.0084 U	
Zinc	--	--	--	--	--	--	--	3 J	NA	1.9	4.37	3.2 J	2.7	5.19
Other Parameters														
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	22,360	18,450	30,900 N	20,800	22,230	12,100	13,400
pH	--	--	--	--	--	--	--	7.92	7.82	8.22	8.01	7.8	7.63	8.12

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

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µg/kg - Micrograms per kilogram

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Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-H1				LW07-H5	
Sample ID			**Ecological Screening Values**					LW07-H1-SD201-00-02C	LW07-H1-SD202-00-02C	LW07-H1-SD301-00-09D	LW07-H1-SD401-00-10C	LW07-H5-SD201-00-02C	LW07-H5-SD202-00-02C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier	Pier
Sample Date								09/27/02	09/27/02	11/24/09	9/10/10	09/26/02	09/26/02
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4	0 - 4
Chemical Name													
Total Metals (mg/kg)													
Copper	184	3,100	19	--	34	108	270	110	134	51.7	166	35.2	21.6
Lead	67.6	400	30.2	--	46.7	112	218	**69.1**	**70.1**	**70.3 J**	62	56.4	63.1
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.46**	**0.46**	0.129	**0.324**	0.05 J	0.14
Tin[1]	9.8	47,000	--	--	--	--	--	6.2 J	6.7 J	8.67 B	7.04	1.6 J	1.5 U
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.001054 J	0.001139 J	0.001474 B	0.001197	0.000272 J	0.000255 U
Zinc	421	23,000	124	--	150	271	410	397	**445**	**943**	**491**	157	97
AVS/SEM (µmol/g)													
Acid Volatile Sulfide	--	--	--	--	--	--	--			20.7 N	1,350		
Cadmium	--	--	--	--	--	--	--	0.003 J	NA	0.0061	0.00799 J	5.50E-04 J	NA
Copper	--	--	--	--	--	--	--	0.53 J	NA	0.62	1.18	0.24 J	NA
Lead	--	--	--	--	--	--	--	0.13 J	NA	0.13	0.287	0.25 J	NA
Mercury	--	--	--	--	--	--	--	2.10E-05 B	NA	0.000096 UN		1.00E-04 J	NA
Nickel	--	--	--	--	--	--	--	0.068 J	NA	0.025	0.0735 J	0.027 J	NA
Silver	--	--	--	--	--	--	--			0.0089 U			
Zinc	--	--	--	--	--	--	--	3 J	NA	3.5	5.34	4.1 J	NA
Other Parameters													
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	5.8	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	21,790	21,790	21,400	30,300	3,463	15,590
pH	--	--	--	--	--	--	--	7.93	7.95	7.85	7.93	8.35	8.03

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
B - Analyte not detected above the level reported in blanks
J - Analyte present. Value may or may not be accurate or precise
L - Analyte present. Value may be biased low. Value may be highe
N - Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling effor
U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-K1						
Sample ID			**Ecological Screening Values**					LW07-K1-SD201-00-02C	LW07-K1-SD202-00-02C	LW07-K1-SD301-00-09D	LW07-K1-SD302-00-09D	LW07-K1-SD303-00-09D	LW07-K1-SD304-00-09D	LW07-K1-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier	Pier	Pier
Sample Date								09/27/02	09/27/02	11/24/09	11/24/09	11/24/09	11/24/09	9/10/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name														
Total Metals (mg/kg)														
Copper	184	3,100	19	--	34	108	270	118	102	101	110	114	121	111
Lead	67.6	400	30.2	--	46.7	112	218	65.2	67.6	**72.1 J**	**80.7 J**	**72.6 J**	61.2 J	67
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.3**	**0.31**	**0.36**	**0.383**	**0.352**	**0.311**	**0.366**
Tin[1]	9.8	47,000	--	--	--	--	--	2.8 J	2.6 J	7.81 B	10.8 B	8.34 B	7.4 B	6.72
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000476 J	0.000442 J	0.001328 B	0.001836 B	0.001418 B	0.001258 B	0.001142
Zinc	421	23,000	124	--	150	271	410	415	383	**461**	**540**	**479**	**449**	**450**
AVS/SEM (µmol/g)														
Acid Volatile Sulfide	--	--	--	--	--	--	--			10.1 N	8.4 N	12.1 N	10.2 N	236
Cadmium	--	--	--	--	--	--	--	0.0041 J	NA	0.0081	0.0071	0.012	0.0082	0.00786 J
Copper	--	--	--	--	--	--	--	0.93 J	NA	0.8	0.84	0.81	0.8	1.07
Lead	--	--	--	--	--	--	--	0.19 J	NA	0.23	0.23	0.24	0.2	0.225
Mercury	--	--	--	--	--	--	--	1.30E-04 J	NA	0.00013 UN	0.00013 UN	0.00014 UN	0.00012 UN	
Nickel	--	--	--	--	--	--	--	0.075 J	NA	0.041	0.44	0.043	0.038	0.0738 J
Silver	--	--	--	--	--	--	--			0.012 U	0.012 U	0.013 U	0.011 U	
Zinc	--	--	--	--	--	--	--	4.1 J	NA	4.9	5.4	5.2	4.8	5.58
Other Parameters														
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	3.6 J	5.2	4.8	5.6	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	28,880	23,400	19,600	25,600	29,000	22,400	31,600
pH	--	--	--	--	--	--	--	8.36	8.35	8.08	7.76	8.17	7.48	8.24

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
B - Analyte not detected above the level reported in blanks
J - Analyte present. Value may or may not be accurate or precise
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N - Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling effor
U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-K6		LW07-L5				LW07-L6
Sample ID			**Ecological Screening Values**					LW07-K6-SD201-00-02C	LW07-K6-SD202-00-02C	LW07-L5-SD201-00-02C	LW07-L5-SD202-00-02C	LW07-L5-SD301-00-09D	LW07-L5-SD401-00-10C	LW07-L6-SD201-00-02C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier	Pier	Pier
Sample Date								09/28/02	09/28/02	09/28/02	09/28/02	11/23/09	9/11/10	10/01/02
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 6	0 - 4
Chemical Name														
Total Metals (mg/kg)														
Copper	184	3,100	19	--	34	108	270	24.5	19.4	90.1	104	94.6	98.7	87
Lead	67.6	400	30.2	--	46.7	112	218	14	12.7	**69.8**	**143**	55.3	63.1	60
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.07 J	0.08 J	**0.41**	**4.1**	**0.309**	**0.266**	**0.29**
Tin[1]	9.8	47,000	--	--	--	--	--	3.2 J	3.3 J	5.6 J	6 J	8.4 B	6.68	5.4 J
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000544 J	0.000561 J	0.000952 J	0.001020 J	0.001428 B	0.001136	0.000918 J
Zinc	421	23,000	124	--	150	271	410	75.9	73.1	362	419	401	396	354
AVS/SEM (µmol/g)														
Acid Volatile Sulfide	--	--	--	--	--	--	--					3.8	983	
Cadmium	--	--	--	--	--	--	--	5.20E-04 J	NA	0.0032 J	NA	0.0031	0.0203	0.0037 J
Copper	--	--	--	--	--	--	--	0.15 J	NA	0.78 J	NA	0.11	0.872	0.61 J
Lead	--	--	--	--	--	--	--	0.052 J	NA	0.15 J	NA	0.065	0.167	0.15 J
Mercury	--	--	--	--	--	--	--	4.70E-05 B	NA	6.50E-05 J	NA	0.00003 UN		6.00E-04 J
Nickel	--	--	--	--	--	--	--	0.019 J	NA	0.06 J	NA	0.0092	0.0598 J	0.07 J
Silver	--	--	--	--	--	--	--					0.0028 U		
Zinc	--	--	--	--	--	--	--	0.77 J	NA	3.5 J	NA	1.7	4.75	2.9 J
Other Parameters														
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	4.8 J	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	2,245	2,937	20,410	19,870	16,300 N	27,600	23,790
pH	--	--	--	--	--	--	--	8.2	8.04	7.89	8.01	8.06	7.99	7.65

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
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U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-M1						
Sample ID			**Ecological Screening Values**					LW07-M1-SD201-00-02C	LW07-M1-SD202-00-02C	LW07-M1-SD301-00-09D	LW07-M1-SD302-00-09D	LW07-M1-SD303-00-09D	LW07-M1-SD304-00-09D	LW07-M1-SD401-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier	Pier	Pier
Sample Date								09/27/02	09/27/02	11/24/09	11/24/09	11/24/09	11/24/09	9/10/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 6
Chemical Name														
Total Metals (mg/kg)														
Copper	184	3,100	19	--	34	108	270	109	88	136	69.4	110	170	127
Lead	67.6	400	30.2	--	46.7	112	218	**177**	**143**	**233 J**	**98.6 J**	**97.8 J**	**131 L**	**236**
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.33**	**0.56**	**0.503**	0.181	**0.534**	**0.63**	**1.21**
Tin[1]	9.8	47,000	--	--	--	--	--	6.6 J	5.1 J	**22.8**	**12.7**	11.7 B	**29.9**	**10.3**
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.001122 J	0.000867 J	0.003876	0.002159	0.001989 B	0.005083	0.001751
Zinc	421	23,000	124	--	150	271	410	**628**	**449**	**794**	349	**504**	**840**	**711**
AVS/SEM (µmol/g)														
Acid Volatile Sulfide	--	--	--	--	--	--	--			10.5	2.9 JN	9.5 N	8.2 N	1,650
Cadmium	--	--	--	--	--	--	--	0.0042 J	NA	0.0034	0.0033 J	0.0099	0.011	0.00814
Copper	--	--	--	--	--	--	--	0.8 J	NA	0.3	0.36	0.67	0.91	1.12
Lead	--	--	--	--	--	--	--	0.59 J	NA	0.17	0.3	0.41	0.96	0.426
Mercury	--	--	--	--	--	--	--	2.00E-04 J	NA	0.000049 UN	0.000076 UN	0.00013 UN	0.00011 UN	
Nickel	--	--	--	--	--	--	--	0.11 J	NA	0.027	0.072	0.13	0.1	0.132
Silver	--	--	--	--	--	--	--			0.0045 U	0.0071 U	0.012 U	0.01 U	
Zinc	--	--	--	--	--	--	--	7.3 J	NA	2.1	4.4	5.6	7.9	7.27
Other Parameters														
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	5.2	2	7.6	3.3	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	20,080	17,030	24,000	6,890	15,100	15,700	24,700
pH	--	--	--	--	--	--	--	8.32	7.86	8.06	8.18	7.89	8.81	8.29

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

[1] TBT fraction of tin calculated using TBT:total ratio of 0.00017 for comparion to screening values (see Appendix D, Table D-19)
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U - The material was analyzed for, but not detected
mg/kg- Milligrams per kilogram
µmol/g - Micromoles per gram
µg/kg - Micrograms per kilogram

Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-M3		LW07-SD301	LW07-SD302	LW07-SD303	LW07-SD304	LW07-SD305	LW07-SD306
Sample ID			**Ecological Screening Values**					LW07-M3-SD201-00-02C	LW07-M3-SD202-00-02C	LW07-SD301-00-09D*	LW07-SD302-00-09D	LW07-SD303-00-09D	LW07-SD304-00-09D	LW07-SD305-00-09D	LW07-SD306-00-09D
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier	Pier	Pier	Pier
Sample Date								09/28/02	09/28/02	11/23/09	11/23/09	11/23/09	11/23/09	11/23/09	11/23/09
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4	0 - 4
Chemical Name															
Total Metals (mg/kg)															
Copper	184	3,100	19	--	34	108	270	121	124	**252**	61.5	30.7	60.6	107	58.2
Lead	67.6	400	30.2	--	46.7	112	218	**107**	**110**	**587**	48.6	20.8	40.8	65.7	44.9
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	**0.45**	**0.36**	**1.77 J**	**0.304**	0.084	0.2	**0.294**	0.134
Tin[1]	9.8	47,000	--	--	--	--	--	**14.5 J**	9.1 J	**29.7**	6.84 B	4.6 B	5.9 B	8.69 B	6.38 B
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.002465 J	0.001547 J	0.005049	0.001163 B	0.000782 B	0.001003 B	0.001477 B	0.001085 B
Zinc	421	23,000	124	--	150	271	410	**1,360**	**767**	**1,440**	252	143	319	**659**	218
AVS/SEM (µmol/g)															
Acid Volatile Sulfide	--	--	--	--	--	--	--			0.33 J	5.3	3.5	2.7	4.4	3.2
Cadmium	--	--	--	--	--	--	--	0.0036 J	NA	0.0019	0.005	0.0064	0.004	0.0039	0.0022
Copper	--	--	--	--	--	--	--	0.89 J	NA	0.19	0.25	0.14	0.12	0.11	0.13
Lead	--	--	--	--	--	--	--	0.33 J	NA	0.55	0.16	0.066	0.22	0.077	0.086
Mercury	--	--	--	--	--	--	--	1.00E-04 J	NA	0.000015 UN	0.000064 UN	0.000044 UN	0.00005 UN	0.000034 UN	0.000021 UN
Nickel	--	--	--	--	--	--	--	0.12 J	NA	0.051	0.036	0.017	0.023	0.012	0.012
Silver	--	--	--	--	--	--	--			0.0014 U	0.006 U	0.0041 U	0.0047 U	0.0032 U	0.002 U
Zinc	--	--	--	--	--	--	--	10.7 J	NA	5.5	3.2	1.4	3.1	2.6	1.2
Other Parameters															
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	5.6 J	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	20,080	19,110	9,360 N	6,910 N	8,580 N	12,100 N	23,500 N	15,800 N
pH	--	--	--	--	--	--	--	7.81	7.92	8.61	8.17	8.07	8.34	7.93	8.24

Notes:
* Duplicate sample collected at this location, most conservative value reported
-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
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Table 3
Surface Sediment Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID								LW07-SD307	LW07-SD401	LW07-SD402	LW07-SD403	LW07-SD404
Sample ID			**Ecological Screening Values**					LW07-SD307-00-09D	LW07-SD401-00-10C	LW07-SD402-00-10C*	LW07-SD403-00-10C	LW07-SD404-00-10C
Area	**Maximum Urban Background**	**Adjusted Residential Soil RSL x 10**						Pier	Pier	Pier	Pier	Pier
Sample Date								11/23/09	9/11/10	9/11/10	9/11/10	9/10/10
Sample Depth (inches below sediment surface)			**TEL**	**AET**	**ER-L**	**PEL**	**ER-M**	0 - 4	0 - 6	0 - 6	0 - 6	0 - 6
Chemical Name												
Total Metals (mg/kg)												
Copper	184	3,100	19	--	34	108	270	34.7	72.5	55.1	157	52.6
Lead	67.6	400	30.2	--	46.7	112	218	44.6	43.2	50.5	**211**	53.1 L
Mercury	0.2	5.6	0.13	--	0.15	0.7	0.71	0.0726	**0.218**	0.162	**0.373**	0.188
Tin[1]	9.8	47,000	--	--	--	--	--	3.9 B	5.81	7.77 J	**19.7**	**12.2**
- Adjusted (as TBT)	--	--	0.048	3.4	--	--	--	0.000663 B	0.000988	0.001321 J	0.003349	0.002074
Zinc	421	23,000	124	--	150	271	410	205	279	294	**987**	296
AVS/SEM (µmol/g)												
Acid Volatile Sulfide	--	--	--	--	--	--	--	2.8	1,120	398	989	211
Cadmium	--	--	--	--	--	--	--	0.0021	0.00462 J	0.0032 J	0.0086	0.0027
Copper	--	--	--	--	--	--	--	0.25	0.639	0.44	1.16	0.306
Lead	--	--	--	--	--	--	--	0.22	0.155	0.0943	0.283	0.139
Mercury	--	--	--	--	--	--	--	0.000036 UN				
Nickel	--	--	--	--	--	--	--	0.031	0.0584 J	0.0389 J	0.144	0.0621
Silver	--	--	--	--	--	--	--	0.0034 U				
Zinc	--	--	--	--	--	--	--	1.6	3.48	2.5	6.37	2.72
Other Parameters												
Tributyltin (µg/kg)	--	18	48.0	3,400	--	--	--	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	--	--	--	--	--	--	--	6,160 N	19,200	17,300	20,800	13,500
pH	--	--	--	--	--	--	--	8.04	8.31	7.79	7.88	7.87

Notes:
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-- Not Established
Bold font indicates exceedance of maximum urban background value.

TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
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Table 4
Surface Sediment Summary Statistics
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

	2000/2002					2009					2010				
Constituent	**Frequency of Detection**	**Minimum Detection**	**Maximum Detection**	**Location of Maximum Detection**	**Mean**	**Frequency of Detection**	**Minimum Detection**	**Maximum Detection**	**Location of Maximum Detection**	**Mean**	**Frequency of Detection**	**Minimum Detection**	**Maximum Detection**	**Location of Maximum Detection**	**Mean**
Connector Channel Area															
Copper	11/11	9.20	72.5	LW07-D5-SD201-00-02C	48.9	5/5	19.8	71.1	LW07-F3-SD301-00-09D	60.4	5/5	24.7	82.4	LW07-D5-SD401-00-10C	51.1
Lead	11/11	5.70	38.5	LW07-D5-SD202-00-02C	30.2	5/5	18.6	50.4	LW07-F3-SD301-00-09D	33.4	5/5	14.9	45.6	LW07-F3-SD401-00-10C	29.5
Mercury	9/11	0.12	0.25	LW07-D5-SD201-00-02C	0.14	5/5	0.06	0.24	LW07-D5-SD301-00-09D	0.15	5/5	0.05	0.35	LW07-F3-SD401-00-10C	0.19
Tin[1]	10/10	1.00	3.00	LW07-D5-SD201-00-02C	1.89	0/5	--	--	--	2.59	5/5	2.50	5.64	LW07-D5-SD401-00-10C	3.83
Tributyltin	--	--	--	--	--	1/5	4.30	4.30	LW07-B5-SD301-00-09D	4.30	--	--	--	--	--
Zinc	11/11	34.8	223	LW07-D5-SD201-00-02C	159	5/5	85.4	277	LW07-F3-SD301-00-09D	194	5/5	92.7	283	LW07-D5-SD401-00-10C	197
Cove Area															
Copper	11/11	55.0	117	LW07-L2-SD201-00-02C	78.3	6/6	65.2	101	LW07-J4-SD301-00-09D	86.1	6/6	75.4	96.1	LW07-K3-SD401-00-10C	85.9
Lead	11/11	40.1	255	LW07-K3-SD201-00-02C	81.5	6/6	42.1	76.4	LW07-K3-SD301-00-09D	56.1	6/6	37.4	131	LW07-J4-SD401-00-10C	78.5
Mercury	11/11	0.15	0.76	LW07-H3-SD202-00-02C	0.34	6/6	0.21	0.38	LW07-K5-SD301-00-09D	0.28	6/6	0.19	0.43	LW07-K3-SD401-00-10C	0.28
Tin	11/11	2.10	9.40	LW07-K4-SD201-00-02C	5.81	2/6	10.1	14.8	LW07-L2-SD301-00-09D	6.39	6/6	5.43	13.6	LW07-L2-SD401-00-10C	8.21
Tributyltin	--	--	--	--	--	1/1	3.40	3.40	LW07-H3-SD301-00-09D	3.40	--	--	--	--	--
Zinc	11/11	283	491	LW07-L2-SD201-00-02C	333	6/6	304	466	LW07-L2-SD301-00-09D	364	6/6	294	974	LW07-K4-SD401-00-10C	522
Pier Area[2]															
Copper	8/8	88.0	134	LW07-H1-SD202-00-02C	107	17/17	30.7	252	LW07-SD301-00-09D	99.0	8/8	52.6	166	LW07-H1-SD401-00-10C	105
Lead	8/8	65.2	177	LW07-M1-SD201-00-02C	101	17/17	20.8	587	LW07-SD301-00-09D	107	8/8	43.2	236	LW07-M1-SD401-00-10C	98.2
Mercury	8/8	0.30	4.10	LW07-L5-SD202-00-02C	0.87	17/17	0.07	1.77	LW07-SD301-00-09D	0.39	8/8	0.16	1.21	LW07-M1-SD401-00-10C	0.39
Tin	8/8	2.60	6.70	LW07-H1-SD202-00-02C	5.20	4/17	12.7	29.9	LW07-M1-SD304-00-09D	8.52	8/8	5.81	19.7	LW07-SD403-00-10C	9.53
Tributyltin	--	--	--	--	--	11/17	2.00	7.60	LW07-M1-SD303-00-09D	4.86	--	--	--	--	--
Zinc	8/8	362	628	LW07-M1-SD201-00-02C	437	17/17	143	1,440	LW07-SD301-00-09D	529	8/8	279	987	LW07-SD403-00-10C	488

Notes:
Values reported in milligrams per kilogram (mg/kg)
[1] The 2009 connector channel mean value for tin is the average of one-half of the detection limits for the 5 samples.
[2] 2000/2002 samples impacted by the MILCON action not included.

Table 5
2010 Surface Water Quality Field Parameters
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	**LW07-B7-SD401**			**LW07-D5-SD401**			**LW07-F3-SD401**			**LW07-F5-SD401**			**LW07-H1-SD401**			**LW07-H3-SD401**		
Sample Depth (feet)	**0.9**	**7.6**	**12.3**	**0.8**	**6.6**	**11.9**	**0.9**	**6.2**	**11.9**	**0.9**	**5.4**	**9.9**	**0.8**	**7**	**12.8**	**0.5**	**8.2**	**13.8**
Sample Date	**9/12/2010**			**9/11/2010**			**9/11/2010**			**9/11/2010**			**9/10/2010**			**9/11/2010**		
Field Parameters																		
ABM (%)	0.01	--	--	0	--	--	0	--	--	4	--	--	0	--	--	0.01	--	--
Average Redox (mm)	2.5	--	--	1	--	--	1.3	--	--	3.5	--	--	3.3	--	--	1.25	--	--
Dissolved Oxygen (mg/L)	6.56	6.54	6.32	7.02	6.87	5.67	6.32	6.18	5.84	6.62	6.71	6.31	4.86	4.83	4.69	6.31	6.09	5.24
Oxidation Reduction Potential (mV)	178.4	177.9	176.7	164.7	164.6	164	161.4	161.5	161	164.1	163.1	162.8	164.9	162.4	163.2	160.7	160.4	160.1
pH (ph)	7.86	7.87	7.85	7.9	7.9	7.82	7.85	7.85	7.83	7.87	7.88	7.86	7.72	7.73	7.73	7.83	7.84	7.76
Salinity (ppt)	22.88	22.88	22.88	22.33	22.34	22.33	22.31	22.33	22.33	22.33	22.33	22.33	24.13	24.14	24.15	22.32	22.32	22.31
Specific Conductivity (ms/cm)	36.24	36.23	36.23	35.47	35.48	35.45	35.44	35.46	35.46	35.46	35.46	35.46	38.02	38.05	38.05	35.44	35.44	35.41
Temperature (^{o}C)	24.65	24.64	24.63	25.33	25.27	24.68	25.13	24.77	24.62	24.99	25.01	24.85	25.05	25.07	25.07	25.04	24.62	24.49
Turbidity (NTU)	1.8	1.7	7.5	3.9	3.7	13.8	3.5	7	8.2	2.6	3.2	9.6	4.1	3.7	9.8	3.2	3.6	12

Station ID	**LW07-J4-SD401**			**LW07-K1-SD401**			**LW07-K3-SD401**			**LW07-K4-SD401**			**LW07-K5-SD401**			**LW07-L2-SD401**		
Sample Depth (feet)	**0.6**	**8.5**	**15**	**0.6**	**7.5**	**13.6**	**0.9**	**7.4**	**13.8**	**0.7**	**8.1**	**14.5**	**0.5**	**8.9**	**14.7**	**1.2**	**7.8**	**14**
Sample Date	**9/11/2010**			**9/10/2010**			**9/11/2010**			**9/11/2010**			**9/11/2010**			**9/11/2010**		
Field Parameters																		
ABM (%)	0.01	--	--	0.01	--	--	5	--	--	3	--	--	0.01	--	--	1	--	--
Average Redox (mm)	1.3	--	--	0.5	--	--	2	--	--	2	--	--	NV	--	--	0.5	--	--
Dissolved Oxygen (mg/L)	6.13	6.04	5.44	4.96	5.26	5.28	5.44	5.54	5.57	5.76	5.6	5.35	5.71	5.85	5.51	5.42	5.57	5.57
Oxidation Reduction Potential (mV)	161.9	161.1	157.5	149.3	149.4	144.4	174	173.7	172.9	169.1	168.6	167.6	166.3	165	164.4	181.3	180.9	179.7
pH (ph)	7.81	7.83	7.78	7.74	7.78	7.78	7.77	7.78	7.8	7.78	7.78	7.77	7.79	7.81	7.78	7.77	7.8	7.8
Salinity (ppt)	22.31	22.32	22.3	24.2	24.21	24.22	22.28	22.28	22.29	22.3	22.29	22.3	22.31	22.31	22.3	22.27	22.29	22.28
Specific Conductivity (ms/cm)	35.43	35.45	35.4	38.14	38.14	38.16	35.37	35.37	35.39	35.39	35.39	35.4	35.43	35.41	35.39	35.36	35.38	35.37
Temperature (^{o}C)	25.05	24.68	24.42	25.17	25.1	25.08	24.51	24.48	24.42	24.56	24.43	24.34	24.89	24.61	24.38	24.53	24.45	24.42
Turbidity (NTU)	3.2	3.3	9.5	4.7	4.3	21.4	3.6	3.9	6.5	4.1	4.8	7.1	3.3	3.5	13.7	4.2	4.4	14.8

Station ID	**LW07-L5-SD401**			**LW07-M1-SD401**			**LW07-SD401**			**LW07-SD402**			**LW07-SD403**			**LW07-SD404**		
Sample Depth (feet)	**0.6**	**8.4**	**14.8**	**0.5**	**7.1**	**13.2**	**1.2**	**8.7**	**15.1**	**0.5**	**6.7**	**14.4**	**0.8**	**5.6**	**12.2**	**0.8**	**7.7**	**15.1**
Sample Date	**9/11/2010**			**9/10/2010**			**9/11/2010**			**9/11/2010**			**9/11/2010**			**9/10/2010**		
Field Parameters																		
ABM (%)	0.001	--	--	1.5	--	--	0.01	--	--	1	--	--	15	--	--	2.5	--	--
Average Redox (mm)	1.5	--	--	1.25	--	--	1.2	--	--	4	--	--	1.2	--	--	1.5	--	--
Dissolved Oxygen (mg/L)	5.79	5.68	5.52	5.18	4.86	5.15	6.02	5.82	5.34	5.88	5.72	5.75	5.33	5.39	5.47	5.49	5.44	5.47
Oxidation Reduction Potential (mV)	166.3	166.1	165.8	144.3	144.4	144.2	164	163.5	160.8	171.1	170.2	170.2	199.2	198	196	146.3	145.9	144.1
pH (ph)	7.8	7.8	7.82	7.76	7.74	7.77	7.81	7.8	7.77	7.79	7.81	7.81	7.76	7.79	7.8	7.77	7.78	7.8
Salinity (ppt)	22.3	22.3	22.3	24.2	24.21	24.2	22.31	22.31	22.3	22.3	22.3	22.29	22.28	22.29	24.48	25.11	24.21	24.2
Specific Conductivity (ms/cm)	35.41	35.4	35.4	38.14	38.14	38.13	35.42	35.42	35.41	35.4	35.4	35.39	35.37	35.38	35.38	38.14	38.14	38.18
Temperature (^{o}C)	24.7	24.47	24.38	25.1	25.11	25.05	24.95	24.77	24.44	24.47	24.48	24.42	24.54	24.52	24.48	25.1	25.1	24.99
Turbidity (NTU)	4	3.4	4.9	5.4	4	5.9	3.4	4.6	11.6	4.9	4.8	5.7	4.6	4.6	5.4	4.3	4.5	14.1

Notes:
^{o}C - Degrees Celsius
mg/L - milligram per liter
mm - millimeter
ms/cm - Milliseimens per centimeter
mV - millivolts
NTU - Nephelometric turbidity units
ph - pH units
ppt - parts per trillion

Figures

\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\FIGURE 1 - SITE LOCATION MAP.MXD CBOWMAN 3/25/2011 12:52:50

Legend

- SWMU7b Boundary
- Installation Boundary

N
W E
S

0 1,000 2,000 4,000 Feet

Figure 1
JEB Little Creek and SWMU7b Location
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL

\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\FIGURE 2 - SWMU 7 BOUNDARY AND IMMEDIATE VICINITY.MXD CBOWMAN 3/25/2011 12:55:40

Legend

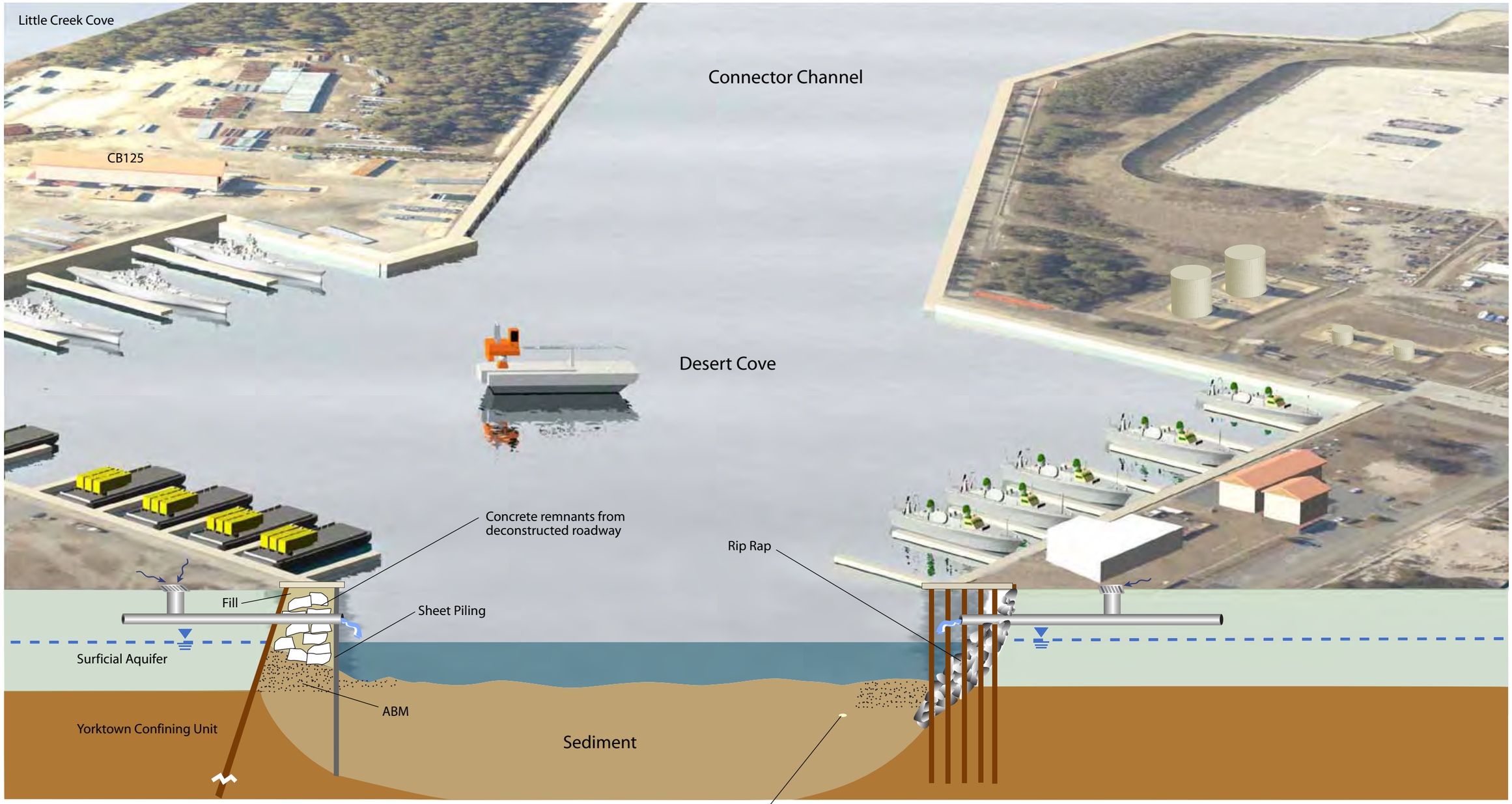
- Outfall
- Storm Sewer Line
- Installation Boundary
- SWMU 7 Boundary
- Area Boundary Line
- Limits of 2008 MILCON Dredge

N
W E
S

0 150 300
Feet

Figure 2
SWMU 7 Boundary and Immediate Vicinity
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL



Benthic Dwelling Organisms (worms, insects, crustaceans)**:** Ingestion of and direct contact with surface sediment.

LEGEND

- Water Table
- Stormwater Runoff
- Sheet Flow

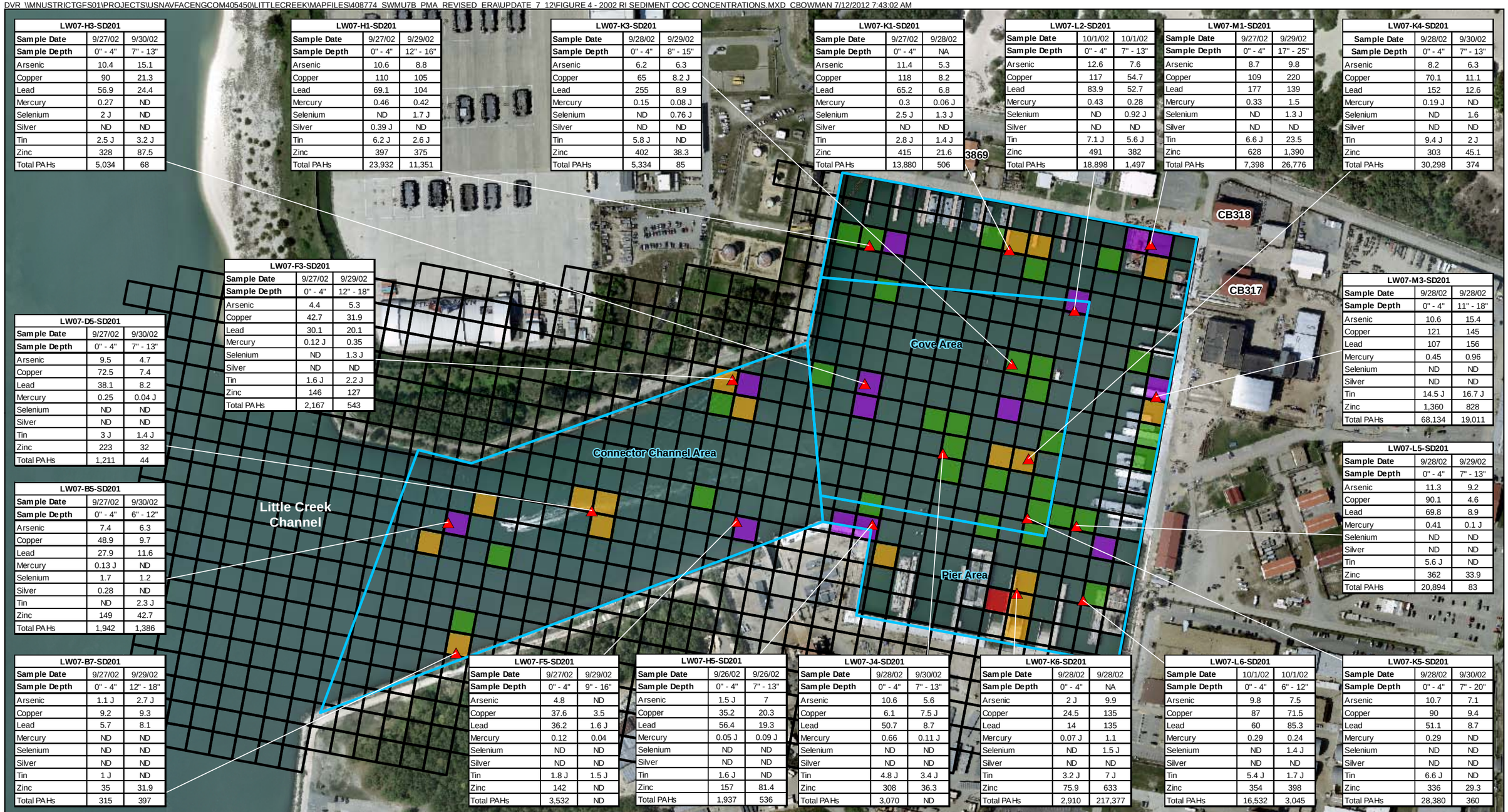
Vertical exageration 1" = 20'

FIGURE 3
SWMU 7b Conceptual Site Model
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL

ES112008005MKE NAB_LC_SWMU7b_CSM_v9.ai 06.23.10 jls/sls/LED \\northend\proj\USNavFacEngCom\LittleCreek\Figures\408774_SWMU7b_PMA_Revised_ERA\AI\Figure 3 - SWMU 7b CSM_rev.ai

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\UPDATE_7_12\FIGURE 4 - 2002 RI SEDIMENT COC CONCENTRATIONS.MXD CBOWMAN 7/12/2012 7:43:02 AM



LW07-H3-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	10.4	15.1
Copper	90	21.3
Lead	56.9	24.4
Mercury	0.27	ND
Selenium	2 J	ND
Silver	ND	ND
Tin	2.5 J	3.2 J
Zinc	328	87.5
Total PAHs	5,034	68

LW07-H1-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 16"
Arsenic	10.6	8.8
Copper	110	105
Lead	69.1	104
Mercury	0.46	0.42
Selenium	ND	1.7 J
Silver	0.39 J	ND
Tin	6.2 J	2.6 J
Zinc	397	375
Total PAHs	23,932	11,351

LW07-K3-SD201		
Sample Date	9/28/02	9/29/02
Sample Depth	0" - 4"	8" - 15"
Arsenic	6.2	6.3
Copper	65	8.2 J
Lead	255	8.9
Mercury	0.15	0.08 J
Selenium	ND	0.76 J
Silver	ND	ND
Tin	5.8 J	ND
Zinc	402	38.3
Total PAHs	5,334	85

LW07-K1-SD201		
Sample Date	9/27/02	9/28/02
Sample Depth	0" - 4"	NA
Arsenic	11.4	5.3
Copper	118	8.2
Lead	65.2	6.8
Mercury	0.3	0.06 J
Selenium	2.5 J	1.3 J
Silver	ND	ND
Tin	2.8 J	1.4 J
Zinc	415	21.6
Total PAHs	13,880	506

LW07-L2-SD201		
Sample Date	10/1/02	10/1/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	12.6	7.6
Copper	117	54.7
Lead	83.9	52.7
Mercury	0.43	0.28
Selenium	ND	0.92 J
Silver	ND	ND
Tin	7.1 J	5.6 J
Zinc	491	382
Total PAHs	18,898	1,497

LW07-M1-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	17" - 25"
Arsenic	8.7	9.8
Copper	109	220
Lead	177	139
Mercury	0.33	1.5
Selenium	ND	1.3 J
Silver	ND	ND
Tin	6.6 J	23.5
Zinc	628	1,390
Total PAHs	7,398	26,776

LW07-K4-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	8.2	6.3
Copper	70.1	11.1
Lead	152	12.6
Mercury	0.19 J	ND
Selenium	ND	1.6
Silver	ND	ND
Tin	9.4 J	2 J
Zinc	303	45.1
Total PAHs	30,298	374

LW07-F3-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 18"
Arsenic	4.4	5.3
Copper	42.7	31.9
Lead	30.1	20.1
Mercury	0.12 J	0.35
Selenium	ND	1.3 J
Silver	ND	ND
Tin	1.6 J	2.2 J
Zinc	146	127
Total PAHs	2,167	543

LW07-M3-SD201		
Sample Date	9/28/02	9/28/02
Sample Depth	0" - 4"	11" - 18"
Arsenic	10.6	15.4
Copper	121	145
Lead	107	156
Mercury	0.45	0.96
Selenium	ND	ND
Silver	ND	ND
Tin	14.5 J	16.7 J
Zinc	1,360	828
Total PAHs	68,134	19,011

LW07-D5-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	9.5	4.7
Copper	72.5	7.4
Lead	38.1	8.2
Mercury	0.25	0.04 J
Selenium	ND	ND
Silver	ND	ND
Tin	3 J	1.4 J
Zinc	223	32
Total PAHs	1,211	44

LW07-L5-SD201		
Sample Date	9/28/02	9/29/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	11.3	9.2
Copper	90.1	4.6
Lead	69.8	8.9
Mercury	0.41	0.1 J
Selenium	ND	ND
Silver	ND	ND
Tin	5.6 J	ND
Zinc	362	33.9
Total PAHs	20,894	83

LW07-B5-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	6" - 12"
Arsenic	7.4	6.3
Copper	48.9	9.7
Lead	27.9	11.6
Mercury	0.13 J	ND
Selenium	1.7	1.2
Silver	0.28	ND
Tin	ND	2.3 J
Zinc	149	42.7
Total PAHs	1,942	1,386

LW07-B7-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 18"
Arsenic	1.1 J	2.7 J
Copper	9.2	9.3
Lead	5.7	8.1
Mercury	ND	ND
Selenium	ND	ND
Silver	ND	ND
Tin	1 J	ND
Zinc	35	31.9
Total PAHs	315	397

LW07-F5-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	9" - 16"
Arsenic	4.8	ND
Copper	37.6	3.5
Lead	36.2	1.6 J
Mercury	0.12	0.04
Selenium	ND	ND
Silver	ND	ND
Tin	1.8 J	1.5 J
Zinc	142	ND
Total PAHs	3,532	ND

LW07-H5-SD201		
Sample Date	9/26/02	9/26/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	1.5 J	7
Copper	35.2	20.3
Lead	56.4	19.3
Mercury	0.05 J	0.09 J
Selenium	ND	ND
Silver	ND	ND
Tin	1.6 J	ND
Zinc	157	81.4
Total PAHs	1,937	536

LW07-J4-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	10.6	5.6
Copper	6.1	7.5 J
Lead	50.7	8.7
Mercury	0.66	0.11 J
Selenium	ND	ND
Silver	ND	ND
Tin	4.8 J	3.4 J
Zinc	308	36.3
Total PAHs	3,070	ND

LW07-K6-SD201		
Sample Date	9/28/02	9/28/02
Sample Depth	0" - 4"	NA
Arsenic	2 J	9.9
Copper	24.5	135
Lead	14	135
Mercury	0.07 J	1.1
Selenium	ND	1.5 J
Silver	ND	ND
Tin	3.2 J	7 J
Zinc	75.9	633
Total PAHs	2,910	217,377

LW07-L6-SD201		
Sample Date	10/1/02	10/1/02
Sample Depth	0" - 4"	6" - 12"
Arsenic	9.8	7.5
Copper	87	71.5
Lead	60	85.3
Mercury	0.29	0.24
Selenium	ND	1.4 J
Silver	ND	ND
Tin	5.4 J	1.7 J
Zinc	354	398
Total PAHs	16,532	3,045

LW07-K5-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 20"
Arsenic	10.7	7.1
Copper	90	9.4
Lead	51.1	8.7
Mercury	0.29	ND
Selenium	ND	ND
Silver	ND	ND
Tin	6.6 J	ND
Zinc	336	29.3
Total PAHs	28,380	360

Legend

▲ 2002 RI Discrete Sediment Sample Location

Area Boundary Line

2002 RI ABM Content

- No ABM
- Trace/Small ABM
- ABM Present
- Heavy ABM

NA - Not Available
ND - Not detected
J - Reported value is estimated

N
W E
S

0 150 300
Feet

Figure 4
2002 RI Sediment COC Concentrations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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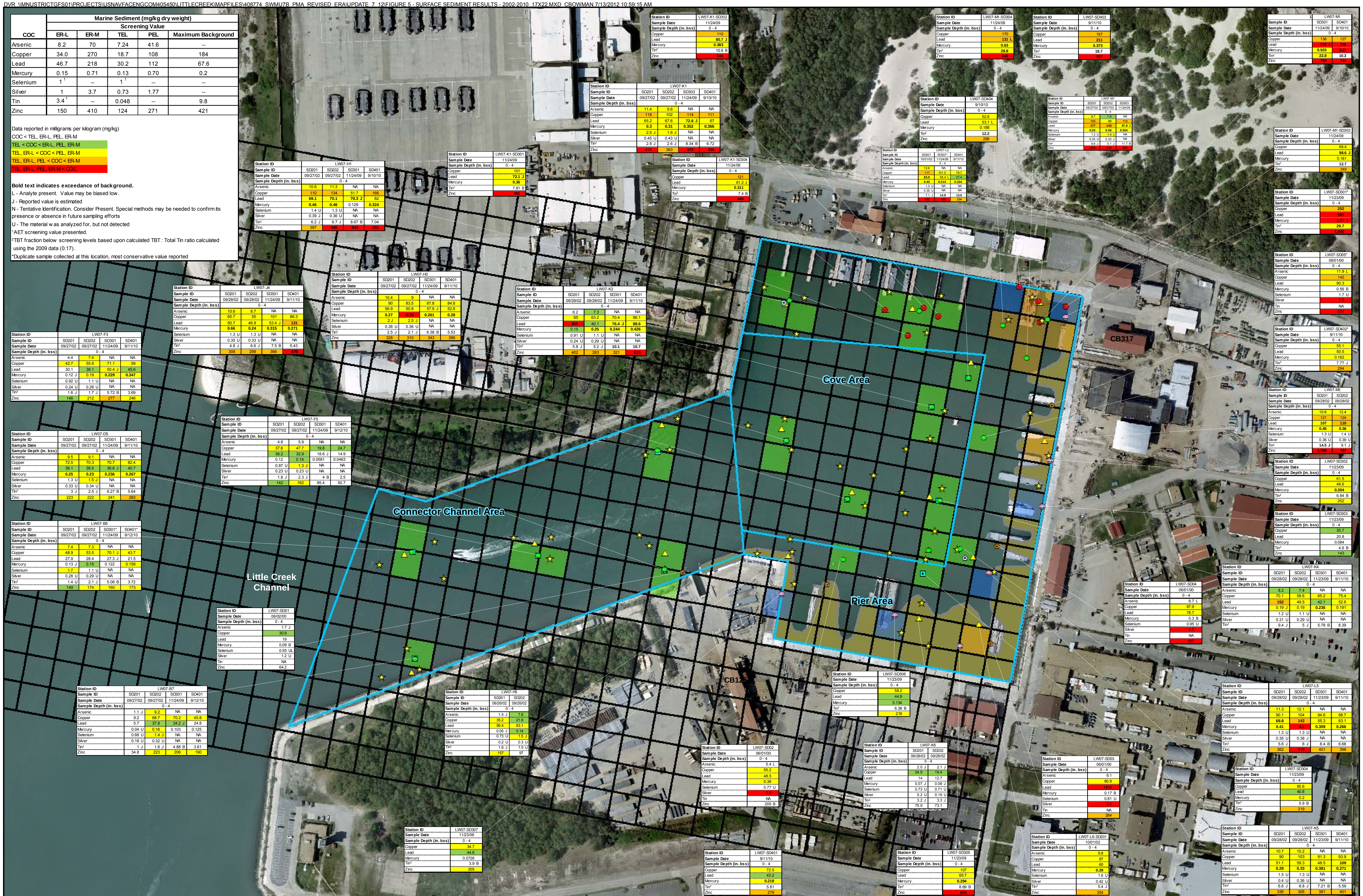
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\UPDATE_7_12\FIGURE 5 - SURFACE SEDIMENT RESULTS - 2002-2010_17X22.MXD CBOWMAN 7/13/2012 10:59:15 AM



COC	Marine Sediment (mg/kg dry weight) Screening Value ER-L	ER-M	TEL	PEL	Maximum Background
Arsenic	8.2	70	7.24	41.6	--
Copper	34.0	270	18.7	108	184
Lead	46.7	218	30.2	112	67.6
Mercury	0.15	0.71	0.13	0.70	0.2
Selenium	1[1]	--	1[1]	--	--
Silver	1	3.7	0.73	1.77	--
Tin	3.4[1]	--	0.048	--	9.8
Zinc	150	410	124	271	421

Data reported in milligrams per kilogram (mg/kg)
COC < TEL, ER-L, PEL, ER-M
TEL < COC < ER-L, PEL, ER-M
TEL, ER-L < COC < PEL, ER-M
TEL, ER-L, PEL < COC < ER-M
TEL, ER-L, PEL, ER-M < COC

Bold text indicates exceedance of background.
L - Analyte present. Value may be biased low.
J - Reported value is estimated
N - Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
U - The material was analyzed for, but not detected
[1]AET screening value presented.
[2]TBT fraction below screening levels based upon calculated TBT : Total Tin ratio calculated using the 2009 data (0.17).
*Duplicate sample collected at this location, most conservative value reported

Station ID	LW07-H1			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/10/10
Sample Depth (in. bss)	0 - 4			
Arsenic	10.6	11.3	NA	NA
Copper	110	134	51.7	166
Lead	69.1	70.1	70.3 J	62
Mercury	0.46	0.46	0.129	0.324
Selenium	1.4 U	1.3 U	NA	NA
Silver	0.39 J	0.36 U	NA	NA
Tin[2]	6.2 J	6.7 J	8.67 B	7.04
Zinc	397	445	943	491

Station ID	LW07-K1-SD301
Sample Date	11/24/09
Sample Depth (in. bss)	0 - 4
Copper	101
Lead	72.1 J
Mercury	0.36
Tin[2]	7.81 B
Zinc	461

Station ID	LW07-K1-SD302
Sample Date	11/24/09
Sample Depth (in. bss)	0 - 4
Copper	110
Lead	80.7 J
Mercury	0.383
Tin[2]	10.8 B
Zinc	540

Station ID	LW07-K1			
Sample ID	SD201	SD202	SD303	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/10/10
Sample Depth (in. bss)	0 - 4			
Arsenic	11.4	9.6	NA	NA
Copper	118	102	114	111
Lead	65.2	67.6	72.6 J	67
Mercury	0.3	0.31	0.352	0.366
Selenium	2.5 J	1.6 J	NA	NA
Silver	0.45 U	0.43 U	NA	NA
Tin[2]	2.8 J	2.6 J	8.34 B	6.72
Zinc	415	383	479	450

Station ID	LW07-K1-SD304
Sample Date	11/24/09
Sample Depth (in. bss)	0 - 4
Copper	121
Lead	61.2 J
Mercury	0.311
Tin[2]	7.4 B
Zinc	449

Station ID	LW07-M1-SD304
Sample Date	11/24/09
Sample Depth (in. bss)	0 - 4
Copper	170
Lead	131 L
Mercury	0.63
Tin[2]	29.9
Zinc	840

Station ID	LW07-SD403
Sample Date	9/11/10
Sample Depth (in. bss)	0 - 4
Copper	157
Lead	211
Mercury	0.373
Tin[2]	19.7
Zinc	987

1	LW07-M1	
Sample ID	SD301	SD401
Sample Date	11/24/09	9/10/10
Sample Depth (in. bss)	0 - 4	
Copper	136	127
Lead	233 J	236
Mercury	0.503	1.21
Tin[2]	22.8	10.3
Zinc	794	711

Station ID	LW07-SD404
Sample Date	9/10/10
Sample Depth (in. bss)	0 - 4
Copper	52.6
Lead	53.1 L
Mercury	0.188
Tin[2]	12.2
Zinc	296

Station ID	LW07-M1		
Sample ID	SD201	SD202	SD303
Sample Date	09/27/02	09/27/02	11/24/09
Sample Depth (in. bss)	0 - 4		
Arsenic	8.7	7.6	NA
Copper	109	88	110
Lead	177	143	97.8 J
Mercury	0.33	0.56	0.534
Selenium	1.3 U	1.4 J	NA
Silver	0.35 U	0.32 J	NA
Tin[2]	6.6 J	5.1 J	11.7 B
Zinc	628	449	504

Station ID	LW07-L2		
Sample ID	SD201	SD301*	SD401
Sample Date	10/01/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4		
Arsenic	12.6	NA	NA
Copper	117	101.0	78.7
Lead	83.9	58.4 L	37.4
Mercury	0.43	0.214	0.234
Selenium	1.3 U	NA	NA
Silver	0.35 U	NA	NA
Tin[2]	7.1 J	14.8	13.6
Zinc	491	466	294

Station ID	LW07-M1-SD302
Sample Date	11/24/09
Sample Depth (in. bss)	0 - 4
Copper	69.4
Lead	98.6 J
Mercury	0.181
Tin[2]	12.7
Zinc	349

Station ID	LW07-SD301*
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	252
Lead	587
Mercury	1.77 J
Tin[2]	29.7
Zinc	1,440

Station ID	LW07-SD05*
Sample Date	06/01/00
Sample Depth (in. bss)	0 - 4
Arsenic	11.9 L
Copper	142
Lead	90.3
Mercury	0.56 B
Selenium	1.7 U
Silver	7.8
Tin	NA
Zinc	534

Station ID	LW07-SD402*
Sample Date	9/11/10
Sample Depth (in. bss)	0 - 4
Copper	55.1
Lead	50.5
Mercury	0.162
Tin[2]	7.77 J
Zinc	294

Station ID	LW07-M3	
Sample ID	SD201	SD202
Sample Date	09/28/02	09/28/02
Sample Depth (in. bss)	0 - 4	
Arsenic	10.6	12.4
Copper	121	124
Lead	107	110
Mercury	0.45	0.36
Selenium	1.3 U	1.4 U
Silver	0.36 U	0.39 U
Tin[2]	14.5 J	9.1 J
Zinc	1,360	767

Station ID	LW07-SD302
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	61.5
Lead	48.6
Mercury	0.304
Tin[2]	6.84 B
Zinc	252

Station ID	LW07-SD303
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	30.7
Lead	20.8
Mercury	0.084
Tin[2]	4.6 B
Zinc	143

Station ID	LW07-J4			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/28/02	09/28/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	10.6	8.7	NA	NA
Copper	65.7	55	101	86.3
Lead	50.7	46.9	53.4 J	131
Mercury	0.66	0.24	0.315	0.271
Selenium	1.3 U	1.3 U	NA	NA
Silver	0.35 U	0.33 U	NA	NA
Tin[2]	4.8 J	6.6 J	7.5 B	5.43
Zinc	308	299	366	479

Station ID	LW07-H3			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	10.4	9	NA	NA
Copper	90	83.5	87.8	84.8
Lead	56.9	50.8	57.9 J	52.6
Mercury	0.27	0.76	0.261	0.28
Selenium	2 J	2.5 J	NA	NA
Silver	0.38 U	0.36 U	NA	NA
Tin[2]	2.5 J	2.1 J	6.38 B	5.53
Zinc	328	310	343	366

Station ID	LW07-K3			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/28/02	09/28/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	6.2	7.3	NA	NA
Copper	65	63.2	70.4	96.1
Lead	255	40.1	76.4 J	88.6
Mercury	0.15	0.25	0.244	0.426
Selenium	0.91 U	1.1 U	NA	NA
Silver	0.24 U	0.29 U	NA	NA
Tin[2]	5.8 J	5.2 J	10.1	10.7
Zinc	402	283	321	615

Station ID	LW07-F3			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	4.4	7.4	NA	NA
Copper	42.7	55.9	71.1	59
Lead	30.1	38.1	50.4 J	45.6
Mercury	0.12 J	0.19	0.229	0.347
Selenium	0.92 U	1.1 U	NA	NA
Silver	0.24 U	0.28 U	NA	NA
Tin[2]	1.6 J	1.7 J	5.72 B	3.69
Zinc	146	212	277	246

Station ID	LW07-F5			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/12/10
Sample Depth (in. bss)	0 - 4			
Arsenic	4.8	5.9	NA	NA
Copper	37.6	47.7	19.8	24.7
Lead	36.2	32.9	18.6 J	14.9
Mercury	0.12	0.14	0.0581	0.0463
Selenium	0.87 U	1.3 J	NA	NA
Silver	0.23 U	0.23 U	NA	NA
Tin[2]	1.8 J	2.3 J	4 B	2.5
Zinc	142	162	85.4	92.7

Station ID	LW07-D5			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	9.5	9.1	NA	NA
Copper	72.5	70.3	70.7	82.4
Lead	38.1	38.5	36.6 J	40.7
Mercury	0.25	0.23	0.236	0.267
Selenium	1.3 U	1.5 J	NA	NA
Silver	0.33 U	0.34 U	NA	NA
Tin[2]	3 J	2.5 J	6.27 B	5.64
Zinc	223	222	241	283

Station ID	LW07-B5			
Sample ID	SD201	SD202	SD301*	SD401*
Sample Date	09/27/02	09/27/02	11/24/09	9/12/10
Sample Depth (in. bss)	0 - 4			
Arsenic	7.4	7.3	NA	NA
Copper	48.9	53.5	70.1 J	43.7
Lead	27.9	28.4	27.3 J	21.5
Mercury	0.13 J	0.15	0.122	0.159
Selenium	1.7	1.1 U	NA	NA
Silver	0.28 U	0.29 U	NA	NA
Tin[2]	1.4 U	2.1 J	5.06 B	3.72
Zinc	149	174	160	173

Station ID	LW07-SD01
Sample Date	06/02/00
Sample Depth (in. bss)	0 - 4
Arsenic	1.7 J
Copper	30.9
Lead	19
Mercury	0.09 B
Selenium	0.55 UL
Silver	1.2 U
Tin	NA
Zinc	64.2

Station ID	LW07-B7			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/27/02	09/27/02	11/24/09	9/12/10
Sample Depth (in. bss)	0 - 4			
Arsenic	1.1 J	9.2	NA	NA
Copper	9.2	68.7	70.2	45.8
Lead	5.7	37.8	34.2 J	24.8
Mercury	0.04 U	0.16	0.103	0.125
Selenium	0.68 U	1.4 J	NA	NA
Silver	0.18 U	0.32 U	NA	NA
Tin[2]	1 J	1.6 J	4.88 B	3.61
Zinc	34.8	223	206	190

Station ID	LW07-H5	
Sample ID	SD201	SD202
Sample Date	09/26/02	09/26/02
Sample Depth (in. bss)	0 - 4	
Arsenic	1.5 J	7.6
Copper	35.2	21.6
Lead	56.4	63.1
Mercury	0.05 J	0.14
Selenium	0.73 U	1.5 J
Silver	0.2 U	0.3 U
Tin[2]	1.6 J	1.5 U
Zinc	157	97

Station ID	LW07-SD307
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	34.7
Lead	44.6
Mercury	0.0726
Tin[2]	3.9 B
Zinc	205

Station ID	LW07-SD02
Sample Date	06/01/00
Sample Depth (in. bss)	0 - 4
Arsenic	5.4 L
Copper	55.2
Lead	48.5
Mercury	0.36
Selenium	0.77 U
Silver	3.9
Tin	NA
Zinc	205 B

Station ID	LW07-SD401
Sample Date	9/11/10
Sample Depth (in. bss)	0 - 4
Copper	72.5
Lead	43.2
Mercury	0.218
Tin[2]	5.81
Zinc	279

Station ID	LW07-SD306
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	58.2
Lead	44.9
Mercury	0.134
Tin[2]	6.38 B
Zinc	218

Station ID	LW07-K6	
Sample ID	SD201	SD202
Sample Date	09/28/02	09/28/02
Sample Depth (in. bss)	0 - 4	
Arsenic	2.0 J	2.1 J
Copper	24.5	19.4
Lead	14	12.7
Mercury	0.07 J	0.08 J
Selenium	0.73 U	0.71 U
Silver	0.2 U	0.19 U
Tin[2]	3.2 J	3.3 J
Zinc	75.9	73.1

Station ID	LW07-SD305
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	107
Lead	65.7
Mercury	0.294
Tin[2]	8.69 B
Zinc	659

Station ID	LW07-SD04
Sample Date	06/01/00
Sample Depth (in. bss)	0 - 4
Arsenic	6.7 L
Copper	87.9
Lead	78.7
Mercury	0.3 B
Selenium	0.95 U
Silver	4.5
Tin	NA
Zinc	497

Station ID	LW07-K4			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/28/02	09/28/02	11/23/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	8.2	7.4	NA	NA
Copper	70.1	58.6	65.2	75.4
Lead	152	49.5	42.1	52.6
Mercury	0.19 J	0.19	0.236	0.191
Selenium	1.2 U	1.1 U	NA	NA
Silver	0.31 U	0.29 U	NA	NA
Tin[2]	9.4 J	5 J	5.78 B	8.39

Station ID	LW07-L5			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/28/02	09/28/02	11/23/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	11.3	12.1	NA	NA
Copper	90.1	104	94.6	98.7
Lead	69.8	143	55.3	63.1
Mercury	0.41	4.1	0.309	0.266
Selenium	1.3 U	1.3 U	NA	NA
Silver	0.35 U	0.38 J	NA	NA
Tin[2]	5.6 J	6 J	8.4 B	6.68
Zinc	362	419	401	396

Station ID	LW07-SD03
Sample Date	06/01/00
Sample Depth (in. bss)	0 - 4
Arsenic	6.1
Copper	80.9
Lead	1810
Mercury	0.17 B
Selenium	0.81 U
Silver	3.6
Tin	NA
Zinc	284

Station ID	LW07-SD304
Sample Date	11/23/09
Sample Depth (in. bss)	0 - 4
Copper	60.6
Lead	40.8
Mercury	0.2
Tin[2]	5.9 B
Zinc	319

Station ID	LW07-L6-SD201
Sample Date	10/01/02
Sample Depth (in. bss)	0 - 4
Arsenic	9.8
Copper	87
Lead	60
Mercury	0.29
Selenium	1.6 U
Silver	0.42 U
Tin[2]	5.4 J
Zinc	354

Station ID	LW07-K5			
Sample ID	SD201	SD202	SD301	SD401
Sample Date	09/28/02	09/28/02	11/23/09	9/11/10
Sample Depth (in. bss)	0 - 4			
Arsenic	10.7	10.2	NA	NA
Copper	90	103	91.3	93.9
Lead	51.1	59.3	48.5	109
Mercury	0.29	0.33	0.381	0.271
Selenium	1.5 U	1.3 U	NA	NA
Silver	0.4 U	0.36 U	NA	NA
Tin[2]	6.6 J	8.8 J	7.21 B	5.59
Zinc	336	305	381	401

Legend

- 2010 Sediment Sample Station Location (mid-point of grab samples)
- 2002 RI Discrete Sediment Sample Location
- 2009 Pier Area Sediment Sample Location - High Concentrations
- 2009 Pier Area Sediment Sample Location - Low Concentrations
- 2009 Dredged Area Sediment Sample Location
- 2009 Cove/Connector Channel Sediment Sample Location
- 2002 RI Composite Sediment Sample Location
- 2000 SI Sediment Sample Location
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)
- ≤ 1%
- 1-5%
- 5-10%

N W E S

0 115 230 460 Feet

Figure 5
Surface Sediment COC Concentrations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\UPDATE_7_12\FIGURE 6 - BACKGROUND SAMPLE LOCATIONS.MXD CBOWMAN 7/12/2012 7:49:41 AM

Legend

- Background Sample Location
- Outfall
- Storm Sewer Line
- Reference Sample Location Area
- Installation Boundary
- SWMU 7 Boundary
- Area Boundary Line
- Limits of 2008 MILCON Dredge

N
W E
S

0 200 400
Feet

Figure 6
Background Sample Locations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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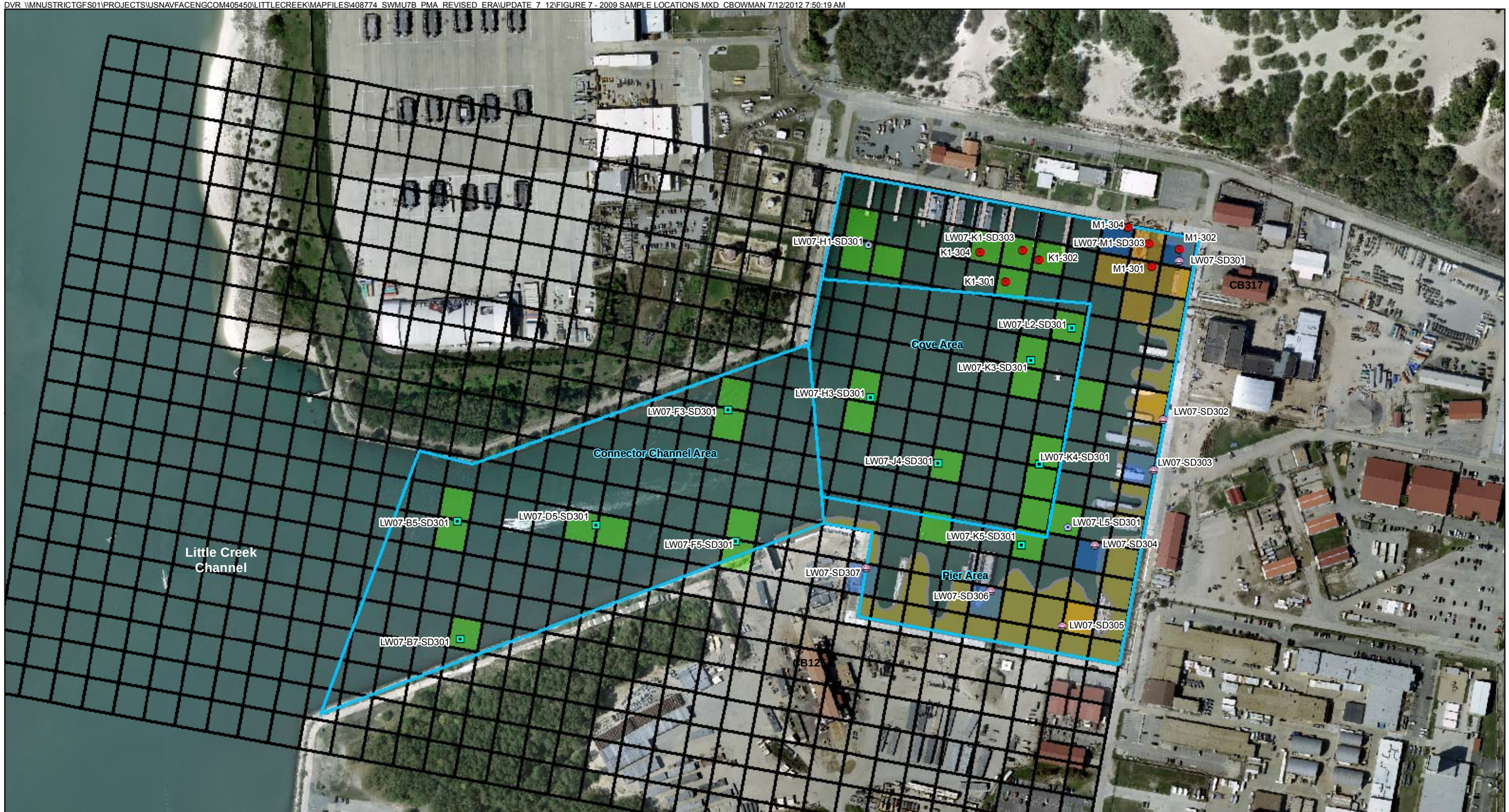
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\UPDATE_7_12\FIGURE 7 - 2009 SAMPLE LOCATIONS.MXD CBOWMAN 7/12/2012 7:50:19 AM



Legend

- 2009 Pier Area Sediment Sample Location (previous RI sample location) - Low Concentrations
- 2009 Pier Area Sediment Sample Location (previous RI sample location) - High Concentrations
- 2009 Dredged Area Sediment Sample Location
- 2009 Cove/Connector Channel Sediment Sample Location (previous RI sample location)
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)

- ≤ 1%
- 1-5%
- 5-10%

N
W E
S

0 150 300
Feet

Figure 7
2009 Sediment Sample Locations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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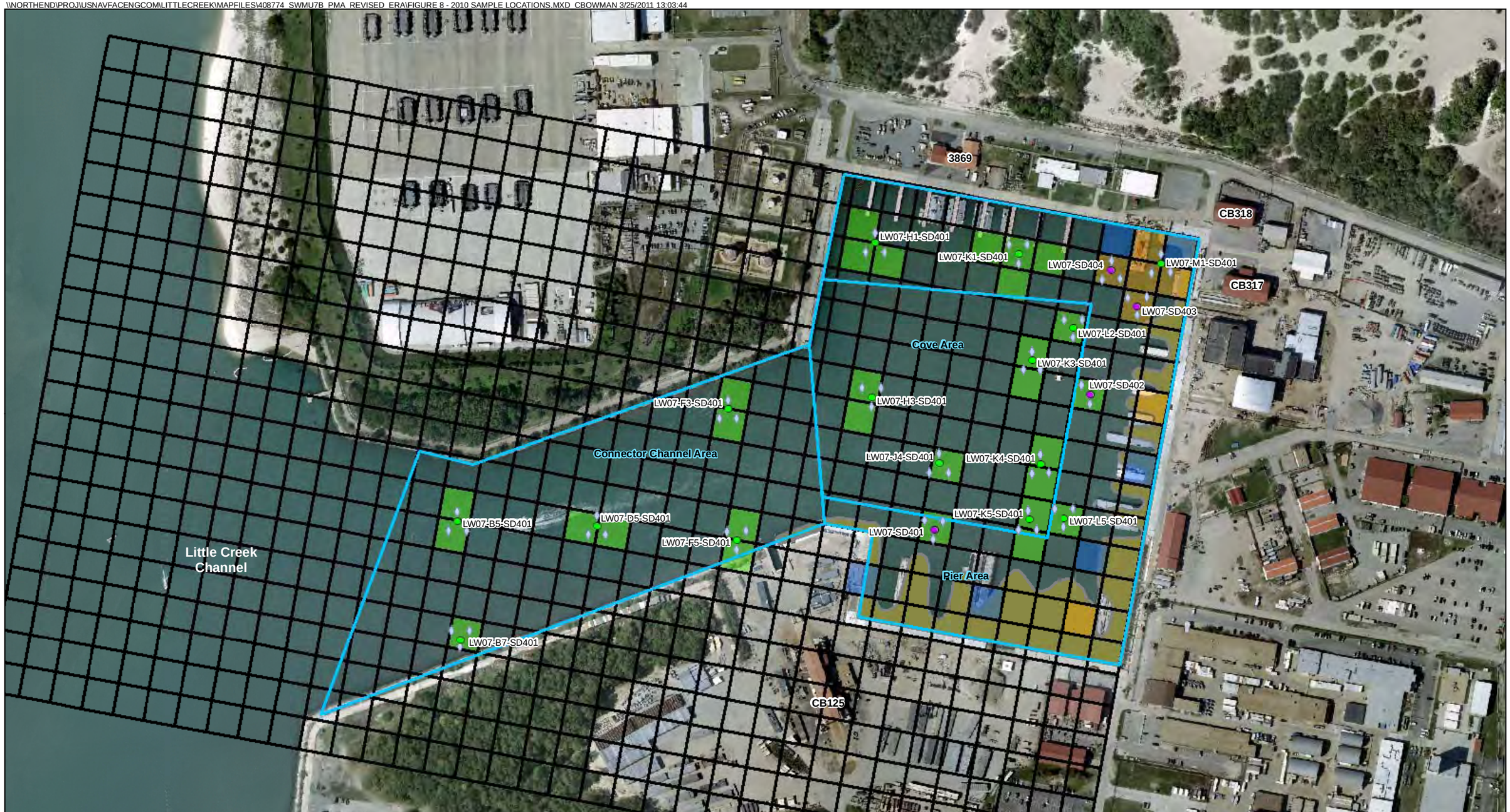
\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\FIGURE 8 - 2010 SAMPLE LOCATIONS.MXD CBOWMAN 3/25/2011 13:03:44



Legend

- Sediment Sample Station Location (mid-point of grab samples) (new location, no surface sediment COC data currently available)
- Sediment Sample Station Location (mid-point of grab samples) (previous RI/2009 post-MILCON sample location)
- Grab Sample Location
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)

- ≤ 1%
- 1-5%
- 5-10%

N
W E
S

0 150 300
Feet

Figure 8
2010 Sediment Sample Locations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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Attachment A
Raw Data

Table A-1
2002 Surface Sediment Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-B5-SD201		LW07-B5-SD202	LW07-B7-SD201	LW07-B7-SD202	LW07-D5-SD201	LW07-D5-SD202	LW07-F3-SD201	LW07-F3-SD202	LW07-F5-SD201	LW07-F5-SD202	LW07-H1-SD201	
Sample ID	LW07-B5-SD201-00-02C	LW07-B5-SD201P-00-02C	LW07-B5-SD202-00-02C	LW07-B7-SD201-00-02C	LW07-B7-SD202-00-02C	LW07-D5-SD201-00-02C	LW07-D5-SD202-00-02C	LW07-F3-SD201-00-02C	LW07-F3-SD202-00-02C	LW07-F5-SD201-00-02C	LW07-F5-SD202-00-02C	LW07-H1-SD201-00-02C	LW07-H1-SD201P-00-02C
Sample Date	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02	09/27/02
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
Acenaphthene	590 U	580 U	610 U	410 U	700 U	750 U	770 U	510 U	620 U	520 U	500 U	27 J	27 J
Acenaphthylene	22 J	22 J	24 J	410 U	27 J	24 J	42 J	35 J	50 J	41 J	26 J	250 J	310 J
Anthracene	45 J	55 J	42 J	11 J	47 J	47 J	70 J	86 J	100 J	140 J	68 J	350 J	340 J
Benzo(a)anthracene	75 J	92 J	73 J	26 J	100 J	84 J	120 J	140 J	190 J	300 J	150 J	1,300	1,800
Benzo(a)pyrene	110 J	120 J	120 J	25 J	150 J	130 J	230 J	220 J	310 J	310 J	160 J	1,800	1,800
Benzo(b)fluoranthene	170 J	190 J	190 J	42 J	270 J	190 J	350 J	360 J	470 J	440 J	260 J	4,100 J	4,100 J
Benzo(g,h,i)perylene	590 U	580 U	610 U	410 U	88 J	750 U	120 J	110 J	130 J	120 J	69 J	820	900
Benzo(k)fluoranthene	120 J	160 J	180 J	37 J	180 J	180 J	340 J	280 J	350 J	330 J	190 J	3,900 J	3,900 J
Chrysene	150 J	220 J	160 J	48 J	180 J	160 J	230 J	280 J	400 J	640	300 J	3,400	3,300
Dibenz(a,h)anthracene	28 J	34 J	24 J	410 U	41 J	750 U	770 U	54 J	54 J	59 J	48 J	480 J	480 J
Fluoranthene	84 J	130 J	100 J	59 J	140 J	100 J	190 J	170 J	240 J	420 J	450 J	970	880
Fluorene	590 U	580 U	610 U	410 U	700 U	750 U	770 U	510 U	620 U	22 J	500 U	54 J	47 J
Indeno(1,2,3-cd)pyrene	78 J	85 J	82 J	18 J	120 J	94 J	160 J	140 J	180 J	170 J	97 J	1,000	1,100
Naphthalene	590 U	580 U	610 U	410 U	700 U	750 U	770 U	510 U	620 U	520 U	500 U	21 J	750 U
Phenanthrene	29 J	54 J	26 J	410 U	36 J	32 J	52 J	42 J	65 J	100 J	50 J	300 J	320 J
Pyrene	150 J	190 J	190 J	49 J	250 J	170 J	390 J	250 J	360 J	440 J	400 J	4,400	3,900
Total Metals (mg/kg)													
Aluminum	8,170	8,450	9,140	1,230	11,400	12,300	12,000	4,510	7,560	4,930	6,510	10,600	9,220
Antimony	0.78 J	0.39 U	0.44 U	0.27 U	0.99 J	0.5 U	0.51 U	0.53 J	0.6 J	0.59 J	0.74 J	0.85 B	0.64 B
Arsenic	6.6	7.4	7.3	1.1 J	9.2	9.5	9.1	4.4	7.4	4.8	5.9	10.6	8.9
Barium	20.5 J	21.2 J	23.5 J	4.2 J	30.4 J	32.1 J	30.3 J	16.5 J	21.1 J	13.6 J	17.5 J	32.2 J	27.3 J
Beryllium	0.42 J	0.45 J	0.45 J	0.07 J	0.63 J	0.62 J	0.57 J	0.3 J	0.4 J	0.28 J	0.34 J	0.79 J	0.55 J
Cadmium	0.1 U	0.09 U	0.11 U	0.06 U	0.12 J	0.12 U	0.16 J	0.11 J	0.1 U	0.08 U	0.09 J	0.88 J	0.57 J
Calcium	3,620 J	4,040 J	3,900 J	2,050 J	11,600 J	4,330 J	3,870 J	22,100 J	7,300 J	2,380 J	2,250 J	3,700	3,710
Chromium	19.9	21.5	22.6	3.9	28.1	30.3	29.5	12.4	22.8	15	18.2	36	33.1
Cobalt	3.8 J	3.9 J	4.2 J	0.62 J	5.1 J	5.2 J	5 J	2.3 J	3.4 J	2.2 J	2.8 J	5.6 J	4.7 J
Copper	39.7	48.9	53.5	9.2	68.7	72.5	70.3	42.7	55.9	37.6	47.7	110	108
Cyanide	0.13 U	0.12 U	0.14 U	0.08 U	0.16 U	0.17 U	0.17 U	0.12 U	0.13 U	0.11 U	0.11 U	0.17 U	0.17 U
Iron	16,300	17,400	18,500	2,360	22,100	24,700	23,200	9,180	15,500	10,400	13,300	22,000	18,800
Lead	20.2	27.9	28.4	5.7	37.8	38.1	38.5	30.1	38.1	36.2	32.9	58.9	69.1
Magnesium	3,860	4,010	4,350	757 J	5,350	5,660	5,480	2,620	3,650	2,300	2,880	5,700	5,090
Manganese	126	132	151	26.1	184	208	196	91.1	123	76.3	93.8	183	157
Mercury	0.13 J	0.12 J	0.15	0.04 U	0.16	0.25	0.23	0.12 J	0.19	0.12	0.14	0.46	0.33
Nickel	9.8 J	10.8 J	10.8 J	1.6 J	14.2 J	14.3 J	13.8 J	5.5 J	8.9 J	6.3 J	8 J	15.4 J	13 J
Potassium	1,720 J	1,740 J	1,870 J	328 J	2,360 J	2,610 J	2,510 J	1,140 J	1,650 J	1,010 J	1,350 J	2,680	2,330
Selenium	1.7 J	0.97 U	1.1 U	0.68 U	1.4 J	1.3 U	1.5 J	0.92 U	1.1 U	0.87 U	1.3 J	1.4 U	1.3 U
Silver	0.28 U	0.26 U	0.29 U	0.18 U	0.32 U	0.33 U	0.34 U	0.24 U	0.28 U	0.23 U	0.23 U	0.39 J	0.35 U
Sodium	6,840	6,690	7,470	2,490	8,620	10,000	10,800	5,270	7,430	4,290	5,400	11,500	11,400
Thallium	0.83 UJ	0.78 UJ	0.87 UJ	0.55 UJ	0.95 UJ	1 UJ	1 UJ	0.74 UJ	0.84 UJ	0.7 UJ	0.68 UJ	1.1 U	1 U
Tin	1.4 U	1.3 J	2.1 J	1 J	1.6 J	3 J	2.5 J	1.6 J	1.7 J	1.8 J	2.3 J	6.2 J	5.5 J
Vanadium	22.4	24.6	25.5	4.2 J	32.7	32.7	32.6	13.3 J	21.6	13.9 J	18.3	32.7	28.4
Zinc	139	149	174	34.8	223	223	222	146	212	142	162	397	351
Wet Chemistry (mg/kg)													
Ammonia	3.9	NA	4.56	2.48 U	9.18	12.7	10.1	4.54	10.5	3.17 U	3.02 U	20.2	NA
Total organic carbon (TOC)	16,830	NA	24,160	3,125	18,670	29,330	30,490	12,900	22,230	24,170	8,024	20,310	21,790
pH	7.94	7.85	7.85	8.18	7.86	7.78	7.69	8.05	8.06	8.14	7.96	7.9	7.93
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)													
Cadmium	0.0014 J	NA	NA	3.60E-04 J	NA	0.0023 J	NA	0.0015 J	NA	0.0012 J	NA	0.003 J	NA
Copper	0.35 J	NA	NA	0.093 J	NA	0.51 J	NA	0.34 J	NA	0.26 J	NA	0.53 J	NA
Lead	0.073 J	NA	NA	0.033 J	NA	0.092 J	NA	0.084 J	NA	0.06 J	NA	0.13 J	NA
Mercury	3.40E-05 B	NA	NA	1.50E-05 B	NA	8.50E-05 J	NA	6.00E-05 J	NA	1.20E-04 J	NA	2.10E-05 B	NA
Nickel	0.036 J	NA	NA	0.01 B	NA	0.056 J	NA	0.029 J	NA	0.027 J	NA	0.068 J	NA
Zinc	1.4 J	NA	NA	0.59 J	NA	2 J	NA	1.9 J	NA	1.2 J	NA	3 J	NA
Cation Exchange Capacity (MEQ/100G)													
Cation Exchange Capacity	10.2	NS	NS	5.9	NS	9.6	NS	15	NS	11.5	NS	10.6	NS

Notes:
J - Analyte Present
B - Possible blank contamination
U - The material was analyzed for, but not detected
NA - Not analyzed
NS - Not sampled
mg/kg - Milligrams per kilogram
pH - pH units
µmol/g - Micromoles per gram

Table A-1
2002 Surface Sediment Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-H1-SD202	LW07-H3-SD201		LW07-H3-SD202	LW07-H5-SD201	LW07-H5-SD202	LW07-J4-SD201	LW07-J4-SD202	LW07-K1-SD201	LW07-K1-SD202	LW07-K3-SD201	LW07-K3-SD202	LW07-K4-SD201
Sample ID	LW07-H1-SD202-00-02C	LW07-H3-SD201-00-02C	LW07-H3-SD201P-00-02C	LW07-H3-SD202-00-02C	LW07-H5-SD201-00-02C	LW07-H5-SD202-00-02C	LW07-J4-SD201-00-02C	LW07-J4-SD202-00-02C	LW07-K1-SD201-00-02C	LW07-K1-SD202-00-02C	LW07-K3-SD201-00-02C	LW07-K3-SD202-00-02C	LW07-K4-SD201-00-02C
Sample Date	09/27/02	09/27/02	09/27/02	09/27/02	09/26/02	09/26/02	09/28/02	09/28/02	09/27/02	09/27/02	09/28/02	09/28/02	09/28/02
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
Acenaphthene	800 U	800 U	790 U	790 U	420 U	660 U	720 U	700 U	970 U	2,000	540 U	650 U	26 J
Acenaphthylene	180 J	74 J	89 J	55 J	16 J	660 U	43 J	56 J	120 J	160 J	77 J	96 J	210 J
Anthracene	320 J	150 J	150 J	100 J	320 J	87 J	120 J	73 J	430 J	1,000	94 J	280 J	440 J
Benzo(a)anthracene	1,000	260 J	330 J	210 J	120 J	170 J	180 J	210 J	1,000	2,000	300 J	360 J	2,700
Benzo(a)pyrene	1,300	440 J	520 J	320 J	100 J	140 J	270 J	280 J	1,000	1,300	470 J	630 J	1,800
Benzo(b)fluoranthene	2,800 J	670 J	860	500 J	160 J	170 J	730 J	750 J	1,600	1,900	1,100 J	1,600 J	3,600 J
Benzo(g,h,i)perylene	660 J	200 J	220 J	160 J	420 U	660 U	170 J	180 J	400 J	440 J	300 J	350 J	950
Benzo(k)fluoranthene	2,700 J	560 J	600 J	380 J	140 J	170 J	710 J	730 J	1,200	1,700	1,100 J	1,500 J	3,100 J
Chrysene	3,000	660 J	700 J	400 J	260 J	340 J	320 J	470 J	2,200	2,800	580	980	4,400 J
Dibenz(a,h)anthracene	290 J	89 J	95 J	62 J	23 J	24 J	70 J	70 J	170 J	210 J	110 J	150 J	340 J
Fluoranthene	770 J	300 J	330 J	230 J	190 J	270 J	200 J	450 J	990	8,900 D	210 J	410 J	4,200
Fluorene	40 J	800 U	790 U	790 U	59 J	660 U	720 U	700 U	970 U	690 J	16 J	650 U	39 J
Indeno(1,2,3-cd)pyrene	750 J	270 J	320 J	210 J	66 J	72 J	170 J	210 J	510 J	660 J	310 J	390 J	1,100 J
Naphthalene	800 U	800 U	790 U	790 U	13 J	660 U	720 U	700 U	970 U	940 U	540 U	650 U	23 J
Phenanthrene	250 J	110 J	100 J	85 J	130 J	80 J	87 J	56 J	360 J	3,600	67 J	130 J	270 J
Pyrene	2,800	600 J	710 J	390 J	340 J	350 J	1,200	730	3,900	6,800	600	940	7,100 D
Total Metals (mg/kg)													
Aluminum	12,300	11,000	12,000	11,300	1,910	12,200	12,700	11,200	14,800	13,100	5,980	8,190	7,860
Antimony	1.2 B	0.54 U	0.61 J	0.53 U	0.33 J	0.46 U	1.1 B	0.79 B	0.98 J	0.97 J	0.74 B	0.52 B	0.57 B
Arsenic	11.3	9.2	10.4	9	1.5 J	7.6	10.6	8.7	11.4	9.6	6.2	7.3	8.2
Barium	36.7 J	28.3 J	30.6 J	29.3 J	9.2 J	27.2 J	33.1 J	30.4 J	38.6 J	33.8 J	20.1 J	24.9 J	23.7 J
Beryllium	0.72 J	0.6 J	0.64 J	0.57 J	0.14 J	0.6 J	0.68 J	0.66 J	0.73 J	0.64 J	0.49 J	0.52 J	0.49 J
Cadmium	0.59 J	0.45 J	0.26 J	0.33 J	0.07 U	0.11 U	0.6 J	0.22 J	0.31 J	0.28 J	0.35 J	0.33 J	0.34 J
Calcium	5,660	4,180 J	3,450 J	4,080 J	2,820 J	6,520 J	3,560	2,720	4,040 J	4,390 J	2,270	4,510	3,640
Chromium	39	29.1	32.7	30.2	15.9	28.4	34.9	31.3	39.2	37.4	30.4	25.2	28.8
Cobalt	6.3 J	4.7 J	5 J	4.6 J	0.99 J	5.3 J	6.1 J	5.8 J	6 J	5.2 J	4 J	4.2 J	4.4 J
Copper	134	78.7	90	83.5	35.2	21.6	65.7	55	118	102	65	63.2	70.1
Cyanide	0.2 J	0.18 U	0.17 B	0.17 U	0.09 U	0.15 U	0.16 U	0.16 U	0.22 U	0.2 U	0.12 U	0.15 U	0.22 J
Iron	25,200	22,700	25,200	23,200	6,080	21,600	23,200	20,900	29,300	25,100	13,400	17,100	17,100
Lead	70.1	56.9	53.5	50.8	56.4	63.1	50.7	46.9	65.2	67.6	255	40.1	152
Magnesium	6,520	5,350	5,610	5,340	1,030 J	5,230	5,710	5,380	7,090	6,260	3,130	4,160	4,000
Manganese	204	173	185	172	42.8	167	188	180	209	175	112	143	137
Mercury	0.46	0.27	0.27	0.76	0.05 J	0.14	0.66	0.24	0.3	0.31	0.15	0.25	0.19 J
Nickel	17.6 J	13.1 J	14.2 J	13.6 J	2.7 J	14 J	16.4 J	16.4 J	16.9 J	15.2 J	15.5	12.9 J	13.8 J
Potassium	3,100	2,430 J	2,670 J	2,550 J	386 J	2,330 J	2,890	2,550	3,390 J	2,960 J	1,410 J	1,940	1,840 J
Selenium	1.3 U	1.8 J	2 J	2.5 J	0.73 U	1.5 J	1.3 U	1.3 U	2.5 J	1.6 J	0.91 U	1.1 U	1.2 U
Silver	0.36 U	0.36 U	0.38 U	0.36 U	0.2 U	0.3 U	0.35 U	0.33 U	0.45 U	0.43 U	0.24 U	0.29 U	0.31 U
Sodium	12,600	11,500	10,700	11,000	1,930	7,630	10,500	9,580	15,400	14,900	5,500	7,940	7,640
Thallium	1.1 U	1.1 UJ	1.1 UJ	1.1 UJ	0.59 UJ	0.91 UJ	1 U	1 U	1.3 UJ	1.3 UJ	0.73 U	0.88 U	0.93 U
Tin	6.7 J	2.4 J	2.5 J	2.1 J	1.6 J	1.5 U	4.8 J	6.6 J	2.8 J	2.6 J	5.8 J	5.2 J	9.4 J
Vanadium	36.7	29.1	31.5	29.9	5.6 J	29.6	37.4	31.2	38.3	33.9	18.4	24.2	24.2
Zinc	445	299	328	310	157	97	308	299	415	383	402	283	303
Wet Chemistry (mg/kg)													
Ammonia	23.8	8.98	NA	7.41	2.54 U	3.99 U	21	17.5	41.2	40.7	8.17	11.9	11.5
Total organic carbon (TOC)	21,790	22,280	NA	23,260	3,463	15,590	14,950	15,900	28,880	23,400	10,780	10,800	13,870
pH	7.95	7.98	8.08	8.13	8.35	8.03	8	7.86	8.36	8.35	7.89	7.8	7.8
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)													
Cadmium	NA	0.0031 J	NA	NA	5.50E-04 J	NA	0.0023 J	NA	0.0041 J	NA	0.002 J	NA	0.0023 J
Copper	NA	0.68 J	NA	NA	0.24 J	NA	0.34 J	NA	0.93 J	NA	0.51 J	NA	0.39 J
Lead	NA	0.14 J	NA	NA	0.25 J	NA	0.09 J	NA	0.19 J	NA	0.14 J	NA	0.24 J
Mercury	NA	1.00E-04 J	NA	NA	1.00E-04 J	NA	6.00E-05 J	NA	1.30E-04 J	NA	3.80E-05 B	NA	6.00E-05 J
Nickel	NA	0.061 J	NA	NA	0.027 J	NA	0.051 J	NA	0.075 J	NA	0.072 J	NA	0.048 J
Zinc	NA	3 J	NA	NA	4.1 J	NA	2 J	NA	4.1 J	NA	2.8 J	NA	2.7 J
Cation Exchange Capacity (MEQ/100G)													
Cation Exchange Capacity	NS	15	NS	NS	5.4	NS	14	NS	9.7	NS	18.6	NS	17.6

Notes:
J - Analyte Present
B - Possible blank contamination
U - The material was analyzed for, but not detected
NA - Not analyzed
NS - Not sampled
mg/kg - Milligrams per kilogram
pH - pH units
µmol/g - Micromoles per gram

Table A-1
2002 Surface Sediment Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-K4-SD202	LW07-K5-SD201	LW07-K5-SD202	LW07-K6-SD201	LW07-K6-SD202	LW07-L2-SD201	LW07-L5-SD201	LW07-L5-SD202	LW07-L6-SD201	LW07-M1-SD201	LW07-M1-SD202	LW07-M3-SD201	LW07-M3-SD202
Sample ID	LW07-K4-SD202-00-02C	LW07-K5-SD201-00-02C	LW07-K5-SD202-00-02C	LW07-K6-SD201-00-02C	LW07-K6-SD202-00-02C	LW07-L2-SD201-00-02C	LW07-L5-SD201-00-02C	LW07-L5-SD202-00-02C	LW07-L6-SD201-00-02C	LW07-M1-SD201-00-02C	LW07-M1-SD202-00-02C	LW07-M3-SD201-00-02C	LW07-M3-SD202-00-02C
Sample Date	09/28/02	09/28/02	09/28/02	09/28/02	09/28/02	10/01/02	09/28/02	09/28/02	10/01/02	09/27/02	09/27/02	09/28/02	09/28/02
Chemical Name													
Semivolatile Organic Compounds (µg/kg)													
Acenaphthene	600 U	1,400	23 J	20 J	13 J	24 J	29 J	78 J	890 U	38 J	19 J	170 J	82 J
Acenaphthylene	140 J	340 J	130 J	23 J	21 J	190 J	260 J	520 J	190 J	170 J	91 J	790 J	430 J
Anthracene	320 J	1,000	1,500	92 J	85 J	360 J	630 J	2,200	500 J	410 J	160 J	2,000	840
Benzo(a)anthracene	550 J	1,400	680 J	190 J	260 J	1,500	1,200	7,500 D	960	660 J	270 J	4,900	3,100
Benzo(a)pyrene	830	1,600	830	190 J	200 J	1,300	1,700	5,100	1,300	850	420 J	6,100	3,000
Benzo(b)fluoranthene	2,000 J	2,800 J	2,000 J	440 J	300 J	3,000	3,800 J	12,000 J	2,700 J	1,300	660	7,800 D	7,600 J
Benzo(g,h,i)perylene	530 J	1,100	530 J	110 J	91 J	710 J	870	2,100	790 J	330 J	180 J	2,500	1,400
Benzo(k)fluoranthene	1,700 J	2,300 J	1,700 J	420 J	280 J	2,600	3,700 J	11,000 J	2,400 J	1,000	540 J	6,700 D	6,400 J
Chrysene	1,300 J	3,000 J	1,600 J	370 J	440	3,200 J	3,300	21,000 J	2,100 J	1,000	470 J	14,000 J	5,900
Dibenz(a,h)anthracene	210 J	330 J	160 J	34 J	32 J	280 J	370 J	1,200 J	220 J	140 J	79 J	1,200 J	630 J
Fluoranthene	610	1,700	500 J	280 J	330 J	950	1,200	4,300	1,600	830	700	4,700	3,400
Fluorene	27 J	620 J	260 J	21 J	20 J	44 J	85 J	220 J	42 J	750 U	650 U	280 J	150 J
Indeno(1,2,3-cd)pyrene	620 J	990 J	570 J	110 J	110 J	820 J	990	2,600	840 J	450 J	250 J	3,000	1,600
Naphthalene	600 U	1,500	32 J	410 U	32 J	790 U	790 U	29 J	890 U	750 U	650 U	34 J	26 J
Phenanthrene	230 J	3,200	800	140 J	76 J	320 J	460 J	1,100	390 J	220 J	87 J	960	650 J
Pyrene	1,300	5,100	1,300	470	380 J	3,600	2,300	12,000 D	2,500	1,400	1,200	13,000 D	11,000 D
Total Metals (mg/kg)													
Aluminum	6,990	12,600	11,300	1,870	1,920	13,700	11,300	11,200	11,400	10,600	9,040	9,520	11,000
Antimony	19 J	0.94 B	0.76 B	0.39 B	0.29 U	1.3 B	0.79 B	1.1 B	0.62 U	1.7 J	0.9 J	1 B	1.5 B
Arsenic	7.4	10.7	10.2	2 J	2.1 J	12.6	11.3	12.1	9.8	8.7	7.6	10.6	12.4
Barium	28.1 J	35.4 J	32.7 J	15.9 J	10.9 J	40.5 J	32.6 J	45.4 J	34 J	33.4 J	27.9 J	37.6 J	39.4 J
Beryllium	0.5 J	0.67 J	0.63 J	0.13 J	0.17 J	0.77 J	0.62 J	0.66 J	0.66 J	0.6 J	0.55 J	0.76 J	0.67 J
Cadmium	0.33 J	0.38 J	0.38 J	0.07 U	0.07 U	0.65 J	0.46 J	0.56 J	0.47 J	0.42 J	0.34 J	0.47 J	0.58 J
Calcium	2,910	2,900	3,180	1,140 J	7,540	5,280	2,560	7,060	2,800	4,020 J	5,870 J	9,510	6,390
Chromium	33.1	36	34.2	7.6	8.2	43.7	37.2	40.8	33.7	63.1	36.5	35.2	41.9
Cobalt	3.9 J	6.1 J	5.8 J	1.8 J	1.6 J	6.8 J	5.7 J	5.8 J	5.5 J	5 J	4.4 J	6.4 J	6.3 J
Copper	58.6	90	103	24.5	19.4	117	90.1	104	87	109	88	121	124
Cyanide	0.16 J	0.27 J	0.17 U	0.09 U	0.09 U	0.17 U	0.17 J	0.16 U	0.2 U	0.17 U	0.14 U	0.18 U	0.18 U
Iron	15,400	25,100	23,200	7,710	5,220	27,600	23,500	23,800	22,400	23,600	22,500	23,200	24,700
Lead	49.5	51.1	59.3	14	12.7	83.9	69.8	143	60	177	143	107	110
Magnesium	3,550	6,390	5,880	1,040 J	1,130 J	6,640	5,940	5,850	6,350	4,900	4,290	5,480	5,950
Manganese	125	204	190	38.5	33.7	220	185	178	167	151	130	177	180
Mercury	0.19	0.29	0.33	0.07 J	0.08 J	0.43	0.41	4.1	0.29	0.33	0.56	0.45	0.36
Nickel	11.1 J	16.6 J	23.4	4.1 J	4 J	19.1	15.1 J	16.2 J	14.9 J	15.9 J	14.2 J	25.4	18.3 J
Potassium	1,580 J	2,950	2,750	425 J	465 J	3,130	2,780	2,660	3,000	2,260 J	1,990 J	2,300	2,660
Selenium	1.1 U	1.5 U	1.3 U	0.73 U	0.71 U	1.3 U	1.3 U	1.3 U	1.6 U	1.3 U	1.4 J	1.3 U	1.4 U
Silver	0.29 U	0.4 U	0.36 U	0.2 U	0.19 U	0.35 U	0.35 U	0.38 J	0.42 U	0.35 U	0.32 J	0.36 U	0.39 U
Sodium	6,320	12,300	11,700	2,390	2,550	11,700	11,900	9,900	15,200	10,500	8,400	11,200	11,300
Thallium	0.86 U	1.2 U	1.1 U	0.59 U	0.57 U	1.1 U	1 U	1.1 U	1.2 U	1.1 UJ	0.9 UJ	1.1 U	1.2 U
Tin	5 J	6.6 J	8.8 J	3.2 J	3.3 J	7.1 J	5.6 J	6 J	5.4 J	6.6 J	5.1 J	14.5 J	9.1 J
Vanadium	21.4	36.4	33.4	6.8 J	7.6 J	40.2	33.9	34.7	34.2	30.3	26.6	31.7	37.1
Zinc	299	336	305	75.9	73.1	491	362	419	354	628	449	1,360	767
Wet Chemistry (mg/kg)													
Ammonia	11.8	35.7	23.1	3.5	2.6 U	15.8	20.4	21.1	28	11.5	3.92 U	24.4	21.9
Total organic carbon (TOC)	13,940	22,360	18,450	2,245	2,937	22,230	20,410	19,870	23,790	20,080	17,030	20,080	19,110
pH	7.79	7.92	7.82	8.2	8.04	7.8	7.89	8.01	7.65	8.32	7.86	7.81	7.92
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)													
Cadmium	NA	0.0028 J	NA	5.20E-04 J	NA	0.0039 J	0.0032 J	NA	0.0037 J	0.0042 J	NA	0.0036 J	NA
Copper	NA	0.56 J	NA	0.15 J	NA	0.67 J	0.78 J	NA	0.61 J	0.8 J	NA	0.89 J	NA
Lead	NA	0.16 J	NA	0.052 J	NA	0.15 J	0.15 J	NA	0.15 J	0.59 J	NA	0.33 J	NA
Mercury	NA	4.10E-05 B	NA	4.70E-05 B	NA	6.00E-04 J	6.50E-05 J	NA	6.00E-04 J	2.00E-04 J	NA	1.00E-04 J	NA
Nickel	NA	0.063 J	NA	0.019 J	NA	0.083 J	0.06 J	NA	0.07 J	0.11 J	NA	0.12 J	NA
Zinc	NA	3 J	NA	0.77 J	NA	3.2 J	3.5 J	NA	2.9 J	7.3 J	NA	10.7 J	NA
Cation Exchange Capacity (MEQ/100G)													
Cation Exchange Capacity	NS	13.4	NS	4.7	NS	8.9	8	NS	8.3	7.8	NS	14.2	NS

Notes:
J - Analyte Present
B - Possible blank contamination
U - The material was analyzed for, but not detected
NA - Not analyzed
NS - Not sampled
mg/kg - Milligrams per kilogram
pH - pH units
µmol/g - Micromoles per gram

Table A-2
2002 Subsurface Sediment Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-B5-SD201		LW07-B7-SD201	LW07-D5-SD201	LW07-F3-SD201	LW07-F5-SD201	LW07-H1-SD201	LW07-H3-SD201	LW07-H5-SD201	LW07-J4-SD201	LW07-K1-SD201
Sample ID	LW07-B5-SD201-02-02C	LW07-B5-SD201P-02-02C	LW07-B7-SD201-02-02C	LW07-D5-SD201-02-02C	LW07-F3-SD201-02-02C	LW07-F5-SD201-02-02C	LW07-H1-SD201-02-02C	LW07-H3-SD201-02-02C	LW07-H5-SD201-02-02C	LW07-J4-SD201-02-02C	LW07-K1-SD201-02-02C
Sample Date	09/30/02	09/30/02	09/29/02	09/30/02	09/29/02	09/29/02	09/29/02	09/30/02	09/26/02	09/30/02	09/28/02
Chemical Name											
Semivolatile Organic Compounds (µg/kg)											
Acenaphthene	630 U	490 U	510 U	430 U	580 U	390 U	27 J	970 U	580 U	720 U	520 U
Acenaphthylene	630 U	490 U	510 U	430 U	22 J	390 U	150 J	970 U	580 U	720 U	15 J
Anthracene	85 J	490 U	16 J	430 U	36 J	390 U	530 J	970 U	580 U	720 U	14 J
Benzo(a)anthracene	120 J	17 J	510 U	430 U	23 J	390 U	1,000	970 U	21 J	720 U	32 J
Benzo(a)pyrene	110 J	13 J	25 J	10 J	36 J	390 U	830	970 U	32 J	720 U	41 J
Benzo(b)fluoranthene	120 J	23 J	38 J	430 U	81 J	390 U	1,300	970 U	47 J	720 U	48 J
Benzo(g,h,i)perylene	130 J	490 U	510 U	430 U	580 U	390 U	420 J	970 U	580 U	720 U	520 U
Benzo(k)fluoranthene	120 J	23 J	31 J	430 U	55 J	390 U	1,200	970 U	50 J	720 U	48 J
Chrysene	130 J	19 J	510 U	430 U	45 J	390 U	1,600	970 U	27 J	720 U	45 J
Dibenz(a,h)anthracene	110 J	490 U	510 U	430 U	580 U	390 U	120 J	970 U	580 U	720 U	520 U
Fluoranthene	120 J	23 J	21 J	430 U	45 J	390 U	1,300	970 U	24 J	720 U	62 J
Fluorene	630 U	490 U	510 U	430 U	580 U	390 U	24 J	970 U	580 U	720 U	520 U
Indeno(1,2,3-cd)pyrene	120 J	490 U	26 J	430 U	30 J	390 U	550 J	970 U	25 J	720 U	29 J
Naphthalene	630 U	490 U	510 U	430 U	580 U	390 U	720 U	970 U	580 U	720 U	520 U
Phenanthrene	71 J	490 U	510 U	430 U	580 U	390 U	200 J	970 U	580 U	720 U	32 J
Pyrene	150 J	49 J	240 J	34 J	170 J	390 U	2,100	68 J	310 J	720 U	140 J
Total Metals (mg/kg)											
Aluminum	11,300 J	9,530 J	4,300	9,280 J	7,540	815	13,100	28,700 J	11,400	11,400 J	6,460
Antimony	0.58 J	0.5 J	0.34 UJ	0.38 J	0.42 UJ	0.28 UJ	0.49 UJ	0.82 J	0.48 J	0.52 UJ	0.35 UJ
Arsenic	6.3	4.7	2.7 J	4.7	5.3	0.71 U	8.8	15.1	7	5.6	5.3
Barium	25.8 J	19.8 J	11.5 J	18.7 J	18.2 J	2.9 J	33.3 J	51.8 J	26.2 J	24 J	16.9 J
Beryllium	0.59 J	0.45 J	0.22 J	0.48 J	0.41 J	0.06 J	0.72 J	1.2 J	0.63 J	0.53 J	0.29 J
Cadmium	0.11 U	0.08 U	0.08 U	0.07 U	0.19 J	0.07 U	0.66 J	0.17 U	0.09 U	0.13 U	0.08 U
Calcium	1,730 J	1,340 J	1,260 J	1,240 J	1,160 J	544 J	3,840	2,710 J	5,220	1,450 J	707 J
Chromium	23.7	18.8	9.4	18.3	18.4	2.7	37	52	22.6	23.6	13.9
Cobalt	5.1 J	3.8 J	1.7 J	4 J	3.4 J	0.39 J	5.2 J	10.4 J	5.9 J	4.6 J	2.3 J
Copper	9.7	7.9	9.3	7.4	31.9	3.5 J	105	21.3	20.3	7.5 J	8.2
Cyanide	0.14 U	0.11 U	0.11 U	0.09 U	0.15 J	0.08 U	0.18 J	0.21 U	0.12 U	0.16 U	0.14 J
Iron	19,200	14,600	7,250	14,500	13,400	1,560	24,100	40,600	21,500	19,900	10,100
Lead	11.6	8.4	8.1	8.2	20.1	1.6	104	24.4	19.3	8.7	6.8
Magnesium	4,580	3,480	1,780	3,620	3,140	444 J	5,580	9,330	4,340	4,720	2,230
Manganese	150	114	51.9	122	89.7	9	162	273	137	143	62.3
Mercury	0.09 U	0.05 U	0.11 B	0.04 J	0.35	0.04 J	0.42	0.12 U	0.09 J	0.11 J	0.06 J
Nickel	12.3 J	9.4 J	4.5 J	9.4 J	8.9 J	0.69 B	15.8 J	25	11.9 J	11.5 J	5.8 J
Potassium	2,380 J	1,820 J	828 J	1,910 J	1,460 J	199 J	2,800 J	5,210 J	2,150 J	2,230 J	1,180 J
Selenium	1.2 J	0.86 J	0.86 U	0.75 U	1.3 J	0.71 U	1.7 J	1.7 U	1.6 B	1.3 U	1.3 J
Silver	0.29 U	0.23 U	0.23 U	0.2 U	0.28 U	0.19 U	0.33 U	0.44 U	0.26 U	0.34 U	0.24 U
Sodium	6,980	5,140	3,330	5,080	5,110	2,030	10,000	13,300	7,020	6,760	3,780
Thallium	0.86 UJ	0.68 UJ	0.69 UJ	0.6 UJ	0.84 UJ	0.56 UJ	0.98 UJ	1.3 UJ	0.78 UJ	1 UJ	0.71 UJ
Tin	2.3 J	1.1 U	1.1 U	1.4 J	2.2 J	1.5 J	2.6 J	3.2 J	1.3 U	3.4 J	1.4 J
Vanadium	29	23.1	12.3 J	21.4	22.6	3.5 J	36.7	60.1	27.1	26	18.6
Zinc	42.7	32.9	31.9	32	127	1.3 B	375	87.5	81.4	36.3	21.6
Wet Chemistry (mg/kg)											
Ammonia	3.87 U	NA	3.06 U	2.61 U	25.8	2.38 U	91.3	5.83 U	6.13	12.7	26.5
Total organic carbon (TOC)	14,690	NA	5,591	7,718	12,870	1,337	24,430	21,800	8,387	15,150	9,591
pH	8.15	8.24	8.15	8.18	8.52	7.99	8.58	8.15	8.17	8.05	8.65

Notes:
U - Not detected
J - Analyte Present. Reported value may not be accurate or precise.
NA- Not analyzed.
mg/kg - Milligrams per kilogram
pH - pH units
µmol/g - Micromoles per gram

Table A-2
2002 Subsurface Sediment Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-K3-SD201		LW07-K4-SD201		LW07-K5-SD201	LW07-K6-SD201	LW07-L2-SD201	LW07-L5-SD201	LW07-L6-SD201	LW07-M1-SD201	LW07-M3-SD201
Sample ID	LW07-K3-SD201-02-02C	LW07-K3-SD201P-02-02C	LW07-K4-SD201-02-02C	LW07-K4-SD201P-02-02C	LW07-K5-SD201-02-02C	LW07-K6-SD201-02-02C	LW07-L2-SD201-02-02C	LW07-L5-SD201-02-02C	LW07-L6-SD201-02-02C	LW07-M1-SD201-02-02C	LW07-M3-SD201-02-02C
Sample Date	09/29/02	09/29/02	09/30/02	09/30/02	09/30/02	09/28/02	10/01/02	09/29/02	10/01/02	09/29/02	09/28/02
Chemical Name											
Semivolatile Organic Compounds (µg/kg)											
Acenaphthene	400 U	600 U	540 U	520 U	430 U	11,000 JD	500 U	730 U	610 U	930	47 J
Acenaphthylene	400 U	600 U	540 U	520 U	430 U	510 J	26 J	730 U	53 J	170 J	130 J
Anthracene	400 U	600 U	540 U	26 J	16 J	750 U	50 J	730 U	65 J	1,700	530 J
Benzo(a)anthracene	13 J	600 U	540 U	32 J	41 J	8,400 JD	51 J	730 U	150 J	1,100	820 J
Benzo(a)pyrene	11 J	600 U	24 J	44 J	33 J	3,000	140 J	730 U	310 J	660	770 J
Benzo(b)fluoranthene	400 U	600 U	24 J	52 J	37 J	4,500	220 J	730 U	400 J	1,100	1,400
Benzo(g,h,i)perylene	400 U	600 U	540 U	520 U	430 U	950	61 J	730 U	150 J	270 J	350 J
Benzo(k)fluoranthene	400 U	600 U	29 J	47 J	40 J	3,400	170 J	730 U	430 J	890	1,000 J
Chrysene	11 J	600 U	15 J	31 J	48 J	6,000	73 J	730 U	290 J	1,600	1,300
Dibenz(a,h)anthracene	400 U	600 U	540 U	520 U	31 J	320 J	500 U	730 U	42 J	52 J	84 J
Fluoranthene	17 J	600 U	19 J	30 J	26 J	56,000 D	49 J	21 J	120 J	7,600 D	3,200
Fluorene	400 U	600 U	540 U	520 U	430 U	16,000 D	500 U	730 U	610 U	440 J	80 J
Indeno(1,2,3-cd)pyrene	400 U	600 U	19 J	23 J	40 J	1,200	87 J	730 U	200 J	340 J	370 J
Naphthalene	400 U	600 U	540 U	520 U	430 U	97 J	500 U	31 J	610 U	24 J	1,000 U
Phenanthrene	400 U	600 U	540 U	520 U	430 U	62,000 D	20 J	730 U	45 J	4,500	330 J
Pyrene	33 J	29 J	89 J	85 J	48 J	44,000 D	550	31 J	790	5,400 D	7,600
Total Metals (mg/kg)											
Aluminum	8,630	11,900	12,700 J	8,560 J	9,720 J	13,600	10,200 J	10,600	9,960 J	12,100	20,700
Antimony	0.33 J	0.42 UJ	0.36 UJ	0.36 UJ	0.44 J	1.3 J	0.79 J	0.53 UJ	0.41 UJ	2 J	1.5 J
Arsenic	5.2	6.3	6.3	4.7	7.1	9.9	7.6	9.2	7.5	9.8	15.4
Barium	17.7 J	24.4 J	24.8 J	18 J	21.1 J	39.1 J	24.1 J	21.5 J	29.9 J	44.7 J	55.3 J
Beryllium	0.42 J	0.57 J	0.55 J	0.42 J	0.4 J	0.81 J	0.62 J	0.52 J	0.48 J	1.5 J	1.2 J
Cadmium	0.07 U	0.1 U	0.09 U	0.09 U	0.07 U	0.66 J	0.38 J	0.13 U	0.56 J	1.1 J	0.82 J
Calcium	1,290	1,460 J	1,540 J	1,210 J	763 J	16,200	1,520 J	1,570 J	2,160 J	2,130	4,550
Chromium	17.5	24.6	24.6	19.2	18.6	45.2	30.6	22.5	27.3	49.9	53.2
Cobalt	3.5 J	4.8 J	4.8 J	3.6 J	4.1 J	6.5 J	4.5 J	4.6 J	4.2 J	8.6 J	10.1 J
Copper	5.6 J	8.2 J	11.1	8.9	9.4	135	54.7	7.7 J	71.5	220	145
Cyanide	0.08 U	0.12 U	0.12 U	0.12 U	0.09 U	0.2 J	0.11 U	0.17 U	0.14 U	0.38 J	0.36 J
Iron	16,400	21,200	18,800	15,200	13,300	29,700	17,600	22,500	20,400	32,200	48,500
Lead	6.5	8.9	12.6	10.1	8.7	135	52.7	8.9	85.3	139	156
Magnesium	3,610	4,890	4,920	3,480	2,430	7,910	4,040	4,440	4,750	6,210	8,370
Manganese	109	147	150	118	68.5	213	141	137	141	212	275
Mercury	0.05 J	0.08 J	0.06 U	0.05 J	0.06 U	1.1	0.28	0.1 J	0.24	1.5	0.96
Nickel	9 J	12.4 J	12.1	10.1 J	7.6 J	22.6	14.3	11.7 J	11.7 J	41.5	43.9
Potassium	1,680 J	2,220 J	2,560 J	1,670 J	1,470 J	2,860 J	2,090 J	1,890 J	2,280 J	2,570 J	4,620 J
Selenium	0.76 J	1.1 U	1.6	0.9 U	0.79 U	1.5 J	0.92 J	1.3 U	1.4 J	1.3 J	1.7 U
Silver	0.19 U	0.28 U	0.24 U	0.24 U	0.21 U	0.33 U	0.22 U	0.35 U	0.27 U	0.85 B	0.78 B
Sodium	4,280	6,070	6,930	4,700	4,180	9,060	6,830	6,230	9,710	8,530	15,900
Thallium	0.57 UJ	0.84 UJ	0.72 UJ	0.72 UJ	0.63 UJ	1 UJ	0.67 UJ	1.1 UJ	0.81 UJ	0.88 UJ	1.4 UJ
Tin	0.96 U	1.4 U	2 J	1.7 J	1 U	7 J	5.6 J	1.8 U	1.7 J	23.5	16.7 J
Vanadium	19.8	26.2	28.9	21.7	22.5	40.5	25.7	32.3	27.5	39.2	60.3
Zinc	27.6	38.3	45.1	34.7	29.3	633	382	33.9	398	1,390	828
Wet Chemistry (mg/kg)											
Ammonia	8.83	NA	8.19	NA	15.8	38.8	5.96	17.3	8.06	11.9	6.23 U
Total organic carbon (TOC)	9,016	NA	6,321	NA	12,710	21,690	12,820	17,070	14,280	27,940	34,450
pH	8.36	8.12	8.15	8.26	8.15	8.44	8.12	7.8	8.14	8.64	8.16

Notes:
U - Not detected
J - Analyte Present. Reported value may not be accu
NA- Not analyzed.
mg/kg - Milligrams per kilogram
pH - pH units
µmol/g - Micromoles per gram

Table A-3
2009 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-B5		LW07-B7	LW07-D5	LW07-F3	LW07-F5	LW07-H1	LW07-H3	LW07-J4
Sample ID	LW07-B5-SD301-00-09D	LW07-B5-SD301P-00-09D	LW07-B7-SD301-00-09D	LW07-D5-SD301-00-09D	LW07-F3-SD301-00-09D	LW07-F5-SD301-00-09D	LW07-H1-SD301-00-09D	LW07-H3-SD301-00-09D	LW07-J4-SD301-00-09D
Sample Date	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09
Chemical Name									
Total Metals (mg/kg)									
Copper	49.2 J	70.1 J	70.2	70.7	71.1	19.8	51.7	87.8	101
Lead	27.3 J	22.6 J	34.2 J	36.6 J	50.4 J	18.6 J	70.3 J	57.9 J	53.4 J
Mercury	0.122	0.119	0.103	0.236	0.229	0.0581	0.129	0.261	0.315
Tin	5.06 B	4.07 B	4.88 B	6.27 B	5.72 B	4 B	8.67 B	6.38 B	7.5 B
Tributyltin	4.3	3.5 J	NS	NS	NS	NS	5.8	3.4	NS
Zinc	160	156	206	241	277	85.4	943	343	366
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Acid Volatile Sulfide	3.7	NS	3.2	4.1	7.9	0.74	20.7 N	7.4 N	13.5
Cadmium	0.0041	NS	0.0048	0.0061	0.0031	0.0011 J	0.0061	0.0075	0.0026
Copper	0.36	NS	0.5	0.7	0.26	0.031	0.62	0.62	0.29
Lead	0.075	NS	0.11	0.14	0.069	0.012	0.13	0.78	0.073
Mercury	0.000051 U	NS	0.000042 U	0.000064 U	0.000041 U	0.000034 U	0.000096 UN	0.00011 UN	0.000054 U
Nickel	0.026	NS	0.031	0.044	0.012	0.0096	0.025	0.13	0.018
Silver	0.0047 U	NS	0.0039 U	0.006 U	0.0038 U	0.0032 U	0.0089 U	0.011 U	0.005 U
Zinc	1.8	NS	2.3	3	1.3	0.24	3.5	12	1.4
Wet Chemistry (mg/kg)									
pH	7.77	NS	8.22	7.45	7.83	8.07	7.85	7.82	8.22
Total Organic Carbon (TOC)	14,100 N	NS	20,300 N	28,000 N	13,300 N	13,300 N	21,400	10,800 N	20,600
Grain Size (PCT/P)									
GS07 Sieve 1" (25.0 mm)	100	100	NS	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	NS	100	100	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	100	100	NS	100	100	100	100	100	100
Sieve No. 004 (4.75 mm)	100	100	NS	100	100	99.3	100	100	100
Sieve No. 010 (2.00 mm)	100	99.8	NS	100	100	99.2	100	100	100

Notes:
B - Not detected substantially above the level reported in laboratory or field blanks
J - Analyte present. Value may or may not be accurate or precise
JN - See 'J' and 'N'
L - Analyte present. Value may be biased low. Value may be higher
N - Spiked sample recovery was not within control limits
NS - Not sampled
U - The material was analyzed for, but not detected
UN - See 'U' and 'N'
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Table A-3
2009 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-K1				LW07-K3	LW07-K4	LW07-K5	LW07-L2	
Sample ID	LW07-K1-SD301-00-09D	LW07-K1-SD302-00-09D	LW07-K1-SD303-00-09D	LW07-K1-SD304-00-09D	LW07-K3-SD301-00-09D	LW07-K4-SD301-00-09D	LW07-K5-SD301-00-09D	LW07-L2-SD301-00-09D	LW07-L2-SD301P-00-09D
Sample Date	11/24/09	11/24/09	11/24/09	11/24/09	11/24/09	11/23/09	11/23/09	11/24/09	11/24/09
Chemical Name									
Total Metals (mg/kg)									
Copper	101	110	114	121	70.4	65.2	91.3	84.6	101
Lead	72.1 J	80.7 J	72.6 J	61.2 J	76.4 J	42.1	48.5	44.4 J	58.4 L
Mercury	0.36	0.383	0.352	0.311	0.244	0.236	0.381	0.214	0.172
Tin	7.81 B	10.8 B	8.34 B	7.4 B	10.1	5.78 B	7.21 B	12.5	14.8
Tributyltin	3.6 J	5.2	4.8	5.6	NS	NS	NS	NS	NS
Zinc	461	540	479	449	321	304	381	466	432
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Acid Volatile Sulfide	10.1 N	8.4 N	12.1 N	10.2 N	1.4 N	3.6	2.4 J	0.72 UN	NS
Cadmium	0.0081	0.0071	0.012	0.0082	0.0073	0.0021	0.0032	0.0039 J	NS
Copper	0.8	0.84	0.81	0.8	0.49	0.15	0.18	0.45	NS
Lead	0.23	0.23	0.24	0.2	0.18	0.12	0.073	0.13	NS
Mercury	0.00013 UN	0.00013 UN	0.00014 UN	0.00012 UN	0.000089 UN	0.000021 UN	0.000026 UN	0.00009 UN	NS
Nickel	0.041	0.44	0.043	0.038	0.053	0.012	0.016	0.074	NS
Silver	0.012 U	0.012 U	0.013 U	0.011 U	0.0083 U	0.002 U	0.0024 U	0.0084 U	NS
Zinc	4.9	5.4	5.2	4.8	5.6	1.4	1.9	2.7	NS
Wet Chemistry (mg/kg)									
pH	8.08	7.76	8.17	7.48	7.26	8.15	8.22	7.63	NS
Total Organic Carbon (TOC)	19,600	25,600	29,000	22,400	11,300	20,600 N	30,900 N	12,100	NS
Grain Size (PCT/P)									
GS07 Sieve 1" (25.0 mm)	100	100	100	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	100	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	100	100	100	100	100	99.5	100	100	100
Sieve No. 004 (4.75 mm)	100	100	100	100	100	99.3	100	100	100
Sieve No. 010 (2.00 mm)	100	100	100	100	99.1	99	100	99.7	99.8

Notes:
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J - Analyte present. Value may or may not be accurate or precise
JN - See 'J' and 'N'
L - Analyte present. Value may be biased low. Value may be higher
N - Spiked sample recovery was not within control limits
NS - Not sampled
U - The material was analyzed for, but not detected
UN - See 'U' and 'N'
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Table A-3
2009 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-L5	LW07-M1				LW07-SD301		LW07-SD302	LW07-SD303
Sample ID	LW07-L5-SD301-00-09D	LW07-M1-SD301-00-09D	LW07-M1-SD302-00-09D	LW07-M1-SD303-00-09D	LW07-M1-SD304-00-09D	LW07-SD301-00-09D	LW07-SD301P-00-09D	LW07-SD302-00-09D	LW07-SD303-00-09D
Sample Date	11/23/09	11/24/09	11/24/09	11/24/09	11/24/09	11/23/09	11/23/09	11/23/09	11/23/09
Chemical Name									
Total Metals (mg/kg)									
Copper	94.6	136	69.4	110	170	252	187	61.5	30.7
Lead	55.3	233 J	98.6 J	97.8 J	131 L	526	587	48.6	20.8
Mercury	0.309	0.503	0.181	0.534	0.63	0.343 J	1.77 J	0.304	0.084
Tin	8.4 B	22.8	12.7	11.7 B	29.9	29.7	23.9	6.84 B	4.6 B
Tributyltin	4.8 J	5.2	2	7.6	3.3	5.6 J	3.4 J	NS	NS
Zinc	401	794	349	504	840	1,170	1,440	252	143
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Acid Volatile Sulfide	3.8	10.5	2.9 JN	9.5 N	8.2 N	NS	0.33 J	5.3	3.5
Cadmium	0.0031	0.0034	0.0033 J	0.0099	0.011	NS	0.0019	0.005	0.0064
Copper	0.11	0.3	0.36	0.67	0.91	NS	0.19	0.25	0.14
Lead	0.065	0.17	0.3	0.41	0.96	NS	0.55	0.16	0.066
Mercury	0.00003 UN	0.000049 UN	0.000076 UN	0.00013 UN	0.00011 UN	NS	0.000015 UN	0.000064 UN	0.000044 UN
Nickel	0.0092	0.027	0.072	0.13	0.1	NS	0.051	0.036	0.017
Silver	0.0028 U	0.0045 U	0.0071 U	0.012 U	0.01 U	NS	0.0014 U	0.006 U	0.0041 U
Zinc	1.7	2.1	4.4	5.6	7.9	NS	5.5	3.2	1.4
Wet Chemistry (mg/kg)									
pH	8.06	8.06	8.18	7.89	8.81	8.61	NS	8.17	8.07
Total Organic Carbon (TOC)	16,300 N	24,000	6,890	15,100	15,700	9,360 N	NS	6,910 N	8,580 N
Grain Size (PCT/P)									
GS07 Sieve 1" (25.0 mm)	100	100	100	100	98.5	NS	NS	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	98.2	NS	NS	100	100
GS09 Sieve 0.5" (12.5 mm)	100	100	100	100	98.2	NS	NS	92.5	100
Sieve No. 004 (4.75 mm)	100	100	100	100	98.2	NS	NS	90.6	97.6
Sieve No. 010 (2.00 mm)	100	100	100	100	97.3	NS	NS	90.6	96

Notes:
B - Not detected substantially above the level reported in laboratory or field blanks
J - Analyte present. Value may or may not be accurate or precise
JN - See 'J' and 'N'
L - Analyte present. Value may be biased low. Value may be higher
N - Spiked sample recovery was not within control limits
NS - Not sampled
U - The material was analyzed for, but not detected
UN - See 'U' and 'N'
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Table A-3
2009 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-SD304	LW07-SD305	LW07-SD306	LW07-SD307
Sample ID	LW07-SD304-00-09D	LW07-SD305-00-09D	LW07-SD306-00-09D	LW07-SD307-00-09D
Sample Date	11/23/09	11/23/09	11/23/09	11/23/09
Chemical Name				
Total Metals (mg/kg)				
Copper	60.6	107	58.2	34.7
Lead	40.8	65.7	44.9	44.6
Mercury	0.2	0.294	0.134	0.0726
Tin	5.9 B	8.69 B	6.38 B	3.9 B
Tributyltin	NS	NS	NS	NS
Zinc	319	659	218	205
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)				
Acid Volatile Sulfide	2.7	4.4	3.2	2.8
Cadmium	0.004	0.0039	0.0022	0.0021
Copper	0.12	0.11	0.13	0.25
Lead	0.22	0.077	0.086	0.22
Mercury	0.00005 UN	0.000034 UN	0.000021 UN	0.000036 UN
Nickel	0.023	0.012	0.012	0.031
Silver	0.0047 U	0.0032 U	0.002 U	0.0034 U
Zinc	3.1	2.6	1.2	1.6
Wet Chemistry (mg/kg)				
pH	8.34	7.93	8.24	8.04
Total Organic Carbon (TOC)	12,100 N	23,500 N	15,800 N	6,160 N
Grain Size (PCT/P)				
GS07 Sieve 1" (25.0 mm)	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	100	100	100	91.8
Sieve No. 004 (4.75 mm)	99.3	100	100	86.2
Sieve No. 010 (2.00 mm)	98.8	100	99.8	83.9

Notes:
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JN - See 'J' and 'N'
L - Analyte present. Value may be biased low. Value may be higher
N - Spiked sample recovery was not within control limits
NS - Not sampled
U - The material was analyzed for, but not detected
UN - See 'U' and 'N'
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Table A-4
2010 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-B5		LW07-B7	LW07-D5	LW07-F3	LW07-F5		LW07-H1	LW07-H3
Sample ID	LW07-B5-SD401-00-10C	LW07-B5-SD401P-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C	LW07-F5-SD401-00-10C-01	LW07-H1-SD401-00-10C	LW07-H3-SD401-00-10C
Sample Date	9/12/10	9/12/10	9/12/10	9/11/10	9/11/10	9/11/10	9/12/10	9/10/10	9/11/10
Chemical Name									
Total Metals (mg/kg)									
Copper	43.7	36.9	45.8	82.4	59	NS	24.7	166	84.8
Lead	21.5	18	24.8	40.7	45.6	NS	14.9	62	52.6
Mercury	0.126	0.159	0.125	0.267	0.347	NS	0.0463	0.324	0.28
Tin	3.72	3.33	3.61	5.64	3.69	NS	2.5	7.04	5.53
Zinc	173	141	190	283	246	NS	92.7	491	366
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Acid volatile sulfide	157	NS	386	130	573	NS	545	1,350	720
Cadmium	0.00413 J	NS	0.0035 J	0.00186 J	0.00474 J	NS	0.00342 J	0.00799 J	0.0103
Copper	0.513	NS	0.435	0.223	0.516	NS	0.191	1.18	0.755
Lead	0.0905	NS	0.0847	0.0779	0.153	NS	0.181	0.287	0.217
Mercury	0.000184 U	NS	0.000163 U	0.000115 U	0.000131 U	NS	0.000162 U	0.000241 U	0.000188 U
Nickel	0.0399 J	NS	0.0414 J	0.0205 J	0.0356 J	NS	0.021 J	0.0735 J	0.0613 J
Silver	0.00882 U	NS	0.00782 U	0.0055 U	0.00626 U	NS	0.0078 U	0.0116 U	0.00902 U
Zinc	2.16	NS	1.91	1.59	2.99	NS	1.5	5.34	4.33
Wet Chemistry									
pH	7.99	NS	8.19	7.73	8.36	NS	7.05	7.93	8.33
Total organic carbon (TOC)	17,200	NS	13,600	15,500	12,400	NS	7,250	30,300	18,100
Grain Size (PCT/P)									
GS07 Sieve 1" (25.0 mm)	100	NS	100	100	100	100	NS	100	100
GS08 Sieve 0.75" (19.0 mm)	100	NS	100	100	100	100	NS	100	100
GS09 Sieve 0.5" (12.5 mm)	100	NS	100	100	100	100	NS	100	100
Sieve No. 004 (4.75 mm)	100	NS	100	100	100	100	NS	100	100
Sieve No. 010 (2.00 mm)	100	NS	99	100	100	99	NS	100	100
Sieve No. 040 (425 um)	96	NS	95	99	99	80	NS	93	99
Sieve No. 100 (150 um)	83	NS	77	95	91	40	NS	84	89
Sieve No. 200 (75 um)	63	NS	62	88	68	23	NS	75	75

Notes:
J - Analyte present. Value may or may not be accurate or precise
L - Analyte present. Value may be biased low. Value may be highe
NS - Not sampled
U - The material was analyzed for, but not detectec
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Table A-4
2010 Raw Analytical Data
Post-MILCON Action Evaluation
SWMU 7b - Small Boats Sandblast Yard (Desert Cove)
JEB Little Creek
Virginia Beach, Virginia

Station ID	LW07-J4	LW07-K1	LW07-K3	LW07-K4	LW07-K5	LW07-L2	LW07-L5	LW07-M1	LW07-SD401
Sample ID	LW07-J4-SD401-00-10C	LW07-K1-SD401-00-10C	LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C	LW07-L2-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C	LW07-SD401-00-10C
Sample Date	9/11/10	9/10/10	9/11/10	9/11/10	9/11/10	9/11/10	9/11/10	9/10/10	9/11/10
Chemical Name									
Total Metals (mg/kg)									
Copper	86.3	111	96.1	75.4	93.9	78.7	98.7	127	72.5
Lead	131	67	88.6	52.6	109	37.4	63.1	236	43.2
Mercury	0.271	0.366	0.426	0.191	0.271	0.234	0.266	1.21	0.218
Tin	5.43	6.72	10.7	8.39	5.59	13.6	6.68	10.3	5.81
Zinc	479	450	615	974	401	294	396	711	279
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)									
Acid volatile sulfide	706	236	255	260	887	615	983	1,650	1,120
Cadmium	0.00699 J	0.00786 J	0.0074	0.00699	0.00687 J	0.00502	0.0203	0.00814	0.00462 J
Copper	0.678	1.07	0.993	1.13	0.841	0.79	0.872	1.12	0.639
Lead	0.148	0.225	0.354	0.382	0.184	0.25	0.167	0.426	0.155
Mercury	0.000177 U	0.000203 U	0.0000914 U	0.0000979 U	0.000196 U	0.000102 U	0.000192 U	0.00018 U	0.000188 U
Nickel	0.0475 J	0.0738 J	0.174	0.0605 J	0.0482 J	0.123	0.0598 J	0.132	0.0584 J
Silver	0.00848 U	0.00972 U	0.00439 U	0.00548 U	0.00939 U	0.00572 U	0.00921 U	0.00865 U	0.00901 U
Zinc	3.75	5.58	7.73	5.35	4.37	5.19	4.75	7.27	3.48
Wet Chemistry									
pH	8.06	8.24	7.87	8.04	8.01	8.12	7.99	8.29	8.31
Total organic carbon (TOC)	15,500	31,600	20,500	17,300	20,800	13,400	27,600	24,700	19,200
Grain Size (PCT/P)									
GS07 Sieve 1" (25.0 mm)	100	100	100	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	100	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	100	100	100	100	100	100	100	100	100
Sieve No. 004 (4.75 mm)	100	100	100	100	100	100	1,000	100	100
Sieve No. 010 (2.00 mm)	100	100	99	100	100	97	100	97	100
Sieve No. 040 (425 um)	97	99	88	89	98	89	96	87	94
Sieve No. 100 (150 um)	81	95	60	82	90	69	88	72	75
Sieve No. 200 (75 um)	70	93	51	57	81	60	79	66	65

Notes:
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L - Analyte present. Value may be biased low. Value may be highe
NS - Not sampled
U - The material was analyzed for, but not detectec
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Station ID	LW07-SD402		LW07-SD403	LW07-SD404
Sample ID	LW07-SD402-00-10C	LW07-SD402P-00-10C	LW07-SD403-00-10C	LW07-SD404-00-10C
Sample Date	9/11/10	9/11/10	9/11/10	9/10/10
Chemical Name				
Total Metals (mg/kg)				
Copper	55.1	49	157	52.6
Lead	35.2	50.5	211	53.1 L
Mercury	0.137	0.162	0.373	0.188
Tin	7.77 J	4.86 J	19.7	12.2
Zinc	294	227	987	296
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)				
Acid volatile sulfide	398	NS	989	211
Cadmium	0.0032 J	NS	0.0086	0.0027
Copper	0.44	NS	1.16	0.306
Lead	0.0943	NS	0.283	0.139
Mercury	0.0000982 U	NS	0.000131 U	0.0000465 U
Nickel	0.0389 J	NS	0.144	0.0621
Silver	0.00471 U	NS	0.00735 U	0.00391 U
Zinc	2.5	NS	6.37	2.72
Wet Chemistry				
pH	7.79	NS	7.88	7.87
Total organic carbon (TOC)	17,300	NS	20,800	13,500
Grain Size (PCT/P)				
GS07 Sieve 1" (25.0 mm)	100	NS	100	100
GS08 Sieve 0.75" (19.0 mm)	100	NS	100	100
GS09 Sieve 0.5" (12.5 mm)	100	NS	100	100
Sieve No. 004 (4.75 mm)	100	NS	100	99
Sieve No. 010 (2.00 mm)	99	NS	99	98
Sieve No. 040 (425 um)	87	NS	89	90
Sieve No. 100 (150 um)	74	NS	75	70
Sieve No. 200 (75 um)	65	NS	68	64

Notes:
J - Analyte present. Value may or may not be accurate or precise
L - Analyte present. Value may be biased low. Value may be highe
NS - Not sampled
U - The material was analyzed for, but not detectec
mg/kg - Milligrams per kilogram
PCT/P - Percent Passed
pH - pH units
µmol/g - Micromoles per gram

Attachment B
Data Validation Report

Initial/Continuing Calibration

Select Metals

Calibration standards exhibited %Rs that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Analyte	%R	Samples	Q Flag	Q Code
CCV8, 12/16, 19:32	lead	84.6%	LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D	L/UL	CCL

Blanks

Select Metals

Preparation blank contamination was noted. Qualification for one analyte was required. Contamination and sample results qualifications are indicated in the following tables. Please note that sample weight, volume, moisture levels and/or dilution factor were taken into consideration when applying the criteria.

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.35J mg/Kg	6.75 mg/Kg	B
PBLK – 9L14010-BLK	tin	1.442J mg/Kg	7.21 mg/Kg	B

Sample ID	analyte	Q Flag	Q Code
LW07-B7-SD301-00-09D, LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D, LW07-D5-SD301-00-09D, LW07-F5-SD301-00-09D, LW07-F3-SD301-00-09D, LW07-H3-SD301-00-09D, LW07-J4-SD301-00-09D, LW07-M1-SD303-00-09D, LW07-K1-SD301-00-09D, LW07-K1-SD302-00-09D, LW07-K1-SD303-00-09D, LW07-K1-SD304-00-09D, LW07-H1-SD301-00-09D	tin	B	BL

Matrix Spike Recoveries

Select Metals

The matrix spike analysis of the sample LW07-H3-SD301-00-09D exhibited non-compliant %Rs (<80% or >120%) for lead. Specific action is noted in the following table.

MS	Analyte	Samples Affected	%R	Q Flag	Q Code
LW07-H3-SD301-00-09D	lead	all samples	123/74.4	J/UJ	MSL*

* The qualifier code MSL was used but the results were flagged J/UJ due to variable MS/MSD recoveries, not low recoveries. There is no qualifier code for variable recoveries (high & low).

Summary of Data Qualifications

Butyltins

Sample ID	Compound	Results	Q Flag	Q code
LW07-B5-SD301P-00-09D, LW07-K1-SD301-00-09D	tri-n-butyltin	+P	J	2C

Select Metals

Sample ID	Analyte	Results	Q Flag	Q code
LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D	lead	+/-	L/UL	CCL
LW07-B7-SD301-00-09D, LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D, LW07-D5-SD301-00-09D, LW07-F5-SD301-00-09D, LW07-F3-SD301-00-09D, LW07-H3-SD301-00-09D, LW07-J4-SD301-00-09D, LW07-M1-SD303-00-09D, LW07-K1-SD301-00-09D, LW07-K1-SD302-00-09D, LW07-K1-SD303-00-09D, LW07-K1-SD304-00-09D, LW07-H1-SD301-00-09D	tin	+ up to action limit	B	MBL
all field samples	lead	+/-	J/UJ*	MSL*
LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D	copper	+	J	FD

Note: for samples LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D, for lead the final flag is L/UL and the qualifier code is CCL – to indicate potential low bias.

DataQual

Environmental Services, LLC

CH2M HILL
5700 Cleveland Street
Suite 101
Virginia Beach, Virginia 23462

February 19, 2010
SDG # CTO222_001, Empirical & Columbia Analytical
NAB Little Creek, CTO-222

Dear Ms. Brynildsen,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # CTO222_001. The data validation was performed in accordance with the SW-846 Methods 6010B and 7471A for select metals and the CAS Lab SOP – SOC-BUTYL for the analysis of tri-n-butyltin. Also used in the validation of these samples were the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, and to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Data Review, 4/93, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3/IM-2 review), as applicable. The lab ID used in the following matrix is the ID assigned to the samples by Empirical, which is the primary lab for this SDG.

Sample ID	Lab ID	Matrix	Butyltins	Select Metals
LW07-K4-SD301-00-09D	0911228-01	sediment		X
LW07-K5-SD301-00-09D	0911228-02	sediment		X
LW07-SD306-00-09D	0911228-03	sediment		X
LW07-SD305-00-09D	0911228-04	sediment		X
LW07-SD304-00-09D	0911228-05	sediment		X
LW07-L5-SD301-00-09D	0911228-06	sediment	X	X
LW07-SD301-00-09D	0911228-07	sediment	X	X
LW07-SD301P-00-09D	0911228-08	sediment	X	X
LW07-SD302-00-09D	0911228-09	sediment		X
LW07-SD307-00-09D	0911228-10	sediment		X
LW07-SD3033-00-09D	0911228-11	sediment		X
LW07-EB-112309	0911228-22	water		X
LW07-SD302-00-09DMS	0911228-07MS	sediment		X
LW07-SD302-00-09DMSD	0911228-07MSD	sediment		X
LW07-SD301P-00-09DMS	K0911477-003MS	sediment	X	
LW07-SD301P-00-09DMSD	K0911477-003MSD	sediment	X	

The following quality control samples were provided with this SDG: sample LW07-SD301P-09D-field duplicate of sample LW07-SD301-09D; and sample LW07-EB-112309-equipment blank.

All areas of concern are discussed in the body of the report and a summary of data qualification is provided. The samples were evaluated based on the following criteria:

• Data Completeness	*
• Technical Holding Times	*
• GC/MS Performance	NA
• GC Performance	*
• Initial/Continuing Calibrations	*
• CRI Standards	*
• Interference Check Sample	*
• Blanks	
• Internal Standards	NA
• Surrogates	*
• Laboratory Control Samples	*
• Matrix Spike Recoveries	*
• Matrix Duplicate RPDs	*
• Post Digestion Spike Recoveries	*
• Serial Dilutions	*
• Field Duplicates	
• Identification/Quantitation	
• Reporting Limits	*
• Tentatively Identified Compounds	NA

*- indicates that no qualifications were required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

Major Problems

No issues requiring rejection of the data were found in this SDG.

Minor Problems

Issues requiring qualification of the analytical data were found in the validation of this SDG. A summary of these issues for each fraction is presented in the following paragraphs. All results qualified as estimated J/UJ or biased high, K or biased low, L/UL, should be considered usable but estimated.

Tributyl Tin

The reported results for tri-n-butyltin were flagged as estimated in the field duplicate pair due to a RPD above 30%.

Results in one sample were flagged as P due to a column quantitation %Ds that was greater than 40%. These results were flagged as estimated J.

Select Metals

Blank contamination was noted in the laboratory blanks associated with the samples in this SDG. Qualifications were added to the data.

The analyte mercury was flagged as estimated in the field duplicate pair due to a RPD above 30%.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required. The laboratory SOP and standard concentrations for tributyl tin were requested and received from CAS. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/23/09 and samples were received at the laboratory 11/24/09. All sample preparation and analysis was performed within Region III and/or method holding time requirements.

Blanks

Select Metals

Preparation blank contamination was noted. Qualification for one analyte was required. Contamination is indicated in the following tables. Please note that sample weight, volume, moisture levels and/or dilution factor were taken into consideration when applying the criteria.

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.68J mg/Kg	8.40 mg/Kg	B

Sample results qualifications are indicated in the following table.

Sample ID	analyte	Q Flag	Q Code
LW07-K4-SD301-00-09D, LW07-K5-SD301-00-09D, LW07-SD306-00-09D, LW07-SD305-00-09D, LW07-SD304-00-09D, LW07-L5-SD301-00-09D, LW07-SD302-00-09D, LW07-SD307-00-09D, LW07-SD302-00-09D	tin	B	BL

Field Duplicates

Butyltins

The reported results for tri-n-butyltin in samples LW07-SD301-00-09D and LW07-SD301P-00-09D were qualified as estimated J due to a high RPD (>30%) between the results, qualifier code FD.

Select Metals

The reported results for mercury in samples LW07-SD301-00-09D and LW07-SD301-00P-09D were qualified as estimated J due to a high RPD (>30%) between the results, qualifier code FD.

Identification/Quantitation

Butyltins

One sample result was reported with a P flag to indicate column quantitation %Ds greater than 40%. The reported positive result for tri-n-butyltin in sample LW07-L5-SD301-00-09D (56%) was flagged as estimated J with a qualifier code of 2C.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland

Jacqueline Cleveland
Vice-President

Summary of Data Qualifications

Butyltins

Sample ID	Compound	Results	Q Flag	Q code
LW07-SD301-00-09D, LW07-SD301P-00-09D	tri-n-butyltin	+	J	FD
LW07-L5-SD301-00-09D	tri-n-butyltin	+P	J	2C

Select Metals

Sample ID	Analyte	Results	Q Flag	Q code
LW07-K4-SD301-00-09D, LW07-K5-SD301-00-09D, LW07-SD306-00-09D, LW07-SD305-00-09D, LW07-SD304-00-09D, LW07-L5-SD301-00-09D, LW07-SD302-00-09D, LW07-SD307-00-09D, LW07-SD303-00-09D	tin	+ up to action limit	B	MBL
LW07-SD301-00-09D, LW07-SD301P-00-09D	mercury	+	J	FD

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
R	result is rejected; the presence or absence of the analyte cannot be verified
D	result value is based on dilution analysis result
NJ	analyte has been tentatively identified, estimated value
L	analyte present, biased low
UL	not detected, quantitation limit is probably higher
K	analyte present, biased high
Q	estimated dioxin/furan concentration
I	interferences present which may cause the results to be biased high

Method Blank Qualification Flags (Q-Flags)

NA	The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.
B	The sample result for the blank contaminant is less than or greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B at the compound value reported.

General Abbreviations

IDL	Instrument Detection Limit
MDL	Method Detection Limit
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
Q Code	Qualifier Code
Q Flag	Qualifier Flag
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - Low Recovery
BSH	Blank Spike/LCS - High Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
EMPC	Estimated Possible Maximum Concentration
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination- MBL, EBL, FBL, TBL
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%Sol	High percent moisture

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911477
Project:	NABLC SWMU7B CTO-222_001/375057.FI.FW	**Date Collected:**	11/23/2009
Sample Matrix:	Sediment	**Date Received:**	11/24/2009

Butyltins (as cation)

Sample Name:	LW07-L5-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911477-001	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	4.8	~~P~~ J 2C	3.0	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	72	18-95	12/04/09	Acceptable

JAC 12/9/10

Comments:

008

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911477
Project:	NABLC SWMU7B CTO-222_001/375057.FI.FW	**Date Collected:**	11/23/2009
Sample Matrix:	Sediment	**Date Received:**	11/24/2009

Butyltins (as cation)

Sample Name:	LW07-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911477-002	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	5.6	J FD	1.8	1	12/01/09	12/07/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	63	18-95	12/07/09	Acceptable

JLC 2/9/10

Comments:

009

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911477
Project:	NABLC SWMU7B CTO-222_001/375057.FI.FW	**Date Collected:**	11/23/2009
Sample Matrix:	Sediment	**Date Received:**	11/24/2009

Butyltins (as cation)

Sample Name:	LW07-SD301P-00-09D	**Units:**	ug/Kg
Lab Code:	K0911477-003	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	3.4	J FD	1.5	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	82	18-95	12/04/09	Acceptable

JC 21910

Comments:

010

ANALYSIS DATA SHEET

LW07-K4-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 10:15
% Solids: 46.57

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-01
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.236	0.0220	0.0559	1		SW7471A	9L15009	12/16/09 10:54
7440-50-8	Copper	65.2	0.416	0.832	1	N	SW6010B	9L11009	12/15/09 16:02
7439-92-1	Lead	42.1	0.125	0.250	1		SW6010B	9L11009	12/15/09 16:02
7440-31-5	Tin	5.78	1.83	5.66	1	B MBL	SW6010B	9L11009	12/15/09 16:02
7440-66-6	Zinc	304	0.416	1.66	1		SW6010B	9L11009	12/15/09 16:02

JAC 21570

ANALYSIS DATA SHEET

LW07-K5-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 10:51
% Solids: 38.29

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-02
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.381	0.0364	0.0923	1		SW7471A	9L15009	12/16/09 10:55
7440-50-8	Copper	91.3	0.516	1.03	1	N	SW6010B	9L11009	12/15/09 16:07
7439-92-1	Lead	48.5	0.155	0.310	1		SW6010B	9L11009	12/15/09 16:07
7440-31-5	Tin	7.21	2.27	7.02	1	B MA	SW6010B	9L11009	12/15/09 16:07
7440-66-6	Zinc	381	0.516	2.06	1		SW6010B	9L11009	12/15/09 16:07

JAC 21570

ANALYSIS DATA SHEET

LW07-SD306-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 11:16
% Solids: 47.37

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-03
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.134	0.0249	0.0633	1		SW7471A	9L15009	12/16/09 10:57
7440-50-8	Copper	58.2	0.421	0.841	1		SW6010B	9L11009	12/15/09 16:11
7439-92-1	Lead	44.9	0.126	0.252	1		SW6010B	9L11009	12/15/09 16:11
7440-31-5	Tin	6.38	1.85	5.72	1	B MBL	SW6010B	9L11009	12/15/09 16:11
7440-66-6	Zinc	218	0.421	1.68	1		SW6010B	9L11009	12/15/09 16:11

JAC
2/15/10

ANALYSIS DATA SHEET

LW07-SD305-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 11:40
% Solids: 29.10

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-04
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.294	0.0362	0.0919	1		SW7471A	9L15009	12/16/09 10:58
7440-50-8	Copper	107	0.679	1.36	1	N	SW6010B	9L11009	12/15/09 16:15
7439-92-1	Lead	65.7	0.204	0.407	1		SW6010B	9L11009	12/15/09 16:15
7440-31-5	Tin	8.69	2.99	9.24	1	B MBL	SW6010B	9L11009	12/15/09 16:15
7440-66-6	Zinc	659	0.679	2.72	1		SW6010B	9L11009	12/15/09 16:15

JC
21570

ANALYSIS DATA SHEET

LW07-SD304-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 12:06
% Solids: 49.63

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-05
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.200	0.0246	0.0623	1		SW7471A	9L15009	12/16/09 10:59
7440-50-8	Copper	60.6	0.401	0.803	1		SW6010B	9L11009	12/15/09 16:20
7439-92-1	Lead	40.8	0.120	0.241	1		SW6010B	9L11009	12/15/09 16:20
7440-31-5	Tin	5.90	1.77	5.46	1	BMBL	SW6010B	9L11009	12/15/09 16:20
7440-66-6	Zinc	319	0.401	1.61	1		SW6010B	9L11009	12/15/09 16:20

JWC
2/5/10

ANALYSIS DATA SHEET

LW07-L5-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 12:44
% Solids: 33.56

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-06
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.309	0.0332	0.0843	1		SW7471A	9L15009	12/16/09 11:00
7440-50-8	Copper	94.6	0.584	1.17	1	~~N~~	SW6010B	9L11009	12/15/09 16:24
7439-92-1	Lead	55.3	0.175	0.351	1		SW6010B	9L11009	12/15/09 16:24
7440-31-5	Tin	8.40	2.57	7.95	1	B MBL	SW6010B	9L11009	12/15/09 16:24
7440-66-6	Zinc	401	0.584	2.34	1		SW6010B	9L11009	12/15/09 16:24

JAC
21510

ANALYSIS DATA SHEET

LW07-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 14:05
% Solids: 61.72

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-07
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.343	0.0197	0.0501	1	J FD	SW7471A	9L15009	12/16/09 11:02
7440-50-8	Copper	252	0.313	0.626	1	N	SW6010B	9L11009	12/15/09 16:29
7439-92-1	Lead	526	0.0938	0.188	1		SW6010B	9L11009	12/15/09 16:29
7440-31-5	Tin	29.7	1.38	4.25	1		SW6010B	9L11009	12/15/09 16:29
7440-66-6	Zinc	1170	1.56	6.26	5	D	SW6010B	9L11009	12/16/09 19:04

JAC 21570

ANALYSIS DATA SHEET

LW07-SD301P-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 14:10
% Solids: 64.81

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-08
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	1.77	0.0194	0.0493	1	J FD	SW7471A	9L15009	12/16/09 11:06
7440-50-8	Copper	187	0.300	0.600	1	N	SW6010B	9L11009	12/15/09 16:33
7439-92-1	Lead	587	0.0901	0.180	1		SW6010B	9L11009	12/15/09 16:33
7440-31-5	Tin	23.9	1.32	4.08	1		SW6010B	9L11009	12/15/09 16:33
7440-66-6	Zinc	1440	1.50	6.00	5	D	SW6010B	9L11009	12/16/09 19:08

JLC
21570

ANALYSIS DATA SHEET

LW07-SD302-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 14:32
% Solids: 39.01

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-09
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.304	0.0294	0.0746	1		SW7471A	9L15009	12/16/09 11:07
7440-50-8	Copper	61.5	0.505	1.01	1	~~N~~	SW6010B	9L11009	12/15/09 16:38
7439-92-1	Lead	48.6	0.151	0.303	1		SW6010B	9L11009	12/15/09 16:38
7440-31-5	Tin	6.84	2.22	6.86	1	~~B~~ MBL	SW6010B	9L11009	12/15/09 16:38
7440-66-6	Zinc	252	0.505	2.02	1		SW6010B	9L11009	12/15/09 16:38

JLC
21570

ANALYSIS DATA SHEET

LW07-SD307-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 15:30
% Solids: 68.87

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-10
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0726	0.0177	0.0449	1		SW7471A	9L15009	12/16/09 11:11
7440-50-8	Copper	34.7	0.286	0.572	1		SW6010B	9L11009	12/15/09 17:01
7439-92-1	Lead	44.6	0.0857	0.171	1		SW6010B	9L11009	12/15/09 17:01
7440-31-5	Tin	3.90	1.26	3.89	1	B MBL	SW6010B	9L11009	12/15/09 17:01
7440-66-6	Zinc	205	0.286	1.14	1		SW6010B	9L11009	12/15/09 17:01

JAC 21570

ANALYSIS DATA SHEET

LW07-SD303-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/23/09 15:00
% Solids: 56.41

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-11
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0840	0.0223	0.0566	1		SW7471A	9L15009	12/16/09 11:13
7440-50-8	Copper	30.7	0.348	0.695	1	N	SW6010B	9L11009	12/15/09 17:18
7439-92-1	Lead	20.8	0.104	0.209	1		SW6010B	9L11009	12/15/09 17:18
7440-31-5	Tin	4.60	1.53	4.73	1	B, MQ	SW6010B	9L11009	12/15/09 17:18
7440-66-6	Zinc	143	0.348	1.39	1		SW6010B	9L11009	12/15/09 17:18

JAC
21570

ANALYSIS DATA SHEET

LW07-EB-112309

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 11/23/09 17:30
% Solids: 0.00

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911217-12
Received: 11/24/09 08:15

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L10015	12/14/09 09:04
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15004	12/16/09 12:34
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15004	12/16/09 12:34
7440-31-5	Tin		12.5	25.0	1	U	SW6010B	9L15004	12/16/09 12:34
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9L15004	12/16/09 12:34

JLC 21510

INORGANIC CASE NARRATIVE
CH2M Hill Little Creek
SDG# CTO222_001
Work Order # 0911217
November, 2009

Empirical Laboratories ID	Client ID
0911217-01	LW07-K4-SD301-00-09D
0911217-02	LW07-K5-SD301-00-09D
0911217-03	LW07-SD306-00-09D
0911217-04	LW07-SD305-00-09D
0911217-05	LW07-SD304-00-09D
0911217-06	LW07-L5-SD301-00-09D
0911217-07	LW07-SD301-00-09D
0911217-08	LW07-SD301P-00-09D
0911217-09	LW07-SD302-00-09D
0911217-10	LW07-SD307-00-09D
0911217-11	LW07-SD303-00-09D
0911217-12	LW07-EB-112309

I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in the case narrative, as verified by the following signature.

Betty DeVille

Betty DeVille
Inorganic Lab Manager

Methods:

The total samples were digested for ICAP by USEPA SW846 method 3050B and analyzed using method 6010B. Method 7471A was used to digest and analyze soil mercury. Method 9045C was used to analyze pH and the Lloyd Kahn method was used to analyze soil TOC. EPA 821/R91-100 Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment was used to distill and extract AVS sulfide and SEM metals. Mercury for this method was digested and analyzed by method 7470A. The metals were run from a filtered and matrix matched solution produced from the AVS distillation. The % solids were analyzed by Standard Methods 20th Edition method 2540B. Note: The "J" flag indicates that the analyte result is between the laboratory MDL and the laboratory reporting limit.

Specific Comments:

All analyses performed by the Inorganic section were completed meeting satisfactorily the corresponding specifications for Quality Control with the following exceptions:

I. ICAP Metals

A. Continuing Calibration Verification (CCV)

Specification Limits (90 to 110%)

* NQ 1. 9L35117-CCV8 was out of the specification limits for lead at 87.3% and for tin at 84.6%. No samples were impacted by these CCVs.

B. Matrix Spike and Matrix Spike Duplicate (MS/MSD)
Specification Limits (75 to 125%)

* NQ 1. The matrix spike duplicate was out of the specification limits for copper at 124% for sample LW07-SD302-00-09D. The post digestion spike recovery was at 106%. **All associated data are flagged with an "N" on the final report.**

II. Total Organic Carbon

A. Matrix Spike and Matrix Spike Duplicate (MS/MSD)
Specification Limits (75 to 125%)

1. The matrix spike and the matrix spike duplicate were out of the specification limits for TOC at 137 and 134% for sample LW07-SD302-00-09D. **All associated data are flagged with an "N" on the final report.**

III. Acid Volatile Sulfide/ Sulfide Extractable Metals (AVS/SEM)

A. Continuing Calibration Verification (CCV)
Specification Limits (90 to 110%)

1. The second, third and fourth CCV in the first ICAP analysis was out of the specification limits for silver at 87.0, 88.3 and 89.4% and for zinc at 89.4 and 89.3% in CCV3 and CCV4. All SEM samples were impacted by these CCVs.

B. Preparation Blank (PBW)
Specification Limits (< ½ ± RL)

1. The following preparation blanks were out of the specification limits for lead at 0.00011 umoles/g and 0.00021 umoles/g and zince at 0.0018 umoles/g. All sample concentrations impacted were greater than ten times the concentration in the blank. There is no impact to the sample data.

C. Matrix Spike and Matrix Spike Duplicate (MS/MSD)
Specification Limits (75 to 125%)

1. The matrix spike dupliate was out of the specification limits for mercury at 70.3% for sample LW07-SD302-00-09D AVS/SEM. **All associated data were flagged with an "N" on the final report.**

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

8438

Send Results to:
Name Vicki Brynildsen
Company CH2M Hill
Address 5700 Cleveland St.
City Virginia Beach
State, Zip VA, 23462
Phone (757) 671-6252
Fax
E-mail

Send Invoice to:
Name Cecilia Landin
Company CH2M Hill
Address 5700 Cleveland St.
City Virginia Beach
State, Zip VA, 23462
Phone (757) 748-3001
Fax
E-mail

Project No./Name: CTO-222 NABLC SWMU76

Sampler's (Signature): [signature]

Analysis Requirements: Select Metals (4oz); TOC / pH (4oz); AVS/SEM (4oz); Grain Size (16oz); ~~HP~~ 03 / Select Metals

Lab Use Only:

VOA Headspace	Y	N	NA
Field Filtered	Y	N	NA
Correct Containers	Y	N	NA
Discrepancies	Y	N	NA
Cust. Seals Intact	Y	N	NA
Containers Intact	Y	N	NA

Airbill #: 2915

CAR #: —

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Select Metals (4oz)	TOC / pH (4oz)	AVS/SEM (4oz)	Grain Size (16oz)	03 / Select Metals	Comments	No. of Bottles	Lab Use Only Containers/Pres.
0911217-01	11/23/09 1015	LW07-K4-SD301-00-09D	SD	1	1	1	1			4	4M
-02	/1051	LW07-K5-SD301-00-09D	SD	1	1	1	1			4	
-03	/1116	LW07-SD306-00-09D	"	1	1	1	1			4	
-04	/1140	LW07-SD305-00-09D	"	1	1	1	1			4	
-05	/1206	LW07-SD304-00-09D	"	1	1	1	1			4	
-06	/1244	LW007-L5-SD301-00-09D	"	1	1	1	1			4	
-07	/1405	LW07-SD301-00-09D	"	1	1	1	1			4	
-08	/1410	LW07-SD301P-00-09D	"	1	1	1	1			4	1M
-09	/1432	LW07-SD302-00-09D	"	3	3	3	3		MS/MSD	12	12M
-10	/1530	LW07-SD307-00-09D	"	1	1	1	1			4	4M
-12	/1730	LW07-EB-112309	AQ					1		1	1C-Ni
*-11											

	Date/Time	Received By: (Signature)
Sample Kit Prep'd by: (Signature)		
Relinquished by: (Signature) [signature]	Date/Time 1800 11/23/09	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature) [signature]	Date/Time 11/24/09 08:15	*Temperature* 0.5°C

REMARKS:
*all "C"s on bottleware labels should be "D" (eg. LW07-SD301-00-09D)

*-See CRF WO 11/24/09

Details:
Page 1 of 1
Cooler No. 1 of 1
Date Shipped 11/23/09
Shipped By L. Carr
Turnaround

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

026

Columbia Analytical Services™

CHAIN OF CUSTODY

SR#: _____

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC #_____

PROJECT NAME: [illegible]
PROJECT NUMBER: [illegible]
PROJECT MANAGER: [illegible]
COMPANY ADDRESS: [illegible]
CITY/STATE/ZIP: [illegible]
E-MAIL ADDRESS:
PHONE #: [illegible] FAX #:
SAMPLER'S SIGNATURE: [illegible]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 8270 8270LL	Volatile Organics 624 8260	Hydrocarbons (*see below) Gas Diesel Fuel Fingerprint (FIQ) Oil	BTEX 8021	NW-HCID Screen 1664 HEM	Oil & Grease-TRPH 1664 SGT	PCB's Aroclors	Pesticides/Herbicides 608 8081A 8141A 8151A	Chlorophenolics Tri Tetra PCP	PAHs 8310 SIM	Metals, Total or Dissolved (Spk list below)	Cyanide	Hex-Chrom	pH, Cond, Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020 AOX 1650 506					REMARKS
[illegible]	[illegible]	[illegible]																								
[illegible]	[illegible]	[illegible]																								
[illegible]	[illegible]	[illegible]		SD	1																1					091217-06
[illegible]	[illegible]	[illegible]		SD	1																1					-07
[illegible]	[illegible]	[illegible]		SD	1																1					-08

REPORT REQUIREMENTS

- I. Routine Report: Method Blank, Surrogate, as required
- II. Report Dup., MS, MSD as required
- III. Data Validation Report (includes all raw data)
- IV. CLP Deliverable Report
- V. EDD

INVOICE INFORMATION

P.O. # _____
Bill To: _____

TURNAROUND REQUIREMENTS

24 hr. ____ 48 hr.
5 Day
Standard (10-15 working days)
Provide FAX Results
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
[illegible]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
[illegible]			
Signature / Date/Time	Signature / Date/Time	Signature / Date/Time	Signature / Date/Time
Printed Name / Firm	Printed Name / Firm	Printed Name / Firm	Printed Name / Firm

RCOC.xls (7/98)

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

LIMS Number: 0911217 Number of Coolers: 1 of 1

Client: CH2M Hill Project: CTO-222

Date/Time Received: **11/24/09 08:15** Date cooler(s) opened: **11/24/09**

Opened By (print): **WILLIAM SCHWAB** (signature): [signature]

Circle response below as appropriate

1. How did the samples arrive?: FedEx UPS DHL Hand Delivered

EL Courier Other: _____

If applicable, enter airbill number here: 2915

2. Were custody seals on outside of cooler(s)? ..... Yes No

How many: 2 Seal date: 11/23/09 Seal Initials: ?

3. Were custody seals unbroken and intact at the date and time of arrival? ..... Yes No N/A
4. Were custody papers sealed in a plastic bag included in the sample cooler? ..... Yes No N/A
5. Were custody papers filled out properly (ink, signed, etc.)? ..... Yes No N/A
6. Did you sign custody papers in the appropriate place for acceptance? ..... Yes No N/A
7. Was project identifiable from custody papers? ..... Yes No N/A
8. If required, was enough ice present in the cooler(s)? ..... Yes No N/A

Type of Coolant: WET DRY BLUE NONE Temperature of Samples upon Receipt: 0-5°C

Dates samples were logged-in: **11/24/09**

9. Initial this form to acknowledge login of sample(s): (Name): Will Schwab (Initial): WS
10. Were all bottle lids intact and sealed tightly? ..... Yes No N/A
11. Did all bottles arrive unbroken? ..... Yes No N/A
12. Was all required bottle label information complete? ..... Yes No N/A
13. Did all bottle labels agree with custody papers? ..... Yes No N/A
14. Were correct containers used for the analyses indicated? ..... Yes No N/A
15. Were preservative levels correct in all applicable sample containers? ..... Yes No N/A
16. Was residual chlorine present in any applicable sample containers? ..... Yes No N/A
17. Was sufficient amount of sample sent for the analyses required? ..... Yes No N/A *
18. Was headspace present in any included VOA vials? ..... Yes No N/A

pH for metals (H2O) <2

If Non-Conformance issues were present, list by sample ID: _____

* only 1 4oz jar rec'd for LW07-SD301P CAR#: _____
-00-09D, should have been 4!

Sample LW07-SD303-00-09D received & not listed on COC! Tagged as 0911217-11 & placed on hold pending client verification!

027

CTO222\001\LOGGED\Im

Sample Delivery Group Assignment Form

CLIENT: CH2M Hill, Inc.
PROJECT NAME: Little Creek CTO222(SWMU7B)
LOG #:CTO222_001
MATRIX: Water

QC LEVEL: EDD/IV
Report Due: 12/28/2009
Client Sample Count: 11

Sample Type	Sampled	Received	Lab ID	Client ID	AVS-SEM	SUB bGrainSize (MECH)	ELLOYDKAHN	SUB TBT	SM2540B	SW6010B	SW7471A	SW9045B
Client Sample	11/23/09	11/24/09	0911217-01	LW07-K4-SD301-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-02	LW07-K5-SD301-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-03	LW07-SD306-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-04	LW07-SD305-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-05	LW07-SD304-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-06	LW07-L5-SD301-00-09D ✓	X	X	X	X	X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-07	LW07-SD301-00-09D ✓	hold		X	X	X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-08	LW07-SD301P-00-09D ✓	X		hold	X	X	X	X	hold
Client Sample	11/23/09	11/24/09	0911217-09	LW07-SD302-00-09D ✓	MS/MSD	MS/MSD	MS/MSD		MS/MSD	MS/MSD	MS/MSD	MS/MSD
Client Sample	11/23/09	11/24/09	0911217-10	LW07-SD307-00-09D ✓	X	X	X		X	X	X	X
Client Sample	11/23/09	11/24/09	0911217-11	LW07-SD303-00-09D ✓	X	X	X		X	X	X	X
Equipment Blank	11/23/09	11/24/09	0911217-12	LW07-EB-112309 ✓						X	X	

TPT PO=09-1513

Grainsize PO=09-1512

20 028

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Empirical Labs	**Service Request No.:**	K0911477
Project:	NABLC SWMU7B CTO-222_001/375057.FI.FW	**Date Received:**	11/24/2009
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three sediment samples were received for analysis at Columbia Analytical Services on 11/24/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Butyltins Compounds

Butyltins by Method Krone:
The confirmation comparison criteria of 40% difference for Tri-n-butyltin was exceeded in sample LW07-L5-SD301-00-09D. The higher of the two values was reported because no evidence of matrix interference was observed.

Approved by C. Bay **Date** 12/9/09

Columbia Analytical Services™

CHAIN OF CUSTODY

SR#: K0411477

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC # 030

PROJECT NAME: NABLC SWMU7B CTO-222
PROJECT NUMBER: 375057.FI.FW
PROJECT MANAGER: Cecilia Landin
COMPANY/ADDRESS: CH2M Hill
5700 Cleveland Street / Suite 101
CITY/STATE/ZIP: Virginia Beach, VA 23462
E-MAIL ADDRESS:
PHONE #: (757) 671-6266 FAX #:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond, Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	Tributyl Tin (Lynne 8/02)				REMARKS
~~[illegible]~~		~~[illegible]~~																						
~~[illegible]~~		~~1051~~																						
LW07-LS-SD301-00-09D	11/23/09	1244		SD	1															1				
LW07-SD301-00-09D	11/23/09	1405		SD	1															1				
LW07-SD301P-00-09D	11/23/09	1410		SD	1															1				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ___
Bill To: ___

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results

___ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:___ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

Note: Empirical is the primary lab.

* all "C"s on bottleware labels should be "D" (eg. LW07-SD301-00-09D)

[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 11/23 1800	Signature: [signature] Date/Time: 11/24/09 0920	Signature / Date/Time	Signature / Date/Time
Printed Name / Firm	Printed Name: Lynn Firm: CAS	Printed Name / Firm	Printed Name / Firm

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: CH2M Hill Service Request K09 11477

Received: 11/24/09 Opened: 11/24/09 By: [illegible]

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? 2F
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: _____ NA Y N
5. **Temperature of cooler(s) upon receipt (°C):** -0.5
   Temperature Blank (°C): 1.0
   Thermometer ID: 285
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA Y N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA Y N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA Y N
16. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: _____

031

Samples in this SDG were analyzed for butyltins (as cation) by a laboratory proprietary method. Results were reported as tri-n-butyltin.

Holding Times

Sampling Date: 11/23/09
Received Date: 11/24/09 at CAS
Extraction Dates: 12/1/09
Analysis Dates: 12/4/09, 12/7/09

Extraction (14 days) and analysis (40 days) holding times were met.

Calibrations

Method calibration procedures were followed. Calibration factors were calculated. %RSDs were within QC limits. Continuing calibration standards were analyzed per the method and all resolution, %D criteria were within QC limits. Raw data was verified.

BLANK SUMMARY

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- Any compound detected in the sample, and the associated blank, must be qualified by elevating the limit of detection or adjusting the limit of detection to the sample result, when the sample concentration is less than five (5) times the blank concentration.
- Sample weight, volume or dilution factor must be taken into consideration when applying the 5X criteria.
- Apply the same data validation guidelines to any associated rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The sample result is greater than the RL and less than five times (5X) the blank value. Cross out the "B" flag and qualify the sample result with a "U".
RL -	The sample result is less than the RL and less than five times (5X) the blank value. Reject the sample result, cross out the "B" flag, and report the RL.
No Action -	The sample result is greater than the RL and greater than five times (5X) the blank value.
B -	The sample result is less than five times (5X) the blank value. Report the blank value with a "B" flag. (Region III)

No contamination was reported in the associated method blank. There were no field QC blanks submitted for this method.

FIELD DUPLICATE SAMPLE SUMMARY

Note: Field duplicate results are assessed only if both results are above the CRDL.
Sample ID: LW07-SD301-00-09D Duplicate Sample ID: LW07-SD301P-00-09D

Compound	Sample Conc.	Duplicate Conc.	RPD
tri-n-butyltin	5.6	3.4	49%

Comments: No qualifications were required

SAMPLE RESULT VERIFICATION

Specific Comments:

The data as reported did require qualifications. One reported positive result exhibited a column quantitation %D greater than 40%. This result was qualified as estimated J according to Region III guidelines. Raw data was verified.

LW07-L5-SD301-00-09D –56.0%

Reviewer JACleveland **Date:** 21910

Initial Calibration Date: 11/23/09, instrument GC26 CAL9045 on Column 1

RRF and %RSD Calculations:

Compound Name: tri-n-butyltin in Level 2
Lab Value: 32100.0000

Area of Compound	142996
Conc. of Compound	4.455
Calculated RRF	32097.8676

Compound Name: tri-n-butyltin
Lab Value: 12.9

RRF of STD 1	30100.0000
RRF of STD 2	32100.0000
RRF of STD 3	38400.0000
RRF of STD 4	38100.0000
RRF of STD 5	40700.0000
RRF of STD 6	42800.0000
RRF of STD 7	42000.0000
Calculated % RSD	12.95

Continuing Calibration File ID: 12/4/09, 16:19, File ID 1204F003.d

RRF and %D Calculations:

Compound Name: tri-n-butyltin
Lab Value: 33400.00000

Area of Compound	1485984
Conc. of Compound	44.55
Calculated RRF	33355.42088

Compound Name: tri-n-butyltin
Lab Value: -12.0

Average RRF	37700.00000
Calibration Check RRF	33400.00000
Calculated % D	11.4

SAMPLE CALCULATION

Sample ID: LW07-SD301-00-09D
Standard ID: ICAL 11/23/09
Compound: tributyl tin
Concentration: 5.6 ug/Kg DB

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound		373106	
RRF of Compound		24000	
Dilution Factor		1	
Weight of Sample	NA	20.36	
Extract Volume		4	
Volume of Sample		NA	
% Moisture	NA	0.547	
Aliquot of sample	NA	NA	
Conversion Factor		1	
Concentration	#DIV/0!	5.58	#REF!

Jacqueline Cleveland

From: Chris Leaf [cleaf@caslab.com]
Sent: Thursday, February 18, 2010 7:00 PM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222
Attachments: Nonstandard conc .pdf

Jackie,

Please see the attachment. I was wrong. The software does not provide this is the data package. So the Standard Concentrations have proven to be non-standard after all. Let me know if I can be of further assistance.

Chris Leaf
Project Chemist

Columbia Analytical Services, Inc.
1317 S. 13th Ave
Kelso, WA 98626
360-577-7222 (office)
360-577-7222 (direct)
www.caslab.com

NOTICE: [illegible] and purpose, [illegible] are hereby notified [illegible] of this communication [illegible] prohibited. Thank you.

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 3:28 PM
To: Chris Leaf
Subject: RE: CH2M HILL NABLC CTO-222

Chris,

Are the actual values for the standard concentrations provided somewhere in the data package? If not would you send them over to me?? Thanks! If you can get those to me in the morning or early afternoon that would be really great.

Jackie

From: Chris Leaf [mailto:cleaf@caslab.com]
Sent: Thursday, February 18, 2010 12:32 PM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222

Jackie,

The labs review is listed as below:

"The amounts shown on the final reported are rounded numbers, however, the numbers used in the calculation have not been rounded. For example, 4.5 is really 4.455. When the response of 142996 is used, the resulting RF is 32098 rounded to 32100. "

Basically those minute details change everything when it comes to rounding. I hope this helps. Let me know if you need more info.

036

Chris Leaf
Project Chemist

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are hereby notified [illegible]
prohibited. Thank you.

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 9:55 AM
To: Chris Leaf
Subject: RE: CH2M HILL NABLC CTO-222

Thanks Chris! I will be watching for your response.

Jackie

From: Chris Leaf [mailto:cleaf@caslab.com]
Sent: Thursday, February 18, 2010 11:38 AM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222

Jackie,

Yes, I did receive it. I apologize for not responding to you. I am having the lab review the data and am waiting for their response. I had hoped to get back to you with an answer yesterday. Unfortunately, it did not happen. I did not mean to leave you waiting. I will update you as soon as the lab responds.

Again, I am sorry for the delay.

Chris Leaf
Project Chemist

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are hereby notified [illegible]
prohibited. Thank you.

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 9:33 AM
To: Chris Leaf
Cc: Victoria.Brynildsen@CH2M.com; 'DataQual'
Subject: FW: CH2M HILL NABLC CTO-222
Importance: High

Hi Chris!

Just checking to make sure you received my e-mail (see below) and on status of the request. Please let me know when I can expect a response! Thanks so much.

Jackie

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Wednesday, February 17, 2010 10:01 AM
To: 'Chris Leaf'
Cc: 'DataQual'; 'Victoria.Brynildsen@CH2M.com'
Subject: CH2M HILL NABLC CTO-222

Good Morning Chris,

I have a quick question regarding the Butyltins analysis for the NABLC CTO-222 data packages. I am currently looking at SDG CTO-222_002. I am verifying calculations and am unable to verify the RFs for tri-n-butyltin in the ICAL analyzed 11/23/2009 on instrument GC26. For example, for level B, the amount is 4.5 (based on p 182 in data package) and the area counts are 142996 (based on p. 193 in data package. This calculates to an RF value of 31777. Rounded to 3 significant figures would be 31800. The RF value reported on p. 182 is 32100. It is possible that I am missing something. Please clarify the calculation for me. Let me know if you have any questions.

Jackie

Jacqueline Cleveland
Vice-President
DataQual, ES, LLC
636-352-9391
cleve137@charter.net

039

Sample Delivery Group Assignment Form

CLIENT: Empirical (CH2M Hill, Inc.)
PROJECT NAME: NABLC SWMU7B
SDG #: CTO-222_001
PROJECT NUMBER: 375057.FI.FW
MATRIX: Sediment

QC LEVEL: EDD/IV
Report Due: 12/15/2009
Client Sample Count: 3

Sample Type	Sampled	Received	Lab ID	Client ID	TBT	%TS
Client Sample	11/23/09	11/24/09	K0911477-001	LW07-L5-SD301-00-09D	X	X
Client Sample	11/23/09	11/24/09	K0911477-002	LW07-SD301-00-09D	X	X
Client Sample	11/23/09	11/24/09	K0911477-003	LW07-SD301P-00-09D	X	X

This SDG contains select total metals analysis SW-846 6010B & 7471A for Cu, Pb, Sn, Zn & Hg. Validation performed using Region III flagging modifications as applicable.

HOLDING TIMES

Sampling Date: 11/23
Received Date: 11/24
Prep. Dates: 12/14, 12/15 ICP; 12/10, 12/15 Hg
Analysis Dates: 12/15-16/09 ICP; 12/14, 12/16 Hg

Metals HT – 6 months

All holding time requirements were met. Cooler temperatures were acceptable and receipt documentation was in order.

CALIBRATIONS

The proper calibration procedures were followed for the metals analyses used by the laboratory. All associated ICV/CCV criteria for the metals analytes were not met. However, no qualifications were required because the non-compliant analytes were not reported from the associated run. The CRI check standards were analyzed. The method QC limits were applied because Region III doesn't have a validation guideline for SW-846. Method criteria for the CRI standards were met. ICSA/ICSAB criteria were met. No other qualifications were required.

BLANK SUMMARY

Blank qualification guidelines:

- No action is taken if an analyte is found in the blank but not in the sample.
- Sample weight, volume, moisture levels and/or dilution factor must be taken into consideration when applying the criteria.
- Apply the same data validation guidelines to any associated calibration, preparation, and field QC blanks and all associated samples.
- Qualification/Action codes:

  Region III action limit of 5X the blank contamination concentration was used to validate the data.

  NA - The sample result is greater than the CRDL and greater than five times (5X) the blank value.

  B - The sample result is less than five times (5X) the blank value.

Blank Contamination and Qualification Summaries

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.68J mg/Kg	8.40 mg/Kg	B

Note: Per CH2MHILL, field QC blanks were not qualified due to laboratory preparation blank contamination.

The concentration noted for the CCBs is the highest concentration in all the CCBs. However, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.
Negative contamination in a prep blank or CCB, if less than the negative analyte CRDL, is qualified based on professional judgement.

See validation report for specific samples and qualifications.

MATRIX SPIKE/DUPLICATE SUMMARY

The matrix spike results of sample LW07-SD301P-00-09D were acceptable for all analytes with the exception of copper in the MSD (124). No qualifications were required because the MS %R and the RPD as well as the PDS recovery were acceptable. All matrix duplicate results were acceptable.

SERIAL DILUTIONS

The serial dilution exhibited acceptable results for the metals analytes.

FIELD DUPLICATE SAMPLE SUMMARY

Note: Field duplicate results are assessed only if both results are above the CRDL.

Sample ID: LW07-SD301-00-09D **Duplicate Sample ID:** LW07-SD301P-00-09D

Analyte	Sample Conc.	Duplicate Conc.	RPD
mercury	0.343	1.77	135%
copper	252	187	30%
lead	526	587	11%
tin	29.7	23.9	22%
zinc	1170	1440	21%

Comments: Flag mercury J in both samples.

SAMPLE CALCULATION

EPA SAMPLE ID: LW07-SD303-00-09D
COMPOUND: tin
CONCENTRATION: 4.60 mg/Kg
% Solids: 56.41
Dilution Factor: 1
2.55g to 100ml
Raw Data result: 66.215 ug/L

66.215 ug/L * 0.100L/2.55g * 1/.5641 * 1000g/1Kg * 1mg/1000ug = 4.603 mg/Kg

EPA SAMPLE ID: LW07-SD301P-00-09D
COMPOUND: mercury
CONCENTRATION: 1.77 mg/Kg
% Solids: 64.81
Dilution Factor: 1
0.31g to 50ml
Raw Data result: 7.1196 ug/L

7.1196 ug/L * 0.050L/0.31g * 1/.6481 * 1000g/1Kg * 1mg/1000ug = 1.772 mg/Kg

SAMPLE RESULT VERIFICATION

Specific Comments:

All sample results were reported within the calibration/linear range of the instruments. Detection limits were acceptable. Raw data was verified.

Reviewer HA Cleveland **Date:** 2/19/10

INITIAL AND CONTINUING CALIBRATION CHECK

SW6010B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Calibration: 9351004
Sequence: 9L35117

Lab Sample ID	Analyte	True	Found	%R	Units	Control Limit
9L35117-ICV1	Copper	1000	1004	100	ug/L	+/- 10.00%
	Lead	1000	1002	100	ug/L	+/- 10.00%
	Tin	1000	1011	101	ug/L	+/- 10.00%
	Zinc	1000	1006	101	ug/L	+/- 10.00%
9L35117-CCV1	Copper	1000	1007	101	ug/L	+/- 10.00%
	Lead	1000	976.9	97.7	ug/L	+/- 10.00%
	Tin	1000	984.0	98.4	ug/L	+/- 10.00%
	Zinc	1000	1024	102	ug/L	+/- 10.00%
9L35117-CCV2	Copper	1000	1031	103	ug/L	+/- 10.00%
	Lead	1000	990.7	99.1	ug/L	+/- 10.00%
	Tin	1000	992.3	99.2	ug/L	+/- 10.00%
	Zinc	1000	1021	102	ug/L	+/- 10.00%
9L35117-CCV7	Copper	1000	976.3	97.6	ug/L	+/- 10.00%
	Lead	1000	922.7	92.3	ug/L	+/- 10.00%
	Tin	1000	912.4	91.2	ug/L	+/- 10.00%
	Zinc	1000	1047	105	ug/L	+/- 10.00%
9L35117-CCV8	Copper	1000	977.1	97.7	ug/L	+/- 10.00%
	Lead	**1000**	**873.0**	**87.3**	**ug/L**	+/- 10.00%
	Tin	**1000**	**845.6**	**84.6**	**ug/L**	+/- 10.00%
	Zinc	1000	1069	107	ug/L	+/- 10.00%

NQ

Only Zn was reported from this CCV — JAC 2/9/10

042

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP
Sequence: 9L35005

SDG: CTO222_001
Project: Little Creek CTO222(SWMU7B)
Calibration: 9350003

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
9L35005-ICB1	Copper	0.08083	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.4766	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.3601	~~50.0~~ 22.0	~~100~~ 68.0	BLD 12/23/09 ug/L	U	SW6010B
	Zinc	0.02902	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB1	Copper	0.687	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.388	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0746	~~50.0~~ 22.0	~~100~~ 68.0	BLD 12/23/09 ug/L	U	SW6010B
	Zinc	0.216	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB2	Copper	0.295	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.748	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.0930	~~50.0~~ 22.0	~~100~~ BLD 12/23/09 68.0	ug/L	U	SW6010B
	Zinc	-0.00661	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB5	Copper	0.380	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.250	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.221	~~50.0~~ 22.0	~~100~~ 68.0 12/23/09 BLD	ug/L	U	SW6010B
	Zinc	0.136	5.00	20.0	ug/L	U	SW6010B
9L11009-BLK1	Copper	0.0241	0.250	0.500	mg/Kg wet	U	SW6010B
	Lead	-0.0228	0.0750	0.150	mg/Kg wet	U	SW6010B
	Zinc	0.271	0.250	1.00	mg/Kg wet	J	SW6010B
9L35005-CCB6	Copper	0.518	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.420	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.374	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.172	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB7	Copper	0.425	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.355	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0156	~~50.0~~ 22.0	~~100~~ BLD 12/23/09 68.0	ug/L	U	SW6010B
	Zinc	0.316	5.00	20.0	ug/L	U	SW6010B

All Zn results > action limit

043

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO222_001
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP
Project: Little Creek CTO222(SWMU7B)
Sequence: 9L35117
Calibration: 9351004

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
9L35117-ICB1	Copper	0.1388	5.00	10.0	ug/L	U	SW6010B
	Lead	0.5282	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.06699	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	-0.09285	5.00	20.0	ug/L	U	SW6010B
9L35117-CCB1	Copper	0.500	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.589	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0482	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.195	5.00	20.0	ug/L	U	SW6010B
9L15004-BLK1	Copper	0.129	1.25	2.50	ug/L	U	SW6010B
	Lead	-0.0856	0.375	0.750	ug/L	U	SW6010B
	Tin	0.00678	~~12.5~~ 5.5	~~25.0~~ 17.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.0903	1.25	5.00	ug/L	U	SW6010B
9L35117-CCB2	Copper	0.219	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.0141	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0771	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.0415	5.00	20.0	ug/L	U	SW6010B
9L35117-CCB7	Copper	-0.255	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.438	1.50	3.00	ug/L	U	SW6010B
	Tin	0.460	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.246	5.00	20.0	ug/L	U	SW6010B
9L11009-BLK2	Tin	1.68	1.10	3.40	mg/Kg wet	J	SW6010B
9L35117-CCB8	Copper	-0.553	5.00	10.0	ug/L	U	SW6010B
	Lead	0.533	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.0000800	~~50.0~~ 22.0	~~100~~ 68.0 BLD 12/23/09	ug/L	U	SW6010B
	Zinc	0.948	5.00	20.0	ug/L	U	SW6010B

Flag as noted in report

044

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SW6010B

LW07-SD302-00-09D

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO222_001
Client:	CH2M Hill, Inc.	Project:	Little Creek CTO222(SWMU7B)
Matrix:	Solid		
Batch:	9L11009		
% Solids:	39.01		

Source Sample Name: **0911217-09**

ANALYTE	SPIKE ADDED (mg/Kg dry)	SAMPLE CONCENTRATION (mg/Kg dry)	MS CONCENTRATION (mg/Kg dry)	MS % REC.	Q	QC LIMITS REC.
Copper	24.74	61.48	88.95	111		80 - 120
Lead	24.74	48.60	77.41	116		80 - 120
Tin	98.96	6.839	121.4	116		80 - 120
Zinc	49.48	252.4	323.3	143		80 - 120

ANALYTE	SPIKE ADDED (mg/Kg dry)	MSD CONCENTRATION (mg/Kg dry)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Copper	24.84	92.31	124	3.71	N	20	80 - 120
Lead	24.84	76.39	112	1.33		20	80 - 120
Tin	99.35	121.4	115	0.0379		20	80 - 120
Zinc	49.67	321.6	139	0.548		20	80 - 120

NQ

Cu { MS OK, RPD OK, PDS OK } No Quals

045

DataQual

Environmental Services, LLC

CH2M HILL
5700 Cleveland Street
Suite 101
Virginia Beach, Virginia 23462

February 19, 2010
SDG # CTO222_002, Empirical & Columbia Analytical
NAB Little Creek, CTO-222

Dear Ms. Brynildsen,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # CTO222_002. The data validation was performed in accordance with the SW-846 Methods 6010B and 7471A for select metals and the CAS Lab SOP – SOC-BUTYL for the analysis of tri-n-butyltin. Also used in the validation of these samples were the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, and to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Data Review, 4/93, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3/IM-2 review), as applicable. The lab ID used in the following matrix is the ID assigned to the samples by Empirical, which is the primary lab for this SDG.

Sample ID	Lab ID	Matrix	Butyltins	Select Metals
LW07-B7-SD301-00-09D	0911228-01	sediment		X
LW07-B5-SD301-00-09D	0911228-02	sediment	X	X
LW07-B5-SD301P-00-09D	0911228-03	sediment	X	X
LW07-D5-SD301-00-09D	0911228-04	sediment		X
LW07-F5-SD301-00-09D	0911228-05	sediment		X
LW07-F3-SD301-00-09D	0911228-06	sediment		X
LW07-H3-SD301-00-09D	0911228-07	sediment	X	X
LW07-J4-SD301-00-09D	0911228-08	sediment		X
LW07-M1-SD301-00-09D	0911228-09	sediment	X	X
LW07-M1-SD302-00-09D	0911228-10	sediment	X	X
LW07-M1-SD303-00-09D	0911228-11	sediment	X	X
LW07-M1-SD304-00-09D	0911228-12	sediment	X	X
LW07-L2-SD301-00-09D	0911228-13	sediment		X
LW07-L2-SD301P-00-09D	0911228-14	sediment		X
LW07-K3-SD301-00-09D	0911228-15	sediment		X
LW07-K1-SD301-00-09D	0911228-16	sediment	X	X
LW07-K1-SD302-00-09D	0911228-17	sediment	X	X
LW07-K1-SD303-00-09D	0911228-18	sediment	X	X
LW07-K1-SD304-00-09D	0911228-19	sediment	X	X
LW07-H1-SD301-00-09D	0911228-20	sediment	X	X
LW07-EB-112409	0911228-21	water		X
LW07-FB-112409	0911228-22	water		X
LW07-H3-SD301-00-09DMS	0911228-07MS	sediment	X	X
LW07-H3-SD301-00-09DMSD	0911228-07MSD	sediment	X	X

The following quality control samples were provided with this SDG: sample LW07-B5-SD301P-09D-field duplicate of sample LW07-B5-SD301-09D; sample LW07-L2-

SD301P-09D -field duplicate of sample LW07-L2-SD301-09D; sample LW07-EB-112409-equipment blank; and sample LW07-FB-112409- field blank.

All areas of concern are discussed in the body of the report and a summary of data qualification is provided. The samples were evaluated based on the following criteria:

• Data Completeness	*
• Technical Holding Times	*
• GC/MS Performance	NA
• GC Performance	*
• Initial/Continuing Calibrations	
• CRI Standards	*
• Interference Check Sample	*
• Blanks	
• Internal Standards	NA
• Surrogates	*
• Laboratory Control Samples	*
• Matrix Spike Recoveries	
• Matrix Duplicate RPDs	*
• Post Digestion Spike Recoveries	*
• Serial Dilutions	*
• Field Duplicates	
• Identification/Quantitation	
• Reporting Limits	*
• Tentatively Identified Compounds	NA

*- indicates that no qualifications were required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page.

Major Problems

No issues requiring rejection of the data were found in this SDG.

Minor Problems

Issues requiring qualification of the analytical data were found in the validation of this SDG. A summary of these issues for each fraction is presented in the following paragraphs. All results qualified as estimated J/UJ or biased high, K or biased low, L/UL, should be considered usable but estimated.

Tributyl Tin

Results in two samples were flagged as P due to column quantitation %Ds that were greater than 40%. These results were flagged as estimated J.

Select Metals

Two samples required qualification as biased low due to a low continuing calibration standard recovery.

Blank contamination was noted in the laboratory blanks associated with the samples in this SDG. Qualifications were added to the data.

Field sample results for lead were qualified as estimated due to variable MS/MSD recoveries.

The analyte copper was flagged as estimated in one of the field duplicate pairs due to a RPD above 30%.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required. The laboratory SOP and standard concentrations for tributyl tin were requested and received from CAS. A copy of the e-mail correspondence is included in the validation worksheets.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/24/09 and samples were received at the laboratory 11/25/09. All sample preparation and analysis was performed within Region III and/or method holding time requirements.

Initial/Continuing Calibration

Select Metals

Calibration standards exhibited %Rs that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results are qualified as indicated.

Standard ID	Analyte	%R	Samples	Q Flag	Q Code
CCV8, 12/16, 19:32	lead	84.6%	LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D	L/UL	CCL

Blanks

Select Metals

Preparation blank contamination was noted. Qualification for one analyte was required. Contamination and sample results qualifications are indicated in the following tables. Please note that sample weight, volume, moisture levels and/or dilution factor were taken into consideration when applying the criteria.

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.35J mg/Kg	6.75 mg/Kg	B
PBLK – 9L14010-BLK	tin	1.442J mg/Kg	7.21 mg/Kg	B

Sample ID	analyte	Q Flag	Q Code
LW07-B7-SD301-00-09D, LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D, LW07-D5-SD301-00-09D, LW07-F5-SD301-00-09D, LW07-F3-SD301-00-09D, LW07-H3-SD301-00-09D, LW07-J4-SD301-00-09D, LW07-M1-SD303-00-09D, LW07-K1-SD301-00-09D, LW07-K1-SD302-00-09D, LW07-K1-SD303-00-09D, LW07-K1-SD304-00-09D, LW07-H1-SD301-00-09D	tin	B	BL

Matrix Spike Recoveries

Select Metals

The matrix spike analysis of the sample LW07-H3-SD301-00-09D exhibited non-compliant %Rs (<80% or >120%) for lead. Specific action is noted in the following table.

MS	Analyte	Samples Affected	%R	Q Flag	Q Code
LW07-H3-SD301-00-09D	lead	all samples	123/74.4	J/UJ	MSL*

* The qualifier code MSL was used but the results were flagged J/UJ due to variable MS/MSD recoveries, not low recoveries. There is no qualifier code for variable recoveries (high & low).

Field Duplicates

Select Metals

The reported results for copper in samples LW07-B5-SD301-00-09D and LW07-B5-SD301-00-09D were qualified as estimated J due to a high RPD (>30%) between the results, qualifier code FD.

Identification/Quantitation

Butyltins

Two sample results were reported with a P flag to indicate column quantitation %Ds greater than 40%. The reported positive results for tri-n-butyltin in samples LW07-B5-SD301P-00-09D (41.4%) and LW07-K1-SD301-00-09D (44.1%) were flagged as estimated J with a qualifier code of 2C.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Jacqueline Cleveland

Jacqueline Cleveland
Vice-President

Summary of Data Qualifications

Butyltins

Sample ID	Compound	Results	Q Flag	Q code
LW07-B5-SD301P-00-09D, LW07-K1-SD301-00-09D	tri-n-butyltin	+P	J	2C

Select Metals

Sample ID	Analyte	Results	Q Flag	Q code
LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D	lead	+/-	L/UL	CCL
LW07-B7-SD301-00-09D, LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D, LW07-D5-SD301-00-09D, LW07-F5-SD301-00-09D, LW07-F3-SD301-00-09D, LW07-H3-SD301-00-09D, LW07-J4-SD301-00-09D, LW07-M1-SD303-00-09D, LW07-K1-SD301-00-09D, LW07-K1-SD302-00-09D, LW07-K1-SD303-00-09D, LW07-K1-SD304-00-09D, LW07-H1-SD301-00-09D	tin	+ up to action limit	B	MBL
all field samples	lead	+/-	J/UJ*	MSL*
LW07-B5-SD301-00-09D, LW07-B5-SD301P-00-09D	copper	+	J	FD

Note: for samples LW07-M1-SD304-00-09D, LW07-L2-SD301P-00-09D, for lead the final flag is L/UL and the qualifier code is CCL – to indicate potential low bias.

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
R	result is rejected; the presence or absence of the analyte cannot be verified
D	result value is based on dilution analysis result
NJ	analyte has been tentatively identified, estimated value
L	analyte present, biased low
UL	not detected, quantitation limit is probably higher
K	analyte present, biased high
Q	estimated dioxin/furan concentration
I	interferences present which may cause the results to be biased high

Method Blank Qualification Flags (Q-Flags)

NA	The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.
B	The sample result for the blank contaminant is less than or greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B at the compound value reported.

General Abbreviations

IDL	Instrument Detection Limit
MDL	Method Detection Limit
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
Q Code	Qualifier Code
Q Flag	Qualifier Flag
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - Low Recovery
BSH	Blank Spike/LCS - High Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
EMPC	Estimated Possible Maximum Concentration
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination- MBL, EBL, FBL, TBL
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%Sol	High percent moisture

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-B5-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-001	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**4.3**		1.9	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	81	18-95	12/04/09	Acceptable

JWC 3/4/10

Comments:

009

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-B5-SD301P-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-002	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	3.5	J 2C	1.9	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	92	18-95	12/04/09	Acceptable

JLC 21610

Comments:

010

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-H3-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-003	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**3.4**		2.3	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	82	18-95	12/04/09	Acceptable

JJC 21610

Comments:

011

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-M1-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-004	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**5.2**		2.4	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	77	18-95	12/04/09	Acceptable

JLC 21610

Comments:

012

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-M1-SD302-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-005	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**2.0**		1.6	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	91	18-95	12/04/09	Acceptable

DJC 2/10/10

Comments:

013

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-M1-SD303-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-006	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**7.6**		2.6	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	86	18-95	12/04/09	Acceptable

JC 2/6/10

Comments:

014

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-M1-SD304-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-007	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**3.3**		1.8	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	91	18-95	12/04/09	Acceptable

JLC 2/6/10

Comments:

015

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.F1.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-K1-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-008	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**3.6**	~~P~~ J 2C	2.6	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	77	18-95	12/04/09	Acceptable

JLC 21610

Comments:

016

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-K1-SD302-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-009	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**5.2**		2.6	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	71	18-95	12/04/09	Acceptable

JAC 21610

Comments:

017

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.F1.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-K1-SD303-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-010	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**4.8**		2.8	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	92	18-95	12/04/09	Acceptable

JLC 21610

Comments:

048

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-K1-SD304-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-011	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**5.6**		2.6	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	83	18-95	12/04/09	Acceptable

JC 2/6/10

Comments:

019

Analytical Results

Client:	Empirical Labs	**Service Request:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Collected:**	11/24/2009
Sample Matrix:	Sediment	**Date Received:**	11/25/2009

Butyltins (as cation)

Sample Name:	LW07-H1-SD301-00-09D	**Units:**	ug/Kg
Lab Code:	K0911500-012	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**5.8**		2.8	1	12/01/09	12/04/09	KWG0911311	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	95	18-95	12/04/09	Acceptable

DJC 21610

Comments:

020

ANALYSIS DATA SHEET

LW07-B7-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 08:20
% Solids: 59.28

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-01
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.103	0.0178	0.0451	1		SW7471A	9L15009	12/16/09 11:14
7440-50-8	Copper	70.2	0.327	0.654	1		SW6010B	9L11009	12/15/09 17:23
7439-92-1	Lead	34.2	0.0981	0.196	1	J MSL	SW6010B	9L11009	12/15/09 17:23
7440-31-5	Tin	4.88	1.44	4.45	1	B MBL	SW6010B	9L11009	12/15/09 17:23
7440-66-6	Zinc	206	0.327	1.31	1		SW6010B	9L11009	12/15/09 17:23

JLC 2/15/10

ANALYSIS DATA SHEET

LW07-B5-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 08:49
% Solids: 49.03

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-02
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.122	0.0221	0.0561	1		SW7471A	9L15009	12/16/09 11:15
7440-50-8	Copper	49.2	0.408	0.816	1	J FD	SW6010B	9L11009	12/15/09 17:27
7439-92-1	Lead	27.3	0.122	0.245	1	J MSL	SW6010B	9L11009	12/15/09 17:27
7440-31-5	Tin	5.06	1.79	5.55	1	~~J~~ B MBL	SW6010B	9L11009	12/15/09 17:27
7440-66-6	Zinc	160	0.408	1.63	1		SW6010B	9L11009	12/15/09 17:27

JAC 21570

ANALYSIS DATA SHEET

LW07-B5-SD301P-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 08:54
% Solids: ~~0.00~~ as rec'd
SMO 12/28/09

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-03
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg wet)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.119	0.0130	0.0330	1		SW7471A	9L15009	12/16/09 11:17
7440-50-8	Copper	70.1	0.198	0.395	1	J FD	SW6010B	9L11009	12/15/09 17:32
7439-92-1	Lead	22.6	0.0593	0.119	1	J MSL	SW6010B	9L11009	12/15/09 17:32
7440-31-5	Tin	4.07	0.870	2.69	1	B MBL	SW6010B	9L11009	12/15/09 17:32
7440-66-6	Zinc	156	0.198	0.791	1		SW6010B	9L11009	12/15/09 17:32

JAC 2/5/10

023

ANALYSIS DATA SHEET

LW07-D5-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 09:00
% Solids: 38.90

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-04
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.236	0.0295	0.0748	1		SW7471A	9L15009	12/16/09 11:18
7440-50-8	Copper	70.7	0.500	1.00	1		SW6010B	9L11009	12/15/09 17:36
7439-92-1	Lead	36.6	0.150	0.300	1	J MSL	SW6010B	9L11009	12/15/09 17:36
7440-31-5	Tin	6.27	2.20	6.80	1	~~J~~ B MBL	SW6010B	9L11009	12/15/09 17:36
7440-66-6	Zinc	241	0.500	2.00	1		SW6010B	9L11009	12/15/09 17:36

JAC 21510

ANALYSIS DATA SHEET

LW07-F5-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 09:10
% Solids: 58.81

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-05
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0581	0.0170	0.0432	1		SW7471A	9L15009	12/16/09 11:21
7440-50-8	Copper	19.8	0.335	0.669	1		SW6010B	9L11009	12/15/09 17:41
7439-92-1	Lead	18.6	0.100	0.201	1	J MSL	SW6010B	9L11009	12/15/09 17:41
7440-31-5	Tin	4.00	1.47	4.55	1	~~J~~ BMBL	SW6010B	9L11009	12/15/09 17:41
7440-66-6	Zinc	85.4	0.335	1.34	1		SW6010B	9L11009	12/15/09 17:41

JAC 24570

ANALYSIS DATA SHEET

LW07-F3-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 10:10
% Solids: 48.76

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-06
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.229	0.0222	0.0564	1		SW7471A	9L15009	12/16/09 11:22
7440-50-8	Copper	71.1	0.399	0.798	1		SW6010B	9L11009	12/15/09 17:45
7439-92-1	Lead	50.4	0.120	0.239	1	J MSC	SW6010B	9L11009	12/15/09 17:45
7440-31-5	Tin	5.72	1.76	5.43	1	B MBL	SW6010B	9L11009	12/15/09 17:45
7440-66-6	Zinc	277	0.399	1.60	1		SW6010B	9L11009	12/15/09 17:45

JC 21510

026

ANALYSIS DATA SHEET

LW07-H3-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 10:31
% Solids: 43.80

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-07
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.261	0.0270	0.0685	1		SW7471A	9L15009	12/16/09 11:24
7440-50-8	Copper	87.8	0.451	0.902	1		SW6010B	9L14010	12/15/09 18:27
7439-92-1	Lead	57.9	0.135	0.271	1	J ~~M~~ MSL	SW6010B	9L14010	12/15/09 18:27
7440-31-5	Tin	6.38	1.99	6.14	1	B MBL	SW6010B	9L14010	12/15/09 18:27
7440-66-6	Zinc	343	0.451	1.80	1		SW6010B	9L14010	12/15/09 18:27

JC 21510

ANALYSIS DATA SHEET

LW07-J4-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 10:33
% Solids: 36.88

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-08
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.315	0.0302	0.0767	1		SW7471A	9L15009	12/16/09 11:27
7440-50-8	Copper	101	0.528	1.06	1		SW6010B	9L11009	12/15/09 17:49
7439-92-1	Lead	53.4	0.158	0.317	1	J MSL	SW6010B	9L11009	12/15/09 17:49
7440-31-5	Tin	7.50	2.32	7.17	1	B MBL	SW6010B	9L11009	12/15/09 17:49
7440-66-6	Zinc	366	0.528	2.11	1		SW6010B	9L11009	12/15/09 17:49

JMC 21570

ANALYSIS DATA SHEET

LW07-M1-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 11:34
% Solids: 40.99

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-09
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.503	0.0244	0.0619	1		SW7471A	9L15009	12/16/09 11:29
7440-50-8	Copper	136	0.488	0.976	1		SW6010B	9L11009	12/15/09 17:54
7439-92-1	Lead	233	0.146	0.293	1	J MSL	SW6010B	9L11009	12/15/09 17:54
7440-31-5	Tin	22.8	2.15	6.64	1		SW6010B	9L11009	12/15/09 17:54
7440-66-6	Zinc	794	0.488	1.95	1		SW6010B	9L11009	12/15/09 17:54

JC 21510

ANALYSIS DATA SHEET

LW07-M1-SD303-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 12:06
% Solids: 37.15

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-11
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.534	0.0339	0.0860	1		SW7471A	9L15010	12/16/09 11:36
7440-50-8	Copper	110	0.530	1.06	1		SW6010B	9L14010	12/15/09 18:50
7439-92-1	Lead	97.8	0.159	0.318	1	J ~~MSL~~	SW6010B	9L14010	12/15/09 18:50
7440-31-5	Tin	11.7	2.33	7.21	1	B MBL	SW6010B	9L14010	12/15/09 18:50
7440-66-6	Zinc	504	0.530	2.12	1		SW6010B	9L14010	12/15/09 18:50

JAC 21570

030

ANALYSIS DATA SHEET

LW07-M1-SD304-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 12:25
% Solids: 44.42

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-12
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.630	0.0244	0.0619	1		SW7471A	9L15010	12/16/09 11:37
7440-50-8	Copper	170	0.876	1.75	2	~~D~~	SW6010B	9L14010	12/16/09 19:13
7439-92-1	Lead	131	0.263	0.526	2	L ~~D~~ CCL	SW6010B	9L14010	12/16/09 19:13
7440-31-5	Tin	29.9	1.93	5.96	1		SW6010B	9L14010	12/15/09 18:54
7440-66-6	Zinc	840	0.876	3.50	2	~~D~~	SW6010B	9L14010	12/16/09 19:13

JAC 21570

ANALYSIS DATA SHEET

LW07-L2-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 12:48
% Solids: 55.40

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-13
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.214	0.0213	0.0542	1		SW7471A	9L15010	12/16/09 11:38
7440-50-8	Copper	84.6	0.361	0.722	1		SW6010B	9L14010	12/15/09 18:59
7439-92-1	Lead	44.4	0.108	0.217	1	J ~~N~~ MSL	SW6010B	9L14010	12/15/09 18:59
7440-31-5	Tin	12.5	1.59	4.91	1		SW6010B	9L14010	12/15/09 18:59
7440-66-6	Zinc	466	0.361	1.44	1		SW6010B	9L14010	12/15/09 18:59

JAC 21570

ANALYSIS DATA SHEET

LW07-L2-SD301P-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 12:50
% Solids: 93.53

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-14
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.172	0.0149	0.0378	1		SW7471A	9L15010	12/16/09 11:39
7440-50-8	Copper	101	0.428	0.855	2	~~D~~	SW6010B	9L14010	12/16/09 19:22
7439-92-1	Lead	58.4	0.128	0.257	2	L ~~D~~ ~~X~~ CCL	SW6010B	9L14010	12/16/09 19:22
7440-31-5	Tin	14.8	0.941	2.91	1		SW6010B	9L14010	12/15/09 19:04
7440-66-6	Zinc	432	0.428	1.71	2	~~D~~	SW6010B	9L14010	12/16/09 19:22

JAC 2/5/10

ANALYSIS DATA SHEET

LW07-K3-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 13:15
% Solids: 56.07

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-15
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.244	0.0193	0.0490	1		SW7471A	9L15010	12/16/09 11:41
7440-50-8	Copper	70.4	0.347	0.694	1		SW6010B	9L14010	12/15/09 19:08
7439-92-1	Lead	76.4	0.104	0.208	1	J X MSL	SW6010B	9L14010	12/15/09 19:08
7440-31-5	Tin	10.1	1.53	4.72	1		SW6010B	9L14010	12/15/09 19:08
7440-66-6	Zinc	321	0.347	1.39	1		SW6010B	9L14010	12/15/09 19:08

JC 21510

034

ANALYSIS DATA SHEET

LW07-K1-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 13:29
% Solids: 38.99

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-16
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.360	0.0286	0.0725	1		SW7471A	9L15010	12/16/09 11:42
7440-50-8	Copper	101	0.495	0.990	1		SW6010B	9L14010	12/15/09 19:13
7439-92-1	Lead	72.1	0.149	0.297	1	J X MS	SW6010B	9L14010	12/15/09 19:13
7440-31-5	Tin	7.81	2.18	6.73	1	B MBL	SW6010B	9L14010	12/15/09 19:13
7440-66-6	Zinc	461	0.495	1.98	1		SW6010B	9L14010	12/15/09 19:13

JAC 2/5/10

ANALYSIS DATA SHEET

LW07-K1-SD302-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 13:41
% Solids: 38.50

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-17
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.383	0.0267	0.0677	1		SW7471A	9L15010	12/16/09 11:43
7440-50-8	Copper	110	0.503	1.01	1		SW6010B	9L14010	12/15/09 19:17
7439-92-1	Lead	80.7	0.151	0.302	1	J ~~M~~ MSL	SW6010B	9L14010	12/15/09 19:17
7440-31-5	Tin	10.8	2.21	6.85	1	B MBL	SW6010B	9L14010	12/15/09 19:17
7440-66-6	Zinc	540	0.503	2.01	1		SW6010B	9L14010	12/15/09 19:17

JAC 21570

036

ANALYSIS DATA SHEET

LW07-K1-SD303-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 13:50
% Solids: 35.67

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-18
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.352	0.0304	0.0771	1		SW7471A	9L15010	12/16/09 11:44
7440-50-8	Copper	114	0.550	1.10	1		SW6010B	9L14010	12/15/09 19:22
7439-92-1	Lead	72.6	0.165	0.330	1	J MGL	SW6010B	9L14010	12/15/09 19:22
7440-31-5	Tin	8.34	2.42	7.48	1	B MGL	SW6010B	9L14010	12/15/09 19:22
7440-66-6	Zinc	479	0.550	2.20	1		SW6010B	9L14010	12/15/09 19:22

JAC 21510

037

ANALYSIS DATA SHEET

LW07-K1-SD304-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 14:07
% Solids: 41.76

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-19
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.311	0.0246	0.0624	1		SW7471A	9L15010	12/16/09 11:46
7440-50-8	Copper	121	0.462	0.925	1		SW6010B	9L14010	12/15/09 19:26
7439-92-1	Lead	61.2	0.139	0.277	1	J ~~X~~ MSL	SW6010B	9L14010	12/15/09 19:26
7440-31-5	Tin	7.40	2.03	6.29	1	B MBL	SW6010B	9L14010	12/15/09 19:26
7440-66-6	Zinc	449	0.462	1.85	1		SW6010B	9L14010	12/15/09 19:26

JC 21510

038

ANALYSIS DATA SHEET

LW07-H1-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 14:11
% Solids: 51.85

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-20
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.129	0.0193	0.0490	1		SW7471A	9L15010	12/16/09 11:47
7440-50-8	Copper	51.7	0.383	0.765	1		SW6010B	9L14010	12/15/09 19:31
7439-92-1	Lead	70.3	0.115	0.230	1	J ~~MSL~~	SW6010B	9L14010	12/15/09 19:31
7440-31-5	Tin	8.67	1.68	5.20	1	B MBL	SW6010B	9L14010	12/15/09 19:31
7440-66-6	Zinc	943	0.765	3.06	2	~~D~~	SW6010B	9L14010	12/16/09 19:26

JAC 21570

LW07-EB-112409

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 11/24/09 18:00
% Solids: 0.00

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-21
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L02004	12/03/09 12:50
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15004	12/16/09 12:39
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15004	12/16/09 12:39
7440-31-5	Tin		12.5	25.0	1	U	SW6010B	9L15004	12/16/09 12:39
7440-66-6	Zinc	1.28	1.25	5.00	1	J	SW6010B	9L15004	12/16/09 12:39

JLC 21570

040

ANALYSIS DATA SHEET

LW07-FB-112409

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 11/24/09 18:15
% Solids: 0.00

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-22
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0800	0.200	1	U	SW7470A	9L02004	12/03/09 12:51
7440-50-8	Copper		1.25	2.50	1	U	SW6010B	9L15004	12/16/09 12:43
7439-92-1	Lead		0.375	0.750	1	U	SW6010B	9L15004	12/16/09 12:43
7440-31-5	Tin		12.5	25.0	1	U	SW6010B	9L15004	12/16/09 12:43
7440-66-6	Zinc		1.25	5.00	1	U	SW6010B	9L15004	12/16/09 12:43

JAC 21570

041

INORGANIC CASE NARRATIVE
CH2M Hill Little Creek
SDG# CTO222_002
Work Order # 0911228
November, 2009

Empirical Laboratories ID	Client ID
0911228-01	LW07-B7-SD301-00-09D
0911228-02	LW07-B5-SD301-00-09D
0911228-03	LW07-B5-SD301P-00-09D
0911228-04	LW07-D5-SD301-00-09D
0911228-05	LW07-F5-SD301-00-09D
0911228-06	LW07-F3-SD301-00-09D
0911228-07	LW07-H3-SD301-00-09D
0911228-08	LW07-J4-SD301-00-09D
0911228-09	LW07-M1-SD301-00-09D
0911228-10	LW07-M1-SD302-00-09D
0911228-11	LW07-M1-SD303-00-09D
0911228-12	LW07-M1-SD304-00-09D
0911228-13	LW07-L2-SD301-00-09D
0911228-14	LW07-L2-SD301P-00-09D
0911228-15	LW07-K3-SD301-00-09D
0911228-16	LW07-K1-SD301-00-09D
0911228-17	LW07-K1-SD302-00-09D
0911228-18	LW07-K1-SD303-00-09D
0911228-19	LW07-K1-SD304-00-09D
0911228-20	LW07-H1-SD301-00-09D
0911228-21	LW07-EB-112409
0911228-22	LW07-FB-112409

I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in the case narrative, as verified by the following signature.

Betty DeVille

Betty DeVille
Inorganic Lab Manager

Methods:

The total samples were digested for ICAP by USEPA SW846 method 3050B and analyzed using method 6010B. Method 7471A was used to digest and analyze soil mercury. Method 9045C was used to analyze pH and the Lloyd Kahn method was used to analyze soil TOC. EPA 821/R91-100 Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment was used to distill and extract AVS sulfide and SEM metals. Mercury for this method was digested and analyzed by method 7470A. The metals were run from a filtered and matrix matched solution produced from the AVS distillation. The % solids were analyzed by Standard Methods 20th Edition method 2540B. Note: The "J" flag indicates that the analyte result is between the laboratory MDL and the laboratory reporting limit.

042

Specific Comments:

All analyses performed by the Inorganic section were completed meeting satisfactorily the corresponding specifications for Quality Control with the following exceptions:

I. ICAP Metals

A. Continuing Calibration Verification (CCV) Specification Limits (90 to 110%)

1. 9L35117-CCV8 was out of the specification limits for lead at 87.3% and for tin at 84.6%. LW07-M1-SD304-00-09D and LW07-L2-SD301P-00-09D were impacted for lead only.

B. Matrix Spike and Matrix Spike Duplicate (MS/MSD) Specification Limits (75 to 125%)

1. The matrix spike and matrix spike duplicate was out of the specification limits for lead at 123 and 74.4% for sample LW07-H3-SD301-00-09D. The post digestion spike recovery was at 107%. **All associated data are flagged with an "N" on the final report.**

C. Laboratory Control Sample (LCS) Specification Limits (80 to 120%)

1. The Laboratory control sample was out of the specification limits for tin at 121%. This LCS impacts all samples in batch 9L14010.

II. Total Organic Carbon

A. Matrix Spike and Matrix Spike Duplicate (MS/MSD) Specification Limits (75 to 125%)

1. The matrix spike duplicate were out of the specification limits for TOC at 126% for sample LW07-H3-SD301-00-09D. **All associated data are flagged with an "N" on the final report.**

III. Acid Volatile Sulfide/Suflide Extractable Metals (AVS/SEM)

A. Continuing Calibration Verification (CCV) Specification Limits (90 to 110%)

1. The second through the fourth CCV in the first ICAP analysis was out of the specification limits for silver at 88.3 and 89.4% in CCV2 and CCV3 and for zinc at 89.4, 89.3 and 89.2%. All samples in the SDG were impacted.

B. Preparation Blank (PBW)
Specification Limits (< ½ ±RL)

1. The preparation blanks were out of the specification limits for lead at 0.0021 and 0.00019 umoles/g. The sample concentration was greater than ten times the concentration in the blank. There was no impact to the sample data.

C. Matrix Spike and Matrix Spike Duplicate (MS/MSD)
Specification Limtis (75 to 125%)

1. The matrix spike and matrix spike duplicate were out of the specification limits for mercury at 73.3 and 74.3% and for AVS at 134.6 and 146.1% in sample LW07-H3-SD301-00-09D. **All associated data are flagged with and "N" on the final report.**

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426 8441

Send Results to:	Send Invoice to:
Name Vickie Brynildsen	Name Cecilia Landin
Company CH2M Hill	Company CH2M Hill
Address 5700 Cleveland St.	Address 5700 Cleveland St.
City Virginia Beach	City Virginia Beach
State, Zip VA, 23462	State, Zip VA, 23462
Phone (757) 671-6252	Phone (757) 671-6266
Fax	Fax
E-mail	E-mail

Project No./Name: CTO-222 NABLC SWMU 76

Sampler's (Signature): Andrey Cass

Analysis Requirements: Select metals (4oz); TOC/pH (4oz); AVS/SEM (4oz); Grain Size (16oz)

Lab Use Only:

VOA Headspace	Y	N	N/
Field Filtered	Y	N	N/
Correct Containers	Y	N	N/
Discrepancies	Y	N	N/
Cust. Seals Intact	Y	N	N/
Containers Intact	Y	N	N/

Airbill #: 1815

CAR #: –

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Select metals (4oz)	TOC/pH (4oz)	AVS/SEM (4oz)	Grain Size (16oz)	Comments	No. of Bottles	Lab Use Only Containers/Pres
0911228-01	11/24/0820	LW07-B7-SD301-00-09D	SD	1	1	1	1			4M
-02	11/24/0849	LW07-B5-SD301-00-09D	SD	1	1	1	1	Laminated		
-03	" /0854	LW07-B5-SD301P-00-09D	SD	1	1	1	1			
-04	" /0900	LW07-D5-SD301-00-09D	SD	1	1	1	1			
-05	" /0910	LW07-F5-SD301-00-09D	SD	1	1	1	1			
-06	" /1010	LW07-F3-SD301-00-09D	SD	1	1	1	1			
-07	" /1031	LW07-H3-SD301-00-09D	SD	2	1	1	1	MS/MSD		5M
-08	" /1033	LW07-J4-SD301-00-09D	SD	1	1	1	1			
-09	" /1134	LW07-M1-SD301-00-09D	SD	1	1	1	1			
-10	" /1150	LW07-M1-SD302-00-09D	SD	1	1	1	1			
-11	" /1206	LW07-M1-SD303-00-09D	SD	1	1	1	1			
-12	" /1225	LW07-M1-SD304-00-09D	SD	1	1	1	1			

	Date/Time		
Sample Kit Prep'd by: (Signature)		Received By: (Signature)	
Relinquished by: (Signature) Andrey Cass	11/24/1900	Received By: (Signature)	
Relinquished by: (Signature)		Received By: (Signature)	
Received for Laboratory by: (Signature)	11/25/09 08:15	Temperature 2.6°C	

REMARKS:

Details:
Page 1 of 2
Cooler No. 1 of 2
Date Shipped 11/24
Shipped By LCarr
Turnaround

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

8442

Send Results to:	Send Invoice to:
Name Vickie Brynildsen	Name Celia Landin
Company CH2M	Company CH2M Hill
Address 5700 Cleveland St	Address 5700 Cleveland St
City Virginia Beach	City Virginia Beach
State, Zip VA, 23462	State, Zip VA, 23462
Phone (757) 671-6252	Phone (757) 671-6266
Fax	Fax
E-mail	E-mail

Project No./Name: CT0222 NABLC SWMU 7b

Sampler's (Signature): [signature]

Analysis Requirements: Select metals; TOC/PH; AVS/SEM; Grain Size; HNO3 (bottle) (select metals); Liter (select metal)

Lab Use Only:

VOA Headspace	Y	N	N
Field Filtered	Y	N	N
Correct Containers	Y	N	N
Discrepancies	Y	N	N
Cust. Seals Intact	Y	N	N
Containers Intact	Y	N	N

Airbill #: 1815

CAR #: —

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Select metals	TOC/PH	AVS/SEM	Grain Size	HNO3 (bottle) (select metals)	Liter (select metal)	Comments	No. of Bottles	Lab Use Only Containers/Pres
0911228-13	11/24/1248	LW07-L2-SD301-00-09D	SD	1	1	1	1					5M
-14	"/1250	LW07-L2-SD301P-00-09D	SD	1	1	1	1					W II
-15	"/1315	LW07-K3-SD301-00-09D	SD	1	1	1	1					
-16	"/1329	LW07-K1-SD301-00-09D	SD	1	1	1	1					
-17	"/1341	LW07-K1-SD302-00-09D	SD	1	1	1	1					
-18	"/1350	LW07-K1-SD303-00-09D	SD	1	1	1	1					
-19	"/1407	LW07-K1-SD304-00-09D	SD	1	1	1	1					
-20	"/1411	LW07-H1-SD301-00-09D	SD	1	1	1	1					
-21	"/1800	LW07-EB-112409	AQ					1				1C-Ni
-22	"/1815	LW07-FB-112409	AQ						1			1A-Ni
23												

Sample Kit Prep'd by: (Signature)	Date/Time	Received By: (Signature)
Relinquished by: (Signature) [signature]	Date/Time 11/24/1900	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature) [signature]	Date/Time 11/25/09 08:15	Temperature 2.6°C

REMARKS:

Details:

Page 2 of 2

Cooler No. 2 of 2

Date Shipped 11/24

Shipped By L. Ca

Turnaround

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

LIMS Number: 0911228 Number of Coolers: 1 of 3

Client: CH2M Hill Project: CTO-222

Date/Time Received: 11/25/09 08:15 Date cooler(s) opened: 11/25/09

Opened By (print): WILLIAM SCHWAB (signature): [signature]

Circle response below as appropriate

1. How did the samples arrive?: FedEx UPS DHL Hand Delivered

EL Courier Other: _____

If applicable, enter airbill number here: 1815

2. Were custody seals on outside of cooler(s)? ..... Yes No

How many: 1 Seal date: 11/24/09 Seal Initials: _____

3. Were custody seals unbroken and intact at the date and time of arrival? ..... Yes No N/A
4. Were custody papers sealed in a plastic bag included in the sample cooler? ..... Yes No N/A
5. Were custody papers filled out properly (ink, signed, etc.)? ..... Yes No N/A
6. Did you sign custody papers in the appropriate place for acceptance? ..... Yes No N/A
7. Was project identifiable from custody papers? ..... Yes No N/A
8. If required, was enough ice present in the cooler(s)? ..... Yes No N/A

Type of Coolant: WET DRY BLUE NONE Temperature of Samples upon Receipt: 2-6°C

Dates samples were logged-in: 11/25/09

9. Initial this form to acknowledge login of sample(s): (Name): Will Schwab (Initial): WS
10. Were all bottle lids intact and sealed tightly? ..... Yes No N/A
11. Did all bottles arrive unbroken? ..... Yes No N/A
12. Was all required bottle label information complete? ..... Yes No N/A
13. Did all bottle labels agree with custody papers? ..... Yes No N/A
14. Were correct containers used for the analyses indicated? ..... Yes No N/A
15. Were preservative levels correct in all applicable sample containers? ..... Yes No N/A
16. Was residual chlorine present in any applicable sample containers? ..... Yes No N/A
17. Was sufficient amount of sample sent for the analyses required? ..... Yes No N/A
18. Was headspace present in any included VOA vials? ..... Yes No N/A

pH for metals (HCO) C2

If Non-Conformance issues were present, list by sample ID: _____

_____ CAR#: _____

047

CTO222_002 INORG Summ

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

LIMS Number: 0911128 Number of Coolers: 2 of 3

Client: CH2M Hill Project: CTO-222

Date/Time Received: 11/25/09 08:15 Date cooler(s) opened: 11/25/09

Opened By (print): WILLIAM SCHWAB (signature): [signature]

Circle response below as appropriate

1. How did the samples arrive?: FedEx UPS DHL Hand Delivered

EL Courier Other:

If applicable, enter airbill number here: 1145

2. Were custody seals on outside of cooler(s)? ..... Yes No

How many: 1 Seal date: 11/24/09 Seal Initials:

3. Were custody seals unbroken and intact at the date and time of arrival? ..... Yes No N/A
4. Were custody papers sealed in a plastic bag included in the sample cooler? ..... Yes No N/A
5. Were custody papers filled out properly (ink, signed, etc.)? ..... Yes No N/A
6. Did you sign custody papers in the appropriate place for acceptance? ..... Yes No N/A
7. Was project identifiable from custody papers? ..... Yes No N/A
8. If required, was enough ice present in the cooler(s)? ..... Yes No N/A

Type of Coolant: WET DRY BLUE NONE Temperature of Samples upon Receipt: 2-30C

Dates samples were logged-in: 11/25/09

9. Initial this form to acknowledge login of sample(s): (Name): (Initial):
10. Were all bottle lids intact and sealed tightly? ..... Yes No N/A
11. Did all bottles arrive unbroken? ..... Yes No N/A
12. Was all required bottle label information complete? ..... Yes No N/A
13. Did all bottle labels agree with custody papers? ..... Yes No N/A
14. Were correct containers used for the analyses indicated? ..... Yes No N/A
15. Were preservative levels correct in all applicable sample containers? ..... Yes No N/A
16. Was residual chlorine present in any applicable sample containers? ..... Yes No N/A
17. Was sufficient amount of sample sent for the analyses required? ..... Yes No N/A
18. Was headspace present in any included VOA vials? ..... Yes No N/A

See page 1 of 3

If Non-Conformance issues were present, list by sample ID:

CAR#:

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

LIMS Number: 0911228 Number of Coolers: 3 of 3

Client: CH2M Hill Project: CTO-222

Date/Time Received: 11/25/09 08:15 Date cooler(s) opened: 11/25/09

Opened By (print): WILLIAM SCHWAB (signature): [signature]

Circle response below as appropriate

1. How did the samples arrive?: FedEx UPS DHL Hand Delivered

EL Courier Other:

If applicable, enter airbill number here: 0907

2. Were custody seals on outside of cooler(s)? ..... Yes No

How many: 1 Seal date: 11/24/09 Seal Initials: -

3. Were custody seals unbroken and intact at the date and time of arrival? ..... Yes No N/A
4. Were custody papers sealed in a plastic bag included in the sample cooler? ..... Yes No N/A
5. Were custody papers filled out properly (ink, signed, etc.)? ..... Yes No N/A
6. Did you sign custody papers in the appropriate place for acceptance? ..... Yes No N/A
7. Was project identifiable from custody papers? ..... Yes No N/A
8. If required, was enough ice present in the cooler(s)? ..... Yes No N/A

Type of Coolant: WET DRY BLUE NONE Temperature of Samples upon Receipt: 2.3°C

~~Dates samples were logged-in:~~ 11/25/09

9. Initial this form to acknowledge login of sample(s): (Name): _____ (Initial): _____
10. Were all bottle lids intact and sealed tightly? ..... Yes No N/A
11. Did all bottles arrive unbroken? ..... Yes No N/A
12. Was all required bottle label information complete? ..... Yes No N/A
13. Did all bottle labels agree with custody papers? ..... Yes No N/A
14. Were correct containers used for the analyses indicated? ..... Yes No N/A
15. Were preservative levels correct in all applicable sample containers? ..... Yes No N/A
16. Was residual chlorine present in any applicable sample containers? ..... Yes No N/A
17. Was sufficient amount of sample sent for the analyses required? ..... Yes No N/A
18. Was headspace present in any included VOA vials? ..... Yes No N/A

See case # 1 of 3

If Non-Conformance issues were present, list by sample ID: _____

_____ CAR#: _____

049

Sample Delivery Group Assignment Form

CLIENT: CH2M Hill, Inc.
PROJECT NAME: Little Creek CTO222(SWMU7B)
SDG #: CTO222_002
MATRIX: Water

QC LEVEL: EDD/IV
Report Due: 12/29/2009 - 12/29/2009
Client Sample Count: 20

Sample Type	Sampled	Received	Lab ID	Client ID	AVS-SEM	bGrainSize (Mech)	ELLOYDKAHN	Krones	SM2540B	SW6010B	SW7471A/ SW7470A	pH
Client Sample	11/24/09	11/25/09	0911228-01	LW07-B7-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-02	LW07-B5-SD301-00-09D	X	x	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-03	LW07-B5-SD301P-00-09D	hold		hold	X	x	x	x	hold
Client Sample	11/24/09	11/25/09	0911228-04	LW07-D5-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-05	LW07-F5-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-06	LW07-F3-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-07	LW07-H3-SD301-00-09D	MS/MSD	MS/MSD	MS/MSD	MS/MSD	MS/MSD	MS/MSD	MS/MSD	MS/MSD
Client Sample	11/24/09	11/25/09	0911228-08	LW07-J4-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-09	LW07-M1-SD301-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-10	LW07-M1-SD302-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-11	LW07-M1-SD303-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-12	LW07-M1-SD304-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-13	LW07-L2-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-14	LW07-L2-SD301P-00-09D	hold		hold		x	x	x	hold
Client Sample	11/24/09	11/25/09	0911228-15	LW07-K3-SD301-00-09D	X	X	X		X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-16	LW07-K1-SD301-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-17	LW07-K1-SD302-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-18	LW07-K1-SD303-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-19	LW07-K1-SD304-00-09D	X	X	X	X	X	X	X	X
Client Sample	11/24/09	11/25/09	0911228-20	LW07-H1-SD301-00-09D	X	X	X	X	X	X	X	X
Equipment Blank	11/24/09	11/25/09	0911228-21	LW07-EB-112409						X	X	
Field Blank	11/24/09	11/25/09	0911228-22	LW07-FB-112409						X	X	

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Empirical Labs	**Service Request No.:**	K0911500
Project:	NABLC SWMU76 CTO-222_002/375057.FI.FK	**Date Received:**	11/25/2009
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twelve sediment samples were received for analysis at Columbia Analytical Services on 11/25/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Butyltins Compounds

Butyltins by Method Krone:
The confirmation comparison criteria of 40% difference for Tri-n-butyltin was exceeded in sample LW07-B5-SD301P-00-09D and LW07-K1-SD301-00-09D. The higher of the two values was reported because no evidence of matrix interference was observed.

Approved by C. Gray **Date** 12/9/09

051

Columbia Analytical Services™

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0911511

PAGE 1 OF 2 COC #

PROJECT NAME: NABLC SWMU 76 CTO-222
PROJECT NUMBER: 375057.FI.FK
PROJECT MANAGER: Celcilia Landin
COMPANY/ADDRESS: CH2M Hill
5700 Cleveland St.
CITY/STATE/ZIP: Virginia Beach/VA/23462
E-MAIL ADDRESS:
PHONE #: (757) 671-6266 FAX #:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ ☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals: Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond, Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	Tributyl Tin (8082)				REMARKS
W07-B5-SD301-00-09D	11/24	0849		SD															1					
W07-B5-SD301P-00-09D	11/24	0854		SD															1					
W07-H3-SD301-00-09D	11/24	1031		SD															1					
W07-M1-SD301-00-09D	11/24	1134		SD															1					
W07-M1-SD302-00-09D	"	1150		SD															1					
W07-M1-SD303-00-09D	"	1206		SD															1					
W07-M1-SD304-00-09D	"	1225		SD															1					
W07-K1-SD301-00-09D	"	1329		"															1					
W07-K1-SD302-00-09D	"	1341		"															1					
W07-K1-SD303-00-09D	"	1350		"															1					

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. #
Bill To:

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed.

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
Note: Empirical Lab is primary lab

[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 11/24/1900	Signature: [signature] Date/Time: 11/25/09 1005	Signature: Date/Time:	Signature: Date/Time:
Printed Name: Firm:	Printed Name: JOHN JONES Firm: CAS	Printed Name: Firm:	Printed Name: Firm:

Columbia Analytical Services™

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: _____

PAGE 2 OF 2 COC # _____

PROJECT NAME: NABLC SWMU76 CTO-222
PROJECT NUMBER: 375057.FI.FK
PROJECT MANAGER: Celicia Landin
COMPANY/ADDRESS: CH2M Hill, 5700 Cleveland St
CITY/STATE/ZIP: Virginia Beach/VA/23462
E-MAIL ADDRESS:
PHONE: (757) 671-6266 FAX #:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ ☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	Tributyl Tin				REMARKS
107-K1-SD304-00-090	11/24	1407		SD															1					
107-H1-SD301-00-090	11/24	1411		SD															1					

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # _____
Bill To: _____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results

_____ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
Note: Empirical Lab is primary lab

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 11/24/1900	Signature: John Jones Date/Time: 11/25/09 1005	Signature / Date/Time	Signature / Date/Time
Printed Name / Firm	Printed Name: John Jones Firm: CAS	Printed Name / Firm	Printed Name / Firm

PC CL

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: CH2M Hill Service Request K09 11500

Received: 11/25/09 Opened: 11/25/09 By: 77

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 front
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: _____ NA Y N

5. **Temperature of cooler(s) upon receipt (°C):** 0.4
   Temperature Blank (°C): 0.8
   Thermometer ID: 271
6. If applicable, list Chain of Custody Numbers: ✓
7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* plastic bag
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA Y N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA Y N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA Y N
16. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions:

054

Sample Delivery Group Assignment Form

CLIENT: Empirical (CH2M Hill, Inc.)
PROJECT NAME: NABLC SWMU76
SDG #: CTO-222_002
PROJECT NUMBER: 375057.FI.FK
MATRIX: Sediment

QC LEVEL: EDD/IV
Report Due: 12/15/2009
Client Sample Count: 12

Sample Type	Sampled	Received	Lab ID	Client ID	TBT	%TS
Client Sample	11/24/09	11/25/09	K0911500-001	LW07-B5-SD301-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-002	LW07-B5-SD301P-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-003	LW07-H3-SD301-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-004	LW07-M1-SD301-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-005	LW07-M1-SD302-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-006	LW07-M1-SD303-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-007	LW07-M1-SD304-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-008	LW07-K1-SD301-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-009	LW07-K1-SD302-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-010	LW07-K1-SD303-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-011	LW07-K1-SD304-00-09D	X	X
Client Sample	11/24/09	11/25/09	K0911500-012	LW07-H1-SD301-00-09D	X	X

055

Samples in this SDG were analyzed for butyltins (as cation) by a laboratory proprietary method. Results were reported as tri-n-butyltin.

Holding Times

Sampling Date: 11/24/09
Received Date: 11/25/09 at CAS
Extraction Dates: 12/1/09
Analysis Dates: 12/4/09

Extraction (14 days) and analysis (40 days) holding times were met.

Calibrations

Method calibration procedures were followed. Calibration factors were calculated. %RSDs were within QC limits. Continuing calibration standards were analyzed per the method and all resolution, %D criteria were within QC limits. Raw data was verified.

BLANK SUMMARY

Blank qualification guidelines:

- No action is taken if a compound is found in the blank but not in the sample.
- Any compound detected in the sample, and the associated blank, must be qualified by elevating the limit of detection or adjusting the limit of detection to the sample result, when the sample concentration is less than five (5) times the blank concentration.
- Sample weight, volume or dilution factor must be taken into consideration when applying the 5X criteria.
- Apply the same data validation guidelines to any associated rinse and field blanks and all associated samples.
- Qualification/Action codes:

U -	The sample result is greater than the RL and less than five times (5X) the blank value. Cross out the "B" flag and qualify the sample result with a "U".
RL -	The sample result is less than the RL and less than five times (5X) the blank value. Reject the sample result, cross out the "B" flag, and report the RL.
No Action -	The sample result is greater than the RL and greater than five times (5X) the blank value.
B -	The sample result is less than five times (5X) the blank value. Report the blank value with a "B" flag. (Region III)

No contamination was reported in the associated method blank. There were no field QC blanks submitted for this method.

FIELD DUPLICATE SAMPLE SUMMARY

Note: Field duplicate results are assessed only if both results are above the CRDL.
Sample ID: LW07-B5-SD301-00-09D Duplicate Sample ID: LW07-B5-SD301P-00-09D

Compound	Sample Conc.	Duplicate Conc.	RPD
tri-n-butyltin	4.3	3.5	21%

Comments: No qualifications were required

SAMPLE RESULT VERIFICATION

Specific Comments:

The data as reported did require qualifications. Two reported positive result exhibited a column quantitation %D greater than 40%. These results were qualified as estimated J according to Region III guidelines. Raw data was verified.

LW07-B5-SD301P-00-09D – 41.4%
LW07-K1-SD301-00-09D 0 44.1%

Reviewer JACleveland **Date:** 2/9/10

QA/QC Results

Client: Empirical Labs
Project: NABLC SWMU76 CTO-222_002/375057.FI.FK

Service Request: K0911500

Analysis Run Log
Butyltins (as cation)

Analysis Method: Krone

Analysis Lot: KWG0911485
Instrument ID: GC26
Column: RTX-1

File ID	Sample Name	Lab Code	Date Analysis Started	Start Time	Q	Date Analysis Finished	Finish Time
204F011.D	Batch QCDMS	KWG0911311-2	12/4/2009	18:29		12/4/2009	18:40
204F012.D	LW07-B5-SD301-00-09D	K0911500-001	12/4/2009	18:46		12/4/2009	18:57
204F013.D	LW07-B5-SD301P-00-09D	K0911500-002	12/4/2009	19:02		12/4/2009	19:13
204F014.D	LW07-H3-SD301-00-09D	K0911500-003	12/4/2009	19:18		12/4/2009	19:29
204F016.D	Instrument Blank	KWG0911485-3	12/4/2009	19:50		12/4/2009	20:01
204F017.D	Continuing Calibration Verification	KWG0911485-4	12/4/2009	20:07		12/4/2009	20:18
204F018.D	Instrument Blank	KWG0911485-3	12/4/2009	20:23		12/4/2009	20:34
204F019.D	LW07-M1-SD301-00-09D	K0911500-004	12/4/2009	20:39		12/4/2009	20:50
204F020.D	LW07-M1-SD302-00-09D	K0911500-005	12/4/2009	20:55		12/4/2009	21:06
204F021.D	LW07-M1-SD303-00-09D	K0911500-006	12/4/2009	21:12		12/4/2009	21:23
204F022.D	LW07-M1-SD304-00-09D	K0911500-007	12/4/2009	21:28		12/4/2009	21:39
204F023.D	LW07-K1-SD301-00-09D	K0911500-008	12/4/2009	21:44		12/4/2009	21:55
204F024.D	LW07-K1-SD302-00-09D	K0911500-009	12/4/2009	22:00		12/4/2009	22:11
204F025.D	LW07-K1-SD303-00-09D	K0911500-010	12/4/2009	22:16		12/4/2009	22:27
204F026.D	LW07-K1-SD304-00-09D	K0911500-011	12/4/2009	22:33		12/4/2009	22:44
204F027.D	LW07-H1-SD301-00-09D	K0911500-012	12/4/2009	22:49		12/4/2009	23:00
204F029.D	Instrument Blank	KWG0911485-5	12/4/2009	23:21		12/4/2009	23:32
204F030.D	Continuing Calibration Verification	KWG0911485-6	12/4/2009	23:37		12/4/2009	23:48
204F002.D	Instrument Blank	KWG0911485-1	12/4/2009	16:03		12/4/2009	16:14
204F003.D	Continuing Calibration Verification	KWG0911485-2	12/4/2009	16:19		12/4/2009	16:30
204F004.D	Instrument Blank	KWG0911485-1	12/4/2009	16:35		12/4/2009	16:46
1204F005.D	Method Blank	KWG0911311-4	12/4/2009	16:52		12/4/2009	17:03
1204F006.D	Lab Control Sample	KWG0911311-3	12/4/2009	17:08		12/4/2009	17:19
1204F007.D	ZZZZZZ	ZZZZZZ	12/4/2009	17:24		12/4/2009	17:35
1204F009.D	Batch QC	K0911477-003	12/4/2009	17:57		12/4/2009	18:08
1204F010.D	Batch QCMS	KWG0911311-1	12/4/2009	18:13		12/4/2009	18:24

21910

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

058

Jacqueline Cleveland

From: Chris Leaf [cleaf@caslab.com]
Sent: Thursday, February 18, 2010 7:00 PM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222
Attachments: Nonstandard conc .pdf

Jackie,

Please see the attachment. I was wrong. The software does not provide this is the data package. So the Standard Concentrations have proven to be non-standard after all. Let me know if I can be of further assistance.

Chris Leaf
Project Chemist

Columbia Analytical Services, Inc.
1317 S. 13th Ave
Kelso, WA 98626
360-577-7222 (office)
360-577-7222 (direct)
www.caslab.com

NOTICE: [illegible] and purpose [illegible] are hereby notified [illegible] of this [illegible] prohibited. Thank you.

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 3:28 PM
To: Chris Leaf
Subject: RE: CH2M HILL NABLC CTO-222

Chris,

Are the actual values for the standard concentrations provided somewhere in the data package? If not would you send them over to me?? Thanks! If you can get those to me in the morning or early afternoon that would be really great.

Jackie

From: Chris Leaf [mailto:cleaf@caslab.com]
Sent: Thursday, February 18, 2010 12:32 PM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222

Jackie,

The labs review is listed as below:

"The amounts shown on the final reported are rounded numbers, however, the numbers used in the calculation have not been rounded. For example, 4.5 is really 4.455. When the response of 142996 is used, the resulting RF is 32098 rounded to 32100. "

Basically those minute details change everything when it comes to rounding. I hope this helps. Let me know if you need more info.

Chris Leaf
Project Chemist

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360-577-7222 (direct)
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From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 9:55 AM
To: Chris Leaf
Subject: RE: CH2M HILL NABLC CTO-222

Thanks Chris! I will be watching for your response.

Jackie

From: Chris Leaf [mailto:cleaf@caslab.com]
Sent: Thursday, February 18, 2010 11:38 AM
To: Jacqueline Cleveland
Subject: RE: CH2M HILL NABLC CTO-222

Jackie,

Yes, I did receive it. I apologize for not responding to you. I am having the lab review the data and am waiting for their response. I had hoped to get back to you with an answer yesterday. Unfortunately, it did not happen. I did not mean to leave you waiting. I will update you as soon as the lab responds.

Again, I am sorry for the delay.

Chris Leaf
Project Chemist

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www.caslab.com
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are hereby notified [illegible]
prohibited. Thank you

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Thursday, February 18, 2010 9:33 AM
To: Chris Leaf
Cc: Victoria.Brynildsen@CH2M.com; 'DataQual'
Subject: FW: CH2M HILL NABLC CTO-222
Importance: High

Hi Chris!

Just checking to make sure you received my e-mail (see below) and on status of the request. Please let me know when I can expect a response! Thanks so much.

Jackie

From: Jacqueline Cleveland [mailto:cleve137@charter.net]
Sent: Wednesday, February 17, 2010 10:01 AM
To: 'Chris Leaf'
Cc: 'DataQual'; 'Victoria.Brynildsen@CH2M.com'
Subject: CH2M HILL NABLC CTO-222

Good Morning Chris,

I have a quick question regarding the Butyltins analysis for the NABLC CTO-222 data packages. I am currently looking at SDG CTO-222_002. I am verifying calculations and am unable to verify the RFs for tri-n-butyltin in the ICAL analyzed 11/23/2009 on instrument GC26. For example, for level B, the amount is 4.5 (based on p 182 in data package) and the area counts are 142996 (based on p. 193 in data package. This calculates to an RF value of 31777. Rounded to 3 significant figures would be 31800. The RF value reported on p. 182 is 32100. It is possible that I am missing something. Please clarify the calculation for me. Let me know if you have any questions.

Jackie

Jacqueline Cleveland
Vice-President
DataQual, ES, LLC
636-352-9391
cleve137@charter.net

Initial Calibration Date: 11/23/09, instrument GC26 CAL9045 on Column 1

RRF and %RSD Calculations:

Compound Name: tri-n-butyltin in Level 2
Lab Value: 32100.0000

Area of Compound	142996
Conc. of Compound	4.455
Calculated RRF	32097.8676

Compound Name: tri-n-butyltin
Lab Value: 12.9

RRF of STD 1	30100.0000
RRF of STD 2	32100.0000
RRF of STD 3	38400.0000
RRF of STD 4	38100.0000
RRF of STD 5	40700.0000
RRF of STD 6	42800.0000
RRF of STD 7	42000.0000
Calculated % RSD	12.95

Continuing Calibration File ID:

RRF and %D Calculations:

Compound Name: tri-n-butyltin
Lab Value: 33400.00000

Area of Compound	1485984
Conc. of Compound	44.55
Calculated RRF	33355.42088

Compound Name: tri-n-butyltin
Lab Value: -12.0

Average RRF	37700.00000
Calibration Check RRF	33400.00000
Calculated % D	11.4

SAMPLE CALCULATION

Sample ID: LW07-K1-SD303-00-09D
Standard ID: ICAL 11/23/09
Compound: tributyl tin
Concentration: 4.8 ug/Kg DB

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound		212847	
RRF of Compound		24000	
Dilution Factor		1	
Weight of Sample	NA	20.34	
Extract Volume		4	
Volume of Sample		NA	
% Moisture	NA	0.364	
Aliquot of sample	NA	NA	
Conversion Factor		1	
Concentration	#DIV/0!	4.79	#REF!

This SDG contains select total metals analysis SW-846 6010B & 7471A for Cu, Pb, Sn, Zn & Hg. Validation performed using Region III flagging modifications as applicable.

HOLDING TIMES

Sampling Date: 11/24
Received Date: 11/25
Prep. Dates: 12/14, 12/15 ICP; 12/2, 12/15 Hg
Analysis Dates: 12/15-16/09 ICP; 12/3, 12/16 Hg

Metals HT – 6 months

All holding time requirements were met. Cooler temperatures were acceptable and receipt documentation was in order.

CALIBRATIONS

The proper calibration procedures were followed for the metals analyses used by the laboratory. All associated ICV/CCV criteria for the metals analytes were not met. The analyte lead required qualification as L/UL in two samples due to a %R less than 90% in the bracketing CCV. The CRI check standards were analyzed. The method QC limits were applied because Region III doesn't have a validation guideline for SW-846. Method criteria for the CRI standards were met. ICSA/ICSAB criteria were met. No other qualifications were required.

BLANK SUMMARY

Blank qualification guidelines:

- No action is taken if an analyte is found in the blank but not in the sample.
- Sample weight, volume, moisture levels and/or dilution factor must be taken into consideration when applying the criteria.
- Apply the same data validation guidelines to any associated calibration, preparation, and field QC blanks and all associated samples.
- Qualification/Action codes:

  Region III action limit of 5X the blank contamination concentration was used to validate the data.

  NA - The sample result is greater than the CRDL and greater than five times (5X) the blank value.

  B - The sample result is less than five times (5X) the blank value.

Blank Contamination and Qualification Summaries

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.35J mg/Kg	6.75 mg/Kg	B
PBLK – 9L14010-BLK	tin	1.442J mg/Kg	7.21 mg/Kg	B

No qualifications were required.

Note: Per CH2MHILL, field QC blanks were not qualified due to laboratory preparation blank contamination.

The concentration noted for the CCBs is the highest concentration in all the CCBs. However, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.
Negative contamination in a prep blank or CCB, if less than the negative analyte CRDL, is qualified based on professional judgement.

See validation report for specific samples and qualifications.

MATRIX SPIKE/DUPLICATE SUMMARY

The matrix spike results of sample LW07-H3-SD301-00-09D were acceptable for all analytes with the exception of lead (123/74.4). All field sample results for lead were flagged J/UJ due to the variable non-compliant recoveries. PDS recoveries were acceptable. All matrix duplicate results were acceptable.

SERIAL DILUTIONS

The serial dilution exhibited acceptable results for the metals analytes.

FIELD DUPLICATE SAMPLE SUMMARY

Note: Field duplicate results are assessed only if both results are above the CRDL.

Sample ID: **LW07-B5-SD301-00-09D** **Duplicate Sample ID:** **LW07-B5-SD301P-00-09D**

Analyte	Sample Conc.	Duplicate Conc.	RPD
mercury	0.122	0.119	2%
copper	49.2	70.1	35%
lead	27.3	22.6	19%
tin	5.06	4.07	22%
zinc	160	156	3%

Comments: Flag copper J in both samples.

Sample ID: **LW07-L2-SD301-00-09D** **Duplicate Sample ID:** **LW07-L2-SD301P-00-09D**

Analyte	Sample Conc.	Duplicate Conc.	RPD
mercury	0.214	0.172	22%
copper	84.6	101	18%
lead	44.4	58.4	27%
tin	12.5	14.8	17%
zinc	466	432	8%

Comments: No qualifications required.

SAMPLE CALCULATION

EPA SAMPLE ID: LWW07-F5-SD301-00-09D
COMPOUND: zinc
CONCENTRATION: 85.4 mg/Kg
% Solids: 58.81
Dilution Factor: 1
2.54g to 100ml
Raw Data result: 1275.2 ug/L

1275.2 ug/L * 0.100L/2.54g * 1/.5881 * 1000g/1Kg * 1mg/1000ug = 85.37 mg/Kg

SAMPLE RESULT VERIFICATION

Specific Comments:

All sample results were reported within the calibration/linear range of the instruments. Detection limits were acceptable. Raw data was verified.

Reviewer Jacqueline Cleveland **Date:** 2/19/10

This SDG contains select total metals analysis SW-846 6010B & 7471A for Cu, Pb, Sn, Zn & Hg. Validation performed using Region III flagging modifications as applicable.

HOLDING TIMES

Sampling Date: 11/24
Received Date: 11/25
Prep. Dates: 12/14, 12/15 ICP; 12/2, 12/15 Hg
Analysis Dates: 12/15-16/09 ICP; 12/3, 12/16 Hg

Metals HT – 6 months

All holding time requirements were met. Cooler temperatures were acceptable and receipt documentation was in order.

CALIBRATIONS

The proper calibration procedures were followed for the metals analyses used by the laboratory. All associated ICV/CCV criteria for the metals analytes were not met. The analyte lead required qualification as L/UL in two samples due to a %R less than 90% in the bracketing CCV. The CRI check standards were analyzed. The method QC limits were applied because Region III doesn't have a validation guideline for SW-846. Method criteria for the CRI standards were met. ICSA/ICSAB criteria were met. No other qualifications were required.

BLANK SUMMARY

Blank qualification guidelines:

- No action is taken if an analyte is found in the blank but not in the sample.
- Sample weight, volume, moisture levels and/or dilution factor must be taken into consideration when applying the criteria.
- Apply the same data validation guidelines to any associated calibration, preparation, and field QC blanks and all associated samples.
- Qualification/Action codes:

  Region III action limit of 5X the blank contamination concentration was used to validate the data.

  NA - The sample result is greater than the CRDL and greater than five times (5X) the blank value.

  B - The sample result is less than five times (5X) the blank value.

Blank Contamination and Qualification Summaries

Blank ID	Analyte	Concentration	Action Level	Q Flag
PBLK – 9L11009-BLK2	tin	1.35J mg/Kg	6.75 mg/Kg	B
PBLK – 9L14010-BLK	tin	1.442J mg/Kg	7.21 mg/Kg	B

Note: Per CH2MHILL, field QC blanks were not qualified due to laboratory preparation blank contamination.

The concentration noted for the CCBs is the highest concentration in all the CCBs. However, when qualifying samples for CCB contamination, associated samples are those just prior to or just following a CCB. Therefore, not all analytes in all samples are flagged for CCB contamination.
Negative contamination in a prep blank or CCB, if less than the negative analyte CRDL, is qualified based on professional judgement.

See validation report for specific samples and qualifications.

MATRIX SPIKE/DUPLICATE SUMMARY

The matrix spike results of sample LW07-H3-SD301-00-09D were acceptable for all analytes with the exception of lead (123/74.4). All field sample results for lead were flagged J/UJ due to the variable non-compliant recoveries. PDS recoveries were acceptable. All matrix duplicate results were acceptable.

SERIAL DILUTIONS

The serial dilution exhibited acceptable results for the metals analytes.

FIELD DUPLICATE SAMPLE SUMMARY

Note: Field duplicate results are assessed only if both results are above the CRDL.

Sample ID: **LW07-B5-SD301-00-09D** **Duplicate Sample ID:** **LW07-B5-SD301P-00-09D**

Analyte	Sample Conc.	Duplicate Conc.	RPD
mercury	0.122	0.119	2%
copper	49.2	70.1	35%
lead	27.3	22.6	19%
tin	5.06	4.07	22%
zinc	160	156	3%

Comments: Flag copper J in both samples.

Sample ID: **LW07-L2-SD301-00-09D** **Duplicate Sample ID:** **LW07-L2-SD301P-00-09D**

Analyte	Sample Conc.	Duplicate Conc.	RPD
mercury	0.214	0.172	22%
copper	84.6	101	18%
lead	44.4	58.4	27%
tin	12.5	14.8	17%
zinc	466	432	8%

Comments: No qualifications required.

SAMPLE CALCULATION

EPA SAMPLE ID: LWW07-F5-SD301-00-09D
COMPOUND: zinc
CONCENTRATION: 85.4 mg/Kg
% Solids: 58.81
Dilution Factor: 1
2.54g to 100ml
Raw Data result: 1275.2 ug/L

1275.2 ug/L * 0.100L/2.54g * 1/.5881 * 1000g/1Kg * 1mg/1000ug = 85.37 mg/Kg

SAMPLE RESULT VERIFICATION

Specific Comments:

All sample results were reported within the calibration/linear range of the instruments. Detection limits were acceptable. Raw data was verified.

Reviewer JACleveland **Date:** 2/19/10

INITIAL AND CONTINUING CALIBRATION

SW6010B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Calibration: 9351004
Sequence: 9L35117

Lab Sample ID	Analyte	True	Found	%R	Units	Control Limit
9L35117-ICV1	Copper	1000	1004	100	ug/L	+/- 10.00%
	Lead	1000	1002	100	ug/L	+/- 10.00%
	Tin	1000	1011	101	ug/L	+/- 10.00%
	Zinc	1000	1006	101	ug/L	+/- 10.00%
9L35117-CCV1	Copper	1000	1007	101	ug/L	+/- 10.00%
	Lead	1000	976.9	97.7	ug/L	+/- 10.00%
	Tin	1000	984.0	98.4	ug/L	+/- 10.00%
	Zinc	1000	1024	102	ug/L	+/- 10.00%
9L35117-CCV2	Copper	1000	1031	103	ug/L	+/- 10.00%
	Lead	1000	990.7	99.1	ug/L	+/- 10.00%
	Tin	1000	992.3	99.2	ug/L	+/- 10.00%
	Zinc	1000	1021	102	ug/L	+/- 10.00%
9L35117-CCV7	Copper	1000	976.3	97.6	ug/L	+/- 10.00%
	Lead	1000	922.7	92.3	ug/L	+/- 10.00%
	Tin	1000	912.4	91.2	ug/L	+/- 10.00%
	Zinc	1000	1047	105	ug/L	+/- 10.00%
9L35117-CCV8	Copper	1000	977.1	97.7	ug/L	+/- 10.00%
	Lead	**1000**	**873.0**	**87.3**	**ug/L**	+/- 10.00%
	Tin	**1000**	**845.6**	**84.6**	**ug/L**	+/- 10.00%
	Zinc	1000	1069	107	ug/L	+/- 10.00%

LW07-M1-SD304-00-09D ✓
L2-SD301P-00-09D ✓
H1-SD301-00-09D

NQ Tin reported from different run
✓ flag Pb L/UL

068

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO222_002
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP
Project: Little Creek CTO222(SWMU7B)
Sequence: 9L35005
Calibration: 9350003

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
9L35005-ICB1	Copper	0.08083	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.4766	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.3601	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.02902	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB1	Copper	0.687	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.388	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0746	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.216	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB5	Copper	0.380	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.250	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.221	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.136	5.00	20.0	ug/L	U	SW6010B
9L11009-BLK1	Copper	0.019	0.200	0.400	mg/Kg wet	U	SW6010B
	Lead	-0.01817	0.0600	0.120	mg/Kg wet	U	SW6010B
	Zinc	0.216612	0.200	0.800	mg/Kg wet	J	SW6010B
9L35005-CCB6	Copper	0.518	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.420	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.374	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.172	5.00	20.0	ug/L	U	SW6010B
9L35005-CCB7	Copper	0.425	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.355	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0156	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.316	5.00	20.0	ug/L	U	SW6010B
9L14010-BLK1	Copper	~~0.0165~~ 0.01318	0.200	0.400	mg/Kg wet	U	SW6010B
	Lead	~~0.0232~~ 0.01816	0.0600	0.120	mg/Kg wet	U	SW6010B
	Tin	~~1.80~~ 1.440	1.10	3.40	mg/Kg wet	J	SW6010B
	Zinc	~~0.212~~ 0.169	0.200	0.800	mg/Kg wet	J	SW6010B
9L35005-CCB8	Copper	0.323	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.210	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.204	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.988	5.00	20.0	ug/L	U	SW6010B

SMO 12/28/09

069

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO222_002
Client: CH2M Hill, Inc.
Instrument ID: ME-ICP
Project: Little Creek CTO222(SWMU7B)
Sequence: 9L35117
Calibration: 9351004

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
9L35117-ICB1	Copper	0.1388	5.00	10.0	ug/L	U	SW6010B
	Lead	0.5282	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.06699	22.0	68.0	ug/L	U	SW6010B
	Zinc	-0.09285	5.00	20.0	ug/L	U	SW6010B
9L35117-CCB1	Copper	0.500	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.589	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0482	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.195	5.00	20.0	ug/L	U	SW6010B
9L15004-BLK1	Copper	0.129	1.25	2.50	ug/L	U	SW6010B
	Lead	-0.0856	0.375	0.750	ug/L	U	SW6010B
	Tin	0.00678	12.5	25.0	ug/L	U	SW6010B
	Zinc	0.0903	1.25	5.00	ug/L	U	SW6010B
9L35117-CCB2	Copper	0.219	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.0141	1.50	3.00	ug/L	U	SW6010B
	Tin	0.0771	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.0415	5.00	20.0	ug/L	U	SW6010B
9L35117-CCB7	Copper	-0.255	5.00	10.0	ug/L	U	SW6010B
	Lead	-0.438	1.50	3.00	ug/L	U	SW6010B
	Tin	0.460	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.246	5.00	20.0	ug/L	U	SW6010B
9L11009-BLK2	Tin	1.35	1.10	3.40	mg/Kg wet	J	SW6010B
9L35117-CCB8	Copper	-0.553	5.00	10.0	ug/L	U	SW6010B
	Lead	0.533	1.50	3.00	ug/L	U	SW6010B
	Tin	-0.0000800	22.0	68.0	ug/L	U	SW6010B
	Zinc	0.948	5.00	20.0	ug/L	U	SW6010B

070

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY
SW6010B

LW07-H3-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
SDG: CTO222_002
Client: CH2M Hill, Inc.
Project: Little Creek CTO222(SWMU7B)
Matrix: Solid
Batch: 9L14010
% Solids: 43.80
Source Sample Name: **0911228-07**

ANALYTE	SPIKE ADDED (mg/Kg dry)	SAMPLE CONCENTRATION (mg/Kg dry)	MS CONCENTRATION (mg/Kg dry)	MS % REC.	Q	QC LIMITS REC.
Copper	22.38	87.84	110.0	98.8		80 - 120
Lead	22.38	57.85	85.31	123	N	80 - 120
Tin	89.54	6.380	108.8	114		80 - 120
Zinc	44.77	343.2	393.6	113		80 - 120

ANALYTE	SPIKE ADDED (mg/Kg dry)	MSD CONCENTRATION (mg/Kg dry)	MSD % REC. #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC.
Copper	22.30	117.8	134	6.88		20	80 - 120
Lead	22.30	74.45	74.4	13.6	N	20	80 - 120
Tin	89.19	108.0	114	0.713		20	80 - 120
Zinc	44.59	389.1	103	1.17		20	80 - 120

J/UJ - all field samples

POST DIGEST SPIKE SAMPLE RECOVERY

SW6010B

LW07-H3-SD301-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Solid
Batch: 9L14010
Preparation: MET_3050B

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 9L14010-PS1
Lab Source ID: 0911228-07
Initial/Final: 2.53 g / 100 mL

Analyte	Spike Sample Result (SSR) (ug/L)	Sample Result (SR) (ug/L)	Spike Added (SA) (ug/L)	%R	Control Limit %R
Copper	1246	973.4	250.0	109	85 - 115
Lead	907.4	641.1	250.0	107	85 - 115
Tin	1192	70.70	1000	112	85 - 115
Zinc	4317	3803	500.0	103	85 - 115

PDS OK

072

LCS / LCS DUPLICATE RECOVERY
SW6010B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO222_002
Client:	CH2M Hill, Inc.	Project:	Little Creek CTO222(SWMU7B)
Matrix:	Solid		
Batch:	9L14010	Laboratory ID:	9L14010-BS1
Preparation:	MET_3050B	Initial/Final:	2 g / 100 mL

ANALYTE	SPIKE ADDED (mg/Kg wet)	LCS CONCENTRATION (mg/Kg wet)	LCS % REC.	QC LIMITS REC.
Copper	12.50	13.51	108	80 - 120
Lead	12.50	13.46	108	80 - 120
Tin	**50.00**	**60.53**	**121**	**80 - 120**
Zinc	25.00	26.41	106	80 - 120

NQ

MS/MSD for Sn was acceptable as was the PDS - no quals

073

ANALYSIS DATA SHEET

LW07-M1-SD302-00-09D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Soil
Sampled: 11/24/09 11:50
% Solids: 65.36

SDG: CTO222_002
Project: Little Creek CTO222(SWMU7B)
Laboratory ID: 0911228-10
Received: 11/25/09 08:15

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.181	0.0149	0.0379	1		SW7471A	9L15010	12/16/09 11:32
7440-50-8	Copper	69.4	0.299	0.598	1		SW6010B	9L11009	12/15/09 17:58
7439-92-1	Lead	98.6	0.0897	0.179	1	J MSL	SW6010B	9L11009	12/15/09 17:58
7440-31-5	Tin	12.7	1.31	4.06	1		SW6010B	9L11009	12/15/09 17:58
7440-66-6	Zinc	349	0.299	1.20	1		SW6010B	9L11009	12/15/09 17:58

JC 22310

029A

MEMORANDUM CH2MHILL

Data Validation Summary

CTO-222 Little Creek

TO: Anita Dodson/VBO

Megan Morrison/WDC

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: November 8, 2010

Introduction

The following data validation report discusses the data validation process and findings for Empirical Laboratories, LLC for SDG 1009022.

Samples were analyzed using the following analytical methods:

- SW6010B Total Metals
- SEM Metals
- SW7470A/7471 Mercury

The samples included in this SDG are listed in the table below.

Sample Name	Lab Sample ID
LW03-SD504A-00-10C	1009022-01
LW03-SD504A-00-10C	1009022-02
LW03-SD574-00-10C	1009022-03
LW03-SD574-00-10C	1009022-04
LW03-SD504-00-10C	1009022-05
LW03-SD504-00-10C	1009022-06
LW03-SD510-00-10C	1009022-07
LW03-SD510-00-10C	1009022-08
LW03-SD517-00-10C	1009022-09
LW03-SD517-00-10C	1009022-10
LW03-SD518-00-10C	1009022-11

Sample Name	Lab Sample ID
LW03-SD518-00-10C	1009022-12
LW03-SD511-00-10C	1009022-13
LW03-SD511-00-10C	1009022-14
LW03-SD505-00-10C	1009022-15
LW03-SD505-00-10C	1009022-16
LW03-SD534-00-10C	1009022-17
LW03-SD534-00-10C	1009022-18
LW03-SD538-00-10C	1009022-19
LW03-SD538-00-10C	1009022-20
LW03-SD537-00-10C	1009022-21
LW03-SD537-00-10C	1009022-22
LW03-SD533-00-10C	1009022-23
LW03-SD533-00-10C	1009022-24
LW03-SD539-00-10C	1009022-25
LW03-SD539-00-10C	1009022-26
LW03-SD544-00-10C	1009022-27
LW03-SD544-00-10C	1009022-28
LW03-SD546-00-10C	1009022-29
LW03-SD546-00-10C	1009022-30
LW03-SD535-00-10C	1009022-31
LW03-SD535-00-10C	1009022-32
LW03-SD545-00-10C	1009022-33
LW03-SD545-00-10C	1009022-34
LW03-SD543-00-10C	1009022-35
LW03-SD543-00-10C	1009022-36
LW03-SD540-00-10C	1009022-37
LW03-SD540-00-10C	1009022-38
LW03-EB01-090110	1009022-39
LW03-SD540P-00-10C	1009022-40

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: National Functional Guidelines for Inorganic Methods Data Review (EPA 2004) and Region III Modifications for Inorganic Data Review (EPA 1993), as applicable. The samples were evaluated based on the following criteria:

- Data Completeness

- Technical Holding Times
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Serial Dilutions
- Laboratory Control Samples
- Matrix Spike Recoveries
- Field Duplicates
- Identification/Quantitation
- Reporting Limits

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to the chain of custody records, sampling was performed on 8/31/10 and 9/1/10. Samples were received at the laboratory on 9/2/10. All sample preparation analysis was performed within holding time requirements.

Calibration

Continuing calibration was below criteria for all zinc results for total metals. See table below for recoveries. Affected data are summarized in **Attachment 1**.

CCV	Compound	Recovery
0I25907-CCV4	Zinc	88.4%
0I25907-CCV5	Zinc	86.2%
0I25907-CCV6	Zinc	86.1%

Blanks

Various compounds were detected in the equipment blank, and method blanks for both total metals and SEM metals as indicated below. Affected data are summarized in **Attachment 1.**

Lab case narrative noted nickel and zinc results in the equipment blank were qualified as Z-01 because sample containers were contaminated with acid containing nickel and zinc.

Blank ID	Compound	Conc.	Units	Action Level	Units
LW03-EB01-090110	Copper	1.65	ug/l	0.4125	mg/kg
LW03-EB01-090110	Lead	0.827	ug/l	0.20675	mg/kg
LW03-EB01-090110	Nickel	48.5	ug/l	12.125	mg/kg
MB-0I14011	Tin	1.44	mg/kg	7.2	mg/kg
MB-0I14012	Tin	1.45	mg/kg	7.25	mg/kg
LW03-EB01-090110	Zinc	8.27	ug/l	2.0675	mg/kg
AVS 0I14025-BLK	Lead	0.000417	umoles/g	0.002085	umoles/g
AVS 0I10001-BLK	Zinc	0.00249	umoles/g	0.01245	umoles/g
AVS 0I14025-BLK	Zinc	0.00212	umoles/g	0.0106	umoles/g

Matrix Spike/Spike Duplicate

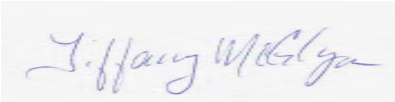
Mercury exhibited low recoveries for the MS/MSD (73.4/71.4%) for sample LW03-SD518-00-10C-SEM. Affected data are summarized in **Attachment 1.**

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Value	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

MEMORANDUM CH2MHILL

Data Validation Summary

CTO-222 Little Creek

TO: Anita Dodson/VBO

Megan Morrison/WDC

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: November 8, 2010

Introduction

The following data validation report discusses the data validation process and findings for Empirical Laboratories, LLC for SDG 1009032.

Samples were analyzed using the following analytical methods:

- SW6010B Total Metals
- SEM Metals
- SW7470A/7471 Mercury

The samples included in this SDG are listed in the table below.

Sample Name	Lab Sample ID
LW03-SD501-00-10C	1009032-01
LW03-SD501-00-10C	1009032-02
LW03-SD502-00-10C	1009032-03
LW03-SD502-00-10C	1009032-04
LW03-SD503-00-10C	1009032-05
LW03-SD503-00-10C	1009032-06
LW03-SD530-00-10C	1009032-07
LW03-SD530-00-10C	1009032-08
LW03-SD525-00-10C	1009032-09
LW03-SD525-00-10C	1009032-10
LW03-SD519-00-10C	1009032-11

Sample Name	Lab Sample ID
LW03-SD519-00-10C	1009032-12
LW03-SD512-00-10C	1009032-13
LW03-SD512-00-10C	1009032-14
LW03-SD507-00-10C	1009032-15
LW03-SD507-00-10C	1009032-16

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: National Functional Guidelines for Inorganic Methods Data Review (EPA 2004) and Region III Modifications for Inorganic Data Review (EPA 1993), as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Serial Dilutions
- Laboratory Control Samples
- Matrix Spike Recoveries
- Field Duplicates
- Identification/Quantitation
- Reporting Limits

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to the chain of custody records, sampling was performed on 9/2/10. Samples were received at the laboratory on 9/3/10. All sample preparation analysis was performed within holding time requirements.

Calibration

Continuing calibration was below criteria for all zinc results for total and SEM metals. See table below for recoveries. Affected data are summarized in **Attachment 1**.

CCV	Compound	Recovery
0I25907-CCV4	Zinc	88.4%
0I25907-CCV5	Zinc	86.2%
0I25907-CCV6	Zinc	86.1%
I 26609-CCV5	Zinc	89.5%
I 26609-CCV6	Zinc	87.5%

Blanks

Various compounds were detected in the equipment blank, method blanks, and calibration blanks for both total metals and SEM metals as indicated below. Affected data are summarized in **Attachment 1.**

Lab case narrative noted nickel and zinc results in the equipment blank were qualified as Z-01 because sample containers were contaminated with acid containing nickel and zinc.

Blank ID	Compound	Conc.	Units	Action Level	Units
LW03-EB01-090110	Copper	1.65	ug/l	0.4125	mg/kg
LW03-EB01-090110	Lead	0.827	ug/l	0.20675	mg/kg

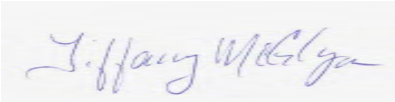
Blank ID	Compound	Conc.	Units	Action Level	Units
LW03-EB01-090110	Nickel	48.5	ug/l	12.125	mg/kg
MB-0I14011	Tin	1.44	mg/kg	7.2	mg/kg
MB-0I14012	Tin	1.45	mg/kg	7.25	mg/kg
LW03-EB01-090110	Zinc	8.27	ug/l	2.0675	mg/kg
0I23010-BLK1 SEM	Cadmium	0.0169	umoles/g	0.0845	umoles/g
0I23010-BLK1 SEM	Copper	0.0123	umoles/g	0.0615	umoles/g
0I23010-BLK1 SEM	Lead	0.0008	umoles/g	0.004	umoles/g
AVS 0I14025	Lead	0.000417	umoles/g	0.002085	umoles/g
0I23010-BLK1 SEM	Nickel	0.0226	umoles/g	0.113	umoles/g
0I23010-BLK1 SEM	Silver	0.00383	umoles/g	0.01915	umoles/g
AVS 0I14025	Zinc	0.00249	umoles/g	0.01245	umoles/g

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Value	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

MEMORANDUM CH2MHILL

Data Validation Summary

CTO-222 Little Creek

TO: Anita Dodson/VBO

Megan Morrison/WDC

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: November 8, 2010

Introduction

The following data validation report discusses the data validation process and findings for Empirical Laboratories, LLC for SDG 1009060.

Samples were analyzed using the following analytical methods:

- SW6010B Total Metals
- SEM Metals
- SW7470A/7471 Mercury

The samples included in this SDG are listed in the table below.

Sample Name	Lab Sample ID
LW03-SD541-00-10C	1009060-01
LW03-SD541-00-10C	1009060-02
LW03-SD547-00-10C	1009060-03
LW03-SD547-00-10C	1009060-04
LW03-SD547P-00-10C	1009060-05
LW03-SD553-00-10C	1009060-06
LW03-SD553-00-10C	1009060-07
LW03-SD559-00-10C	1009060-08
LW03-SD559-00-10C	1009060-09
LW03-SD552-00-10C	1009060-10
LW03-SD552-00-10C	1009060-11

Sample Name	Lab Sample ID
LW03-SD558-00-10C	1009060-12
LW03-SD558-00-10C	1009060-13
LW03-SD564-00-10C	1009060-14
LW03-SD564-00-10C	1009060-15
LW03-SD551-00-10C	1009060-16
LW03-SD551-00-10C	1009060-17
LW03-SD557-00-10C	1009060-18
LW03-SD557-00-10C	1009060-19
LW03-SD563-00-10C	1009060-20
LW03-SD563-00-10C	1009060-21
LW03-SD550-00-10C	1009060-22
LW03-SD550-00-10C	1009060-23
LW03-SD556-00-10C	1009060-24
LW03-SD556-00-10C	1009060-25
LW03-SD556P-00-10C	1009060-26
LW03-SD562-00-10C	1009060-27
LW03-SD562-00-10C	1009060-28
LW03-SD567-00-10C	1009060-29
LW03-SD567-00-10C	1009060-30
LW03-SD571-00-10C	1009060-31
LW03-SD571-00-10C	1009060-32
LW03-EB01-090810	1009060-33

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: National Functional Guidelines for Inorganic Methods Data Review (EPA 2004) and Region III Modifications for Inorganic Data Review (EPA 1993), as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Serial Dilutions
- Laboratory Control Samples

- Matrix Spike Recoveries
- Field Duplicates
- Identification/Quantitation
- Reporting Limits

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to the chain of custody records, sampling was performed on 9/7/10 and 9/8/10. Samples were received at the laboratory on 9/9/10. All sample preparation analysis was performed within holding time requirements.

Calibration

Continuing calibration was above criteria at 111% for CCV3 and CCV4 for copper in total metals. For SEM metals, the continuing calibration for zinc was below criteria, CCV5 89.5% and CCV6 87.5%. Criteria for continuing calibration is 90-110%. Affected data are summarized in **Attachment 1**.

Blanks

Various compounds were detected in the equipment blank, method blanks, and calibration blanks for both total metals and SEM metals as indicated below. Affected data are summarized in **Attachment 1.**

Lab case narrative noted nickel and zinc results in the equipment blank were qualified as Z-01 because sample containers were contaminated with acid containing nickel and zinc.

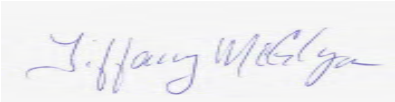
Blank ID	Compound	Conc.	Units	Action Level	Units
LW03-EB01-090810	Copper	1.83	ug/L	0.4575	mg/kg
LW03-EB01-090810	Lead	1.11	ug/L	0.2775	mg/kg
LW03-EB01-090810	Nickel	64.6	ug/L	16.15	mg/kg
LW03-EB01-090810	Tin	1.4	ug/L	0.35	mg/kg
LW03-EB01-090810	Zinc	8.61	ug/L	2.1525	mg/kg
0J27402-CCB4	Zinc	5.27	ug/L	1.3175	mg/kg
0I23010-BLK1 SEM	Cadmium	0.0169	umoles/g	0.0845	umoles/g
0I23010-BLK1 SEM	Copper	0.0123	umoles/g	0.0615	umoles/g
0I23010-BLK1 SEM	Lead	0.0008	umoles/g	0.004	umoles/g
0J01005	Lead	0.000694	umoles/g	0.00347	umoles/g
0I23010-BLK1 SEM	Nickel	0.0226	umoles/g	0.113	umoles/g
0I23010-BLK1 SEM	Silver	0.00383	umoles/g	0.01915	umoles/g
0J01005	Zinc	0.00242	umoles/g	0.0121	umoles/g

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Value	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

MEMORANDUM CH2MHILL

Data Validation Summary

CTO-222 Little Creek

TO: Anita Dodson/VBO

Megan Morrison/WDC

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: November 8, 2010

Introduction

The following data validation report discusses the data validation process and findings for Empirical Laboratories, LLC for SDG 1009086.

Samples were analyzed using the following analytical methods:

- SW6010B Total Metals
- SEM Metals
- SW7470A/7471 Mercury

The samples included in this SDG are listed in the table below.

Sample Name	Lab Sample ID
LW03-SD523-00-10C	1009086-01
LW03-SD523-00-10C	1009086-02
LW03-SD509-00-10C	1009086-03
LW03-SD509-00-10C	1009086-04
LW03-SD516-00-10C	1009086-05
LW03-SD516-00-10C	1009086-06
LW03-SD529-00-10C	1009086-07
LW03-SD529-00-10C	1009086-08
LW03-SD548-00-10C	1009086-09
LW03-SD548-00-10C	1009086-10
LW03-SD549-00-10C	1009086-11

Sample Name	Lab Sample ID
LW03-SD549-00-10C	1009086-12
LW03-SD555-00-10C	1009086-13
LW03-SD555-00-10C	1009086-14
LW03-SD515-00-10C	1009086-15
LW03-SD515-00-10C	1009086-16
LW03-SD522-00-10C	1009086-17
LW03-SD522-00-10C	1009086-18
LW03-SD528-00-10C	1009086-19
LW03-SD528-00-10C	1009086-20
LW03-SD506-00-10C	1009086-21
LW03-SD506-00-10C	1009086-22
LW03-SD506P-00-10C	1009086-23
LW03-SD513-00-10C	1009086-24
LW03-SD513-00-10C	1009086-25
LW03-SD526-00-10C	1009086-26
LW03-SD526-00-10C	1009086-27
LW03-SD526P-00-10C	1009086-28
LW03-SD520-00-10C	1009086-29
LW03-SD520-00-10C	1009086-30
LW03-SD514-00-10C	1009086-31
LW03-SD514-00-10C	1009086-32
LW03-SD514P-00-10C	1009086-33
LW03-SD508-00-10C	1009086-34
LW03-SD508-00-10C	1009086-35
LW07-H1-SD401-00-10C	1009086-36
LW07-H1-SD401-00-10C	1009086-37
LW07-K1-SD401-00-10C	1009086-38
LW07-K1-SD401-00-10C	1009086-39
LW07-M1-SD401-00-10C	1009086-40
LW07-M1-SD401-00-10C	1009086-41
LW07-SD404-00-10C	1009086-42
LW07-SD404-00-10C	1009086-43
LW07-EB01-091010	1009086-44

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: National Functional Guidelines for Inorganic Methods Data

Review (EPA 2004) and Region III Modifications for Inorganic Data Review (EPA 1993), as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Serial Dilutions
- Laboratory Control Samples
- Matrix Spike Recoveries
- Field Duplicates
- Identification/Quantitation
- Reporting Limits

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to the chain of custody records, sampling was performed on 9/9/10 and 9/10/10. Samples were received at the laboratory on 9/11/10 and 9/13/10. All sample preparation analysis was performed within holding time requirements.

Calibration

Continuing calibration was above criteria for CCV3 (111%) and CCV4 (111%) for copper in total metals. For SEM metals, continuing calibration was below criteria for CCV5 (89.5%) and CCV6 (87.5%). Criteria for continuing calibration is 90-110%. Affected data are summarized in **Attachment 1**.

Blanks

Various compounds were detected in the equipment blank, and method blanks for both total metals and SEM metals as indicated below. Affected data are summarized in **Attachment 1.**

Lab case narrative noted nickel and zinc results in the equipment blank were qualified as Z-01 because sample containers were contaminated with acid containing nickel and zinc.

Blank ID	Compound	Conc.	Units	Action Level	Units
LW07-EB01-091010	Copper	1.83	ug/l	0.4575	mg/kg
LW07-EB01-091010	Copper	1.55	ug/l	0.3875	mg/kg
LW07-EB01-091010	Lead	1.11	ug/l	0.2775	mg/kg
LW07-EB01-091010	Lead	1.21	ug/l	0.3025	mg/kg
LW07-EB01-091010	Nickel	64.6	ug/l	16.15	mg/kg
MB	Tin	1.4	mg/kg	7	mg/kg
MB	Tin	1.45	mg/kg	7.25	mg/kg
MB	Tin	1.41	mg/kg	7.05	mg/kg
LW07-EB01-091010	Zinc	8.61	ug/l	2.1525	mg/kg
LW07-EB01-091010	Zinc	7.58	ug/l	1.895	mg/kg
0J27402-CCB4	Zinc	5.27	ug/l	1.3175	mg/kg
MB	Lead	0.000694	umoles/g	0.00347	umoles/g
MB	Lead	0.00126	umoles/g	0.0063	umoles/g
MB	Zinc	0.00242	umoles/g	0.0121	umoles/g

Matrix Spike/Spike Duplicate

MS/MSD recovery was below criteria for lead affecting samples LW07-SD529-00-10C and LW07-SD404-00-10C. Recoveries affecting sample LW07-SD555-00-10C were copper and lead which recovered below criteria whereas zinc recovered above criteria. Affected data are summarized in **Attachment 1.**

Serial Dilution

Serial dilution did not meet criteria for nickel in sample LW07-SD555-00-10C with an RPD of 42%. Affected data are summarized in **Attachment 1**.

Field Duplicate Precision

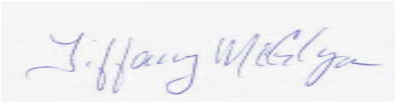
Field duplicate precision did not meet criteria for zinc in samples LW03-SD506-00-10C and LW03-SD506P-00-10C. The RPD for zinc was 57% (limit is 30% RPD). Affected data are summarized in **Attachment 1.**

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Value	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

MEMORANDUM CH2MHILL

Data Validation Summary

CTO-222 Little Creek

TO: Anita Dodson/VBO

Megan Morrison/WDC

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: November 8, 2010

Introduction

The following data validation report discusses the data validation process and findings for Empirical Laboratories, LLC for SDG 1009095.

Samples were analyzed using the following analytical methods:

- SW6010B Total Metals
- SEM Metals
- SW7470A/7471 Mercury

The samples included in this SDG are listed in the table below.

Sample Name	Lab Sample ID
LW07-SD403-00-10C	1009095-01
LW07-SD403-00-10C	1009095-02
LW07-L2-SD401-00-10C	1009095-03
LW07-L2-SD401-00-10C	1009095-04
LW07-K3-SD401-00-10C	1009095-05
LW07-K3-SD401-00-10C	1009095-06
LW07-SD402-00-10C	1009095-07
LW07-SD402-00-10C	1009095-08
LW07-SD402P-00-10C	1009095-09
LW07-K4-SD401-00-10C	1009095-10
LW07-K4-SD401-00-10C	1009095-11

Sample Name	Lab Sample ID
LW07-L5-SD401-00-10C	1009095-12
LW07-L5-SD401-00-10C	1009095-13
LW07-K5-SD401-00-10C	1009095-14
LW07-K5-SD401-00-10C	1009095-15
LW07-SD401-00-10C	1009095-16
LW07-SD401-00-10C	1009095-17
LW07-J4-SD401-00-10C	1009095-18
LW07-J4-SD401-00-10C	1009095-19
LW07-H3-SD401-00-10C	1009095-20
LW07-H3-SD401-00-10C	1009095-21
LW07-F3-SD401-00-10C	1009095-22
LW07-F3-SD401-00-10C	1009095-23
LW07-D5-SD401-00-10C	1009095-24
LW07-D5-SD401-00-10C	1009095-25
LW07-B7-SD401-00-10C	1009095-26
LW07-B7-SD401-00-10C	1009095-27
LW07-F5-SD401-00-10C-01	1009095-28
LW07-B5-SD401-00-10C	1009095-30
LW07-B5-SD401-00-10C	1009095-31
LW07-B5-SD401P-00-10C	1009095-32
LW03-SD521-00-10C	1009095-33
LW03-SD521-00-10C	1009095-34
LW03-SD527-00-10C	1009095-35
LW03-SD527-00-10C	1009095-36
LW07-F5-SD401-00-10C-01	1009095-37

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: National Functional Guidelines for Inorganic Methods Data Review (EPA 2004) and Region III Modifications for Inorganic Data Review (EPA 1993), as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Initial/Continuing Calibrations
- Blanks

- Internal Standards
- Serial Dilutions
- Laboratory Control Samples
- Matrix Spike Recoveries
- Field Duplicates
- Identification/Quantitation
- Reporting Limits

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to the chain of custody records, sampling was performed 9/11/10 and 9/12/10. Samples were received at the laboratory on 9/14/10. All sample preparation analysis was performed within holding time requirements.

Field Duplicate Precision

Field duplicate and native did not meet criteria for LW07-SD402-00-10C and LW07-SD402P-00-10C. Precision between the native and field dupcliate were 46% (limit is 30%). Affected data are summarized in table below.

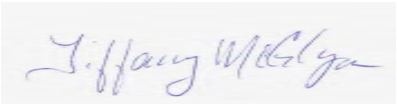
Sample ID	Compound	Q Flag	Qual Code
LW07-SD402-00-10C	Tin	J	FD
LW07-SD402P-00-10C	Tin	J	FD

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Value	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

CTO-222 Little Creek
Attachment 1 Change Qual. Table
SDG 1009022

Sample ID	Metals	Compound	Q Flag	Qual Code
LW03-SD504A-00-10C	6010B	Tin	B	MBL
LW03-SD504A-00-10C	6010B	Zinc	L	CCL
LW03-SD574-00-10C	6010B	Tin	B	MBL
LW03-SD574-00-10C	6010B	Zinc	L	CCL
LW03-SD504-00-10C	6010B	Tin	B	MBL
LW03-SD510-00-10C	6010B	Tin	B	MBL
LW03-SD510-00-10C	6010B	Zinc	L	CCL
LW03-SD517-00-10C	6010B	Zinc	L	CCL
LW03-SD518-00-10C	6010B	Tin	B	MBL
LW03-SD518-00-10C	6010B	Zinc	L	CCL
LW03-SD518-00-10C	SEM	Mercury	UL	MSL
LW03-SD511-00-10C	6010B	Zinc	L	CCL
LW03-SD505-00-10C	6010B	Zinc	L	CCL
LW03-SD534-00-10C	6010B	Zinc	L	CCL
LW03-SD538-00-10C	6010B	Zinc	L	CCL
LW03-SD537-00-10C	6010B	Zinc	L	CCL
LW03-SD533-00-10C	6010B	Zinc	L	CCL
LW03-SD539-00-10C	6010B	Zinc	L	CCL
LW03-SD544-00-10C	6010B	Zinc	L	CCL
LW03-SD546-00-10C	6010B	Zinc	L	CCL
LW03-SD535-00-10C	6010B	Zinc	L	CCL
LW03-SD545-00-10C	6010B	Zinc	L	CCL
LW03-SD543-00-10C	6010B	Zinc	L	CCL
LW03-SD540-00-10C	6010B	Zinc	L	CCL
LW03-SD540P-00-10C	6010B	Zinc	L	CCL

CTO-222 Little Creek
Attachment 1 Change Qual. Table
SDG 1009032

Sample ID	Metals	Compound	Q Flag	Qual Code
LW03-SD501-00-10C	6010B	Tin	B	MBL
LW03-SD501-00-10C	6010B	Zinc	L	CCL
LW03-SD501-00-10C	SEM	Nickel	B	MBL
LW03-SD501-00-10C	SEM	Zinc	L	CCL
LW03-SD502-00-10C	6010B	Tin	B	MBL
LW03-SD502-00-10C	6010B	Zinc	L	CCL
LW03-SD502-00-10C	SEM	Zinc	L	CCL
LW03-SD503-00-10C	6010B	Tin	B	MBL
LW03-SD503-00-10C	6010B	Zinc	L	CCL
LW03-SD503-00-10C	SEM	Zinc	L	CCL
LW03-SD530-00-10C	6010B	Zinc	L	CCL
LW03-SD530-00-10C	SEM	Zinc	L	CCL
LW03-SD525-00-10C	6010B	Zinc	L	CCL
LW03-SD525-00-10C	SEM	Zinc	L	CCL
LW03-SD519-00-10C	6010B	Zinc	L	CCL
LW03-SD519-00-10C	SEM	Zinc	L	CCL
LW03-SD512-00-10C	6010B	Zinc	L	CCL
LW03-SD512-00-10C	SEM	Zinc	L	CCL
LW03-SD507-00-10C	6010B	Tin	B	MBL
LW03-SD507-00-10C	6010B	Zinc	L	CCL
LW03-SD507-00-10C	SEM	Zinc	L	CCL

CTO-222 Little Creek
Attachment 1 Change Qual. Table
SDG 1009060

Sample ID	Metals	Compound	Q Flag	Qual Code
LW03-SD541-00-10C	6010B	Copper	K	CCH
LW03-SD541-00-10C	SEM	Zinc	L	CCL
LW03-SD547-00-10C	6010B	Copper	K	CCH
LW03-SD547-00-10C	SEM	Zinc	L	CCL
LW03-SD547P-00-10C	6010B	Copper	K	CCH
LW03-SD553-00-10C	6010B	Copper	K	CCH
LW03-SD559-00-10C	6010B	Copper	K	CCH
LW03-SD559-00-10C	6010B	Nickel	B	EBL
LW03-SD552-00-10C	6010B	Copper	K	CCH
LW03-SD558-00-10C	6010B	Copper	K	CCH
LW03-SD564-00-10C	6010B	Copper	K	CCH
LW03-SD551-00-10C	6010B	Copper	K	CCH
LW03-SD557-00-10C	6010B	Copper	K	CCH
LW03-SD563-00-10C	6010B	Copper	K	CCH
LW03-SD550-00-10C	6010B	Copper	K	CCH
LW03-SD550-00-10C	6010B	Nickel	B	EBL
LW03-SD556-00-10C	6010B	Copper	K	CCH
LW03-SD556P-00-10C	6010B	Copper	K	CCH
LW03-SD562-00-10C	6010B	Copper	K	CCH
LW03-SD567-00-10C	6010B	Copper	K	CCH
LW03-SD571-00-10C	6010B	Copper	K	CCH

CTO-222 Little Creek
Attachment 1 Change Qual. Table
SDG 1009086

Sample ID	Metals	Compound	Q Flag	Qual Code
LW03-SD523-00-10C	6010B	Copper	K	CCH
LW03-SD523-00-10C	SEM	Zinc	L	CCL
LW03-SD509-00-10C	6010B	Copper	K	CCH
LW03-SD509-00-10C	6010B	Nickel	B	MBL
LW03-SD509-00-10C	SEM	Zinc	L	CCL
LW03-SD529-00-10C	6010B	Tin	L	MSL
LW03-SD555-00-10C	SEM	Copper	L	MSL
LW03-SD555-00-10C	SEM	Lead	L	MSL
LW03-SD555-00-10C	SEM	Nickel	J	SD
LW03-SD555-00-10C	SEM	Zinc	K	MSH
LW03-SD506-00-10C	6010B	Zinc	J	FD
LW03-SD506P-00-10C	6010B	Zinc	J	FD
LW07-SD404-00-10C	6010B	Lead	L	MSL

Initial and Continuing Calibration

Lab SDG/Report: **1009086**

Date Analyzed **10/4/2010**

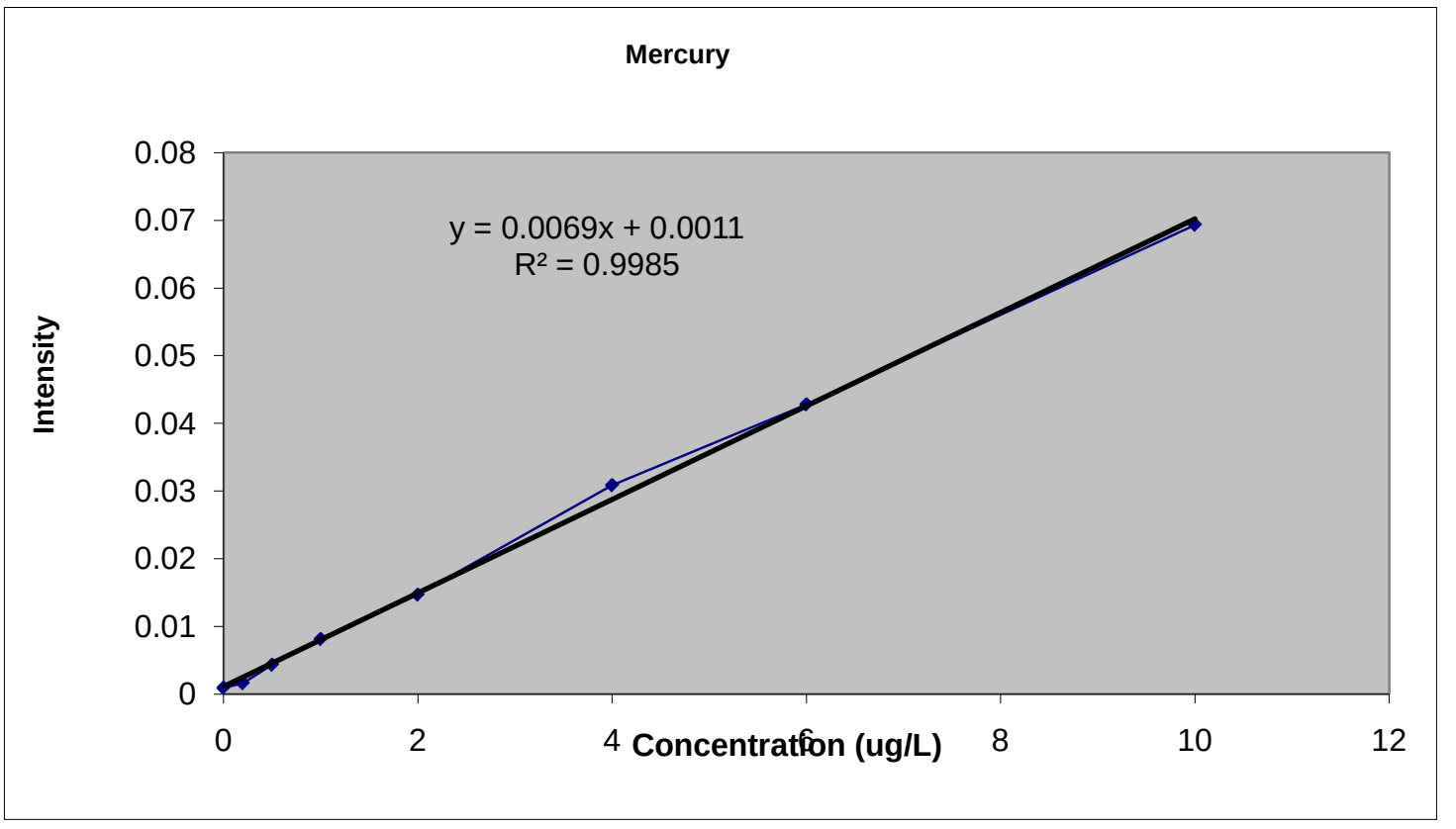
Parameter: **Mercury**

Initial Calibration - Y - mX + b

Slope (m) =	0.0069	Lab Slope (m):	0.0069
Intercept (b) =	0.0011	Lab intercept (b):	0.001

Level	Concentration (mg/L)	Area (mVS)	RF
1	0	0.00092	0.000000E+00
2	0.2	0.00159	1.257862E+02
3	0.5	0.00431	1.160093E+02
4	1	0.00811	1.233046E+02
5	2	0.01467	1.363327E+02
6	4	0.03085	1.296596E+02
7	6	0.04279	1.402197E+02
8	10	0.06933	1.442377E+02

NR = Not Reported



Continuing Calibration **Date / Time:** 6/25/2010 - 0928

Expected Conc.	5.00	Actual Conc.	5.03
Calculated % Rec=	100.60	Lab % Rec=	101

NR - Not Reported

Sample Concentrations

Formula for Calculation of Concentrations

Soil

$$\text{Sample Conc} = \frac{(Conc_{QR})\,(V_f)\,(DF)}{(W)\,(S)}$$

where

ConcQR =	Concentration on Quantitation Report (ug/L)
V_f =	Final volume in liters
DF =	Dilution factor
W =	Weight in grams of wet sample
S =	%solids / 100

Water

$$\text{Sample Conc} = (Conc_{QR})\,(DF)$$

where

ConcQR =	Concentration on Quantitation Report (ug/L)
DF =	Dilution factor

Sample ID	1009086-36	1009086-40
Date / Time Analyzed	10/8/2010 - 1449	10/8/2010 - 1451
$Conc_{QR}$	0.75	3.18875
V_f	0.05	0.05
DF	1	1
W	0.35	0.33
S	0.3309	0.3995
Calculated Conc.	0.324	1.209
Lab Reported Conc	0.324	1.21

Formulas

Formula for Calculation of Recovery

$$\% \text{ Recovery} = \frac{\text{Concentration or amount found}}{\text{Concentration or amount spiked}} \times 100$$

Formula for Calculation of Matrix Spike Recovery

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

where:
SSR = Spike sample result
SR = Sample result
SA = Spike added

Formula for Calculation of Relative Percent Difference

$$\text{Relative Percent Difference (RPD)} = \frac{(|\text{Value 1} - \text{Value 2}|)}{(1/2)\,(\text{Value 1} + \text{Value 2})} \times 100$$

Formula for Calculation of Percent Difference

$$\text{Percent Difference (\%D)} = \frac{(|\text{Value 1} - \text{Value 2}|)}{(\text{Value 1} + \text{Value 2})} \times 100$$

QC Check Sample

Lab SDG/Report: 1009086
Date Analyzed: 6/25/2010
Parameter: Mercury
Sample: 0J28402-CRL1

ug/L	True Value	Cal. Rec.	Lab Rec.	OK?
0.182	0.2	91	91	**YES**

NR = Not Reported

Laboratory Control Sample (LCS) Recoveries and/or Precision

Lab SDG/Report: 1009086
Date Analyzed: 6/25/2010
Parameter: Mercury

	Conc Found	Conc Spiked	Cal. Rec.	Lab Rec.	OK?
LCS Conc. Found	3.300	3.6	91.7	92	**YES**
LCSD Conc. Found					

		Cal. RPD	Lab RPD	OK?
Relative Percent Difference	=			

MS/MSD Accuracy and Precision Recoveries

Lab SDG/Report: 1009086
Date Analyzed: 6/25/2010
Parameter: Mercury
Sample ID: 1009086-42

	Conc Found	Conc Spiked (SA)	Cal. Rec.	Lab Rec.	OK?
Spike sample result (SSR)	0.6337	0.513	86.94	86.9	**YES**
Duplicate Spike sample result (SSR)	0.68	0.5441	90.39	90.4	**YES**
Sample result (SR)	0.1877				

NR = Not Reported

		Cal. RPD	Lab RPD	OK?
Relative Percent Difference	=	6.975	6.98	**YES**

Lab SDG/Report: **1009086**
Parameter: **Zinc**

Initial and Continuing Calibration

Initial Calibration Verification		**Date / Time:**	10/6/2010 1032
Expected Conc.	1000.00	Actual Conc.	986.40
Calculated % Rec=	98.64	Lab % Rec=	99%

Continuing Calibration		**Date / Time:**	10/6/2010 1613
Expected Conc.	1000.00	Actual Conc.	980.00
Calculated % Rec=	98.00	Lab % Rec=	98.00

Lab SDG/Report: **1009086**
Parameter: **Zinc**

Sample Concentrations

Formula for Calculation of Concentrations

Soil

$$\text{Sample Conc} = \frac{(Conc_{QR})\ (V_f)\ (DF)]\ /\ W}{S/100}$$

where
ConcQR = Concentration on Quantitation Report (ug/L)
V_f = Final volume in liters
DF = Dilution factor
W = Weight in grams of wet sample
S = %solids

Water

$$\text{Sample Conc} = \frac{(Conc_{QR})\ (V_f)\ (DF)}{(V_i)}$$

where
ConcQR = Concentration on Quantitation Report (ug/L)
V_f = Final volume in liters
DF = Dilution factor
V_i = Initial volume in liters

Sample ID	1009086-36	1009086-40
Date / Time Analyzed	10/6/10 1652	10/6/10 1701
Parameter	Zinc	Zinc
$Conc_{QR}$	3251.2	5961.6
V_f	0.1	0.1
DF	1	1
V_i	1	1
W	2.0	2.1
S	33.09	39.95
Calculated Concentration	491.3	710.6
Reported Concentration	491	711

Lab SDG/Report: **1009086**
Parameter: **Copper**

Formulas

Formula for Calculation of Recovery

$$\% \text{ Recovery} = \frac{\text{Concentration or amount found}}{\text{Concentration or amount spiked}} \times 100$$

Formula for Calculation of Matrix Spike Recovery

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

where:
SSR = Spike sample result
SR = Sample result
SA = Spike added

Formula for Calculation of Relative Percent Difference

$$\text{Relative Percent Difference (RPD)} = \frac{(|\text{Value 1} - \text{Value 2}|)}{(1/2)\,(\text{Value 1} + \text{Value 2})} \times 100$$

Formula for Calculation of Percent Difference

$$\text{Percent Difference (\%D)} = \frac{(|\text{Value 1} - \text{Value 2}|)}{(\text{Value 1} + \text{Value 2})} \times 100$$

Laboratory Control Sample (LCS) Recoveries and/or Precision

Sample ID 0I15002-BS1
Parameter Copper

	Conc Found	Conc Spiked	Cal. Rec.	Lab Rec.	OK?
LCS Conc. Found	5.24	5	105	105	**Yes**
LCSD Conc. Found					

		Cal. RPD	Lab RPD	OK?
Relative Percent Difference	=			

MS/MSD Accuracy and Precision Recoveries

Sample ID: 1009086-42
Parameter Copper

	Conc Found	Conc Spiked (SA)	Cal. Rec.	Lab Rec.	OK?
Spike sample result (SSR)	75.96	22.11	106	106	**Yes**
Duplicate Spike sample result (SSR)	77.1	21.9	112	112	**Yes**
Sample result (SR)	52.56				

NR = Not Reported

		Cal. RPD	Lab RPD	OK?
Relative Percent Difference	=	1.42	1.43	**Yes**

Attachment C
Benthic Report

Benthic Macroinvertebrate Infauna Data
CLEAN III Contract Task Order 222
SWMUs 3 and 7B
Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Prepared for

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Introduction

CH2M HILL is conducting work for the Atlantic Division of the Naval Facilities Engineering Command under the Navy CLEAN III contract N62470-02-D-3052, Contract Task Order 222 at Naval Amphibious Base Little Creek in Virginia Beach, Virginia. Water & Air Research, Inc. was contracted (CH2M HILL Purchase Order 940698) to analyze benthic invertebrate petite Ponar dredge samples collected by CH2M HILL staff on August 31 through September 12, 2010. Composite samples of three grabs per site at a total of 91 sites were collected within SWMUs 3 and 7B. All samples were analyzed in Water & Air's biological laboratory in Gainesville, Florida.

Method of Analysis

Analytical methods followed for this project were described in the Quality Assurance Project Plan (Water and & Air Research 2010). In general, Water & Air adhered to Florida Department of Environmental Protection Quality Control Procedures, including LQ7410 (macroinvertebrate sorting) and LQ7420 (macroinvertebrate taxonomic identification). Also internal Florida Department of Environmental Protection Biology Department Standard Operating Procedures and Florida Administrative Code, Quality Assurance Rule, Chapter 62-160, were used as a guide for this project.

Upon receipt samples were inspected for condition and adequacy of documentation, logged and then stored in a secure air-conditioned laboratory with access restricted to authorized personnel. Preservative (formalin) was decanted through a U.S. Standard No. 35 mesh sieve (500 microns) and properly stored and disposed. Waste formalin and ethanol were double-contained and stored in a labeled locked enclosure, until transported to the Alachua County Hazardous Waste Collection Center or a certified private disposal firm.

Samples were rinsed using a U.S. Standard No. 35 mesh sieve to retain organisms, sediment, and debris. The invertebrates were sorted from the debris and placed in glass vials, preserved in 80 percent ethanol with glycerin, and sealed with stoppers. Each vial was labeled with its sample number other pertinent information, and a record of all samples was kept in an electronic Excel file. Each sample was assigned a macroinvertebrate identification log sheet. Taxonomists recorded scientific names and counts for each taxon on laboratory bench sheets. After the invertebrates were identified and counted they were placed in glass vials labeled with the sample number, preserved in 80 percent ethanol with glycerin, and sealed with stoppers.

Counts for headless organism fragments were recorded as zero (0). Fragments with a head were counted at the Lowest Practical Identification Level.

Organism Classification

Pollution sensitivity classifications were assigned to benthic invertebrate taxa using the following published literature:

Alden, R.W., III, D.M. Dauer, J.A. Ranasinghe, L.C. Scott, and R.J. Llanso. 2002. Statistical verification of the Chesapeake Bay Benthic Index of Biotic Integrity. Environmetrics 13:473-498.

Llanso, R.J. 2002. Methods for calculating the Chesapeake Bay Benthic Index of Biotic Integrity. Versar, Inc., Columbia, MD.

Ranasinghe, J. A., S. B. Weisberg, D. M. Dauer, L. C. Schaffner, R. J. Diaz, and J. B. Frithsen. 1994. Chesapeake Bay Benthic Community Restoration Goals. Prepared for the U.S. EPA Chesapeake Bay Program Office, the Governor's Council on Chesapeake Bay Research Fund, and the Maryland Department of Natural Resources by Versar, Inc., Columbia, MD.

Weisberg, S.B., J.A. Ranasinghe, D.M. Dauer, L.C. Schaffner, R.J. Diaz, and J.B. Frithsen. 1997. An estuarine benthic index of biotic integrity (B-IBI) for the Chesapeake Bay. Estuaries 20:149-158.

Based on a review of readily available literature, numerical sensitivity scores are not available estuarine–marine macro-infauna in the project area. Based on professional judgment, Ranasinghe et al. (1994) developed a benthic infauna classification for opportunistic (OP) and equilibrium (EQ) species. Another classification for pollution-sensitive (PS) and pollution indicative (PI) estuarine macro-infauna was developed by Weisberg et al. (1997). More recent authors on the subject reference these classifications as the basis of expanded work (Alden et al. 2002; Llanso 2002).

Quality Control Procedures and Results

Quality control (QC) checks for sample sorting were performed by a second lab technician on 13 of the 91 samples (14%) and the results were recorded in the electronic sample-processing logbook in the form of an Excel spreadsheet. Precision for macroinvertebrate data is determined for sample sorting by conducting the above-described QC check on 10 percent of the samples as described previously. For each QC check the number of specimens remaining in the sample after sorting is completed, and the total number of organisms in the sample (as counted by a taxonomist) are recorded and presented as a percentage using the following formula:

$$\frac{(\text{Total organisms} - \text{QC organisms}) \times 100}{\text{Total Organisms}} = \text{Sorting efficiency (\%)}$$

Water & Air's policy is to immediately train or re-train sorting technicians when average sorting efficiency falls below 95%. QC checks are continued on each sample until a 95% average sorting efficiency is attained. Sorting QC results are presented in Appendix A, Table A-1. Corrective actions, when necessary, are noted in the comments section of the table. Note that one of the Laboratory technicians was new and in-training at the time of this project. The two samples sorted by the new technician were checked by a second technician to ensure completeness of the sorting process.

A total of six samples were randomly selected for taxonomic QC checks from two sampling areas in the following fashion:

Three (3) samples from the SWMU 3 area

Three (3) samples from the SWMU 7B area

Taxonomic identification and count data were recorded on macroinvertebrate bench sheets. Quality control checks for identifications and counts were conducted, the results were recorded on a Taxonomy QC form, and the resulting taxonomic proficiencies were recorded in an electronic logbook. For tracking overall proficiency for each taxonomist, each entry for a given taxonomist was kept in a separate electronic file with the resulting average taxonomic proficiency. Hard copies of identifications and resolutions recorded on the Water & Air Internal Taxonomy Proficiency Form were kept in a paper file. Our policy is to immediately train or re-train when taxonomic proficiency falls below 90%. QC checks are continued until a taxonomic proficiency of at least 90% is attained by each taxonomist. QC results for taxonomic identification and counts are provided in Appendix A, Table A-2.

Biological Data Reduction with Computer Programs

Due to the large number of taxa (frequently more than 50 per sample) in some samples, Water & Air uses proprietary WARSTAT and NAVSTAT computer programs to assist in data management. These programs were developed by Water & Air for use on personal computers and are currently written using Microsoft Access. Master species lists are maintained with the taxonomic name and a corresponding code name. Data output is presented in an organized tabular format and a QC check for accuracy is performed on all tabulated data.

Laboratory Data Management and Verification

Calculators or computer programs are used to perform data calculations as well as WARSTAT and NAVSTAT to assist in data management. All entries or formulas used in calculations are double checked for accuracy and data output from WARSTAT and NAVSTAT is also checked.

Benthic Infauna Results

Species density tables are provided in Appendix B. Raw data, species pollution sensitivity classifications, and various metrics are provided in Appendix C.

Appendix A

Sorting and Identification QC Results

Table A-1. Results of Sorting Quality Control Checks

Sorting Efficiency

WAR ID #	Date Collected	Station ID	Replicate	Sample Type	Sort/Mount	Project Name	Project #	Proj. Manager	Sort Date	Sorted by	Sort QA Date	Sort QA Reviewer	Total # organisms	# found in QA	% Efficiency	Comments
20623	9/2/10	LW03 SD501	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/10/10	JF	9/23/2010	LAL	60	8	86.67%	
20647	9/1/10	LW03 SD525	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/4/10	JF	9/8/2010	TLS	0	0	100.00%	
20654	9/1/10	LW03 SD534	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/4/10	JF	9/8/2010	TLS	0	0	100.00%	
20657	9/1/10	LW03 SD538	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/4/10	JF	9/8/2010	TLS	0	0	100.00%	
20658	9/1/10	LW03 SD539	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/4/10	JF	9/8/2010	TLS	0	0	100.00%	
20681	9/8/10	LW03 SD571	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	10/1/10	JF	10/3/2010	DCC	0	0	100.00%	
20701	9/10/10	LW07 SD404-00-10C	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	10/1/10	JF	10/3/2010	DCC	104	0	100.00%	
20642	9/2/10	LW03 SD519	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/3/10	TS	9/3/2010	LAL	0	0	100.00%	
20673	9/1/10	LW03 SD556	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	10/14/10	MRP	10/15/2010	LAL	7	0	100.00%	
20683	9/12/10	LW07 B5 SD401-00-10C	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	9/28/10	MRP	9/29/2010	JF	106	1	99.00%	
20693A	9/11/10	LW07 L2 SD401-01-10C	N/A	Ponar	S	Navy Clean III	10-7765-01	DLE	10/13/10	MRP	10/14/2010	LAL	29	1	96.60%	
20676	9/7/10	LW03 SD559		Ponar	S	Navy Clean III	10-7765-01	DLE	9/27/10	ACC	9/27/2010	MRP	4	2	50.00%	In Training - Two small polychaete heads missed, training occurred
20695	9/27/10	LW07 K1 SD401-00-10C		Ponar	S	Navy Clean III	10-7765-01	DLE	9/27/10	ACC	9/29/2010	MRP	54	7	87.00%	In Training

Table A-2. Results of Identification and Count QC Checks

Identification Efficiency

WAR ID #	Date Collected	Station ID	Sample ID/ Replicate	Sample Type	Project Name	Project Number	Project Manager	ID Date	ID'ed by	ID QA date	ID Reviewer	Total # of Organisms	Incorrect # in QA	% ID Efficiency
20649	9/12/10	LW03SD527	1	PP	Navy Clean III	10-7765-01	DLE	10/4/2010	LL	11/11/2010	DGS	70	2	97.14%
20650	9/9/10	LW03SD528	1	PP	Navy Clean III	10-7765-01	DLE	10/4/2010	LL	11/11/2010	DGS	7	0	100.00%
20685	9/11/10	LW07D5SD401	1	PP	Navy Clean III	10-7765-01	DLE	10/6/2010	LL	11/11/2010	DGS	16	1	93.75%
20698	9/11/2010	LW07SD401	1	PP	Navy Clean III	10-7765-01	DLE	10/10/2010	LL	11/11/2010	DGS	45	2	95.55%
20703	9/1/2010	LW07SD53403	1	PP	Navy Clean III	10-7765-01	DLE	10/4/2010	LL	11/11/2010	DGS	41	0	100.00%
20713	9/11/2010	LW07SD40303	1	PP	Navy Clean III	10-7765-01	DLE	10/21/2010	LL	11/11/2010	DGS	58	1	98.27%

Appendix B

Species Density Tables

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

water & air RESEARCH, INC.
6821 SW Archer Road
Gainesville, FL 32608
www.waterandair.com

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD501 LW03-SD501-00-10C 09/02/10	LW03-SD502 LW03-SD502-00-10C 09/02/10	LW03-SD503 LW03-SD503-00-10C 09/02/10	LW03-SD504A LW03-SD504A-00-10C 08/31/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	14	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		29	-	14	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		14	-	-	-
Family: Goniadidae					
Glycinde solitaria		29	14	-	14
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		14	-	-	14
Family: Nereididae					

water & air RESEARCH, INC.
6821 SW Archer Road
Gainesville, FL 32608
www.waterandair.com

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD501 LW03-SD501-00-10C 09/02/10	LW03-SD502 LW03-SD502-00-10C 09/02/10	LW03-SD503 LW03-SD503-00-10C 09/02/10	LW03-SD504A LW03-SD504A-00-10C 08/31/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		86	14	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		14	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		29	29	-	29
Family: Cirratulidae					
Aphelochaeta sp.		-	72	14	-
Cirratulidae (LPIL)		14	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	57	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	14	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	14
Serpulidae (LPIL)		-	14	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD501	LW03-SD502	LW03-SD503	LW03-SD504A
Station	LW03-SD501	LW03-SD502	LW03-SD503	LW03-SD504A
Replicate	LW03-SD501-00-10C	LW03-SD502-00-10C	LW03-SD503-00-10C	LW03-SD504A-00-10C
Collection Date	09/02/10	09/02/10	09/02/10	08/31/10
Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	-	-	-
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	43	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	14	-	14	29
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	14	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	29	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	101	-	43	14
Capitella jonesi	-	-	-	-
Capitella sp.	-	14	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	-	29	-	-
Mediomastus ambiseta	72	-	29	57
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	14	57	14	14
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	-	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD501	LW03-SD502	LW03-SD503	LW03-SD504A
	Replicate	LW03-SD501-00-10C	LW03-SD502-00-10C	LW03-SD503-00-10C	LW03-SD504A-00-10C
	Collection Date	09/02/10	09/02/10	09/02/10	08/31/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD501 LW03-SD501-00-10C 09/02/10	LW03-SD502 LW03-SD502-00-10C 09/02/10	LW03-SD503 LW03-SD503-00-10C 09/02/10	LW03-SD504A LW03-SD504A-00-10C 08/31/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		14	29	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		14	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	14	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	14	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	14	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		115	72	-	-
Crepidula plana		29	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	14	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	14	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	14	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD501 LW03-SD501-00-10C 09/02/10	LW03-SD502 LW03-SD502-00-10C 09/02/10	LW03-SD503 LW03-SD503-00-10C 09/02/10	LW03-SD504A LW03-SD504A-00-10C 08/31/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		14	-	14	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		14	29	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		29	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		86	72	29	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		14	43	43	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD501 LW03-SD501-00-10C 09/02/10	LW03-SD502 LW03-SD502-00-10C 09/02/10	LW03-SD503 LW03-SD503-00-10C 09/02/10	LW03-SD504A LW03-SD504A-00-10C 08/31/10
Phoronida (LPIL)		101	86	43	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		862	761	330	187
Total Taxa		22	23	13	8

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	14	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	29	29
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	43
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	14	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	14	14
Family: Hesionidae					
Gyptis crypta		-	-	29	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	14	-
Family: Nereididae					

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Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	14	14
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	14
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	14	57	14
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	72
Cirratulidae (LPIL)		-	-	101	-
Tharyx sp.		-	-	43	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	14	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	43	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD504 / LW03-SD504-00-10C / 08/30/10	LW03-SD505 / LW03-SD505-00-10C / 08/31/10	LW03-SD506 / LW03-SD506-00-10C / 09/10/10	LW03-SD507 / LW03-SD507-00-10C / 09/02/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	57	14	-
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	14	-	29
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	43	29	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		14	-	-	-
Mediomastus ambiseta		-	14	72	43
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	86	14
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	14	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	14
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	14	-
Acteocina sp.		-	-	-	14
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	14	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	14
Family: Conidae					
Pyrgocythara plicosa		-	-	57	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	244	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	14
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

water & air RESEARCH, INC.
6821 SW Archer Road
Gainesville, FL 32608
www.waterandair.com

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	14	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	14	57	29
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		29	-	-	29
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	14	172	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	43
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD504 LW03-SD504-00-10C 08/30/10	LW03-SD505 LW03-SD505-00-10C 08/31/10	LW03-SD506 LW03-SD506-00-10C 09/10/10	LW03-SD507 LW03-SD507-00-10C 09/02/10
Phoronida (LPIL)		-	115	374	172
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	29
No Organisms Present		-	-	-	-
Total Organisms		43	302	1537	647
Total Taxa		2	9	24	19

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD508	LW03-SD509	LW03-SD510	LW03-SD511
Station	LW03-SD508	LW03-SD509	LW03-SD510	LW03-SD511
Replicate	LW03-SD508-00-10C	LW03-SD509-00-10C	LW03-SD510-00-10C	LW03-SD511-00-10C
Collection Date	09/10/10	09/09/10	08/31/10	08/31/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	-	-	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	14	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	14
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	14	-	-	29
Family: Hesionidae				
Gyptis crypta	-	-	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	14	-	-
Family: Nereididae				

Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD508	LW03-SD509	LW03-SD510	LW03-SD511
	Replicate	LW03-SD508-00-10C	LW03-SD509-00-10C	LW03-SD510-00-10C	LW03-SD511-00-10C
	Collection Date	09/10/10	09/09/10	08/31/10	08/31/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		14	29	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	14	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		14	-	14	72
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	14	14
Tharyx sp.		-	-	29	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	14
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	14	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	14	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD508	LW03-SD509	LW03-SD510	LW03-SD511
Station	LW03-SD508	LW03-SD509	LW03-SD510	LW03-SD511
Replicate	LW03-SD508-00-10C	LW03-SD509-00-10C	LW03-SD510-00-10C	LW03-SD511-00-10C
Collection Date	09/10/10	09/09/10	08/31/10	08/31/10
Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	-	115	144
Polydora cornuta	29	-	-	29
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	129	14	72	-
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	14	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	201	158	-	-
Capitella jonesi	14	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	14	-	-	-
Mediomastus ambiseta	-	-	29	-
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	14	-	-	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	-	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD508 LW03-SD508-00-10C 09/10/10	LW03-SD509 LW03-SD509-00-10C 09/09/10	LW03-SD510 LW03-SD510-00-10C 08/31/10	LW03-SD511 LW03-SD511-00-10C 08/31/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD508 LW03-SD508-00-10C 09/10/10	LW03-SD509 LW03-SD509-00-10C 09/09/10	LW03-SD510 LW03-SD510-00-10C 08/31/10	LW03-SD511 LW03-SD511-00-10C 08/31/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	57	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	101
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	14
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	14	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	43	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	29
Class: Bivalvia					

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD508 / LW03-SD508-00-10C / 09/10/10	LW03-SD509 / LW03-SD509-00-10C / 09/09/10	LW03-SD510 / LW03-SD510-00-10C / 08/31/10	LW03-SD511 / LW03-SD511-00-10C / 08/31/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	14	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	14	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	14	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		29	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	29
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		14	862	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		29	14	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	14	29	72
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	14	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD508 LW03-SD508-00-10C 09/10/10	LW03-SD509 LW03-SD509-00-10C 09/09/10	LW03-SD510 LW03-SD510-00-10C 08/31/10	LW03-SD511 LW03-SD511-00-10C 08/31/10
Phoronida (LPIL)		43	-	57	287
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	14	-	-
No Organisms Present		-	-	-	-
Total Organisms		560	1336	388	848
Total Taxa		13	18	10	13

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD512 LW03-SD512-00-10C 09/02/10	LW03-SD513 LW03-SD513-00-10C 09/10/10	LW03-SD514 LW03-SD514-00-10C 09/10/10	LW03-SD515 LW03-SD515-00-10C 09/09/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	29
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		14	-	-	43
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	14	14
Family: Nereididae					

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD512 LW03-SD512-00-10C 09/02/10	LW03-SD513 LW03-SD513-00-10C 09/10/10	LW03-SD514 LW03-SD514-00-10C 09/10/10	LW03-SD515 LW03-SD515-00-10C 09/09/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	14	-	-
Nereididae (LPIL)		14	-	-	-
Platynereis dumerilii		-	-	-	14
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	29	14
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	14
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		14	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	14	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	14

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD512	LW03-SD513	LW03-SD514	LW03-SD515
	Replicate	LW03-SD512-00-10C	LW03-SD513-00-10C	LW03-SD514-00-10C	LW03-SD515-00-10C
	Collection Date	09/02/10	09/10/10	09/10/10	09/09/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		57	-	-	29
Polydora cornuta		-	14	-	14
Pseudopolydora sp.		14	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		14	-	57	72
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	43	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	216	72	29
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	14

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD512 LW03-SD512-00-10C 09/02/10	LW03-SD513 LW03-SD513-00-10C 09/10/10	LW03-SD514 LW03-SD514-00-10C 09/10/10	LW03-SD515 LW03-SD515-00-10C 09/09/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD512	LW03-SD513	LW03-SD514	LW03-SD515
	Replicate	LW03-SD512-00-10C	LW03-SD513-00-10C	LW03-SD514-00-10C	LW03-SD515-00-10C
	Collection Date	09/02/10	09/10/10	09/10/10	09/09/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD512 LW03-SD512-00-10C 09/02/10	LW03-SD513 LW03-SD513-00-10C 09/10/10	LW03-SD514 LW03-SD514-00-10C 09/10/10	LW03-SD515 LW03-SD515-00-10C 09/09/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	14
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD512 LW03-SD512-00-10C 09/02/10	LW03-SD513 LW03-SD513-00-10C 09/10/10	LW03-SD514 LW03-SD514-00-10C 09/10/10	LW03-SD515 LW03-SD515-00-10C 09/09/10
Phoronida (LPIL)		-	14	-	57
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		129	302	187	374
Total Taxa		6	5	5	14

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD516 LW03-SD516-00-10C 09/09/10	LW03-SD517 LW03-SD517-00-10C 08/31/10	LW03-SD518 LW03-SD518-00-10C 08/31/10	LW03-SD519 LW03-SD519-00-10C 09/02/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	14	14	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		72	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD516	LW03-SD517	LW03-SD518	LW03-SD519
	Replicate	LW03-SD516-00-10C	LW03-SD517-00-10C	LW03-SD518-00-10C	LW03-SD519-00-10C
	Collection Date	09/09/10	08/31/10	08/31/10	09/02/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		14	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	14
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	29
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD516 LW03-SD516-00-10C 09/09/10	LW03-SD517 LW03-SD517-00-10C 08/31/10	LW03-SD518 LW03-SD518-00-10C 08/31/10	LW03-SD519 LW03-SD519-00-10C 09/02/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	-	-	43
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	29
Scolelepis texana		14	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		14	-	-	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		29	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		14	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		14	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	14	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD516 LW03-SD516-00-10C 09/09/10	LW03-SD517 LW03-SD517-00-10C 08/31/10	LW03-SD518 LW03-SD518-00-10C 08/31/10	LW03-SD519 LW03-SD519-00-10C 09/02/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		14	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	29	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD516 LW03-SD516-00-10C 09/09/10	LW03-SD517 LW03-SD517-00-10C 08/31/10	LW03-SD518 LW03-SD518-00-10C 08/31/10	LW03-SD519 LW03-SD519-00-10C 09/02/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		14	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		14	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD516	LW03-SD517	LW03-SD518	LW03-SD519
Station	LW03-SD516	LW03-SD517	LW03-SD518	LW03-SD519
Replicate	LW03-SD516-00-10C	LW03-SD517-00-10C	LW03-SD518-00-10C	LW03-SD519-00-10C
Collection Date	09/09/10	08/31/10	08/31/10	09/02/10
Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	-	-	-	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	14	-	-	-
Family: Veneridae				
Gemma gemma	244	14	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	29	-	-	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD516 LW03-SD516-00-10C 09/09/10	LW03-SD517 LW03-SD517-00-10C 08/31/10	LW03-SD518 LW03-SD518-00-10C 08/31/10	LW03-SD519 LW03-SD519-00-10C 09/02/10
Phoronida (LPIL)		57	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		560	29	57	115
Total Taxa		14	2	3	4

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD520 / LW03-SD520-00-10C / 09/10/10	LW03-SD521 / LW03-SD521-00-10C / 09/12/10	LW03-SD522 / LW03-SD522-00-10C / 09/09/10	LW03-SD523 / LW03-SD523-00-10C / 09/09/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	14	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	14	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		43	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	14	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	43	57
Family: Hesionidae					
Gyptis crypta		57	-	-	14
Hesionidae (LPIL)		57	14	-	-
Podarke obscura		187	-	-	29
Family: Nereididae					

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD520	LW03-SD521	LW03-SD522	LW03-SD523
	Replicate	LW03-SD520-00-10C	LW03-SD521-00-10C	LW03-SD522-00-10C	LW03-SD523-00-10C
	Collection Date	09/10/10	09/12/10	09/09/10	09/09/10
Laeonereis culveri		-	-	-	29
Neanthes succinea		14	14	-	14
Nereididae (LPIL)		-	-	-	101
Platynereis dumerilii		-	-	-	14
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		43	29	14	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	14
Cirratulidae (LPIL)		-	14	14	29
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	14	29
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	14	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	29	-	14
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	43
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		29	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD520 / LW03-SD520-00-10C / 09/10/10	LW03-SD521 / LW03-SD521-00-10C / 09/12/10	LW03-SD522 / LW03-SD522-00-10C / 09/09/10	LW03-SD523 / LW03-SD523-00-10C / 09/09/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	29	29	29
Polydora cornuta		57	29	-	29
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		14	-	-	14
Streblospio benedicti		201	57	201	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		72	29	-	-
Terebellidae (LPIL)		-	-	29	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		101	216	14	675
Capitella jonesi		29	14	29	43
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	14
Mediomastus ambiseta		101	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		43	-	14	72
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	14	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	14
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		359	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	14

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD520 LW03-SD520-00-10C 09/10/10	LW03-SD521 LW03-SD521-00-10C 09/12/10	LW03-SD522 LW03-SD522-00-10C 09/09/10	LW03-SD523 LW03-SD523-00-10C 09/09/10
Family: Corophiidae					
Monocorophium acherusicum		29	-	-	-
Monocorophium insidiosum		14	-	-	-
Monocorophium sp.		187	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	14	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	14
Family: Panopeidae					
Panopeidae (LPIL)		14	-	-	14
Panopeus herbstii		-	-	-	14
Rhithropanopeus harrisii		-	-	-	29
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	14
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD520 LW03-SD520-00-10C 09/10/10	LW03-SD521 LW03-SD521-00-10C 09/12/10	LW03-SD522 LW03-SD522-00-10C 09/09/10	LW03-SD523 LW03-SD523-00-10C 09/09/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	43
Family: Balanomorpha					
Balanomorpha (LPIL)		-	14	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	14	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	57
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD520 LW03-SD520-00-10C 09/10/10	LW03-SD521 LW03-SD521-00-10C 09/12/10	LW03-SD522 LW03-SD522-00-10C 09/09/10	LW03-SD523 LW03-SD523-00-10C 09/09/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	14
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	14
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	43
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	29	216
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	14	14	57
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	14	29	29
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD520 LW03-SD520-00-10C 09/10/10	LW03-SD521 LW03-SD521-00-10C 09/12/10	LW03-SD522 LW03-SD522-00-10C 09/09/10	LW03-SD523 LW03-SD523-00-10C 09/09/10
Phoronida (LPIL)		-	-	244	129
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		1652	575	761	1983
Total Taxa		20	18	17	35

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD525	LW03-SD526	LW03-SD527	LW03-SD528
Station	LW03-SD525	LW03-SD526	LW03-SD527	LW03-SD528
Replicate	LW03-SD525-00-10C	LW03-SD526-00-10C	LW03-SD527-00-10C	LW03-SD528-00-10C
Collection Date	09/02/10	09/10/10	09/12/10	09/09/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	14	14	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	-	532	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	14	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	14
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	14	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	-	-	-	-
Family: Hesionidae				
Gyptis crypta	-	-	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	-	43	-
Family: Nereididae				

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD525	LW03-SD526	LW03-SD527	LW03-SD528
	Replicate	LW03-SD525-00-10C	LW03-SD526-00-10C	LW03-SD527-00-10C	LW03-SD528-00-10C
	Collection Date	09/02/10	09/10/10	09/12/10	09/09/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	14	29
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	115	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	29	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	29	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD525 LW03-SD525-00-10C 09/02/10	LW03-SD526 LW03-SD526-00-10C 09/10/10	LW03-SD527 LW03-SD527-00-10C 09/12/10	LW03-SD528 LW03-SD528-00-10C 09/09/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	-	-	43
Polydora cornuta		-	-	57	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	43	-	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	129	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

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Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD525 LW03-SD525-00-10C 09/02/10	LW03-SD526 LW03-SD526-00-10C 09/10/10	LW03-SD527 LW03-SD527-00-10C 09/12/10	LW03-SD528 LW03-SD528-00-10C 09/09/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD525 / LW03-SD525-00-10C / 09/02/10	LW03-SD526 / LW03-SD526-00-10C / 09/10/10	LW03-SD527 / LW03-SD527-00-10C / 09/12/10	LW03-SD528 / LW03-SD528-00-10C / 09/09/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	14	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD525	LW03-SD526	LW03-SD527	LW03-SD528
	Replicate	LW03-SD525-00-10C	LW03-SD526-00-10C	LW03-SD527-00-10C	LW03-SD528-00-10C
	Collection Date	09/02/10	09/10/10	09/12/10	09/09/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
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Taxonomic Classification	Station Replicate Collection Date	LW03-SD525 LW03-SD525-00-10C 09/02/10	LW03-SD526 LW03-SD526-00-10C 09/10/10	LW03-SD527 LW03-SD527-00-10C 09/12/10	LW03-SD528 LW03-SD528-00-10C 09/09/10
Phoronida (LPIL)		-	-	-	14
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		✓	-	-	-
Total Organisms		0	57	1006	101
Total Taxa		N/A	2	12	4

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD529 LW03-SD529-00-10C 09/09/10	LW03-SD530 LW03-SD530-00-10C 09/02/10	LW03-SD533 LW03-SD533-00-10C 09/01/10	LW03-SD534-01 LW03-SD534-01-10C 09/01/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		14	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		101	-	-	-
Actiniaria sp. A		14	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		43	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		72	-	-	-
Family: Nereididae					

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Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		57	-	-	-
Tharyx sp.		57	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		43	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		29	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

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	Replicate	LW03-SD529-00-10C	LW03-SD530-00-10C	LW03-SD533-00-10C	LW03-SD534-01-10C
	Collection Date	09/09/10	09/02/10	09/01/10	09/01/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	-	43	-
Polydora cornuta		129	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		43	-	57	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		43	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		29	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		29	-	-	-
Heteromastus filiformis		14	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		129	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		14	-	-	-
Scoloplos rubra		29	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		14	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
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Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		14	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		29	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		72	-	-	-
Crepidula plana		29	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		14	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		115	-	-	-
Family: Veneridae					
Gemma gemma		445	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		43	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		517	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		72	-	14	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Macroinvertebrate Results
Data Per Square Meter (Unpooled)

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD529 LW03-SD529-00-10C 09/09/10	LW03-SD530 LW03-SD530-00-10C 09/02/10	LW03-SD533 LW03-SD533-00-10C 09/01/10	LW03-SD534-01 LW03-SD534-01-10C 09/01/10
Phoronida (LPIL)		158	-	29	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	✓	-	✓
Total Organisms		2414	14	144	14
Total Taxa		30	N/A	4	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD535 LW03-SD535-00-10C 09/01/10	LW03-SD537 LW03-SD537-00-10C 09/01/10	LW03-SD538 LW03-SD538-00-10C 09/01/10	LW03-SD539 LW03-SD539-00-10C 09/01/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		14	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		29	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		14	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		273	-	-	-
Family: Hesionidae					
Gyptis crypta		115	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		144	-	-	-
Family: Nereididae					

Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD535 LW03-SD535-00-10C 09/01/10	LW03-SD537 LW03-SD537-00-10C 09/01/10	LW03-SD538 LW03-SD538-00-10C 09/01/10	LW03-SD539 LW03-SD539-00-10C 09/01/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		14	-	-	-
Phyllodocidae (LPIL)		14	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		14	-	-	-
Tharyx sp.		14	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		72	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		72	-	-	-
Family: Serpulidae					
Hydroides sp.		14	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD535	LW03-SD537	LW03-SD538	LW03-SD539
Station	LW03-SD535	LW03-SD537	LW03-SD538	LW03-SD539
Replicate	LW03-SD535-00-10C	LW03-SD537-00-10C	LW03-SD538-00-10C	LW03-SD539-00-10C
Collection Date	09/01/10	09/01/10	09/01/10	09/01/10
Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	-	-	-
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	14	14	-	-
Family: Terebellidae				
Loimia medusa	57	-	-	-
Loimia sp.	-	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	14	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	-	-	-	-
Capitella jonesi	14	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	-	-	-	-
Mediomastus ambiseta	43	-	-	-
Mediomastus californiensis	14	-	-	-
Mediomastus sp.	57	-	-	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	-	-
Tubificoides sp.	14	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD535 LW03-SD535-00-10C 09/01/10	LW03-SD537 LW03-SD537-00-10C 09/01/10	LW03-SD538 LW03-SD538-00-10C 09/01/10	LW03-SD539 LW03-SD539-00-10C 09/01/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		14	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD535	LW03-SD537	LW03-SD538	LW03-SD539
Station	LW03-SD535	LW03-SD537	LW03-SD538	LW03-SD539
Replicate	LW03-SD535-00-10C	LW03-SD537-00-10C	LW03-SD538-00-10C	LW03-SD539-00-10C
Collection Date	09/01/10	09/01/10	09/01/10	09/01/10
Squilla empusa	-	-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	-	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	14	-	-	-
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	-	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	-	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	57	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	-
Class: Bivalvia				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD535 LW03-SD535-00-10C 09/01/10	LW03-SD537 LW03-SD537-00-10C 09/01/10	LW03-SD538 LW03-SD538-00-10C 09/01/10	LW03-SD539 LW03-SD539-00-10C 09/01/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		14	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		43	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		14	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		43	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		29	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		172	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD535 LW03-SD535-00-10C 09/01/10	LW03-SD537 LW03-SD537-00-10C 09/01/10	LW03-SD538 LW03-SD538-00-10C 09/01/10	LW03-SD539 LW03-SD539-00-10C 09/01/10
Phoronida (LPIL)		158	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	✓	✓
Total Organisms		1595	14	14	14
Total Taxa		31	1	N/A	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD540	LW03-SD541	LW03-SD543	LW03-SD544
	Replicate	LW03-SD540-00-10C	LW03-SD541-00-10C	LW03-SD543-00-10C	LW03-SD544-00-10C
	Collection Date	09/01/10	09/07/10	09/01/10	09/01/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD540 LW03-SD540-00-10C 09/01/10	LW03-SD541 LW03-SD541-00-10C 09/07/10	LW03-SD543 LW03-SD543-00-10C 09/01/10	LW03-SD544 LW03-SD544-00-10C 09/01/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	29	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	14	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD540	LW03-SD541	LW03-SD543	LW03-SD544
	Replicate	LW03-SD540-00-10C	LW03-SD541-00-10C	LW03-SD543-00-10C	LW03-SD544-00-10C
	Collection Date	09/01/10	09/07/10	09/01/10	09/01/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	14	-	-
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	-	-	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD540 LW03-SD540-00-10C 09/01/10	LW03-SD541 LW03-SD541-00-10C 09/07/10	LW03-SD543 LW03-SD543-00-10C 09/01/10	LW03-SD544 LW03-SD544-00-10C 09/01/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Project: Navy Clean III
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Taxonomic Classification	Station Replicate Collection Date	LW03-SD540 LW03-SD540-00-10C 09/01/10	LW03-SD541 LW03-SD541-00-10C 09/07/10	LW03-SD543 LW03-SD543-00-10C 09/01/10	LW03-SD544 LW03-SD544-00-10C 09/01/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	14	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD540 LW03-SD540-00-10C 09/01/10	LW03-SD541 LW03-SD541-00-10C 09/07/10	LW03-SD543 LW03-SD543-00-10C 09/01/10	LW03-SD544 LW03-SD544-00-10C 09/01/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	14	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	14	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Sample Group: Navy Clean Aug-Sept 2010

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD540 LW03-SD540-00-10C 09/01/10	LW03-SD541 LW03-SD541-00-10C 09/07/10	LW03-SD543 LW03-SD543-00-10C 09/01/10	LW03-SD544 LW03-SD544-00-10C 09/01/10
Phoronida (LPIL)		-	29	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		✓	-	✓	✓
Total Organisms		14	129	14	14
Total Taxa		N/A	7	N/A	N/A

Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548
Station	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548
Replicate	LW03-SD545-00-10C	LW03-SD546-00-10C	LW03-SD547-00-10C	LW03-SD548-00-10C
Collection Date	09/01/10	09/01/10	09/07/10	09/09/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	-	-	14
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	-	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	-
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	-	-	29	-
Family: Hesionidae				
Gyptis crypta	-	-	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	-	-	-
Family: Nereididae				

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD545 LW03-SD545-00-10C 09/01/10	LW03-SD546 LW03-SD546-00-10C 09/01/10	LW03-SD547 LW03-SD547-00-10C 09/07/10	LW03-SD548 LW03-SD548-00-10C 09/09/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	14	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

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Project: Navy Clean III
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Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD545 LW03-SD545-00-10C 09/01/10	LW03-SD546 LW03-SD546-00-10C 09/01/10	LW03-SD547 LW03-SD547-00-10C 09/07/10	LW03-SD548 LW03-SD548-00-10C 09/09/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	-	-	-
Polydora cornuta		-	-	14	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	-	14	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

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Sample Method: Petite Ponar (x3)
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Taxonomic Classification	Station Replicate Collection Date	LW03-SD545 LW03-SD545-00-10C 09/01/10	LW03-SD546 LW03-SD546-00-10C 09/01/10	LW03-SD547 LW03-SD547-00-10C 09/07/10	LW03-SD548 LW03-SD548-00-10C 09/09/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Taxonomic Classification	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548
Station	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548
Replicate	LW03-SD545-00-10C	LW03-SD546-00-10C	LW03-SD547-00-10C	LW03-SD548-00-10C
Collection Date	09/01/10	09/01/10	09/07/10	09/09/10
Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	-	-	-	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	-	-	-	-
Family: Veneridae				
Gemma gemma	-	-	29	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	-	-	187	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD545 LW03-SD545-00-10C 09/01/10	LW03-SD546 LW03-SD546-00-10C 09/01/10	LW03-SD547 LW03-SD547-00-10C 09/07/10	LW03-SD548 LW03-SD548-00-10C 09/09/10
Phoronida (LPIL)		-	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		✓	✓	-	-
Total Organisms		14	14	287	14
Total Taxa		N/A	N/A	6	1

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD549 LW03-SD549-00-10C 09/09/10	LW03-SD550-01 LW03-SD550-01-10C 09/08/10	LW03-SD551 LW03-SD551-00-10C 09/08/10	LW03-SD552 LW03-SD552-00-10C 09/07/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD549 LW03-SD549-00-10C 09/09/10	LW03-SD550-01 LW03-SD550-01-10C 09/08/10	LW03-SD551 LW03-SD551-00-10C 09/08/10	LW03-SD552 LW03-SD552-00-10C 09/07/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD549 / LW03-SD549-00-10C / 09/09/10	LW03-SD550-01 / LW03-SD550-01-10C / 09/08/10	LW03-SD551 / LW03-SD551-00-10C / 09/08/10	LW03-SD552 / LW03-SD552-00-10C / 09/07/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	-	14	-
Polydora cornuta		-	-	14	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	-	14	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD549 / LW03-SD549-00-10C / 09/09/10	LW03-SD550-01 / LW03-SD550-01-10C / 09/08/10	LW03-SD551 / LW03-SD551-00-10C / 09/08/10	LW03-SD552 / LW03-SD552-00-10C / 09/07/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		29	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD549 LW03-SD549-00-10C 09/09/10	LW03-SD550-01 LW03-SD550-01-10C 09/08/10	LW03-SD551 LW03-SD551-00-10C 09/08/10	LW03-SD552 LW03-SD552-00-10C 09/07/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD549 LW03-SD549-00-10C 09/09/10	LW03-SD550-01 LW03-SD550-01-10C 09/08/10	LW03-SD551 LW03-SD551-00-10C 09/08/10	LW03-SD552 LW03-SD552-00-10C 09/07/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD549	LW03-SD550-01	LW03-SD551	LW03-SD552
	Replicate	LW03-SD549-00-10C	LW03-SD550-01-10C	LW03-SD551-00-10C	LW03-SD552-00-10C
	Collection Date	09/09/10	09/08/10	09/08/10	09/07/10
Phoronida (LPIL)		-	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	✓	-	✓
Total Organisms		29	14	43	14
Total Taxa		1	N/A	3	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD553 LW03-SD553-00-10C 09/07/10	LW03-SD555 LW03-SD555-00-10C 09/09/10	LW03-SD556 LW03-SD556-00-10C 09/08/10	LW03-SD557 LW03-SD557-00-10C 09/08/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		14	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		14	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		14	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

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Taxonomic Classification	Station	LW03-SD553	LW03-SD555	LW03-SD556	LW03-SD557
	Replicate	LW03-SD553-00-10C	LW03-SD555-00-10C	LW03-SD556-00-10C	LW03-SD557-00-10C
	Collection Date	09/07/10	09/09/10	09/08/10	09/08/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		14	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
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Minuspio sp.	-	-	-	-
Paraprionospio pinnata	14	14	-	-
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	-	172	43	-
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	14	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	14	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	14	-	-	-
Capitella jonesi	-	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	14	-	-	-
Mediomastus ambiseta	-	-	-	-
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	-	-	-	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	-	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD553 LW03-SD553-00-10C 09/07/10	LW03-SD555 LW03-SD555-00-10C 09/09/10	LW03-SD556 LW03-SD556-00-10C 09/08/10	LW03-SD557 LW03-SD557-00-10C 09/08/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	14
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	29	14
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	14	-
Neomysis americana		-	-	-	14
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD553	LW03-SD555	LW03-SD556	LW03-SD557
Station	LW03-SD553	LW03-SD555	LW03-SD556	LW03-SD557
Replicate	LW03-SD553-00-10C	LW03-SD555-00-10C	LW03-SD556-00-10C	LW03-SD557-00-10C
Collection Date	09/07/10	09/09/10	09/08/10	09/08/10
Squilla empusa	-	-	14	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	14	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	14	-	-	-
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	-	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	14	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	-	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	-
Class: Bivalvia				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD553 LW03-SD553-00-10C 09/07/10	LW03-SD555 LW03-SD555-00-10C 09/09/10	LW03-SD556 LW03-SD556-00-10C 09/08/10	LW03-SD557 LW03-SD557-00-10C 09/08/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		14	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		29	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		14	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		14	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		57	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD553 LW03-SD553-00-10C 09/07/10	LW03-SD555 LW03-SD555-00-10C 09/09/10	LW03-SD556 LW03-SD556-00-10C 09/08/10	LW03-SD557 LW03-SD557-00-10C 09/08/10
Phoronida (LPIL)		14	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		316	187	101	43
Total Taxa		18	2	4	3

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-01 LW03-SD558-01-10C 09/08/10	LW03-SD559 LW03-SD559-00-10C 09/07/10	LW03-SD562 LW03-SD562-00-10C 09/08/10	LW03-SD563 LW03-SD563-00-10C 09/08/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	14	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	-	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-01 LW03-SD558-01-10C 09/08/10	LW03-SD559 LW03-SD559-00-10C 09/07/10	LW03-SD562 LW03-SD562-00-10C 09/08/10	LW03-SD563 LW03-SD563-00-10C 09/08/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		14	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD558-01 / LW03-SD558-01-10C / 09/08/10	LW03-SD559 / LW03-SD559-00-10C / 09/07/10	LW03-SD562 / LW03-SD562-00-10C / 09/08/10	LW03-SD563 / LW03-SD563-00-10C / 09/08/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	14	-	-
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		14	14	-	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-01 LW03-SD558-01-10C 09/08/10	LW03-SD559 LW03-SD559-00-10C 09/07/10	LW03-SD562 LW03-SD562-00-10C 09/08/10	LW03-SD563 LW03-SD563-00-10C 09/08/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	14	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	14	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		14	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-01 LW03-SD558-01-10C 09/08/10	LW03-SD559 LW03-SD559-00-10C 09/07/10	LW03-SD562 LW03-SD562-00-10C 09/08/10	LW03-SD563 LW03-SD563-00-10C 09/08/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD558-01	LW03-SD559	LW03-SD562	LW03-SD563
Replicate	LW03-SD558-01-10C	LW03-SD559-00-10C	LW03-SD562-00-10C	LW03-SD563-00-10C
Collection Date	09/08/10	09/07/10	09/08/10	09/08/10
Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	-	-	-	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	-	-	-	-
Family: Veneridae				
Gemma gemma	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

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Macroinvertebrate Results
Data Per Square Meter (Unpooled)

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-01 LW03-SD558-01-10C 09/08/10	LW03-SD559 LW03-SD559-00-10C 09/07/10	LW03-SD562 LW03-SD562-00-10C 09/08/10	LW03-SD563 LW03-SD563-00-10C 09/08/10
Phoronida (LPIL)		-	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	✓
Total Organisms		43	57	14	14
Total Taxa		3	4	1	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	-	-	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	-	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	-
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	-	-	-	-
Family: Hesionidae				
Gyptis crypta	-	-	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	-	-	-
Family: Nereididae				

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
	Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
	Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	-	-	-
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	-	-	-	-
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	-	-	-	-
Capitella jonesi	-	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	-	-	-	-
Mediomastus ambiseta	-	-	-	-
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	-	-	-	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	-	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
	Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
	Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		14	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		14	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Squilla empusa	-	-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	-	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	-	-	-	-
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	-	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	-	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	-	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	-
Class: Bivalvia				

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
	Replicate	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
	Collection Date	09/08/10	09/08/10	09/08/10	08/31/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD564 LW03-SD564-00-10C 09/08/10	LW03-SD567 LW03-SD567-00-10C 09/08/10	LW03-SD571 LW03-SD571-00-10C 09/08/10	LW03-SD574 LW03-SD574-00-10C 08/31/10
Phoronida (LPIL)		-	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	✓	✓	✓
Total Organisms		29	14	14	14
Total Taxa		2	N/A	N/A	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification / Station / Replicate / Collection Date	LW07-B5-SD401 LW07-B5-SD401-00-10C 09/12/10	LW07-B7-SD401 LW07-B7-SD401-00-10C 09/12/10	LW07-D5-SD401 LW07-D5-SD401-00-10C 09/11/10	LW07-F3-SD401 LW07-F3-SD401-00-10C 09/11/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	-	14	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	14	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	57	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	14	14	-	14
Nemertea sp. A (LPIL)	29	-	14	-
Nemertea sp. B (LPIL)	14	-	-	29
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	14
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	216	-	-
Dorvilleidae (LPIL)	-	29	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	14	-	14
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	14	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	43	43	14	14
Family: Hesionidae				
Gyptis crypta	-	43	-	14
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	417	-	-
Family: Nereididae				

Macroinvertebrate Results
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Report Date: 11/08/2010

Taxonomic Classification / Station / Replicate / Collection Date	LW07-B5-SD401 LW07-B5-SD401-00-10C 09/12/10	LW07-B7-SD401 LW07-B7-SD401-00-10C 09/12/10	LW07-D5-SD401 LW07-D5-SD401-00-10C 09/11/10	LW07-F3-SD401 LW07-F3-SD401-00-10C 09/11/10
Laeonereis culveri	-	-	-	-
Neanthes succinea	-	29	-	-
Nereididae (LPIL)	-	29	-	-
Platynereis dumerilii	-	129	-	14
Family: Oenonidae				
Drilonereis longa	-	-	-	-
Family: Onuphidae				
Diopatra cuprea	-	-	-	-
Family: Phyllodocidae				
Eteone sp.	-	-	-	-
Eumida sanguinea	-	14	-	-
Phyllodoce mucosa	-	-	-	-
Phyllodocidae (LPIL)	-	-	-	-
Family: Polynoidae				
Lepidonotus sp.	-	14	-	-
Family: Syllidae				
Grubeosyllis clavata	-	57	-	-
Syllidae (LPIL)	-	-	-	-
Order: Canalipalpata				
Family: Ampharetidae				
Ampharetidae (LPIL)	-	-	-	-
Family: Chaetopteridae				
Spiochaetopterus costarum	14	29	-	14
Family: Cirratulidae				
Aphelochaeta sp.	-	-	-	-
Cirratulidae (LPIL)	101	57	-	129
Tharyx sp.	43	29	43	129
Family: Pectinariidae				
Pectinaria gouldii	-	29	-	-
Pectinaria sp.	-	-	-	-
Family: Sabellidae				
Demonax microphthalmus	-	43	-	-
Sabellaria vulgaris	-	14	-	-
Sabellidae (LPIL)	-	29	-	-
Sabellinae (LPIL)	-	-	-	-
Family: Serpulidae				
Hydroides dianthus	-	517	-	-
Family: Serpulidae				
Hydroides diathus	-	-	-	-
Family: Serpulidae				
Hydroides sp.	-	144	-	-
Serpulidae (LPIL)	-	-	-	-
Family: Spionidae				
Apoprionospio pygmaea	-	-	-	-
Dipolydora cauleri	-	14	-	-
Dipolydora socialis	-	14	-	-
Marenzelleria viridis	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification / Station / Replicate / Collection Date	LW07-B5-SD401 LW07-B5-SD401-00-10C 09/12/10	LW07-B7-SD401 LW07-B7-SD401-00-10C 09/12/10	LW07-D5-SD401 LW07-D5-SD401-00-10C 09/11/10	LW07-F3-SD401 LW07-F3-SD401-00-10C 09/11/10
Minuspio sp.	-	14	-	-
Paraprionospio pinnata	201	158	86	57
Polydora cornuta	29	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	-	14	-	72
Family: Terebellidae				
Loimia medusa	43	14	-	43
Loimia sp.	14	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	14	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	-	-	-	-
Capitella jonesi	-	14	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	14	-	-	-
Mediomastus ambiseta	-	259	-	29
Mediomastus californiensis	-	158	-	-
Mediomastus sp.	14	675	14	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	14	14	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	29	14	14	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	86	-	14
Tubificoides sp.	-	86	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification / Station Replicate Collection Date	LW07-B5-SD401 LW07-B5-SD401-00-10C 09/12/10	LW07-B7-SD401 LW07-B7-SD401-00-10C 09/12/10	LW07-D5-SD401 LW07-D5-SD401-00-10C 09/11/10	LW07-F3-SD401 LW07-F3-SD401-00-10C 09/11/10
Family: Corophiidae				
Monocorophium acherusicum	-	-	-	-
Monocorophium insidiosum	-	-	-	-
Monocorophium sp.	-	-	-	-
Family: Liljeborgiidae				
Listriella clymenellae	-	-	-	-
Order: Cumacea				
Family: Bodotriidae				
Cyclaspis varians	-	-	-	-
Family: Leuconidae				
Leucon americanus	-	-	-	14
Family: Unspecified				
Cumacea (LPIL)	-	-	-	-
Order: Decapoda				
Family: Alpheidae				
Alpheus sp.	-	-	-	-
Family: Palaemonidae				
Palaemonetes sp.	-	-	-	-
Family: Panopeidae				
Panopeidae (LPIL)	-	29	-	-
Panopeus herbstii	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-
Family: Pinnotheridae				
Pinnixa sp.	-	-	-	-
Family: Portunidae				
Callinectes sp.	-	-	-	-
Portunidae (LPIL)	-	-	-	-
Family: Unspecified				
Decapoda (LPIL)	-	-	-	-
Decapoda *(zoea)*	-	-	-	-
Decapoda *zoea (larva)*	-	-	-	-
Order: Isopoda				
Family: Idoteidae				
Edotia triloba	-	-	-	-
Order: Leptostraca				
Family: Unspecified				
Leptostraca (LPIL)	-	-	-	-
Order: Mysida				
Family: Mysidae				
Americamysis bigelowi	-	-	-	-
Americamysis sp.	-	-	-	-
Mysidae (LPIL)	-	-	-	-
Neomysis americana	-	-	-	-
Family: Unspecified				
Mysidacea (LPIL)	-	-	-	-
Order: Stomatopoda				
Family: Squillidae				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	14	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		302	101	-	287
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		14	-	14	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		43	259	-	-
Crepidula plana		14	14	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		29	29	-	-
Class: Bivalvia					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	43	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	201	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	14	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	-	-	-	43
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	14	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	-	-	-	-
Family: Veneridae				
Gemma gemma	-	-	-	14
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	72	172	-	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	43	14	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station Replicate Collection Date	LW07-B5-SD401 LW07-B5-SD401-00-10C 09/12/10	LW07-B7-SD401 LW07-B7-SD401-00-10C 09/12/10	LW07-D5-SD401 LW07-D5-SD401-00-10C 09/11/10	LW07-F3-SD401 LW07-F3-SD401-00-10C 09/11/10
Phoronida (LPIL)		359	115	-	72
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		1523	4555	230	1034
Total Taxa		25	50	9	20

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification / Station / Replicate / Collection Date	LW07-F5-SD401 LW07-F5-SD401-00-10C 09/11/10	LW07-H3-SD401 LW07-H3-SD401-00-10C 09/11/10	LW07-J4-SD401 LW07-J4-SD401-00-10C 09/11/10	LW07-K3-SD401 LW07-K3-SD401-00-10C 09/11/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	-	-	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	-	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	72	-	-	14
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	14	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	14	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	43	29	14	14
Family: Hesionidae				
Gyptis crypta	-	-	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	29	-	29	-
Family: Nereididae				

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Laeonereis culveri	-	-	-	-
Neanthes succinea	43	-	-	-
Nereididae (LPIL)	14	-	-	-
Platynereis dumerilii	-	-	-	-
Family: Oenonidae				
Drilonereis longa	-	-	-	-
Family: Onuphidae				
Diopatra cuprea	-	-	-	-
Family: Phyllodocidae				
Eteone sp.	-	-	-	-
Eumida sanguinea	-	-	-	-
Phyllodoce mucosa	-	-	-	-
Phyllodocidae (LPIL)	-	-	-	-
Family: Polynoidae				
Lepidonotus sp.	-	-	-	-
Family: Syllidae				
Grubeosyllis clavata	-	-	-	-
Syllidae (LPIL)	-	-	-	-
Order: Canalipalpata				
Family: Ampharetidae				
Ampharetidae (LPIL)	-	-	-	-
Family: Chaetopteridae				
Spiochaetopterus costarum	-	-	-	-
Family: Cirratulidae				
Aphelochaeta sp.	14	-	-	-
Cirratulidae (LPIL)	115	57	-	402
Tharyx sp.	57	-	29	72
Family: Pectinariidae				
Pectinaria gouldii	14	14	14	-
Pectinaria sp.	-	-	-	-
Family: Sabellidae				
Demonax microphthalmus	-	-	-	-
Sabellaria vulgaris	-	-	-	-
Sabellidae (LPIL)	-	-	-	-
Sabellinae (LPIL)	-	-	-	-
Family: Serpulidae				
Hydroides dianthus	14	-	-	-
Family: Serpulidae				
Hydroides diathus	-	-	-	-
Family: Serpulidae				
Hydroides sp.	-	-	-	-
Serpulidae (LPIL)	-	-	-	-
Family: Spionidae				
Apoprionospio pygmaea	14	-	-	-
Dipolydora cauleri	-	-	-	-
Dipolydora socialis	-	-	-	-
Marenzelleria viridis	-	-	-	-

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Data Per Square Meter (Unpooled)

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Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	101	259	86
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	129	201	316	187
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	-	-	-	-
Capitella jonesi	-	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	14	14	-	-
Mediomastus ambiseta	187	14	14	-
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	517	72	115	101
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	43	-	14	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	14	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	14	14	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	29	14	57	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

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Data Per Square Meter (Unpooled)

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Family: Corophiidae				
Monocorophium acherusicum	-	-	-	-
Monocorophium insidiosum	-	-	-	-
Monocorophium sp.	-	-	-	-
Family: Liljeborgiidae				
Listriella clymenellae	-	-	-	-
Order: Cumacea				
Family: Bodotriidae				
Cyclaspis varians	-	-	-	-
Family: Leuconidae				
Leucon americanus	-	14	-	14
Family: Unspecified				
Cumacea (LPIL)	-	-	-	-
Order: Decapoda				
Family: Alpheidae				
Alpheus sp.	-	-	-	-
Family: Palaemonidae				
Palaemonetes sp.	-	-	-	-
Family: Panopeidae				
Panopeidae (LPIL)	-	-	-	-
Panopeus herbstii	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-
Family: Pinnotheridae				
Pinnixa sp.	-	-	-	-
Family: Portunidae				
Callinectes sp.	-	-	-	-
Portunidae (LPIL)	-	-	-	-
Family: Unspecified				
Decapoda (LPIL)	-	-	-	-
Decapoda *(zoea)*	-	-	-	-
Decapoda *zoea (larva)*	-	-	-	-
Order: Isopoda				
Family: Idoteidae				
Edotia triloba	14	14	-	-
Order: Leptostraca				
Family: Unspecified				
Leptostraca (LPIL)	-	-	-	-
Order: Mysida				
Family: Mysidae				
Americamysis bigelowi	-	14	-	29
Americamysis sp.	-	-	-	-
Mysidae (LPIL)	-	-	-	-
Neomysis americana	-	-	-	-
Family: Unspecified				
Mysidacea (LPIL)	-	-	-	-
Order: Stomatopoda				
Family: Squillidae				

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Squilla empusa	-	-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	-	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	86	72	72	57
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	14	29	14	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	14	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	-	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	-	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	-
Class: Bivalvia				

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Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	14	29	-	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	14	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	-	-	-	-
Family: Veneridae				
Gemma gemma	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	29	-	14	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	-	14
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

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Sample Method: Petite Ponar (x3)
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Taxonomic Classification / Station / Replicate / Collection Date	LW07-F5-SD401 LW07-F5-SD401-00-10C 09/11/10	LW07-H3-SD401 LW07-H3-SD401-00-10C 09/11/10	LW07-J4-SD401 LW07-J4-SD401-00-10C 09/11/10	LW07-K3-SD401 LW07-K3-SD401-00-10C 09/11/10
Phoronida (LPIL)	172	29	43	72
Phylum: Echinodermata				
Class: Ophiuroidea				
Order: Unspecified				
Family: Unspecified				
Ophiuroidea (LPIL)	-	-	-	14
Phylum: Chordata				
Class: Cephalochordata				
Order: Amphioxiformes				
Family: Branchiostomatidae				
Branchiostoma sp.	-	-	-	-
No Organisms Present	-	-	-	-
Total Organisms	1739	747	1020	1078
Total Taxa	27	18	15	13

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification / Station / Replicate / Collection Date	LW07-K4-SD401 LW07-K4-SD401-00-10C 09/11/10	LW07-K5-SD401 LW07-K5-SD401-00-10C 09/11/10	LW07-L2-SD401-01 LW07-L2-SD401-01-10C-01 09/11/10	LW07-H1-SD401-01 LW07-H1-SD401-00-10C-01 09/10/10
Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	-	14	-	14
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	-	-	-	-
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	-
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	-	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	14	14	-	-
Family: Hesionidae				
Gyptis crypta	-	29	-	-
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	-	-	-
Family: Nereididae				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Report Date: 11/08/2010

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Laeonereis culveri	-	-	-	-
Neanthes succinea	-	-	-	-
Nereididae (LPIL)	-	-	-	-
Platynereis dumerilii	-	-	-	-
Family: Oenonidae				
Drilonereis longa	-	-	-	-
Family: Onuphidae				
Diopatra cuprea	-	-	-	-
Family: Phyllodocidae				
Eteone sp.	-	-	-	-
Eumida sanguinea	-	-	-	-
Phyllodoce mucosa	-	-	-	-
Phyllodocidae (LPIL)	-	-	-	-
Family: Polynoidae				
Lepidonotus sp.	-	-	-	-
Family: Syllidae				
Grubeosyllis clavata	-	-	-	-
Syllidae (LPIL)	-	-	-	-
Order: Canalipalpata				
Family: Ampharetidae				
Ampharetidae (LPIL)	-	-	-	-
Family: Chaetopteridae				
Spiochaetopterus costarum	-	14	-	-
Family: Cirratulidae				
Aphelochaeta sp.	-	-	-	-
Cirratulidae (LPIL)	388	29	-	-
Tharyx sp.	201	-	14	-
Family: Pectinariidae				
Pectinaria gouldii	-	-	-	-
Pectinaria sp.	-	-	-	-
Family: Sabellidae				
Demonax microphthalmus	-	-	-	-
Sabellaria vulgaris	-	-	-	-
Sabellidae (LPIL)	-	-	-	-
Sabellinae (LPIL)	-	-	-	-
Family: Serpulidae				
Hydroides dianthus	-	-	-	-
Family: Serpulidae				
Hydroides diathus	-	-	-	-
Family: Serpulidae				
Hydroides sp.	-	-	-	-
Serpulidae (LPIL)	-	-	-	-
Family: Spionidae				
Apoprionospio pygmaea	-	-	-	-
Dipolydora cauleri	-	-	-	-
Dipolydora socialis	-	-	-	-
Marenzelleria viridis	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification / Station / Replicate / Collection Date	LW07-K4-SD401 LW07-K4-SD401-00-10C 09/11/10	LW07-K5-SD401 LW07-K5-SD401-00-10C 09/11/10	LW07-L2-SD401-01 LW07-L2-SD401-01-10C-01 09/11/10	LW07-H1-SD401-01 LW07-H1-SD401-00-10C-01 09/10/10
Minuspio sp.	-	-	-	-
Paraprionospio pinnata	57	158	57	-
Polydora cornuta	-	-	-	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	14	-	-	-
Streblospio benedicti	29	101	57	489
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	-	-	-	-
Capitella jonesi	-	-	-	-
Capitella sp.	-	-	-	14
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	-	-	-	-
Mediomastus ambiseta	14	57	-	29
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	-	43	129	-
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	-	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	29	29	14	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	-	-	14	-
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Sample Method: Petite Ponar (x3)
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Family: Corophiidae				
Monocorophium acherusicum	-	-	-	-
Monocorophium insidiosum	-	-	-	-
Monocorophium sp.	-	-	-	-
Family: Liljeborgiidae				
Listriella clymenellae	-	-	-	-
Order: Cumacea				
Family: Bodotriidae				
Cyclaspis varians	-	-	-	-
Family: Leuconidae				
Leucon americanus	-	14	-	-
Family: Unspecified				
Cumacea (LPIL)	-	-	-	-
Order: Decapoda				
Family: Alpheidae				
Alpheus sp.	-	-	-	-
Family: Palaemonidae				
Palaemonetes sp.	-	-	-	-
Family: Panopeidae				
Panopeidae (LPIL)	-	-	-	-
Panopeus herbstii	-	-	-	-
Rhithropanopeus harrisii	-	-	-	-
Family: Pinnotheridae				
Pinnixa sp.	-	-	-	-
Family: Portunidae				
Callinectes sp.	-	-	-	-
Portunidae (LPIL)	-	-	-	-
Family: Unspecified				
Decapoda (LPIL)	-	-	-	-
Decapoda *(zoea)*	-	-	-	-
Decapoda *zoea (larva)*	-	-	-	-
Order: Isopoda				
Family: Idoteidae				
Edotia triloba	-	-	-	-
Order: Leptostraca				
Family: Unspecified				
Leptostraca (LPIL)	-	-	-	-
Order: Mysida				
Family: Mysidae				
Americamysis bigelowi	-	14	-	-
Americamysis sp.	-	-	-	-
Mysidae (LPIL)	-	-	-	-
Neomysis americana	-	-	-	-
Family: Unspecified				
Mysidacea (LPIL)	-	-	-	-
Order: Stomatopoda				
Family: Squillidae				

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Squilla empusa	-	-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	-	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	14	29	86	29
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	-	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	-	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	-	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	-
Class: Bivalvia				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	14	14	14	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	14	-	-	-
Family: Veneridae				
Gemma gemma	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	14	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	-	-	14	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station Replicate Collection Date	LW07-K4-SD401 LW07-K4-SD401-00-10C 09/11/10	LW07-K5-SD401 LW07-K5-SD401-00-10C 09/11/10	LW07-L2-SD401-01 LW07-L2-SD401-01-10C-01 09/11/10	LW07-H1-SD401-01 LW07-H1-SD401-00-10C-01 09/10/10
Phoronida (LPIL)		43	-	14	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	-
Total Organisms		848	560	417	575
Total Taxa		13	14	10	5

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)	14	-	14	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)	-	-	14	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)	14	-	-	14
Actiniaria sp. A	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)	-	-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)	-	-	-	-
Nemertea sp. A (LPIL)	-	-	-	-
Nemertea sp. B (LPIL)	-	-	-	-
Nemertea sp. C (LPIL)	-	-	-	-
Nemertea sp. D (LPIL)	-	-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi	-	-	-	-
Dorvilleidae (LPIL)	-	-	-	-
Family: Eunicidae				
Marphysa sanguinea	-	-	-	-
Family: Glyceridae				
Glycera americana	-	-	-	-
Glycera dibranchiata	-	-	14	-
Glycera sp.	-	-	-	-
Ophioglycera sp.	-	-	-	-
Family: Goniadidae				
Glycinde solitaria	14	-	-	-
Family: Hesionidae				
Gyptis crypta	-	-	-	14
Hesionidae (LPIL)	-	-	-	-
Podarke obscura	-	-	-	-
Family: Nereididae				

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Laeonereis culveri	-	-	-	-
Neanthes succinea	-	-	-	-
Nereididae (LPIL)	-	-	-	-
Platynereis dumerilii	-	-	-	-
Family: Oenonidae				
Drilonereis longa	-	-	-	-
Family: Onuphidae				
Diopatra cuprea	-	-	-	-
Family: Phyllodocidae				
Eteone sp.	-	-	-	-
Eumida sanguinea	-	-	-	-
Phyllodoce mucosa	-	-	-	-
Phyllodocidae (LPIL)	-	-	-	-
Family: Polynoidae				
Lepidonotus sp.	-	-	-	-
Family: Syllidae				
Grubeosyllis clavata	-	-	-	-
Syllidae (LPIL)	-	-	-	-
Order: Canalipalpata				
Family: Ampharetidae				
Ampharetidae (LPIL)	-	-	-	-
Family: Chaetopteridae				
Spiochaetopterus costarum	-	-	14	-
Family: Cirratulidae				
Aphelochaeta sp.	-	-	-	-
Cirratulidae (LPIL)	-	-	-	14
Tharyx sp.	-	-	187	-
Family: Pectinariidae				
Pectinaria gouldii	-	-	14	-
Pectinaria sp.	-	-	-	-
Family: Sabellidae				
Demonax microphthalmus	-	-	-	-
Sabellaria vulgaris	-	-	-	-
Sabellidae (LPIL)	-	-	-	-
Sabellinae (LPIL)	-	-	-	-
Family: Serpulidae				
Hydroides dianthus	-	-	-	-
Family: Serpulidae				
Hydroides diathus	-	-	-	-
Family: Serpulidae				
Hydroides sp.	-	-	-	-
Serpulidae (LPIL)	-	-	-	-
Family: Spionidae				
Apoprionospio pygmaea	-	-	-	-
Dipolydora cauleri	-	-	-	-
Dipolydora socialis	-	-	-	-
Marenzelleria viridis	-	-	-	-

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Minuspio sp.	-	-	-	-
Paraprionospio pinnata	-	43	14	14
Polydora cornuta	29	-	14	-
Pseudopolydora sp.	-	-	-	-
Scolelepis texana	-	-	-	-
Spio sp.	-	-	-	-
Spionidae (LPIL)	-	-	-	-
Streblospio benedicti	589	57	747	445
Family: Terebellidae				
Loimia medusa	-	-	-	-
Loimia sp.	-	-	-	-
Pista cristata	-	-	-	-
Terebellidae (LPIL)	-	-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake	14	-	14	-
Capitella jonesi	29	-	-	-
Capitella sp.	-	-	-	-
Capitellidae (LPIL)	-	-	-	-
Heteromastus filiformis	-	-	-	-
Mediomastus ambiseta	-	-	101	-
Mediomastus californiensis	-	-	-	-
Mediomastus sp.	29	-	29	14
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis	-	-	-	-
Leitoscoloplos sp.	-	14	-	-
Orbiniidae (LPIL)	-	-	-	-
Scoloplos rubra	-	-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata	-	-	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata	-	-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici	-	-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)	14	-	29	43
Tubificoides sp.	-	-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)	-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW07-K1-SD401 LW07-K1-SD401-00-10C 09/10/10	LW07-L5-SD401 LW07-L5-SD401-00-10C 09/11/10	LW07-M1-SD401 LW07-M1-SD401-00-10C 09/10/10	LW07-SD401 LW07-SD401-00-10C 09/11/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	14	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	14
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	14
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	14	-	14
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		14	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification / Station Replicate Collection Date	LW07-K1-SD401 LW07-K1-SD401-00-10C 09/10/10	LW07-L5-SD401 LW07-L5-SD401-00-10C 09/11/10	LW07-M1-SD401 LW07-M1-SD401-00-10C 09/10/10	LW07-SD401 LW07-SD401-00-10C 09/11/10
Squilla empusa	-	-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus	-	-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)	-	-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)	-	-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)	-	-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata	-	43	14	29
Acteocina sp.	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia	-	-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta	-	-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata	-	-	-	-
Nassarius vibex	-	-	-	-
Family: Conidae				
Pyrgocythara plicosa	-	-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata	-	-	-	-
Crepidula plana	-	-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii	-	-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola	-	-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)	-	-	-	14
Class: Bivalvia				

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Sample Method: Petite Ponar (x3)
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Taxonomic Classification / Station / Replicate / Collection Date	LW07-K1-SD401 LW07-K1-SD401-00-10C 09/10/10	LW07-L5-SD401 LW07-L5-SD401-00-10C 09/11/10	LW07-M1-SD401 LW07-M1-SD401-00-10C 09/10/10	LW07-SD401 LW07-SD401-00-10C 09/11/10
Order: Arcoida				
Family: Arcidae				
Anadara transversa	-	-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex	-	-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis	-	-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica	-	-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina	-	-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)	-	29	-	-
Mulinia lateralis	-	-	-	-
Mulinia lateralis	-	-	-	-
Family: Petricolidae				
Petricolaria pholadiformis	-	-	-	-
Family: Solecurtidae				
Tagelus plebeius	-	-	-	-
Tagelus sp.	-	-	-	-
Family: Tellinidae				
Macoma tenta	-	-	-	-
Tellinidae (LPIL)	-	-	-	-
Family: Veneridae				
Gemma gemma	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria	-	-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.	-	-	-	-
Veneridae (LPIL)	14	14	-	-
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)	-	-	14	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification / Station / Replicate / Collection Date	LW07-K1-SD401 LW07-K1-SD401-00-10C 09/10/10	LW07-L5-SD401 LW07-L5-SD401-00-10C 09/11/10	LW07-M1-SD401 LW07-M1-SD401-00-10C 09/10/10	LW07-SD401 LW07-SD401-00-10C 09/11/10
Phoronida (LPIL)	-	-	-	-
Phylum: Echinodermata				
Class: Ophiuroidea				
Order: Unspecified				
Family: Unspecified				
Ophiuroidea (LPIL)	-	-	-	-
Phylum: Chordata				
Class: Cephalochordata				
Order: Amphioxiformes				
Family: Branchiostomatidae				
Branchiostoma sp.	-	-	-	-
No Organisms Present	-	-	-	-
Total Organisms	776	216	1250	647
Total Taxa	11	7	16	12

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		14	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		29	-	-	-
Family: Hesionidae					
Gyptis crypta		14	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

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Taxonomic Classification	Station	LW07-SD402	LW07-SD403-01	LW07-SD404	LW03-SD534-02
	Replicate	LW07-SD402-00-10C	LW07-SD403-00-10C-01	LW07-SD404-00-10C	LW03-SD534-02-10C
	Collection Date	09/11/10	09/11/10	09/10/10	09/01/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		14	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	14	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		14	-	144	-
Tharyx sp.		72	-	43	-
Family: Pectinariidae					
Pectinaria gouldii		29	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	14	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station	LW07-SD402	LW07-SD403-01	LW07-SD404	LW03-SD534-02
	Replicate	LW07-SD402-00-10C	LW07-SD403-00-10C-01	LW07-SD404-00-10C	LW03-SD534-02-10C
	Collection Date	09/11/10	09/11/10	09/10/10	09/01/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		86	-	72	-
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		963	445	632	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		417	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		273	14	503	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		14	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		57	14	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

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Macroinvertebrate Results
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Taxonomic Classification	Station	LW07-SD402	LW07-SD403-01	LW07-SD404	LW03-SD534-02
	Replicate	LW07-SD402-00-10C	LW07-SD403-00-10C-01	LW07-SD404-00-10C	LW03-SD534-02-10C
	Collection Date	09/11/10	09/11/10	09/10/10	09/01/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	14	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	14	-	-
Family: Leuconidae					
Leucon americanus		-	14	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		14	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		29	-	43	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	43	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	14	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		14	14	14	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	29	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

Macroinvertebrate Results
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Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW07-SD402 LW07-SD402-00-10C 09/11/10	LW07-SD403-01 LW07-SD403-00-10C-01 09/11/10	LW07-SD404 LW07-SD404-00-10C 09/10/10	LW03-SD534-02 LW03-SD534-02-10C 09/01/10
Phoronida (LPIL)		43	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	✓
Total Organisms		2098	603	1494	14
Total Taxa		17	10	9	N/A

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Macroinvertebrate Results
Data Per Square Meter (Unpooled)

Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD534-03 LW03-SD534-03-10C 09/01/10	LW03-SD550-02 LW03-SD550-02-10C 09/08/10	LW03-SD550-03 LW03-SD550-03-10C 09/08/10	LW03-SD558-02 LW03-SD558-02-10C 09/08/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	-	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	-	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		86	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		29	-	-	-
Family: Hesionidae					
Gyptis crypta		43	-	-	-
Hesionidae (LPIL)		57	-	-	-
Podarke obscura		72	-	-	-
Family: Nereididae					

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD534-03 LW03-SD534-03-10C 09/01/10	LW03-SD550-02 LW03-SD550-02-10C 09/08/10	LW03-SD550-03 LW03-SD550-03-10C 09/08/10	LW03-SD558-02 LW03-SD558-02-10C 09/08/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	-	-	-
Tharyx sp.		-	-	-	-
Family: Pectinariidae					
Pectinaria gouldii		14	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		29	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

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Macroinvertebrate Results
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Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD534-03 LW03-SD534-03-10C 09/01/10	LW03-SD550-02 LW03-SD550-02-10C 09/08/10	LW03-SD550-03 LW03-SD550-03-10C 09/08/10	LW03-SD558-02 LW03-SD558-02-10C 09/08/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		101	-	-	-
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	14	-	-
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		43	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	-	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		14	-	-	-
Mediomastus ambiseta		-	-	-	-
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		14	-	-	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	-	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	-	-	-
Tubificoides sp.		29	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station	LW03-SD534-03	LW03-SD550-02	LW03-SD550-03	LW03-SD558-02
	Replicate	LW03-SD534-03-10C	LW03-SD550-02-10C	LW03-SD550-03-10C	LW03-SD558-02-10C
	Collection Date	09/01/10	09/08/10	09/08/10	09/08/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	-	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	29	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	-	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD534-03 / LW03-SD534-03-10C / 09/01/10	LW03-SD550-02 / LW03-SD550-02-10C / 09/08/10	LW03-SD550-03 / LW03-SD550-03-10C / 09/08/10	LW03-SD558-02 / LW03-SD558-02-10C / 09/08/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		14	-	-	-
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Macroinvertebrate Results
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Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD534-03 LW03-SD534-03-10C 09/01/10	LW03-SD550-02 LW03-SD550-02-10C 09/08/10	LW03-SD550-03 LW03-SD550-03-10C 09/08/10	LW03-SD558-02 LW03-SD558-02-10C 09/08/10
Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		14	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	-	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	-	-
Veneridae (LPIL)		29	-	-	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	-	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Sample Group: Navy Clean Aug-Sept 2010

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Report Date: 11/08/2010

Taxonomic Classification	Station Replicate Collection Date	LW03-SD534-03 LW03-SD534-03-10C 09/01/10	LW03-SD550-02 LW03-SD550-02-10C 09/08/10	LW03-SD550-03 LW03-SD550-03-10C 09/08/10	LW03-SD558-02 LW03-SD558-02-10C 09/08/10
Phoronida (LPIL)		-	-	-	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		-	-	-	✓
Total Organisms		589	14	29	14
Total Taxa		15	1	1	N/A

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-03 LW03-SD558-03-10C 09/08/10	LW07-L2-SD401-02 LW07-L2-SD401-02-10C-02 09/11/10	LW07-L2-SD401-03 LW07-L2-SD401-03-10C-03 09/11/10	LW07-H1-SD401-02 LW07-H1-SD401-00-10C-02 09/10/10
Phylum: Porifera					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Porifera (LPIL)		-	14	-	-
Phylum: Cnidaria					
Class: Hydrozoa					
Order: Unspecified					
Family: Unspecified					
Hydrozoa (LPIL)		-	-	-	-
Class: Anthozoa					
Order: Actiniaria					
Family: Unspecified					
Actiniaria (LPIL)		-	-	-	-
Actiniaria sp. A		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Anthozoa (LPIL)		-	-	-	-
Phylum: Nemertea					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Nemertea (LPIL)		-	-	-	-
Nemertea sp. A (LPIL)		-	-	-	-
Nemertea sp. B (LPIL)		-	-	-	-
Nemertea sp. C (LPIL)		-	-	14	-
Nemertea sp. D (LPIL)		-	-	-	-
Phylum: Annelida					
Class: Polychaeta					
Order: Aciculata					
Family: Dorvilleidae					
Dorvillea (Schistomeringos) rudolphi		-	-	-	-
Dorvilleidae (LPIL)		-	-	-	-
Family: Eunicidae					
Marphysa sanguinea		-	-	-	-
Family: Glyceridae					
Glycera americana		-	-	-	-
Glycera dibranchiata		-	-	-	-
Glycera sp.		-	-	-	-
Ophioglycera sp.		-	-	-	-
Family: Goniadidae					
Glycinde solitaria		-	-	14	-
Family: Hesionidae					
Gyptis crypta		-	-	-	-
Hesionidae (LPIL)		-	-	-	-
Podarke obscura		-	-	-	-
Family: Nereididae					

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD558-03 LW03-SD558-03-10C 09/08/10	LW07-L2-SD401-02 LW07-L2-SD401-02-10C-02 09/11/10	LW07-L2-SD401-03 LW07-L2-SD401-03-10C-03 09/11/10	LW07-H1-SD401-02 LW07-H1-SD401-00-10C-02 09/10/10
Laeonereis culveri		-	-	-	-
Neanthes succinea		-	-	-	-
Nereididae (LPIL)		-	-	-	-
Platynereis dumerilii		-	-	-	-
Family: Oenonidae					
Drilonereis longa		-	-	-	-
Family: Onuphidae					
Diopatra cuprea		-	-	-	-
Family: Phyllodocidae					
Eteone sp.		-	-	-	-
Eumida sanguinea		-	-	-	-
Phyllodoce mucosa		-	-	-	-
Phyllodocidae (LPIL)		-	-	-	-
Family: Polynoidae					
Lepidonotus sp.		-	-	-	-
Family: Syllidae					
Grubeosyllis clavata		-	-	-	-
Syllidae (LPIL)		-	-	-	-
Order: Canalipalpata					
Family: Ampharetidae					
Ampharetidae (LPIL)		-	-	-	-
Family: Chaetopteridae					
Spiochaetopterus costarum		-	-	-	-
Family: Cirratulidae					
Aphelochaeta sp.		-	-	-	-
Cirratulidae (LPIL)		-	14	-	-
Tharyx sp.		-	14	129	-
Family: Pectinariidae					
Pectinaria gouldii		-	-	-	-
Pectinaria sp.		-	-	-	-
Family: Sabellidae					
Demonax microphthalmus		-	-	-	-
Sabellaria vulgaris		-	-	-	-
Sabellidae (LPIL)		-	-	-	-
Sabellinae (LPIL)		-	-	-	-
Family: Serpulidae					
Hydroides dianthus		-	-	-	-
Family: Serpulidae					
Hydroides diathus		-	-	-	-
Family: Serpulidae					
Hydroides sp.		-	-	-	-
Serpulidae (LPIL)		-	-	-	-
Family: Spionidae					
Apoprionospio pygmaea		-	-	-	-
Dipolydora cauleri		-	-	-	-
Dipolydora socialis		-	-	-	-
Marenzelleria viridis		-	-	-	-

Macroinvertebrate Results
Data Per Square Meter (Unpooled)

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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD558-03 LW03-SD558-03-10C 09/08/10	LW07-L2-SD401-02 LW07-L2-SD401-02-10C-02 09/11/10	LW07-L2-SD401-03 LW07-L2-SD401-03-10C-03 09/11/10	LW07-H1-SD401-02 LW07-H1-SD401-00-10C-02 09/10/10
Minuspio sp.		-	-	-	-
Paraprionospio pinnata		-	43	43	14
Polydora cornuta		-	-	-	-
Pseudopolydora sp.		-	-	-	-
Scolelepis texana		-	-	-	-
Spio sp.		-	-	-	-
Spionidae (LPIL)		-	-	-	-
Streblospio benedicti		-	230	445	187
Family: Terebellidae					
Loimia medusa		-	-	-	-
Loimia sp.		-	-	-	-
Pista cristata		-	-	-	-
Terebellidae (LPIL)		-	-	-	-
Order: Capitellida					
Family: Capitellidae					
Capitella capitata complex Blake		-	-	14	-
Capitella jonesi		-	-	-	-
Capitella sp.		-	-	-	-
Capitellidae (LPIL)		-	-	-	-
Heteromastus filiformis		-	-	-	-
Mediomastus ambiseta		-	86	86	57
Mediomastus californiensis		-	-	-	-
Mediomastus sp.		-	57	172	-
Order: Orbiniida					
Family: Orbiniidae					
Leitoscoloplos fragilis		-	-	-	-
Leitoscoloplos sp.		-	-	-	-
Orbiniidae (LPIL)		-	-	-	-
Scoloplos rubra		-	-	-	-
Order: Phyllodocida					
Family: Pilargidae					
Sigambra tentaculata		-	14	-	-
Order: Unspecified					
Family: Maldanidae					
Clymenella torquata		-	-	-	-
Class: Clitellata					
Order: Haplotaxida					
Family: Naididae					
Paranais frici		-	-	-	-
Family: Tubificoid Naididae					
Tubificoid Naididae imm. w/o hair setae (LPIL)		-	14	-	-
Tubificoides sp.		-	-	-	-
Phylum: Arthropoda					
Class: Malacostraca					
Order: Amphipoda					
Family: Aoridae					
Aoridae (LPIL)		-	-	-	-

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Macroinvertebrate Results
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Prepared For: CH2M HILL
Project: Navy Clean III
Sample Group: Navy Clean Aug-Sept 2010

Sample Method: Petite Ponar (x3)
Report Date: 11/08/2010

Taxonomic Classification	Station / Replicate / Collection Date	LW03-SD558-03 LW03-SD558-03-10C 09/08/10	LW07-L2-SD401-02 LW07-L2-SD401-02-10C-02 09/11/10	LW07-L2-SD401-03 LW07-L2-SD401-03-10C-03 09/11/10	LW07-H1-SD401-02 LW07-H1-SD401-00-10C-02 09/10/10
Family: Corophiidae					
Monocorophium acherusicum		-	-	-	-
Monocorophium insidiosum		-	-	-	-
Monocorophium sp.		-	-	-	-
Family: Liljeborgiidae					
Listriella clymenellae		-	-	-	-
Order: Cumacea					
Family: Bodotriidae					
Cyclaspis varians		-	-	-	-
Family: Leuconidae					
Leucon americanus		-	-	14	-
Family: Unspecified					
Cumacea (LPIL)		-	-	-	-
Order: Decapoda					
Family: Alpheidae					
Alpheus sp.		-	-	-	-
Family: Palaemonidae					
Palaemonetes sp.		-	-	-	-
Family: Panopeidae					
Panopeidae (LPIL)		-	-	-	-
Panopeus herbstii		-	-	-	-
Rhithropanopeus harrisii		-	-	-	-
Family: Pinnotheridae					
Pinnixa sp.		-	-	-	-
Family: Portunidae					
Callinectes sp.		-	-	-	-
Portunidae (LPIL)		-	-	-	-
Family: Unspecified					
Decapoda (LPIL)		-	-	-	-
Decapoda *(zoea)*		-	-	-	-
Decapoda *zoea (larva)*		-	-	-	-
Order: Isopoda					
Family: Idoteidae					
Edotia triloba		-	-	-	-
Order: Leptostraca					
Family: Unspecified					
Leptostraca (LPIL)		-	-	-	-
Order: Mysida					
Family: Mysidae					
Americamysis bigelowi		-	-	14	-
Americamysis sp.		-	-	-	-
Mysidae (LPIL)		-	-	-	-
Neomysis americana		-	-	-	-
Family: Unspecified					
Mysidacea (LPIL)		-	-	-	-
Order: Stomatopoda					
Family: Squillidae					

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Taxonomic Classification	Station Replicate Collection Date	LW03-SD558-03 LW03-SD558-03-10C 09/08/10	LW07-L2-SD401-02 LW07-L2-SD401-02-10C-02 09/11/10	LW07-L2-SD401-03 LW07-L2-SD401-03-10C-03 09/11/10	LW07-H1-SD401-02 LW07-H1-SD401-00-10C-02 09/10/10
Squilla empusa		-	-	-	-
Class: Maxillopoda					
Order: Sessilia					
Family: Balanoidea					
Balanus improvisus		-	-	-	-
Family: Balanomorpha					
Balanomorpha (LPIL)		-	-	-	-
Class: Entognatha					
Order: Collembola					
Family: Unspecified					
Collembola (LPIL)		-	-	-	-
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					
Crustacea (LPIL)		-	-	-	-
Phylum: Mollusca					
Class: Gastropoda					
Order: Cephalaspidea					
Family: Cylichnidae					
Acteocina canaliculata		-	-	14	14
Acteocina sp.		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Odostomia engonia		-	-	-	-
Order: Heterostropha					
Family: Pyramidellidae					
Turbonilla interrupta		-	-	-	-
Order: Neogastropoda					
Family: Columbellidae					
Astyris lunata		-	-	-	-
Nassarius vibex		-	-	-	-
Family: Conidae					
Pyrgocythara plicosa		-	-	-	-
Order: Neotaenioglossa					
Family: Calyptraeidae					
Crepidula fornicata		-	-	-	-
Crepidula plana		-	-	-	-
Order: Neotaenioglossa					
Family: Cerithiopsidae					
Cerithiopsis greenii		-	-	-	-
Order: Neotaenioglossa					
Family: Epitoniidae					
Epitonium rupicola		-	-	-	-
Order: Unspecified					
Family: Unspecified					
Gastropoda (LPIL)		-	-	-	-
Class: Bivalvia					

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Report Date: 11/08/2010

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Order: Arcoida					
Family: Arcidae					
Anadara transversa		-	-	-	-
Order: Mytiloida					
Family: Mytilidae					
Amygdalum papyrium		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Anomia simplex		-	-	-	-
Order: Ostreoida					
Family: Anomiidae					
Pododesmus rudis		-	-	-	-
Order: Ostreoida					
Family: Ostreidae					
Crassostrea virginica		-	-	-	-
Order: Pholadomyoida					
Family: Lyonsiidae					
Lyonsia hyalina		-	-	-	-
Order: Veneroida					
Family: Mactridae					
Mactridae (LPIL)		-	-	-	-
Mulinia lateralis		-	-	-	-
Mulinia lateralis		-	-	-	-
Family: Petricolidae					
Petricolaria pholadiformis		-	-	-	-
Family: Solecurtidae					
Tagelus plebeius		-	-	-	-
Tagelus sp.		-	-	-	-
Family: Tellinidae					
Macoma tenta		-	-	14	-
Tellinidae (LPIL)		-	-	-	-
Family: Veneridae					
Gemma gemma		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Mercenaria mercenaria		-	-	-	-
Order: Veneroida					
Family: Veneridae					
Pitar sp.		-	-	14	-
Veneridae (LPIL)		-	-	14	-
Order: Unspecified					
Family: Unspecified					
Bivalvia (LPIL)		-	14	-	-
Phylum: Phoronida					
Class: Unspecified					
Order: Unspecified					
Family: Unspecified					

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Phoronida (LPIL)		-	14	14	-
Phylum: Echinodermata					
Class: Ophiuroidea					
Order: Unspecified					
Family: Unspecified					
Ophiuroidea (LPIL)		-	-	-	-
Phylum: Chordata					
Class: Cephalochordata					
Order: Amphioxiformes					
Family: Branchiostomatidae					
Branchiostoma sp.		-	-	-	-
No Organisms Present		✓	-	-	-
Total Organisms		14	517	1020	273
Total Taxa		N/A	11	15	4

Macroinvertebrate Results
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Phylum: Porifera				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Porifera (LPIL)		-	-	-
Phylum: Cnidaria				
Class: Hydrozoa				
Order: Unspecified				
Family: Unspecified				
Hydrozoa (LPIL)		-	-	-
Class: Anthozoa				
Order: Actiniaria				
Family: Unspecified				
Actiniaria (LPIL)		-	-	-
Actiniaria sp. A		-	-	-
Order: Unspecified				
Family: Unspecified				
Anthozoa (LPIL)		-	-	-
Phylum: Nemertea				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Nemertea (LPIL)		-	-	-
Nemertea sp. A (LPIL)		-	-	-
Nemertea sp. B (LPIL)		-	-	-
Nemertea sp. C (LPIL)		-	-	-
Nemertea sp. D (LPIL)		-	-	-
Phylum: Annelida				
Class: Polychaeta				
Order: Aciculata				
Family: Dorvilleidae				
Dorvillea (Schistomeringos) rudolphi		-	-	-
Dorvilleidae (LPIL)		-	-	-
Family: Eunicidae				
Marphysa sanguinea		-	-	-
Family: Glyceridae				
Glycera americana		-	-	-
Glycera dibranchiata		-	-	-
Glycera sp.		-	-	-
Ophioglycera sp.		-	-	-
Family: Goniadidae				
Glycinde solitaria		-	-	-
Family: Hesionidae				
Gyptis crypta		14	-	-
Hesionidae (LPIL)		-	-	-
Podarke obscura		-	-	-
Family: Nereididae				

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Laeonereis culveri		-	-	-
Neanthes succinea		-	-	-
Nereididae (LPIL)		-	-	-
Platynereis dumerilii		-	-	-
Family: Oenonidae				
Drilonereis longa		-	-	-
Family: Onuphidae				
Diopatra cuprea		-	-	-
Family: Phyllodocidae				
Eteone sp.		-	-	-
Eumida sanguinea		-	-	-
Phyllodoce mucosa		-	-	-
Phyllodocidae (LPIL)		-	-	-
Family: Polynoidae				
Lepidonotus sp.		-	-	-
Family: Syllidae				
Grubeosyllis clavata		-	-	-
Syllidae (LPIL)		-	-	-
Order: Canalipalpata				
Family: Ampharetidae				
Ampharetidae (LPIL)		-	-	-
Family: Chaetopteridae				
Spiochaetopterus costarum		-	-	-
Family: Cirratulidae				
Aphelochaeta sp.		-	-	-
Cirratulidae (LPIL)		-	-	-
Tharyx sp.		-	14	115
Family: Pectinariidae				
Pectinaria gouldii		-	-	14
Pectinaria sp.		-	-	-
Family: Sabellidae				
Demonax microphthalmus		-	-	-
Sabellaria vulgaris		-	-	-
Sabellidae (LPIL)		-	-	-
Sabellinae (LPIL)		-	-	-
Family: Serpulidae				
Hydroides dianthus		-	-	-
Family: Serpulidae				
Hydroides diathus		-	-	-
Family: Serpulidae				
Hydroides sp.		-	-	-
Serpulidae (LPIL)		-	-	-
Family: Spionidae				
Apoprionospio pygmaea		-	-	-
Dipolydora cauleri		-	-	-
Dipolydora socialis		-	-	-
Marenzelleria viridis		-	-	-

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Minuspio sp.		-	-	-
Paraprionospio pinnata		29	14	-
Polydora cornuta		14	-	-
Pseudopolydora sp.		-	-	-
Scolelepis texana		-	-	-
Spio sp.		-	-	-
Spionidae (LPIL)		-	-	-
Streblospio benedicti		287	57	402
Family: Terebellidae				
Loimia medusa		-	-	-
Loimia sp.		-	-	-
Pista cristata		-	-	-
Terebellidae (LPIL)		-	-	-
Order: Capitellida				
Family: Capitellidae				
Capitella capitata complex Blake		43	14	-
Capitella jonesi		-	-	-
Capitella sp.		-	-	-
Capitellidae (LPIL)		-	-	-
Heteromastus filiformis		-	-	-
Mediomastus ambiseta		14	14	172
Mediomastus californiensis		-	-	-
Mediomastus sp.		-	-	43
Order: Orbiniida				
Family: Orbiniidae				
Leitoscoloplos fragilis		-	-	-
Leitoscoloplos sp.		-	-	-
Orbiniidae (LPIL)		-	-	-
Scoloplos rubra		-	-	-
Order: Phyllodocida				
Family: Pilargidae				
Sigambra tentaculata		14	-	-
Order: Unspecified				
Family: Maldanidae				
Clymenella torquata		-	-	-
Class: Clitellata				
Order: Haplotaxida				
Family: Naididae				
Paranais frici		-	-	-
Family: Tubificoid Naididae				
Tubificoid Naididae imm. w/o hair setae (LPIL)		14	14	29
Tubificoides sp.		-	-	-
Phylum: Arthropoda				
Class: Malacostraca				
Order: Amphipoda				
Family: Aoridae				
Aoridae (LPIL)		-	-	-

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Family: Corophiidae				
Monocorophium acherusicum		-	-	-
Monocorophium insidiosum		-	-	-
Monocorophium sp.		-	-	14
Family: Liljeborgiidae				
Listriella clymenellae		-	-	-
Order: Cumacea				
Family: Bodotriidae				
Cyclaspis varians		-	-	-
Family: Leuconidae				
Leucon americanus		-	-	-
Family: Unspecified				
Cumacea (LPIL)		-	-	-
Order: Decapoda				
Family: Alpheidae				
Alpheus sp.		-	-	-
Family: Palaemonidae				
Palaemonetes sp.		-	-	-
Family: Panopeidae				
Panopeidae (LPIL)		-	-	-
Panopeus herbstii		-	-	-
Rhithropanopeus harrisii		-	-	-
Family: Pinnotheridae				
Pinnixa sp.		-	-	-
Family: Portunidae				
Callinectes sp.		-	-	-
Portunidae (LPIL)		-	-	-
Family: Unspecified				
Decapoda (LPIL)		-	-	-
Decapoda *(zoea)*		-	-	-
Decapoda *zoea (larva)*		-	-	-
Order: Isopoda				
Family: Idoteidae				
Edotia triloba		-	-	-
Order: Leptostraca				
Family: Unspecified				
Leptostraca (LPIL)		-	-	-
Order: Mysida				
Family: Mysidae				
Americamysis bigelowi		14	-	-
Americamysis sp.		-	-	-
Mysidae (LPIL)		-	-	-
Neomysis americana		-	-	-
Family: Unspecified				
Mysidacea (LPIL)		-	-	-
Order: Stomatopoda				
Family: Squillidae				

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Squilla empusa		-	-	-
Class: Maxillopoda				
Order: Sessilia				
Family: Balanoidea				
Balanus improvisus		-	-	-
Family: Balanomorpha				
Balanomorpha (LPIL)		-	-	-
Class: Entognatha				
Order: Collembola				
Family: Unspecified				
Collembola (LPIL)		-	-	-
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				
Crustacea (LPIL)		-	-	-
Phylum: Mollusca				
Class: Gastropoda				
Order: Cephalaspidea				
Family: Cylichnidae				
Acteocina canaliculata		14	29	-
Acteocina sp.		-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Odostomia engonia		-	-	-
Order: Heterostropha				
Family: Pyramidellidae				
Turbonilla interrupta		-	-	-
Order: Neogastropoda				
Family: Columbellidae				
Astyris lunata		-	-	-
Nassarius vibex		-	-	-
Family: Conidae				
Pyrgocythara plicosa		-	-	-
Order: Neotaenioglossa				
Family: Calyptraeidae				
Crepidula fornicata		-	-	-
Crepidula plana		-	-	-
Order: Neotaenioglossa				
Family: Cerithiopsidae				
Cerithiopsis greenii		-	-	-
Order: Neotaenioglossa				
Family: Epitoniidae				
Epitonium rupicola		-	-	-
Order: Unspecified				
Family: Unspecified				
Gastropoda (LPIL)		-	-	-
Class: Bivalvia				

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Order: Arcoida				
Family: Arcidae				
Anadara transversa		-	-	-
Order: Mytiloida				
Family: Mytilidae				
Amygdalum papyrium		-	-	-
Order: Ostreoida				
Family: Anomiidae				
Anomia simplex		-	-	-
Order: Ostreoida				
Family: Anomiidae				
Pododesmus rudis		-	-	-
Order: Ostreoida				
Family: Ostreidae				
Crassostrea virginica		-	-	-
Order: Pholadomyoida				
Family: Lyonsiidae				
Lyonsia hyalina		-	-	-
Order: Veneroida				
Family: Mactridae				
Mactridae (LPIL)		-	14	14
Mulinia lateralis		-	-	-
Mulinia lateralis		-	-	-
Family: Petricolidae				
Petricolaria pholadiformis		-	-	-
Family: Solecurtidae				
Tagelus plebeius		-	-	-
Tagelus sp.		-	-	-
Family: Tellinidae				
Macoma tenta		-	-	-
Tellinidae (LPIL)		-	-	-
Family: Veneridae				
Gemma gemma		-	-	-
Order: Veneroida				
Family: Veneridae				
Mercenaria mercenaria		-	-	-
Order: Veneroida				
Family: Veneridae				
Pitar sp.		-	-	-
Veneridae (LPIL)		14	-	14
Order: Unspecified				
Family: Unspecified				
Bivalvia (LPIL)		-	-	-
Phylum: Phoronida				
Class: Unspecified				
Order: Unspecified				
Family: Unspecified				

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Phoronida (LPIL)		-	-	-
Phylum: Echinodermata				
Class: Ophiuroidea				
Order: Unspecified				
Family: Unspecified				
Ophiuroidea (LPIL)		-	-	-
Phylum: Chordata				
Class: Cephalochordata				
Order: Amphioxiformes				
Family: Branchiostomatidae				
Branchiostoma sp.		-	-	-
No Organisms Present		-	-	-
Total Organisms		474	172	819
Total Taxa		11	8	9

Appendix C

Raw Data Species Pollution Sensitivity Classifications, and Various Metrics

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD501	LW03-SD502	LW03-SD503	LW03-SD504A	LW03-SD504
					LW03-SD501-00-10C	LW03-SD502-00-10C	LW03-SD503-00-10C	LW03-SD504A-00-10C	LW03-SD504-00-10C
					09/02/2010	09/02/2010	09/02/2010	08/31/2010	08/30/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	1	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		2	0	1	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		1	0	0	0	0
			Glycinde solitaria	PS, OP	2	1	0	1	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		1	0	0	1	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		6	1	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		1	0	0	0	0
			Spiochaetopterus costarum	PS	2	2	0	2	0
			Aphelochaeta sp.		0	5	1	0	0
			Cirratulidae (LPIL)		1	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	4	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	1	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	1	0
			Serpulidae (LPIL)		0	1	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	0	0	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	3	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	1	0	1	2	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	1	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	2	0	0	0
			Capitella capitata complex Blake	PI, OP	7	0	3	1	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	1	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	2	0	0	1
			Mediomastus ambiseta	PS, PI, OP	5	0	2	4	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		1	4	1	1	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD501	LW03-SD502	LW03-SD503	LW03-SD504A	LW03-SD504
					LW03-SD501-00-10C	LW03-SD502-00-10C	LW03-SD503-00-10C	LW03-SD504A-00-10C	LW03-SD504-00-10C
					09/02/2010	09/02/2010	09/02/2010	08/31/2010	08/30/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		1	2	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	1	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	1	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	1	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	1	0	0	0
			Crepidula fornicata		8	5	0	0	0
			Crepidula plana		2	0	0	0	0
			Cerithiopsis greenii		0	1	0	0	0
			Epitonium rupicola		0	1	0	0	0
			Gastropoda (LPIL)		0	1	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		1	0	1	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	1	2	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		2	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	6	5	2	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	2
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		1	3	3	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		7	6	3	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		60	53	23	13	3
			Number of Taxa		22	23	13	8	2
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		60	53	23	13	3
			Total Density (Number per Square Meter)		862	761	330	187	43
			Number of Taxa		22	23	13	8	2
			Shannon Diversity Index (Base e)		2.755	2.91	2.442	1.925	0.637
			Shannon Diversity Index (Base 2)		3.975	4.198	3.523	2.777	0.918
			Name of Dominant Taxon		Crepidula fornicata	Phoronida (LPIL)	Capitella capitata complex Blake	Mediomastus ambiseta	Mercenaria mercenaria
			Percent Contribution of Dominant Taxon		13.33	11.32	13.04	30.77	66.67
			Density (No./Square Meter) Dominant Taxon		115	86	43	57	29
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		18.40	18.90	26.00	0.00	66.70
			Percent Spionid Polychaetes		1.70	0.00	17.40	15.40	0.00
			Percent Mediomastus Polychaetes		10.00	7.55	13.05	38.46	0.00
			Percent Deposit Feeders		32.5	17.93	30.44	61.53	33.33

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD505	LW03-SD506	LW03-SD507	LW03-SD508	LW03-SD509
					LW03-SD505-00-10C	LW03-SD506-00-10C	LW03-SD507-00-10C	LW03-SD508-00-10C	LW03-SD509-00-10C
					08/31/2010	09/10/2010	09/02/2010	09/10/2010	09/09/2010
Porifera									
			Porifera (LPIL)		1	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	2	2	0	1
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	3	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	1	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	1	1	1	0
			Gyptis crypta		0	2	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	1	0	0	1
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	1	2
			Nereididae (LPIL)		0	1	1	0	0
			Platynereis dumerilii		0	0	0	0	1
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	1	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	1	4	1	1	0
			Aphelochaeta sp.		0	0	5	0	0
			Cirratulidae (LPIL)		0	7	0	0	0
			Tharyx sp.		0	3	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	1	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	3	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	1
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	4	1	0	0	0
			Polydora cornuta	PI, OP	0	0	0	2	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	1	0	2	9	1
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	1	2	0	14	11
			Capitella jonesi	PI, OP	0	0	0	1	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	1	0
			Mediomastus ambiseta	PS, PI, OP	1	5	3	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	6	1	1	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD505	LW03-SD506	LW03-SD507	LW03-SD508	LW03-SD509
					LW03-SD505-00-10C	LW03-SD506-00-10C	LW03-SD507-00-10C	LW03-SD508-00-10C	LW03-SD509-00-10C
					08/31/2010	09/10/2010	09/02/2010	09/10/2010	09/09/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	1	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	1	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	4
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	1	0	0	0
			Acteocina sp.		0	0	1	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	1	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	1	0	1
			Pyrgocythara plicosa		0	4	0	0	0
			Crepidula fornicata		0	17	0	0	3
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	1	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	1	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	1
			Pododesmus rudis		0	0	0	0	1
			Crassostrea virginica		0	0	0	0	1
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	2	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	1	4	2	1	60
			Mercenaria mercenaria	PS, EQ	0	0	0	2	1
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		1	12	0	0	1
			Bivalvia (LPIL)		0	0	3	0	1
Phoronida									
			Phoronida (LPIL)		8	26	12	3	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	2	0	1
			Total Raw Count		19	107	43	39	93
			Number of Taxa		9	24	18	13	18
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		19	107	43	39	93
			Total Density (Number per Square Meter)		273	1537	618	560	1336
			Number of Taxa		9	24	18	13	18
			Shannon Diversity Index (Base e)		1.777	2.593	2.522	2.018	1.497
			Shannon Diversity Index (Base 2)		2.564	3.741	3.638	2.911	2.16
			Name of Dominant Taxon		Phoronida (LPIL)	Phoronida (LPIL)	Phoronida (LPIL)	Streblospio benedicti	Gemma gemma
			Percent Contribution of Dominant Taxon		42.11	24.30	27.91	23.08	64.52
			Density (No./Square Meter) Dominant Taxon		115	374	172	129	862
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	7.70	67.80
			Percent Spionid Polychaetes		26.30	0.90	4.70	28.20	2.20
			Percent Mediomastus Polychaetes		5.26	10.28	9.31	2.56	0.00
			Percent Deposit Feeders		26.32	25.23	13.95	60.26	15.06

water & air RESEARCH, INC.

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD510	LW03-SD511	LW03-SD512	LW03-SD513	LW03-SD514
					LW03-SD510-00-10C	LW03-SD511-00-10C	LW03-SD512-00-10C	LW03-SD513-00-10C	LW03-SD514-00-10C
					08/31/2010	08/31/2010	09/02/2010	09/10/2010	09/10/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	1	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	2	1	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	1
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	1	0
			Nereididae (LPIL)		0	0	1	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	1	5	0	0	2
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		1	1	0	0	0
			Tharyx sp.		2	0	0	0	0
			Pectinaria gouldii		0	1	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		1	0	0	0	0
			Sabellinae (LPIL)		0	0	1	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	1
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	8	10	4	0	0
			Polydora cornuta	PI, OP	0	2	0	1	0
			Pseudopolydora sp.		0	0	1	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	5	0	1	0	4
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		1	0	0	3	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	15	5
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	2	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD510	LW03-SD511	LW03-SD512	LW03-SD513	LW03-SD514
					LW03-SD510-00-10C	LW03-SD511-00-10C	LW03-SD512-00-10C	LW03-SD513-00-10C	LW03-SD514-00-10C
					08/31/2010	08/31/2010	09/02/2010	09/10/2010	09/10/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	7	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	1	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	2	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	2	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		2	5	0	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		4	20	0	1	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		27	59	9	21	13
			Number of Taxa		10	13	6	5	5
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		27	59	9	21	13
			Total Density (Number per Square Meter)		388	848	129	302	187
			Number of Taxa		10	13	6	5	5
			Shannon Diversity Index (Base e)		2.022	2.074	1.581	0.953	1.413
			Shannon Diversity Index (Base 2)		2.917	2.992	2.281	1.375	2.038
			Name of Dominant Taxon		Paraprionospio pinnata	Phoronida (LPIL)	Paraprionospio pinnata	Capitella capitata complex Blake	Capitella capitata complex Blake
			Percent Contribution of Dominant Taxon		29.63	33.90	44.44	71.43	38.46
			Density (No./Square Meter) Dominant Taxon		115	287	57	216	72
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		7.40	11.90	0.00	0.00	0.00
			Percent Spionid Polychaetes		48.10	20.30	66.70	4.80	30.80
			Percent Mediomastus Polychaetes		7.41	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		46.3	17.79	38.89	83.33	61.54

water & air RESEARCH, INC.

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD515	LW03-SD516	LW03-SD517	LW03-SD518	LW03-SD519
					LW03-SD515-00-10C	LW03-SD516-00-10C	LW03-SD517-00-10C	LW03-SD518-00-10C	LW03-SD519-00-10C
					09/09/2010	09/09/2010	08/31/2010	08/31/2010	09/02/2010
Porifera									
			Porifera (LPIL)		0	0	1	1	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		2	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	3	5	0	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		1	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	1	0	0	0
			Platynereis dumerilii		1	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	1
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	1	0	0	0	2
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		1	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	1	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	2	0	0	0	3
			Polydora cornuta	PI, OP	1	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	2
			Scolelepis texana		0	1	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	5	1	0	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	2	2	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	1	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	1	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	1	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD515	LW03-SD516	LW03-SD517	LW03-SD518	LW03-SD519
					LW03-SD515-00-10C	LW03-SD516-00-10C	LW03-SD517-00-10C	LW03-SD518-00-10C	LW03-SD519-00-10C
					09/09/2010	09/09/2010	08/31/2010	08/31/2010	09/02/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		1	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	1	0	0	0
			Decapoda (LPIL)		0	0	0	2	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	1	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	1	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	1	0	0	0
			Gemma gemma	OP	0	17	1	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	2	0	0	0
			Bivalvia (LPIL)		1	0	0	0	0
Phoronida									
			Phoronida (LPIL)		4	4	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		26	39	2	4	8
			Number of Taxa		14	14	2	3	4
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		26	39	2	4	8
			Total Density (Number per Square Meter)		374	560	29	57	115
			Number of Taxa		14	14	2	3	4
			Shannon Diversity Index (Base e)		2.449	2.009	0.693	1.04	1.321
			Shannon Diversity Index (Base 2)		3.533	2.898	1	1.5	1.906
			Name of Dominant Taxon		Streblospio benedicti	Gemma gemma	Porifera (LPIL)/ Gemma gemma	Decapoda (LPIL)	Paraprionospio pinnata
			Percent Contribution of Dominant Taxon		19.23	43.59	50.00	50.00	37.50
			Density (No./Square Meter) Dominant Taxon		72	244	14	29	43
			Percent Amphipods		3.80	0.00	0.00	0.00	0.00
			Percent Bivalves		3.80	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		34.60	5.10	0.00	0.00	62.50
			Percent Mediomastus Polychaetes		0.00	2.56	0.00	0.00	0.00
			Percent Deposit Feeders		34.61	14.11	0	25	43.75

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD520	LW03-SD521	LW03-SD522	LW03-SD523	LW03-SD525
					LW03-SD520-00-10C	LW03-SD521-00-10C	LW03-SD522-00-10C	LW03-SD523-00-10C	LW03-SD525-00-10C
					09/10/2010	09/12/2010	09/09/2010	09/09/2010	09/02/2010
Porifera									
			Porifera (LPIL)		0	1	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	1	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		3	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	1	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	3	4	0
			Gyptis crypta		4	0	0	1	0
			Hesionidae (LPIL)		4	1	0	0	0
			Podarke obscura		13	0	0	2	0
			Laeonereis culveri		0	0	0	2	0
			Neanthes succinea	PI, OP	1	1	0	1	0
			Nereididae (LPIL)		0	0	0	7	0
			Platynereis dumerilii		0	0	0	1	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	3	2	1	0	0
			Aphelochaeta sp.		0	0	0	1	0
			Cirratulidae (LPIL)		0	1	1	2	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	1	2	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	1	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	2	0	1	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	3	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		2	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	2	2	2	0
			Polydora cornuta	PI, OP	4	2	0	2	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		1	0	0	1	0
			Streblospio benedicti	PI, OP	14	4	14	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		5	2	0	0	0
			Terebellidae (LPIL)		0	0	2	0	0
			Capitella capitata complex Blake	PI, OP	7	15	1	47	0
			Capitella jonesi	PI, OP	2	1	2	3	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	1	0
			Mediomastus ambiseta	PS, PI, OP	7	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		3	0	1	5	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	1	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	1	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		25	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD520	LW03-SD521	LW03-SD522	LW03-SD523	LW03-SD525
					LW03-SD520-00-10C	LW03-SD521-00-10C	LW03-SD522-00-10C	LW03-SD523-00-10C	LW03-SD525-00-10C
					09/10/2010	09/12/2010	09/09/2010	09/09/2010	09/02/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	1	0
			Monocorophium acherusicum		2	0	0	0	0
			Monocorophium insidiosum		1	0	0	0	0
			Monocorophium sp.		13	0	0	0	0
			Listriella clymenellae	PS	0	0	1	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	1	0
			Panopeidae (LPIL)		1	0	0	1	0
			Panopeus herbstii		0	0	0	1	0
			Rhithropanopeus harrisii		0	0	0	2	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	1	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	3	0
			Balanomorpha (LPIL)		0	1	0	0	0
	Entognatha								
			Collembola (LPIL)		0	1	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	4	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	1	0
			Crassostrea virginica		0	0	0	1	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	3	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	2	15	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	1	1	4	0
			Bivalvia (LPIL)		0	1	2	2	0
Phoronida									
			Phoronida (LPIL)		0	0	17	9	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		115	40	53	138	0
			Number of Taxa		20	18	17	35	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		115	40	53	138	0
			Total Density (Number per Square Meter)		1652	575	761	1983	0
			Number of Taxa		20	18	17	35	0
			Shannon Diversity Index (Base e)		2.57	2.361	2.171	2.725	0
			Shannon Diversity Index (Base 2)		3.708	3.407	3.133	3.931	0
			Name of Dominant Taxon		Tubificoides sp.	Capitella capitata complex Blake	Phoronida (LPIL)	Capitella capitata complex Blake	N/A
			Percent Contribution of Dominant Taxon		21.74	37.50	32.08	34.06	0
			Density (No./Square Meter) Dominant Taxon		359	216	244	675	0
			Percent Amphipods		13.90	0.00	1.90	0.70	0.00
			Percent Bivalves		0.00	5.00	9.50	18.10	0.00
			Percent Spionid Polychaetes		18.30	20.00	30.20	3.60	0.00
			Percent Mediomastus Polychaetes		8.70	0.00	1.89	3.62	0.00
			Percent Deposit Feeders		52.61	61.25	31.13	49.28	0

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD526	LW03-SD527	LW03-SD528	LW03-SD529	LW03-SD530
					LW03-SD526-00-10C	LW03-SD527-00-10C	LW03-SD528-00-10C	LW03-SD529-00-10C	LW03-SD530-00-10C
					09/10/2010	09/12/2010	09/09/2010	09/09/2010	09/02/2010
Porifera									
			Porifera (LPIL)		1	1	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	1	0
	Anthozoa								
			Actiniaria (LPIL)		0	37	0	7	0
			Actiniaria sp. A		0	0	0	1	0
			Anthozoa (LPIL)		0	1	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	1	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	1	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	0	3	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	3	0	5	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	1	2	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	4	0
			Tharyx sp.		0	0	0	4	0
			Pectinaria gouldii		0	0	0	3	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	8	0	2	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	2	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	2	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	3	0	0
			Polydora cornuta	PI, OP	0	4	0	9	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	3	0	0	3	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	3	0
			Capitella capitata complex Blake	PI, OP	0	9	0	2	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	2	0
			Heteromastus filiformis	PI, OP	0	0	0	1	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	9	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	1	0
			Scoloplos rubra		0	0	0	2	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	1	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD526	LW03-SD527	LW03-SD528	LW03-SD529	LW03-SD530
					LW03-SD526-00-10C	LW03-SD527-00-10C	LW03-SD528-00-10C	LW03-SD529-00-10C	LW03-SD530-00-10C
					09/10/2010	09/12/2010	09/09/2010	09/09/2010	09/02/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	1	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	2	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	1	0	5	0
			Crepidula plana		0	0	0	2	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	1	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	8	0
			Gemma gemma	OP	0	0	0	31	0
			Mercenaria mercenaria	PS, EQ	0	0	0	3	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	0	36	0
			Bivalvia (LPIL)		0	0	0	5	0
Phoronida									
			Phoronida (LPIL)		0	0	1	11	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		4	70	7	168	0
			Number of Taxa		2	12	4	30	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		4	70	7	168	0
			Total Density (Number per Square Meter)		57	1006	101	2414	0
			Number of Taxa		2	12	4	30	0
			Shannon Diversity Index (Base e)		0.562	1.654	1.277	2.793	0
			Shannon Diversity Index (Base 2)		0.811	2.386	1.842	4.029	0
			Name of Dominant Taxon		Streblospio benedicti	Actiniaria (LPIL)	Paraprionospio pinnata	Vereridae (LPIL)	N/A
			Percent Contribution of Dominant Taxon		75.00	52.86	42.86	21.43	0
			Density (No./Square Meter) Dominant Taxon		43	532	43	517	0
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	49.50	0.00
			Percent Spionid Polychaetes		75.00	5.70	42.90	7.10	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	5.36	0.00
			Percent Deposit Feeders		37.5	16.43	35.71	21.13	0

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD533	LW03-SD534-01	LW03-SD535	LW03-SD537	LW03-SD538
					LW03-SD533-00-10C	LW03-SD534-01-10C	LW03-SD535-00-10C	LW03-SD537-00-10C	LW03-SD538-00-10C
					09/01/2010	09/01/2010	09/01/2010	09/01/2010	09/01/2010
Porifera									
			Porifera (LPIL)		0	0	1	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	2	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	1	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	19	0	0
			Gyptis crypta		0	0	8	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	10	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	1	0	0
			Phyllodocidae (LPIL)		0	0	1	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	1	0	0
			Tharyx sp.		0	0	1	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	5	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	5	0	0
			Hydroides sp.		0	0	1	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	3	0	0	0	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	4	0	1	1	0
			Loimia medusa	PS	0	0	4	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	1	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	3	0	0
			Mediomastus californiensis		0	0	1	0	0
			Mediomastus sp.		0	0	4	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	1	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD533	LW03-SD534-01	LW03-SD535	LW03-SD537	LW03-SD538
					LW03-SD533-00-10C	LW03-SD534-01-10C	LW03-SD535-00-10C	LW03-SD537-00-10C	LW03-SD538-00-10C
					09/01/2010	09/01/2010	09/01/2010	09/01/2010	09/01/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	1	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	1	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	4	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	1	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	3	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	1	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	3	0	0
			Mercenaria mercenaria	PS, EQ	0	0	2	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	12	0	0
			Bivalvia (LPIL)		1	0	0	0	0
Phoronida									
			Phoronida (LPIL)		2	0	11	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		10	0	110	1	0
			Number of Taxa		4	0	30	1	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		10	0	110	1	0
			Total Density (Number per Square Meter)		144	0	1580	14	0
			Number of Taxa		4	0	30	1	0
			Shannon Diversity Index (Base e)		1.28	0	2.908	0	0
			Shannon Diversity Index (Base 2)		1.846	0	4.195	0	0
			Name of Dominant Taxon		Streblospio benedicti	N/A	Glycinda solitara	Streblospio benedicti	N/A
			Percent Contribution of Dominant Taxon		40.00	0	17.12	100.00	0
			Density (No./Square Meter) Dominant Taxon		57	0	271	14	0
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		10.00	0.00	33.30	0.00	0.00
			Percent Spionid Polychaetes		70.00	0.00	0.90	100.00	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		35	0	13.51	50	0

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD539	LW03-SD540	LW03-SD541	LW03-SD543	LW03-SD544
					LW03-SD539-00-10C	LW03-SD540-00-10C	LW03-SD541-00-10C	LW03-SD543-00-10C	LW03-SD544-00-10C
					09/01/2010	09/01/2010	09/07/2010	09/01/2010	09/01/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	0	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		0	0	2	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	1	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	1	0	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	0	0	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD539	LW03-SD540	LW03-SD541	LW03-SD543	LW03-SD544
					LW03-SD539-00-10C	LW03-SD540-00-10C	LW03-SD541-00-10C	LW03-SD543-00-10C	LW03-SD544-00-10C
					09/01/2010	09/01/2010	09/07/2010	09/01/2010	09/01/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	1	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	1	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	1	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	0	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	2	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		0	0	9	0	0
			Number of Taxa		0	0	7	0	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		0	0	9	0	0
			Total Density (Number per Square Meter)		0	0	129	0	0
			Number of Taxa		0	0	7	0	0
			Shannon Diversity Index (Base e)		0	0	1.889	0	0
			Shannon Diversity Index (Base 2)		0	0	2.725	0	0
			Name of Dominant Taxon		N/A	N/A	Phoronida (LPIL) / Tharyx sp.	N/A	N/A
			Percent Contribution of Dominant Taxon		0	0	22.22	0	0
			Density (No./Square Meter) Dominant Taxon		0	0	29	0	0
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		0.00	0.00	11.10	0.00	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		0	0	27.78	0	0

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548	LW03-SD549
					LW03-SD545-00-10C	LW03-SD546-00-10C	LW03-SD547-00-10C	LW03-SD548-00-10C	LW03-SD549-00-10C
					09/01/2010	09/01/2010	09/07/2010	09/09/2010	09/09/2010
Porifera									
			Porifera (LPIL)		0	0	0	1	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	2	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	1	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	0	0	0
			Polydora cornuta	PI, OP	0	0	1	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	0	1	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD545	LW03-SD546	LW03-SD547	LW03-SD548	LW03-SD549
					LW03-SD545-00-10C	LW03-SD546-00-10C	LW03-SD547-00-10C	LW03-SD548-00-10C	LW03-SD549-00-10C
					09/01/2010	09/01/2010	09/07/2010	09/09/2010	09/09/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	2
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	2	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	13	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		0	0	20	1	2
			Number of Taxa		0	0	6	1	1
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		0	0	20	1	2
			Total Density (Number per Square Meter)		0	0	287	14	29
			Number of Taxa		0	0	6	1	1
			Shannon Diversity Index (Base e)		0	0	1.19	0	0
			Shannon Diversity Index (Base 2)		0	0	1.717	0	0
			Name of Dominant Taxon		N/A	N/A	Veneridae (LPIL)	Porifera (LPIL)	Decapoda zoea (LPIL)
			Percent Contribution of Dominant Taxon		0	0	65.00	100.00	100.00
			Density (No./Square Meter) Dominant Taxon		0	0	187	14	29
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		0.00	0.00	10.00	0.00	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		0	0	10	0	0

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Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD550-01	LW03-SD551	LW03-SD552	LW03-SD553	LW03-SD555
					LW03-SD550-01-10C	LW03-SD551-00-10C	LW03-SD552-00-10C	LW03-SD553-00-10C	LW03-SD555-00-10C
					09/08/2010	09/08/2010	09/07/2010	09/07/2010	09/09/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	1	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	0	1	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	1	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	1	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	1	0	1	1
			Polydora cornuta	PI, OP	0	1	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	1	0	0	12
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	1	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	1	0
			Capitella capitata complex Blake	PI, OP	0	0	0	1	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	1	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD550-01 LW03-SD550-01-10C 09/08/2010	LW03-SD551 LW03-SD551-00-10C 09/08/2010	LW03-SD552 LW03-SD552-00-10C 09/07/2010	LW03-SD553 LW03-SD553-00-10C 09/07/2010	LW03-SD555 LW03-SD555-00-10C 09/09/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	1	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	1	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	1	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	1	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	1	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	1	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	0	4	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	0	1	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		0	3	0	20	13
			Number of Taxa		0	3	0	17	2
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		0	3	0	20	13
			Total Density (Number per Square Meter)		0	43	0	287	187
			Number of Taxa		0	3	0	17	2
			Shannon Diversity Index (Base e)		0	1.099	0	2.776	0.271
			Shannon Diversity Index (Base 2)		0	1.585	0	4.005	0.391
			Name of Dominant Taxon		N/A	Paraprionospio pinnata / Polydora cornuta / Streblospio benedicti	N/A	Veneridae (LPIL)	Streblospio benedicti
			Percent Contribution of Dominant Taxon		0	33.33	0	18.18	95.31
			Density (No./Square Meter) Dominant Taxon		0	14	0	52	178
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	36.30	0.00
			Percent Spionid Polychaetes		0.00	100.00	0.00	4.50	100.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		0	50	0	18.18	50

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD556	LW03-SD557	LW03-SD558-01	LW03-SD559	LW03-SD562
					LW03-SD556-00-10C	LW03-SD557-00-10C	LW03-SD558-01-10C	LW03-SD559-00-10C	LW03-SD562-00-10C
					09/08/2010	09/08/2010	09/08/2010	09/07/2010	09/08/2010
Porifera									
			Porifera (LPIL)		0	0	0	1	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	0	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	1	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	0	1	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	3	0	1	1	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD556	LW03-SD557	LW03-SD558-01	LW03-SD559	LW03-SD562
					LW03-SD556-00-10C	LW03-SD557-00-10C	LW03-SD558-01-10C	LW03-SD559-00-10C	LW03-SD562-00-10C
					09/08/2010	09/08/2010	09/08/2010	09/07/2010	09/08/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	1	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	1	0	0	0
			Decapoda zoea (larva)		2	1	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	1
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	1	0	0
			Mysidae (LPIL)		1	0	0	0	0
			Neomysis americana		0	1	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	1	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	0	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		7	3	3	4	1
			Number of Taxa		4	3	3	4	1
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		7	3	3	4	1
			Total Density (Number per Square Meter)		101	43	43	57	14
			Number of Taxa		4	3	3	4	1
			Shannon Diversity Index (Base e)		1.277	1.099	1.099	1.386	0
			Shannon Diversity Index (Base 2)		1.842	1.585	1.585	2	0
			Name of Dominant Taxon		Streblospio benedicti	Decapoda (LPIL) / Decapoda zoea (LPIL) / Neomysis americana	Neanthes succinea / Streblospio benedicti / Americamysis sp.	Porifera (LPIL) / Paraprionospio pinnata / Streblospio benedicti / Pinnixa sp.	Leptostraca (LPIL)
			Percent Contribution of Dominant Taxon		42.86	33.33	33.33	25.00	100.00
			Density (No./Square Meter) Dominant Taxon		43	14	14	14	14
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		42.90	0.00	33.30	50.00	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		21.43	0	33.33	37.5	0

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD563	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
					LW03-SD563-00-10C	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
					09/08/2010	09/08/2010	09/08/2010	09/08/2010	08/31/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	0	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		0	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	0	0	0	0	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	0	0	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		0	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD563	LW03-SD564	LW03-SD567	LW03-SD571	LW03-SD574
					LW03-SD563-00-10C	LW03-SD564-00-10C	LW03-SD567-00-10C	LW03-SD571-00-10C	LW03-SD574-00-10C
					09/08/2010	09/08/2010	09/08/2010	09/08/2010	08/31/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	1	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	1	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	0	0	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		0	2	0	0	0
			Number of Taxa		0	2	0	0	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		0	2	0	0	0
			Total Density (Number per Square Meter)		0	29	0	0	0
			Number of Taxa		0	2	0	0	0
			Shannon Diversity Index (Base e)		0	0.693	0	0	0
			Shannon Diversity Index (Base 2)		0	1	0	0	0
			Name of Dominant Taxon		N/A	Americamysis sp. / Neomysis americana	N/A	N/A	N/A
			Percent Contribution of Dominant Taxon		0	50.00	0	0	0
			Density (No./Square Meter) Dominant Taxon		0	14	0	0	0
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Mediomastus Polychaetes		0.00	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		0	0	0	0	0

Phylum	Class	Order	Taxon	Pollution Classification	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010
Porifera									
			Porifera (LPIL)		0	0	1	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	1	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	4	0	0	0
Nemertea									
			Nemertea (LPIL)		1	1	0	1	5
			Nemertea sp. A (LPIL)		2	0	1	0	0
			Nemertea sp. B (LPIL)		1	0	0	2	0
			Nemertea sp. C (LPIL)		0	0	0	0	1
			Nemertea sp. D (LPIL)		0	0	0	1	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	15	0	0	1
			Dorvilleidae (LPIL)		0	2	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	1	0	1	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	1	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	3	3	1	1	3
			Gyptis crypta		0	3	0	1	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	29	0	0	2
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	2	0	0	3
			Nereididae (LPIL)		0	2	0	0	1
			Platynereis dumerilii		0	9	0	1	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	1	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	1	0	0	0
			Grubeosyllis clavata		0	4	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	1	2	0	1	0
			Aphelochaeta sp.		0	0	0	0	1
			Cirratulidae (LPIL)		7	4	0	9	8
			Tharyx sp.		3	4	3	9	4
			Pectinaria gouldii		0	2	0	0	1
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	3	0	0	0
			Sabellaria vulgaris		0	1	0	0	0
			Sabellidae (LPIL)		0	2	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	36	0	0	1
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	10	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	1
			Dipolydora cauleri		0	1	0	0	0
			Dipolydora socialis		0	1	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	1	0	0	0
			Paraprionospio pinnata	PI, OP	14	11	6	4	0
			Polydora cornuta	PI, OP	2	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	1	0	5	9
			Loimia medusa	PS	3	1	0	3	0
			Loimia sp.		1	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	1	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	1	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	1	0	0	0	1
			Mediomastus ambiseta	PS, PI, OP	0	18	0	2	13
			Mediomastus californiensis		0	11	0	0	0
			Mediomastus sp.		1	47	1	0	36
			Leitoscoloplos fragilis	PI, OP	1	1	0	0	3
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	1
			Sigambra tentaculata		2	1	1	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	6	0	1	2
			Tubificoides sp.		0	6	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	1	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	2	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	1
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	1	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	21	7	0	20	6
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		1	0	1	0	1
			Turbonilla interrupta		0	0	0	0	1
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		3	18	0	0	0
			Crepidula plana		1	1	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		2	2	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	3	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	14	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		1	0	0	0	0
			Mactridae (LPIL)		0	0	0	3	1
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		1	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	1	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		5	12	0	0	2
			Bivalvia (LPIL)		3	1	0	0	0
Phoronida									
			Phoronida (LPIL)		25	8	0	5	12
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		106	319	16	72	121
			Number of Taxa		25	50	9	20	27
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		106	319	16	72	121
			Total Density (Number per Square Meter)		1523	4583	230	1034	1739
			Number of Taxa		25	50	9	20	27
			Shannon Diversity Index (Base e)		2.54	3.217	1.895	2.465	2.589
			Shannon Diversity Index (Base 2)		3.665	4.641	2.733	3.556	3.736
			Name of Dominant Taxon		Phoronida (LPIL)	Mediomastus sp.	Paraprionospio pinnata	Acteocina canaliculata	Mediomastus sp.
			Percent Contribution of Dominant Taxon		23.58	14.73	37.50	27.78	29.75
			Density (No./Square Meter) Dominant Taxon		359	675	86	287	517
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		9.30	9.40	0.00	5.60	2.50
			Percent Spionid Polychaetes		15.10	4.70	37.50	12.50	8.30
			Percent Mediomastus Polychaetes		0.94	23.82	6.25	2.78	40.49
			Percent Deposit Feeders		22.17	36.21	50	38.89	63.23

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Phylum	Class	Order	Taxon	Pollution Classification	LW07-H3-SD401	LW07-J4-SD401	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401
					LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C	LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	1
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	1	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	2	1	1	1	1
			Gyptis crypta		0	0	0	0	2
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	2	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	1
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		4	0	28	27	2
			Tharyx sp.		0	2	5	14	0
			Pectinaria gouldii		1	1	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	7	18	6	4	11
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	1	0
			Streblospio benedicti	PI, OP	14	22	13	2	7
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	1	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	1	1	0	1	4
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		5	8	7	0	3
			Leitoscoloplos fragilis	PI, OP	0	1	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		1	1	0	2	2
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	1	4	0	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW07-H3-SD401	LW07-J4-SD401	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401
					LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C	LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		1	0	1	0	1
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		1	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		1	0	2	0	1
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	5	5	4	1	2
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		2	1	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		2	0	0	1	1
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	1	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	1	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	1	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	1	0	0	0
			Bivalvia (LPIL)		0	0	1	0	0
Phoronida									
			Phoronida (LPIL)		2	3	5	3	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	1	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		52	71	75	59	39
			Number of Taxa		18	15	13	13	14
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		52	71	75	59	39
			Total Density (Number per Square Meter)		747	1020	1078	848	560
			Number of Taxa		18	15	13	13	14
			Shannon Diversity Index (Base e)		2.456	2.061	1.997	1.746	2.269
			Shannon Diversity Index (Base 2)		3.543	2.973	2.881	2.519	3.274
			Name of Dominant Taxon		Streblospio benedicti	Streblospio benedicti	Cirratulidae (LPIL)	Cirratulidae (LPIL)	Paraprionospio pinnata
			Percent Contribution of Dominant Taxon		26.92	30.99	37.33	45.76	28.21
			Density (No./Square Meter) Dominant Taxon		201	316	402	388	158
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		5.70	1.40	1.30	10.20	2.60
			Percent Spionid Polychaetes		40.40	56.30	25.30	11.90	46.20
			Percent Mediomastus Polychaetes		11.54	12.68	9.33	1.69	17.52
			Percent Deposit Feeders		45.19	52.12	66	77.11	47.44

Phylum	Class	Order	Taxon	Pollution Classification	LW07-L2-SD401-01	LW07-H1-SD401-01	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401
					W07-L2-SD401-01-10C-0	W07-H1-SD401-00-10C-0	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C
					09/11/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010
Porifera									
			Porifera (LPIL)		0	1	1	0	1
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	1
	Anthozoa								
			Actiniaria (LPIL)		0	0	1	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	1
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	1	0	0
			Gyptis crypta		0	0	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	1
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		1	0	0	0	13
			Pectinaria gouldii		0	0	0	0	1
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	4	0	0	3	1
			Polydora cornuta	PI, OP	0	0	2	0	1
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	4	34	41	4	52
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	1	0	1
			Capitella jonesi	PI, OP	0	0	2	0	0
			Capitella sp.	PI, OP	0	1	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	2	0	0	7
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		9	0	2	0	2
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	1	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		1	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	1	0	1	0	2
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW07-L2-SD401-01	LW07-H1-SD401-01	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401
					W07-L2-SD401-01-10C-0	W07-H1-SD401-00-10C-0	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C
					09/11/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	1
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	1	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	1	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	6	2	0	3	1
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		1	0	0	2	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		1	0	1	1	0
			Bivalvia (LPIL)		0	0	0	0	1
Phoronida									
			Phoronida (LPIL)		1	0	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		29	40	54	15	87
			Number of Taxa		10	5	11	7	16
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		29	40	54	15	87
			Total Density (Number per Square Meter)		417	575	776	216	1250
			Number of Taxa		10	5	11	7	16
			Shannon Diversity Index (Base e)		1.932	0.622	1.092	1.807	1.533
			Shannon Diversity Index (Base 2)		2.788	0.898	1.576	2.606	2.211
			Name of Dominant Taxon		Mediomastus sp.	Streblospio benedicti	Streblospio benedicti	Streblospio benedicti	Streblospio benedicti
			Percent Contribution of Dominant Taxon		31.03	85.00	75.93	26.67	59.77
			Density (No./Square Meter) Dominant Taxon		129	489	589	57	747
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		10.20	0.00	1.90	20.00	1.10
			Percent Spionid Polychaetes		27.60	85.00	79.60	46.70	62.10
			Percent Mediomastus Polychaetes		31.03	5.00	3.70	0.00	10.35
			Percent Deposit Feeders		51.72	50	50.92	30	61.49

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Phylum	Class	Order	Taxon	Pollution Classification	LW07-SD401	LW07-SD402	LW07-SD403-01	LW07-SD404	LW03-SD534-02
					LW07-SD401-00-10C	LW07-SD402-00-10C	LW07-SD403-00-10C-01	LW07-SD404-00-10C	LW03-SD534-02-10C
					09/11/2010	09/11/2010	09/11/2010	09/10/2010	09/01/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	1	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		1	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	0	2	0	0	0
			Gyptis crypta		1	1	0	0	0
			Hesionidae (LPIL)		0	0	0	0	0
			Podarke obscura		0	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	1	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	1	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		1	1	0	10	0
			Tharyx sp.		0	5	0	3	0
			Pectinaria gouldii		0	2	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	1	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		0	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	1	6	0	5	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	31	67	31	44	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	29	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		1	19	1	35	0
			Leitoscoloplos fragilis	PI, OP	0	1	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	3	4	1	0	0
			Tubificoides sp.		0	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW07-SD401	LW07-SD402	LW07-SD403-01	LW07-SD404	LW03-SD534-02
					LW07-SD401-00-10C	LW07-SD402-00-10C	LW07-SD403-00-10C-01	LW07-SD404-00-10C	LW03-SD534-02-10C
					09/11/2010	09/11/2010	09/11/2010	09/10/2010	09/01/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	1	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	1	0	0
			Leucon americanus		0	0	1	0	0
			Cumacea (LPIL)		1	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	1	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		1	0	0	0	0
			Decapoda zoea (larva)		0	0	0	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	1	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	2	2	0	3	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		1	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		0	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	3	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	1	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		0	1	1	1	0
			Bivalvia (LPIL)		0	0	0	2	0
Phoronida									
			Phoronida (LPIL)		0	3	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		45	146	42	104	0
			Number of Taxa		12	17	10	9	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		45	146	42	104	0
			Total Density (Number per Square Meter)		647	2098	603	1494	0
			Number of Taxa		12	17	10	9	0
			Shannon Diversity Index (Base e)		1.337	1.784	1.125	1.471	0
			Shannon Diversity Index (Base 2)		1.929	2.574	1.622	2.123	0
			Name of Dominant Taxon		Streblospio benedicti	Streblospio benedicti	Streblospio benedicti	Streblospio benedicti	N/A
			Percent Contribution of Dominant Taxon		68.89	45.89	73.81	42.31	0
			Density (No./Square Meter) Dominant Taxon		445	963	445	632	0
			Percent Amphipods		0.00	0.00	2.40	0.00	0.00
			Percent Bivalves		0.00	0.70	11.90	2.90	0.00
			Percent Spionid Polychaetes		71.10	50.00	73.80	47.10	0.00
			Percent Mediomastus Polychaetes		2.22	32.87	2.38	33.65	0.00
			Percent Deposit Feeders		46.67	66.78	41.66	69.71	0

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD534-03	LW03-SD550-02	LW03-SD550-03	LW03-SD558-02	LW03-SD558-03
					LW03-SD534-03-10C	LW03-SD550-02-10C	LW03-SD550-03-10C	LW03-SD558-02-10C	LW03-SD558-03-10C
					09/01/2010	09/08/2010	09/08/2010	09/08/2010	09/08/2010
Porifera									
			Porifera (LPIL)		0	0	0	0	0
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	0
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	0
			Actiniaria sp. A		0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0
Nemertea									
			Nemertea (LPIL)		0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		6	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0
			Marphysa sanguinea		0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0
			Glycera sp.		0	0	0	0	0
			Ophioglycera sp.		0	0	0	0	0
			Glycinde solitaria	PS, OP	2	0	0	0	0
			Gyptis crypta		3	0	0	0	0
			Hesionidae (LPIL)		4	0	0	0	0
			Podarke obscura		5	0	0	0	0
			Laeonereis culveri		0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0
			Drilonereis longa		0	0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0	0
			Eteone sp.		0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0
			Phyllodoce mucosa		0	0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0
			Syllidae (LPIL)		0	0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0
			Tharyx sp.		0	0	0	0	0
			Pectinaria gouldii		1	0	0	0	0
			Pectinaria sp.		0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0
			Sabellinae (LPIL)		0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0
			Hydroides diathus		0	0	0	0	0
			Hydroides sp.		2	0	0	0	0
			Serpulidae (LPIL)		0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0
			Dipolydora socialis		0	0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0
			Paraprionospio pinnata	PI, OP	7	0	0	0	0
			Polydora cornuta	PI, OP	0	0	0	0	0
			Pseudopolydora sp.		0	0	0	0	0
			Scolelepis texana		0	0	0	0	0
			Spio sp.		0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0
			Streblospio benedicti	PI, OP	0	1	0	0	0
			Loimia medusa	PS	0	0	0	0	0
			Loimia sp.		0	0	0	0	0
			Pista cristata		0	0	0	0	0
			Terebellidae (LPIL)		3	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0
			Capitella jonesi	PI, OP	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0	0
			Heteromastus filiformis	PI, OP	1	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	0	0	0	0
			Mediomastus californiensis		0	0	0	0	0
			Mediomastus sp.		1	0	0	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0
			Sigambra tentaculata		0	0	0	0	0
			Clymenella torquata	PS, EQ	0	0	0	0	0
	Clitellata								
			Paranais frici		0	0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	0	0	0	0	0
			Tubificoides sp.		2	0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW03-SD534-03	LW03-SD550-02	LW03-SD550-03	LW03-SD558-02	LW03-SD558-03
					LW03-SD534-03-10C	LW03-SD550-02-10C	LW03-SD550-03-10C	LW03-SD558-02-10C	LW03-SD558-03-10C
					09/01/2010	09/08/2010	09/08/2010	09/08/2010	09/08/2010
Arthropoda									
	Malacostraca								
		Amphipoda							
			Aoridae (LPIL)		0	0	0	0	0
			Monocorophium acherusicum		0	0	0	0	0
			Monocorophium insidiosum		0	0	0	0	0
			Monocorophium sp.		0	0	0	0	0
			Listriella clymenellae	PS	0	0	0	0	0
		Cumacea							
			Cyclaspis varians		0	0	0	0	0
			Leucon americanus		0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	0
			Palaemonetes sp.		0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0
			Panopeus herbstii		0	0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0	0
			Pinnixa sp.		0	0	0	0	0
			Callinectes sp.		0	0	0	0	0
			Portunidae (LPIL)		0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0
			Decapoda zoea (larva)		0	0	2	0	0
		Isopoda							
			Edotia triloba		0	0	0	0	0
		Leptostraca							
			Leptostraca (LPIL)		0	0	0	0	0
		Mysida							
			Americamysis bigelowi		0	0	0	0	0
			Americamysis sp.		0	0	0	0	0
			Mysidae (LPIL)		0	0	0	0	0
			Neomysis americana		0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0
		Stomatopoda							
			Squilla empusa	PS, EQ	0	0	0	0	0
	Maxillopoda								
		Sessilia							
			Balanus improvisus		0	0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0	0
	Entognatha								
			Collembola (LPIL)		0	0	0	0	0
	Unspecified								
			Crustacea (LPIL)		0	0	0	0	0
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	1	0	0	0	0
			Acteocina sp.		0	0	0	0	0
			Odostomia engonia		0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0
			Astyris lunata		0	0	0	0	0
			Nassarius vibex		0	0	0	0	0
			Pyrgocythara plicosa		0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0
			Crepidula plana		0	0	0	0	0
			Cerithiopsis greenii		0	0	0	0	0
			Epitonium rupicola		0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	0
			Amygdalum papyrium		0	0	0	0	0
			Anomia simplex		1	0	0	0	0
			Pododesmus rudis		0	0	0	0	0
			Crassostrea virginica		0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0
			Mactridae (LPIL)		0	0	0	0	0
			Mulinia lateralis	OP	0	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0
			Macoma tenta		0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0
			Pitar sp.		0	0	0	0	0
			Veneridae (LPIL)		2	0	0	0	0
			Bivalvia (LPIL)		0	0	0	0	0
Phoronida									
			Phoronida (LPIL)		0	0	0	0	0
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	0
Chordata									
			Branchiostoma sp.		0	0	0	0	0
			Total Raw Count		41	1	2	0	0
			Number of Taxa		15	1	1	0	0
			PS = Pollution Sensitive, Weisberg et al, 1997						
			PI = Polution Indicator, Weisberg et al. 1997						
			OP = Opportunistic, Ranasinghe et al. 1994						
			EQ = Equlibrium, Ranasinghe et al. 1994						
			? = Uncertanty due to taxonomic identification level						
Metrics									
			Total Raw Count		41	1	2	0	0
			Total Density (Number per Square Meter)		589	14	29	0	0
			Number of Taxa		15	1	1	0	0
			Shannon Diversity Index (Base e)		2.492	0	0	0	0
			Shannon Diversity Index (Base 2)		3.595	0	0	0	0
			Name of Dominant Taxon		Paraprionospio pinnata	Streblospio benedicti	Decapoda zoea (LPIL)	N/A	N/A
			Percent Contribution of Dominant Taxon		17.07	100.00	100.00	0	0
			Density (No./Square Meter) Dominant Taxon		101	14	29	0	0
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		4.90	0.00	0.00	0.00	0.00
			Percent Spionid Polychaetes		17.10	100.00	0.00	0.00	0.00
			Percent Mediomastus Polychaetes		2.44	0.00	0.00	0.00	0.00
			Percent Deposit Feeders		24.4	50	0	0	0

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Phylum	Class	Order	Taxon	Pollution Classification	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-02	LW07-H1-SD401-03
					LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03
					09/11/2010	09/11/2010	09/10/2010	09/10/2010
Porifera								
			Porifera (LPIL)		1	0	0	0
Cnidaria								
	Hydrozoa							
			Hydrozoa (LPIL)		0	0	0	0
	Anthozoa							
			Actiniaria (LPIL)		0	0	0	0
			Actiniaria sp. A		0	0	0	0
			Anthozoa (LPIL)		0	0	0	0
Nemertea								
			Nemertea (LPIL)		0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0
			Nemertea sp. C (LPIL)		0	1	0	0
			Nemertea sp. D (LPIL)		0	0	0	0
Annelida								
	Polychaeta							
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0
			Marphysa sanguinea		0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0
			Glycera dibranchiata		0	0	0	0
			Glycera sp.		0	0	0	0
			Ophioglycera sp.		0	0	0	0
			Glycinde solitaria	PS, OP	0	1	0	0
			Gyptis crypta		0	0	0	1
			Hesionidae (LPIL)		0	0	0	0
			Podarke obscura		0	0	0	0
			Laeonereis culveri		0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0
			Nereididae (LPIL)		0	0	0	0
			Platynereis dumerilii		0	0	0	0
			Drilonereis longa		0	0	0	0
			Diopatra cuprea	PS, EQ	0	0	0	0
			Eteone sp.		0	0	0	0
			Eumida sanguinea		0	0	0	0
			Phyllodoce mucosa		0	0	0	0
			Phyllodocidae (LPIL)		0	0	0	0
			Lepidonotus sp.		0	0	0	0
			Grubeosyllis clavata		0	0	0	0
			Syllidae (LPIL)		0	0	0	0
			Ampharetidae (LPIL)		0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0
			Aphelochaeta sp.		0	0	0	0
			Cirratulidae (LPIL)		1	0	0	0
			Tharyx sp.		1	9	0	0
			Pectinaria gouldii		0	0	0	0
			Pectinaria sp.		0	0	0	0
			Demonax microphthalmus		0	0	0	0
			Sabellaria vulgaris		0	0	0	0
			Sabellidae (LPIL)		0	0	0	0
			Sabellinae (LPIL)		0	0	0	0
			Hydroides dianthus		0	0	0	0
			Hydroides diathus		0	0	0	0
			Hydroides sp.		0	0	0	0
			Serpulidae (LPIL)		0	0	0	0
			Apoprionospio pygmaea		0	0	0	0
			Dipolydora cauleri		0	0	0	0
			Dipolydora socialis		0	0	0	0
			Marenzelleria viridis	PS	0	0	0	0
			Minuspio sp.		0	0	0	0
			Paraprionospio pinnata	PI, OP	3	3	1	2
			Polydora cornuta	PI, OP	0	0	0	1
			Pseudopolydora sp.		0	0	0	0
			Scolelepis texana		0	0	0	0
			Spio sp.		0	0	0	0
			Spionidae (LPIL)		0	0	0	0
			Streblospio benedicti	PI, OP	16	31	13	20
			Loimia medusa	PS	0	0	0	0
			Loimia sp.		0	0	0	0
			Pista cristata		0	0	0	0
			Terebellidae (LPIL)		0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	1	0	3
			Capitella jonesi	PI, OP	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0
			Capitellidae (LPIL)		0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	6	6	4	1
			Mediomastus californiensis		0	0	0	0
			Mediomastus sp.		4	12	0	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0
			Orbiniidae (LPIL)		0	0	0	0
			Scoloplos rubra		0	0	0	0
			Sigambra tentaculata		1	0	0	1
			Clymenella torquata	PS, EQ	0	0	0	0
	Clitellata							
			Paranais frici		0	0	0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	1	0	0	1
			Tubificoides sp.		0	0	0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
Conversion Factor: 0.0696
Report Generated: 11/04/2010

Phylum	Class	Order	Taxon	Pollution Classification	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-02	LW07-H1-SD401-03
					LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03
					09/11/2010	09/11/2010	09/10/2010	09/10/2010
Arthropoda								
	Malacostraca							
		Amphipoda						
			Aoridae (LPIL)		0	0	0	0
			Monocorophium acherusicum		0	0	0	0
			Monocorophium insidiosum		0	0	0	0
			Monocorophium sp.		0	0	0	0
			Listriella clymenellae	PS	0	0	0	0
		Cumacea						
			Cyclaspis varians		0	0	0	0
			Leucon americanus		0	1	0	0
			Cumacea (LPIL)		0	0	0	0
		Decapoda						
			Alpheus sp.	PS, EQ?	0	0	0	0
			Palaemonetes sp.		0	0	0	0
			Panopeidae (LPIL)		0	0	0	0
			Panopeus herbstii		0	0	0	0
			Rhithropanopeus harrisii		0	0	0	0
			Pinnixa sp.		0	0	0	0
			Callinectes sp.		0	0	0	0
			Portunidae (LPIL)		0	0	0	0
			Decapoda (LPIL)		0	0	0	0
			Decapoda zoea (larva)		0	0	0	0
		Isopoda						
			Edotia triloba		0	0	0	0
		Leptostraca						
			Leptostraca (LPIL)		0	0	0	0
		Mysida						
			Americamysis bigelowi		0	1	0	1
			Americamysis sp.		0	0	0	0
			Mysidae (LPIL)		0	0	0	0
			Neomysis americana		0	0	0	0
			Mysidacea (LPIL)		0	0	0	0
		Stomatopoda						
			Squilla empusa	PS, EQ	0	0	0	0
	Maxillopoda							
		Sessilia						
			Balanus improvisus		0	0	0	0
			Balanomorpha (LPIL)		0	0	0	0
	Entognatha							
			Collembola (LPIL)		0	0	0	0
	Unspecified							
			Crustacea (LPIL)		0	0	0	0
Mollusca								
	Gastropoda							
			Acteocina canaliculata	PS	0	1	1	1
			Acteocina sp.		0	0	0	0
			Odostomia engonia		0	0	0	0
			Turbonilla interrupta		0	0	0	0
			Astyris lunata		0	0	0	0
			Nassarius vibex		0	0	0	0
			Pyrgocythara plicosa		0	0	0	0
			Crepidula fornicata		0	0	0	0
			Crepidula plana		0	0	0	0
			Cerithiopsis greenii		0	0	0	0
			Epitonium rupicola		0	0	0	0
			Gastropoda (LPIL)		0	0	0	0
	Bivalvia							
			Anadara transversa	PS, EQ	0	0	0	0
			Amygdalum papyrium		0	0	0	0
			Anomia simplex		0	0	0	0
			Pododesmus rudis		0	0	0	0
			Crassostrea virginica		0	0	0	0
			Lyonsia hyalina		0	0	0	0
			Mactridae (LPIL)		0	0	0	0
			Mulinia lateralis	OP	0	0	0	0
			Petricolaria pholadiformis		0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0
			Macoma tenta		0	1	0	0
			Tellinidae (LPIL)		0	0	0	0
			Gemma gemma	OP	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0
			Pitar sp.		0	1	0	0
			Veneridae (LPIL)		0	1	0	1
			Bivalvia (LPIL)		1	0	0	0
Phoronida								
			Phoronida (LPIL)		1	1	0	0
Echinodermata								
			Ophiuroidea (LPIL)		0	0	0	0
Chordata								
			Branchiostoma sp.		0	0	0	0
			Total Raw Count		36	71	19	33
			Number of Taxa		11	15	4	11
			PS = Pollution Sensitive, Weisberg et al, 1997					
			PI = Polution Indicator, Weisberg et al. 1997					
			OP = Opportunistic, Ranasinghe et al. 1994					
			EQ = Equlibrium, Ranasinghe et al. 1994					
			? = Uncertanty due to taxonomic identification level					
Metrics								
			Total Raw Count		36	71	19	33
			Total Density (Number per Square Meter)		517	1020	273	474
			Number of Taxa		11	15	4	11
			Shannon Diversity Index (Base e)		1.807	1.867	0.898	1.539
			Shannon Diversity Index (Base 2)		2.607	2.693	1.295	2.22
			Name of Dominant Taxon		Streblospio benedicti	Streblospio benedicti	Streblospio benedicti	Streblospio benedicti
			Percent Contribution of Dominant Taxon		44.44	43.66	68.42	60.61
			Density (No./Square Meter) Dominant Taxon		230	445	187	287
			Percent Amphipods		0.00	0.00	0.00	0.00
			Percent Bivalves		2.80	4.20	0.00	3.00
			Percent Spionid Polychaetes		52.80	47.90	73.70	69.70
			Percent Mediomastus Polychaetes		27.78	25.35	21.05	3.03
			Percent Deposit Feeders		62.5	63.38	57.89	50

Phylum	Class	Order	Taxon	Pollution Classification	LW07-SD403-02	LW07-SD403-03
					LW07-SD403-00-10C-02	LW07-SD403-00-10C-03
					09/11/2010	09/11/2010
Porifera						
			Porifera (LPIL)		0	0
Cnidaria						
	Hydrozoa					
			Hydrozoa (LPIL)		0	0
	Anthozoa					
			Actiniaria (LPIL)		0	0
			Actiniaria sp. A		0	0
			Anthozoa (LPIL)		0	0
Nemertea						
			Nemertea (LPIL)		0	0
			Nemertea sp. A (LPIL)		0	0
			Nemertea sp. B (LPIL)		0	0
			Nemertea sp. C (LPIL)		0	0
			Nemertea sp. D (LPIL)		0	0
Annelida						
	Polychaeta					
			Dorvillea (Schistomeringos) rudolphi		0	0
			Dorvilleidae (LPIL)		0	0
			Marphysa sanguinea		0	0
			Glycera americana	PS, EQ	0	0
			Glycera dibranchiata		0	0
			Glycera sp.		0	0
			Ophioglycera sp.		0	0
			Glycinde solitaria	PS, OP	0	0
			Gyptis crypta		0	0
			Hesionidae (LPIL)		0	0
			Podarke obscura		0	0
			Laeonereis culveri		0	0
			Neanthes succinea	PI, OP	0	0
			Nereididae (LPIL)		0	0
			Platynereis dumerilii		0	0
			Drilonereis longa		0	0
			Diopatra cuprea	PS, EQ	0	0
			Eteone sp.		0	0
			Eumida sanguinea		0	0
			Phyllodoce mucosa		0	0
			Phyllodocidae (LPIL)		0	0
			Lepidonotus sp.		0	0
			Grubeosyllis clavata		0	0
			Syllidae (LPIL)		0	0
			Ampharetidae (LPIL)		0	0
			Spiochaetopterus costarum	PS	0	0
			Aphelochaeta sp.		0	0
			Cirratulidae (LPIL)		0	0
			Tharyx sp.		1	8
			Pectinaria gouldii		0	1
			Pectinaria sp.		0	0
			Demonax microphthalmus		0	0
			Sabellaria vulgaris		0	0
			Sabellidae (LPIL)		0	0
			Sabellinae (LPIL)		0	0
			Hydroides dianthus		0	0
			Hydroides diathus		0	0
			Hydroides sp.		0	0
			Serpulidae (LPIL)		0	0
			Apoprionospio pygmaea		0	0
			Dipolydora cauleri		0	0
			Dipolydora socialis		0	0
			Marenzelleria viridis	PS	0	0
			Minuspio sp.		0	0
			Paraprionospio pinnata	PI, OP	1	0
			Polydora cornuta	PI, OP	0	0
			Pseudopolydora sp.		0	0
			Scolelepis texana		0	0
			Spio sp.		0	0
			Spionidae (LPIL)		0	0
			Streblospio benedicti	PI, OP	4	28
			Loimia medusa	PS	0	0
			Loimia sp.		0	0
			Pista cristata		0	0
			Terebellidae (LPIL)		0	0
			Capitella capitata complex Blake	PI, OP	1	0
			Capitella jonesi	PI, OP	0	0
			Capitella sp.	PI, OP	0	0
			Capitellidae (LPIL)		0	0
			Heteromastus filiformis	PI, OP	0	0
			Mediomastus ambiseta	PS, PI, OP	1	12
			Mediomastus californiensis		0	0
			Mediomastus sp.		0	3
			Leitoscoloplos fragilis	PI, OP	0	0
			Leitoscoloplos sp.		0	0
			Orbiniidae (LPIL)		0	0
			Scoloplos rubra		0	0
			Sigambra tentaculata		0	0
			Clymenella torquata	PS, EQ	0	0
	Clitellata					
			Paranais frici		0	0
			Tubificoid Naididae imm. w/o hair setae (LP	PI	1	2
			Tubificoides sp.		0	0

Prepared For: CH2M HILL
Project Name: Navy Clean III
Sample Group: Navy Clean
August - September 2010

Sample Method: Petite Ponar
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Phylum	Class	Order	Taxon	Pollution Classification	LW07-SD403-02 LW07-SD403-00-10C-02 09/11/2010	LW07-SD403-03 LW07-SD403-00-10C-03 09/11/2010
Arthropoda						
	Malacostraca					
		Amphipoda				
			Aoridae (LPIL)		0	0
			Monocorophium acherusicum		0	0
			Monocorophium insidiosum		0	0
			Monocorophium sp.		0	1
			Listriella clymenellae	PS	0	0
		Cumacea				
			Cyclaspis varians		0	0
			Leucon americanus		0	0
			Cumacea (LPIL)		0	0
		Decapoda				
			Alpheus sp.	PS, EQ?	0	0
			Palaemonetes sp.		0	0
			Panopeidae (LPIL)		0	0
			Panopeus herbstii		0	0
			Rhithropanopeus harrisii		0	0
			Pinnixa sp.		0	0
			Callinectes sp.		0	0
			Portunidae (LPIL)		0	0
			Decapoda (LPIL)		0	0
			Decapoda zoea (larva)		0	0
		Isopoda				
			Edotia triloba		0	0
		Leptostraca				
			Leptostraca (LPIL)		0	0
		Mysida				
			Americamysis bigelowi		0	0
			Americamysis sp.		0	0
			Mysidae (LPIL)		0	0
			Neomysis americana		0	0
			Mysidacea (LPIL)		0	0
		Stomatopoda				
			Squilla empusa	PS, EQ	0	0
	Maxillopoda					
		Sessilia				
			Balanus improvisus		0	0
			Balanomorpha (LPIL)		0	0
	Entognatha					
			Collembola (LPIL)		0	0
	Unspecified					
			Crustacea (LPIL)		0	0
Mollusca						
	Gastropoda					
			Acteocina canaliculata	PS	2	0
			Acteocina sp.		0	0
			Odostomia engonia		0	0
			Turbonilla interrupta		0	0
			Astyris lunata		0	0
			Nassarius vibex		0	0
			Pyrgocythara plicosa		0	0
			Crepidula fornicata		0	0
			Crepidula plana		0	0
			Cerithiopsis greenii		0	0
			Epitonium rupicola		0	0
			Gastropoda (LPIL)		0	0
	Bivalvia					
			Anadara transversa	PS, EQ	0	0
			Amygdalum papyrium		0	0
			Anomia simplex		0	0
			Pododesmus rudis		0	0
			Crassostrea virginica		0	0
			Lyonsia hyalina		0	0
			Mactridae (LPIL)		1	1
			Mulinia lateralis	OP	0	0
			Petricolaria pholadiformis		0	0
			Tagelus plebeius	EQ	0	0
			Tagelus sp.	PS, EQ?	0	0
			Macoma tenta		0	0
			Tellinidae (LPIL)		0	0
			Gemma gemma	OP	0	0
			Mercenaria mercenaria	PS, EQ	0	0
			Pitar sp.		0	0
			Veneridae (LPIL)		0	1
			Bivalvia (LPIL)		0	0
Phoronida						
			Phoronida (LPIL)		0	0
Echinodermata						
			Ophiuroidea (LPIL)		0	0
Chordata						
			Branchiostoma sp.		0	0
			Total Raw Count		12	57
			Number of Taxa		8	9
			PS = Pollution Sensitive, Weisberg et al, 1997			
			PI = Polution Indicator, Weisberg et al. 1997			
			OP = Opportunistic, Ranasinghe et al. 1994			
			EQ = Equlibrium, Ranasinghe et al. 1994			
			? = Uncertanty due to taxonomic identification level			
Metrics						
			Total Raw Count		12	57
			Total Density (Number per Square Meter)		172	819
			Number of Taxa		8	9
			Shannon Diversity Index (Base e)		1.907	1.509
			Shannon Diversity Index (Base 2)		2.752	2.177
			Name of Dominant Taxon		Streblospio benedicti	Streblospio benedicti
			Percent Contribution of Dominant Taxon		33.33	49.12
			Density (No./Square Meter) Dominant Taxon		57	402
			Percent Amphipods		0.00	1.80
			Percent Bivalves		8.30	3.60
			Percent Spionid Polychaetes		41.70	49.10
			Percent Mediomastus Polychaetes		8.33	26.31
			Percent Deposit Feeders		54.17	70.18

Attachment D
Ecological Risk Assessment

ATTACHMENT D

Ecological Risk Assessment

D.1 Introduction

This attachment provides an update to the ecological risk assessment (ERA) documented in the December 2004 Remedial Investigation (RI) report (CH2M HILL, 2004) to evaluate the changes in site conditions that have occurred since the RI was completed. In 2008, a military construction (MILCON) action to demolish and replace Piers 44 through 51, construct a new quay wall along the eastern and southern edges of Desert Cove, and dredge limited areas surrounding the former piers was completed (**Figure D-1**). Following the MILCON action, additional data were collected in 2009 and 2010 at SWMU 7b (surface sediment and benthic invertebrates), as well as at a reference area in Little Creek Cove (surface sediment). This baseline (Step 7) ERA evaluates these additional data, together with the previously collected (historical) data from the RI and Site Investigation (SI), to identify and document changes in ecological risks in the context of the current, post-MILCON conditions at the site.

D.1.1 Previous Ecological Risk Assessments

A draft ERA, through Step 3 of the ERA process, was previously completed for SWMU 7 in 2001 (CH2M HILL, 2001) and was based upon analytical data collected as part of the 1998 SI. Following completion of the 2001 ERA, additional sediment, surface soil, subsurface soil, and groundwater samples were collected at SWMU 7 as part of the RI (CH2M HILL, 2004). This additional sampling included a number of sediment, soil, and groundwater locations not evaluated in the 2001 ERA. The 2004 final RI, which was accepted by the Little Creek Partnering Team, included an ERA that reiterated Steps 1 through 3 of the ERA process, incorporating these new data, and concluded the following:

- The terrestrial portion (SWMU 7a) of the site is highly developed, and the resulting low quality of the habitat present (pavement, gravel, or hard-packed dirt with sparse herbaceous plants) results in a lack of significant exposure pathways to ecological receptors. Additionally, a September 2004 interim removal action completed for surface soil in the northern portion of the site reduced the potential for continued transport of abrasive blast material (ABM) residues and associated metals to Desert Cove. The potential for continued transport of ABM residues and associated metals to Desert Cove via wind and surface runoff from the eastern and southern portions of the site is low.
- To better evaluate potential ecological risks where potential exposures could vary because of differences in the magnitude of contaminant concentrations, SWMU 7b was divided into three areas: the Connector Channel, Cove, and Pier Area (**Figure D-1**). ABM was observed in surface sediment samples collected throughout the Connector Channel, Cove, and Pier Area, but was most abundant in portions of the Pier Area. ABM was less commonly observed in subsurface sediment samples, particularly in the Connector Channel, and was confined to the top foot of the sediment column.
- In surface sediment (0 to 4 inch depth), metals (particularly copper, lead, mercury, tin, and zinc) and polycyclic aromatic hydrocarbons (PAHs) were identified as chemicals of concern (COCs) (**Figure D-2**). A comparison of surface and subsurface sediment concentrations suggests some mixing is occurring within the top foot or so of the sediment column. In general, sediment concentrations were highest in the Pier Area and lowest in the Connector Channel. This pattern was also reflected in the benthic invertebrate community data, which generally showed a more abundant and diverse benthic invertebrate community in the Connector Channel relative to the Pier Area, and was also consistent with the known site history and proximity to source areas. Simultaneously extracted metals/acid-volatile sulfide (SEM/AVS) ratios from surface sediment samples, however, suggest that metal bioavailability is low, with only 1 of 18 ratios exceeding 1. A comparison of surface sediment concentrations to equilibrium partitioning-based sediment values, which provide a measure of bioavailability for the three PAHs with available values, suggests that potential exposures and PAH-related risks are relatively high in the Pier Area and low elsewhere.

- The benthic invertebrate community found within the Desert Cove system is generally typical of what is expected for this geographical area and type of habitat (urban harbor). The dominant organisms are generally characterized as tolerant of pollutants and low dissolved oxygen (DO), and opportunistic; are indicative of organic enrichment and depositional environments; and are surface dwellers, inhabiting the sediment/water interface (deeper-dwelling organisms were generally low to absent, probably because of the anoxic conditions at depths more than a few centimeters below the sediment surface).
- There were no exceedances for aquatic-based food web exposures based upon No Observed Adverse Effect Levels (NOAELs).
- Groundwater was not a significant transport route from the site to the Desert Cove system for ABM-related constituents.
- In summary, the highest site-related ecological risks were associated with metals (primarily copper, lead, mercury, tin, and zinc, but also arsenic, selenium, and silver) and PAHs in Desert Cove sediments, particularly in the Pier Area.
- The RI recommended that further investigation of SWMU 7b be conducted following completion of the scheduled MILCON action.

During the November 2008 partnering meeting, in preparation for post-MILCON action site evaluations, the Navy, USEPA, and VDEQ re-evaluated existing site data to refine the existing conceptual site model. The partnering team agreed that potential ecological risks associated with PAHs in sediment are not unacceptable and do not require further investigation, based on the following:

- PAHs are not likely attributable to the CERCLA activities (sandblasting) at SWMU 7b. PAHs are not typically associated with sandblasting residues. PAHs are likely to be primarily attributable to the nineteen (19) storm water outlets which convey storm water runoff from various locations within the facility, including numerous parking areas.

Although arsenic, selenium, and silver may have been components of ship hull paint historically sandblasted at SWMU 7b (Navy, 2006), potential risks associated with these COCs in sediment are considered not unacceptable based upon the following:

- Arsenic was identified as a COC in the Cove Area and Pier Area during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum hazard quotient (HQ) for arsenic, based upon the effects range-low (ER-L), in surface sediment is 1.54 and the site-wide mean HQ is less than 1. Arsenic was detected in 41 of 41 surface sediment samples collected; however, the maximum detected concentration of arsenic (12.6 mg/kg) is below the probable effects level (PEL) (41.6 mg/kg) and effects range-median (ER-M) (70 mg/kg). Although arsenic was not measured as part of the background sediment investigation (see Section 5.1.2, Background Data), the similarity of the mean (8.00 mg/kg) and maximum (12.6 mg/kg) concentrations suggests that this chemical is present at levels representative of the urban nature of the water body rather than historic sandblasting activities. Additionally, copper, lead, mercury, tin, and zinc do not show similar uniform distributions.
- Selenium was identified as a COC in the Channel, Cove, and Pier Areas during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum HQ for selenium, based upon the apparent effects threshold (AET), in surface sediment is 2.50 and the site-wide mean HQ is less than 1. All detected concentrations of selenium (maximum of 2.5 mg/kg) exceed the AET (1 mg/kg); however selenium was only detected in 10 of 41 (about 25 percent) of the surface samples.
- Silver was identified as a COC in the Pier Area during the 2004 RI, where only the discrete RI sediment samples were used to derive the list of COCs. When considering both the discrete and composite RI samples, the site-wide maximum HQ for silver, based upon the ER-L, in surface sediment is 7.80 and the site-wide mean HQ is less than 1. Silver was detected in 7 of 41 (about 15 percent) of surface sediment samples and was not

detected in subsurface sediment. The four sample locations that exceeded screening values (ER-L, ER-M, TEL, and/or PEL) are located within the area since removed by the MILCON action.

D.1.2 Subsequent Sampling

In November 2009, surface sediment sampling was conducted to evaluate post-MILCON dredge conditions in the Desert Cove system. Discrete surface sediment samples were collected from the 15 RI (2002) locations that were outside of the area affected by the MILCON action, as well as from additional locations in the Pier Area within and outside of the area affected by the MILCON action, and analyzed for copper, lead, mercury, tin, zinc, total organic carbon (TOC), pH, AVS/SEM, and grain size (**Figure D-3**). A subset of samples was also analyzed for tributyltin (TBT). Percent ABM was qualitatively estimated. Surface water parameter measurements (pH, specific conductance, salinity, turbidity, temperature, DO, and oxidation-reduction potential [ORP]) were collected from the top, middle, and bottom of the water column at each sediment sampling location.

In September 2010, additional surface sediment sampling was conducted to evaluate the current condition of the benthic invertebrate community within the Connector Channel, Cove, and Pier Area. Composite surface sediment samples (comprising three subsamples) were collected within a 1-acre grid around the center point of the 15 RI (2002) locations that were outside of the area affected by the MILCON action, as well as from four additional locations in the Pier Area outside of the area affected by the MILCON action (**Figure D-4**), and analyzed for copper, lead, mercury, tin, zinc, TOC, pH, AVS/SEM, and grain size. Percent ABM was quantitatively measured. Surface water parameter measurements (pH, specific conductance, salinity, turbidity, temperature, DO, and ORP) were collected from the top, middle, and bottom of the water column at each sediment sampling location (center point of the grid). Benthic invertebrate samples (composite) were also collected at each of the 19 locations (see Section D.5.2). The benthic invertebrate taxonomy report is included as **Attachment C** of the technical memorandum.

This ERA evaluates the data from both the November 2009 and September 2010 sampling efforts.

D.1.3 Scope and Objectives of the ERA

The ERA was limited to the sediments of the Desert Cove system (Connector Channel, Cove, and Pier Area) and to the primary COCs identified in the RI (copper, lead, mercury, tin, and zinc). As described in Section D.1.1, there were no unacceptable ecological risks associated with the terrestrial portion of the site because of the lack of significant exposure pathways. Groundwater was not a significant transport route from the site to the Desert Cove system for ABM-related constituents.

No surface water data have been collected from SWMU 7b as part of site-specific studies because this medium has not been identified as contributing significantly to potential ecological exposures (several historical surface water samples have been collected in the Desert Cove system, as documented in the 2004 RI report, as part of non-Installation Restoration Program studies). Ecological exposures via food webs were not recalculated in the ERA because the surface sediment concentrations of the primary COCs, all of which have the potential for significant bioaccumulation, were similar between 2000/2002 (where ecological risks from this pathway were found to be acceptable during the 2004 RI) and subsequent (2009 and 2010) sampling events.

As documented in the sampling and analysis plan (SAP) (CH2M HILL, 2011), the primary objective of the SWMU 7b investigation was to assess the existing benthic invertebrate community at SWMU 7b in order to identify any site-related impacts from ABM and/or the metal COCs on this community, and to determine if further investigation, action, or no action is warranted. The environmental questions to be answered were as follows:

- What is the composition and condition of the existing benthic invertebrate community at SWMU 7b and how does it vary spatially throughout the site?
- Is the composition and condition of the existing benthic invertebrate community at SWMU 7b correlated with the concentration of the COCs and/or the presence of ABM?
- Is further investigation or action required for the Cove, Connector Channel, and/or Pier Area at SWMU 7b?

The focus of the ERA was to address the project objective and to answer the environmental questions developed as part of the 2010 SAP. The process to be followed for risk screening and risk acceptability was developed

through a series of discussions at a number of Tier 1 partnering team meetings, including September 2008, October 2008, November 2008, March 2010, and December 2010. These discussions are summarized in the 2010 SAP (CH2M HILL, 2011).

D.2 Problem Formulation

Problem formulation establishes the goals, scope, and focus of an ERA. As part of problem formulation, the environmental setting of SWMU 7b was characterized in terms of the habitats and biota known or likely to be present. The types and concentrations of chemicals present in ecologically relevant media (in this case sediment) are also described. A conceptual site model was developed that describes source areas, transport pathways and exposure media, exposure pathways and routes, and receptors. Assessment endpoints, measurement endpoints, and risk hypotheses were developed to evaluate those receptors for which critical exposure pathways exist. The fate, transport, and toxicological properties of the primary COCs for SWMU 7b also were considered during this process.

D.2.1 Environmental Setting

For investigation purposes, SWMU 7 was divided into two areas: (1) the terrestrial portion of the site (SWMU 7a), which consists of the area along former Piers 44 through 55 at Desert Cove, as well as the area surrounding the northern portion of Building CB-125; and (2) the aquatic portion of the site (SWMU 7b), which consists of Desert Cove and the Connector Channel (**Figure D-1**).

SWMU 7a was used to sandblast and paint ships from 1960 until 1996. In 1996, sandblasting activities were moved to an indoor facility (Building CB-125). Approximately 4,000 cubic yards (yd^3) of spent ABM generated between 1960 and 1982 were stored in open piles in the construction footprint of Building CB-125 and in the area of Buildings CB-317 and CB-318. This ABM has since been sampled (Extraction Procedure toxicity), removed, and disposed of offsite.

No historical mechanisms to control releases have been identified at SWMU 7a. Based upon visual site inspections conducted in 1988 (Earth Technologies Corp., 1988), historical releases of spent ABM and oily substances to soils and to Desert Cove have occurred at this site. According to the Navy's responses to the draft Resource Conservation and Recovery Act Facility Assessment (A.T. Kearney, 1989), oil-stained soils in the area have been removed. During the SI, ABM was encountered on the ground surface only in the portions of SWMU 7a near Buildings CB-125, CB-317, CB-318, and 3869 (**Figure D-1**); no ABM was identified in subsurface soils. From visual observations, it was estimated that ABM comprised less than 5 percent of surface soils at SWMU 7a. Most of the observed ABM was noted in the vicinity of Building CB-125, which currently serves as an indoor sandblasting facility, and a small area near Building CB-317.

An Interim Removal Action was completed in September 2004 that removed approximately 40 yd^3 of lead-contaminated soil. Following the completion of this action, the Navy, in partnership with USEPA and VDEQ, agreed no further action was required for SWMU 7a, and a Record of Decision was signed in June 2005.

A large portion of the ground surface at SWMU 7a is covered by asphalt or buildings. Most of the remaining area consists of hard-packed dirt or gravel. Heavy equipment (cranes and trailers) is currently stored in portions of the site. The current and anticipated future land use of the SWMU 7 area is not expected to change.

Precipitation runs off to Desert Cove and the Connector Channel or is discharged through one permitted (Outfall 007) and 18 non-permitted storm water outfalls, with very little infiltration to groundwater. All drainage to the Cove and Connector Channel is from on-Base areas, consisting mainly of buildings and asphalt parking areas. Groundwater flow in the area is west-northwest towards Desert Cove.

There are no forested habitats on SWMU 7a. Open areas of maintained grass are present, but are very limited in extent. There are no wetlands on SWMU 7a. Desert Cove borders SWMU 7a to the north and west. The entire shoreline of Desert Cove is composed of bulkheads and piers that are used to moor small ships. Most of the shoreline in the Connector Channel consists of a narrow, shrubby fringe adjacent to developed areas.

In 2008, a MILCON action to demolish and replace Piers 44 through 51, construct a new quay wall along the eastern and southern edges of Desert Cove, and dredge limited areas surrounding the former piers was completed (**Figure D-1**). The new quay wall was constructed approximately 32 feet outboard of the former knee wall. Sheet piling was installed to a depth of 24 feet below the sediment surface, and all material between the sheet pile and knee wall was left in place. The roadway adjacent to the shoreline was demolished, and debris was allowed to fall in place. A new concrete roadway was constructed along the edge of the new quay wall. Following demolition and before construction of the new piers, the area around the former piers was dredged to a depth of 10 feet below mean low water (resulting in between about 1 and 7 feet of sediment being removed, depending upon area, mostly immediately adjacent to the existing bulkhead). Other than the 2008 MILCON action, no dredging has occurred in the Desert Cove system since 1953, when the Cove (Piers 36 through 55) was dredged to a depth of approximately 10 feet below mean low water.

As part of the MILCON action, a pre-dredge survey was conducted in January 2008. Results indicate the deposition rate for the Cove is relatively low. Water depth in the Connector Channel is typically around 13 feet, plus or minus 3 feet (the approximate tidal range), but is shallower near the shorelines because they do not contain bulkheads. Water depth in the Cove and the Pier Area is typically around 15 feet, plus or minus 3 feet (the approximate tidal range).

The salinity of Desert Cove and the Connector Channel is generally between about 21 and 22 parts per thousand (ppt) near the surface and in the middle of the water column (**Tables D-1 through D-3**) but may be lower at locations near storm water outfalls during rain events. At the bottom of the water column, the salinity tends to be slightly higher, generally between about 22 and 23 ppt (**Tables D-1 through D-3**).

The TOC concentration in surface sediments typically exceeds 1 percent (range of 0.22 to 3.2 percent), averaging about 1.7 percent (**Table D-4**). The sediment pH is typically about 8. The percent fines (silt and clay) typically exceeds 50 percent (range of 11.1 to 94.0 percent), averaging about 63 percent. The depth to the redox boundary is typically only a few millimeters. The SEM/AVS ratio, a measure of metal bioavailability, rarely exceeded 1 (indicating low bioavailability) in the September/October 2002 surface sediment samples (2 of 19 samples) and did not exceed 1 in any of the September 2010 surface sediment samples (0 of 19), but exceeded 1 in 25 percent (7 of 28) of the surface sediment samples collected in November 2009 (**Table D-4**).

During the 2002 RI sampling, ABM was present in 63 percent of surface (depths of 0 to 4 inches) sediment samples, generally in low to trace amounts. ABM was also observed in about half of the 2002 sediment cores (core depths were approximately 5 feet), generally at depths of less than 6 inches and not at depths below 15 inches (**Table D-4**). In 2009 surface sediment samples, ABM was absent or present only in trace amounts (≤1 percent) in the Connector Channel, present at levels of up to 5 percent in the Cove and at levels of up to 10 percent in portions of the Pier Area (**Table D-4**) based upon qualitative visual estimates. In 2010 surface sediment samples, where ABM was measured quantitatively, ABM was present in only trace amounts (≤1 percent) in the Connector Channel, Cove, and in the Pier Area, except in the northeast corner, where it ranged from 1.5 to 2.5 percent (**Table D-4**).

Other potential sources of contaminants to Desert Cove, other than ABM residue from SWMU 7a, are leaks/spills from fuel barges moored at the piers in the Cove and a number of storm water outfalls that enter the Cove along the northern, eastern, and southern sides (**Figure D-1; Table D-5**).The effect of outfall inputs into the Desert Cove system upon the chemical concentrations in sediment is not known. The northeastern and southeastern corners of Desert Cove represent the areas of largest storm water runoff loading.

As documented in the 2004 RI report, no state or federally listed threatened or endangered species are known to occur on or near SWMU 7b. Various species of estuarine fish are likely to use the Desert Cove system at least periodically. The benthic invertebrate community found in the Desert Cove system, based upon 2002 and 2010 sampling, is generally typical of what is expected for this geographical area and type of habitat (urban harbor). The dominant organisms are generally characterized as tolerant of pollutants and low DO, and opportunistic; are indicative of organic enrichment and depositional environments; and are surface dwellers, inhabiting the sediment/water interface (deeper-dwelling organisms were generally low to absent, probably because of the

anoxic conditions at depths more than a few centimeters below the sediment surface) (**Tables D-6 and D-7**). The available benthic invertebrate community data were evaluated in detail as part of the risk characterization discussed in Section D.5.2.

D.2.2 Summary of Available Analytical Sediment Data

Some surface sediment data have been collected in Desert Cove as part of non-Installation Restoration Program studies (1984-1996), as shown in **Table D-8**. These data were considered only qualitatively in the ERA because the data quality and validation status were not known.

In June 2000, as part of the SI, surface sediment (0–4 inches below sediment surface [bss]) samples were collected in Desert Cove adjacent to the bulkhead at five locations. Four of these samples were in the area affected by the 2008 MILCON action. In September 2002, as part of the RI, 19 discrete and 17 composite surface (0-4 inches bss) sediment samples were collected from the Desert Cove system. Seven of these samples (4 discrete and 3 composite) were in the area affected by the 2008 MILCON action. Nineteen subsurface (depth varied because samples were generally collected in the 6-inch depth increment just below the extent of visible ABM) samples were also collected from the Desert Cove system as part of the September 2002 RI sampling. Four of these subsurface samples were in the area affected by the 2008 MILCON action.

In November 2009, surface sediment sampling was conducted to evaluate post-MILCON dredge conditions in the Desert Cove system. Discrete surface sediment samples were collected from the 15 RI (2002) locations that were outside of the area affected by the MILCON action, as well as from 13 additional locations in the Pier Area within and outside of the area affected by the MILCON action (28 total samples). In September 2010, surface sediment sampling was conducted to evaluate the current condition of the benthic invertebrate community within the Connector Channel, Cove, and Pier Area. Composite surface sediment samples were collected from around the 15 RI (2002) locations that were outside of the area affected by the MILCON action, as well as from 4 additional locations in the Pier Area outside of the area affected by the MILCON action (19 total samples).

Sampling locations are shown on **Figures D-2, D-3, and D-4**. **Table D-9** lists the IDs of all samples used in the ERA. The raw analytical data are provided in **Attachment A** of the technical memorandum. The number and location of all 2002 (RI), 2009, and 2010 samples were scoped jointly by the Navy, USEPA, VDEQ, and the Region 3 Biological Technical Assistance Group as part of the work planning process or as part of the SAP preparation.

D.2.3 Conceptual Site Model

The conceptual model relates potentially exposed receptor populations with potential source areas based upon physical site characteristics and complete exposure pathways. Important components of the conceptual site model are the identification of potential source areas, transport pathways, exposure media, exposure pathways and routes, and receptors. Actual or potential exposures of ecological receptors associated with a site are assessed by identifying the most likely and most important mechanisms and pathways of contaminant release and transport. A complete exposure pathway has three components: (1) a source of chemicals that results in a release to the environment; (2) a pathway and mechanism of chemical transport through an environmental medium; and (3) an exposure or contact point for an ecological receptor. **Figure D-5** illustrates a diagrammatic conceptual site model for SWMU 7b. Key components of this conceptual model are discussed in the following subsections.

Source Areas

The site-related potential source areas at SWMU 7 include the areas in which historical sandblasting-related activities occurred.

Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby chemicals may be transported from a source of contamination to ecologically relevant media (such as sediment). These transport pathways are shown on **Figure D-5**.

As discussed in Section D.1.3, the exposure medium for ecological receptors that is relevant to the ERA was limited to sediment. Site-related chemicals in soils may have been transported via direct and/or indirect (via the

storm sewer system) surface runoff to Desert Cove. ABM residue may also have been transported via wind to Desert Cove. Site-related chemicals in surface sediment may be taken up and accumulated in the tissue of biota, and then transported to upper trophic level receptors via food webs. Based upon the 2004 RI, the food web pathway did not result in any unacceptable risks and was not evaluated in this ERA.

Exposure Pathways and Routes

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and therefore potential risk, can occur only if complete exposure pathways exist. **Figure D-5** shows the complete exposure pathways to ecological receptors at SWMU 7b. The key complete exposure pathway is to the benthic invertebrate community using the Desert Cove system (direct exposure to surface sediments).

An exposure route describes the specific mechanism(s) by which a receptor is exposed to a chemical present in an environmental medium. The most common exposure routes are dermal contact, direct uptake, ingestion, and inhalation. The key exposure route for the ERA was direct contact with surface sediments (particularly for benthic invertebrates).

Receptors

The key receptors for the ERA were benthic invertebrates. Various species of estuarine fish may use the Desert Cove system, at least periodically, but the duration and magnitude of potential exposures are expected to be limited. Based upon habitat and salinity, amphibians and reptiles were not expected to be significant receptors at this site. Similarly, exposures for upper trophic level receptors (birds and mammals) were not expected to be significant at the site because of the limited habitat along the shoreline (primarily rip-rap or bulkhead), the depth of the water, and the results of the food web modeling conducted as part of the 2004 RI.

Endpoints and Risk Hypotheses

The conclusion of the problem formulation includes the selection of ecological endpoints and risk hypotheses, which are based upon the conceptual site model. Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process (USEPA, 1997). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997). Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants.

Endpoints define ecological attributes to be protected (assessment endpoints) and measurable characteristics of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment upon particular components of the ecosystem that could be adversely affected by chemicals attributable to a site (USEPA, 1997). Assessment endpoints contain an entity (e.g., benthic invertebrate population) and an attribute of that entity (e.g., survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or contaminant sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself. Effects upon individual organisms are important for some receptors, such as rare and endangered species; population- and community-level effects are typically more relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level. In addition, use of criteria values designed to protect

the majority of the components of a community (for example, ambient water quality criteria for the protection of aquatic life) can be useful in evaluating potential community- and/or population-level effects.

Table D-10 shows the assessment endpoints, risk hypotheses, and measurement endpoints that were used in the ERA. **Table D-10** also shows the receptors associated with each endpoint.

D.3 Exposure Assessment

The principal activity associated with the exposure assessment is the estimation of chemical concentrations in applicable media, termed exposure point concentrations (EPCs), to which the receptors may be exposed. This is accomplished through the selection of appropriate sets of the available analytical data using a set of criteria. Once the analytical data sets are selected, EPCs are calculated as a particular point on the distribution of concentrations. At the screening level, EPCs are maximum concentrations. At the baseline level, EPCs are central tendency estimates (e.g., arithmetic mean).

D.3.1 Selection Criteria for Analytical Data

Available analytical data (described in Section D.2.2) were selected for use in the ERA based upon the following:

- Site data must have been validated by a qualified validator using acceptable methods. Rejected (R) values were not used in the ERA. Unqualified data and those qualified as J, L, or K were treated as detected. Data qualified as U or B were treated as non-detected (used at one-half value when calculating the mean).
- For samples with duplicate analyses, the higher of the two concentrations was used when both values were detects or when both values were non-detects. In cases where one result was a detection and the other a non-detect, the detected value was used.
- For sediment, samples from depths of 0 to 4 inches were used preferentially because this depth range represents the most realistic exposures for sediment-dwelling species. Available subsurface sediment data were qualitatively considered from a transport perspective.

D.3.2 Data Groupings

The following spatial groupings were utilized:

- Connector Channel - samples collected in the Connector Channel (**Table D-9**).
- Cove - samples collected in Desert Cove not within or immediately adjacent to the piers (**Table D-9**).
- Pier Area - samples collected along and within the former or existing piers in Desert Cove (**Table D-9**).

These spatial groupings were used to better evaluate potential risks in different portions of the Desert Cove system where potential exposures could vary because of differences in the magnitude of chemical concentrations. In addition, these groupings assisted in the evaluation of the spatial distribution of potential risks in the Desert Cove system relative to the source areas at the site.

D.3.3 Exposure Point Concentrations

EPCs are calculated as a particular point on the distribution of concentrations. At the baseline level, EPCs are central tendency estimates (e.g., arithmetic mean), which provide a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints). For the ERA, the maximum, arithmetic mean, and 95 percent upper confidence limit (UCL) of the arithmetic mean were evaluated for direct exposures.

D.4 Effects Assessment

The effects assessment defines the methods and data used to define an adverse ecological effect. Effects data, which are reflected in the measurement endpoints, included:

- **Screening Values for Sediment** – Analytical data were compared to the sediment screening values summarized in **Table D-11**. Maximum, mean, and 95 percent UCL concentrations were compared with these screening values.

- **Benthic Invertebrate Surveys** – Results of the benthic invertebrate surveys that were conducted in 2002 as part of the RI sampling (used qualitatively) and in 2010 following the 2008 MILCON action (used quantitatively).
- **Bioavailability Measures** – Additional data were collected to help evaluate the chemical-specific bioavailability for direct exposures to surface sediment (AVS/SEM, TOC, and grain size).

In addition, SWMU 7b surface sediment concentrations were compared to facility-specific background surface sediment concentrations as an additional line of evidence. In June 2007, the Navy, in partnership with USEPA and VDEQ, agreed to collect background sediment samples from an urban cove area unaffected by sandblasting activities for use in developing remediation goals for SWMU 3. Following a review of historical data (**Table D-12**), the northern portion of Little Creek Cove was identified as a potentially suitable area for this purpose. Similar to SWMU 7b, Little Creek Cove receives storm water runoff from various locations within the facility, including other CERCLA sites within the ER Program.

A traditional, statistically-based work plan was not developed for the collection of urban background sediment samples. In July 2007, surface sediment grab samples were collected along a series of transects and visually inspected for grain size and ABM content. Based upon these observations, eight surface sediment samples (and one field duplicate) were collected (**Figure D-6**) and analyzed for the SWMU 3 COCs (copper, lead, mercury, nickel, tin, and zinc), TOC, pH, and grain size. Three of the samples were also analyzed for AVS/SEM. The data from this background sampling are provided in **Table D-13**. The background sediment samples were broadly similar in terms of physical characteristics to site samples (**Table D-14**) but tended to be higher in TOC and composed of a higher percentage of fines (silt/clay). In addition, the range of concentrations in the background sediment samples was narrow (low variability), which suggests that these samples represent urban background for this geographical area.

During the scoping of the post-MILCON investigation, the use of these urban background sediment data in the evaluation of SWMU 7b was considered. Following the risk management decision for secondary COCs (PAHs, arsenic, selenium, and silver; see Section D.1.1), it was determined that the background sediment investigation analyte list was now inclusive of all remaining SWMU 7b sediment COCs and suitable for comparison against site data. The approach for using these background data is documented in the 2009 and 2010 SAPs (CH2M HILL, 2009; 2011) and consists primarily of a comparison of the maximum value from the background data set with site-specific concentrations. The uncertainties associated with the use of these background data are discussed in Section D.6.

D.5 Risk Characterization

Risk characterization uses the information generated during the three previous parts of the ERA (problem formulation, exposure assessment, and effects assessment) to estimate potential risks to ecological receptors.

D.5.1 Comparison with Sediment Screening Values and Background

Sediment exposure concentrations are compared with the corresponding screening values to derive risk estimates using the hazard quotient (HQ) method. HQs are calculated by dividing the chemical concentration in the sediment by the corresponding chemical-specific screening value. HQs equaling or exceeding 1 indicate the potential for unacceptable risk since the chemical concentration (exposure) equals or exceeds the screening value (effect). HQs of less than 1 indicate that unacceptable risks are unlikely. Maximum, arithmetic mean, and 95 percent UCL of the arithmetic mean concentrations are compared with screening values. Each site sample is also compared with the maximum background concentration; mean background concentrations are also compared with mean site concentrations.

In 2002, both discrete and composite surface sediment samples were collected, with the discrete sample collected from the center of each 1-acre sampling grid. A corresponding composite sample was also collected at 17 of the 19 sampled grids and was composed of three subsamples collected from randomly selected points within the grid. The results from these two sets of samples were, with few exceptions, highly correlated statistically (**Table D-15**). There were only two statistically significant differences between the composite and discrete samples from a paired two-sample test (Wilcoxon Signed Rank Test) with all samples combined, but no

statistically significant differences using the same test for each of the three areas (Channel, Cove, and Pier Area) (**Table D-16**). Based upon the results of these tests, both the 2002 discrete and composite samples were included in the analysis.

Only discrete samples were collected in 2000 and 2009. In 2010, all samples were collected as composite samples using an approach similar to the one used in 2002. All of these samples, as well as the 2002 samples (discussed above), were pooled for the purposes of the screening value and background comparisons.

Surface Sediment

The surface sediment evaluation was conducted using the data groupings discussed in Section D.3.2 and is summarized in **Table D-17. Table D-18** and **Figure D-7** show the sample-specific HQs. For all samples combined, HQs exceeded 1 for all of the metal COCs, except TBT, based upon all of the EPCs (maximum, arithmetic mean, and 95 percent UCL) when compared to the threshold effect level[1] (TEL) and the effects range-low (ER-L) (the apparent effects threshold [AET] for tin). Relative to the probable effect level (PEL), only the maximum concentration exceeded for copper, lead, and mercury (tin did not have a PEL) but all three of the EPCs exceeded for zinc. Copper did not exceed the effects range-median (ER-M). Only the maximum HQ exceeded 1 based upon the ER-M for lead and mercury (tin did not have an ER-M). The maximum and 95 percent UCL HQs, but not the mean HQ, exceeded 1 based upon the ER-M for zinc (**Table D-17**). Copper exceeded background in only 1 of 77 samples at a maximum ratio of 1.37 (the mean ratio did not exceed one), and total tin exceeded background in 11 of 76 samples at a maximum ratio of 3.05 (the mean ratio did not exceed one). Lead and zinc exceeded background in about one-third of the samples, and mercury exceeded background in about two-thirds of the samples. Maximum and mean ratios were 3.42 and 1.30 for zinc, 8.68 and 1.66 for lead, and 20.5 and 2.26 for mercury (**Table D-17**). The SEM/AVS ratio, a measure of metal bioavailability, rarely exceeded 1 (indicating low bioavailability) in the September/October 2002 surface sediment samples (2 of 19 samples) and did not exceed 1 in the September 2010 surface sediment samples (0 of 19), but exceeded 1 in 25 percent (7 of 28) of the surface sediment samples collected in November 2009 (**Table D-4**).

In the Connector Channel, surface sediment concentrations were similar among the 2010, 2009, and 2000/2002 sampling events (**Figure D-8**). Mean HQs based upon the TEL and ER-L exceeded 1 for copper, mercury, and zinc (the mean HQ for lead [1.02] also exceeded 1 based upon the TEL) but the magnitude was low (ER-L mean HQs of 1.53, 1.03, and 1.18, respectively) (**Table D-17**). Copper and zinc, however, did not exceed background and the maximum background ratio for mercury was just 1.74 and the mean ratio was just below 1. Except for the maximum zinc HQ (1.04 for the PEL), there were no exceedances based upon the PEL or the ER-M. Except for one 2002 sample, for which AVS was below the detection limit, all SEM/AVS ratios in the Connector Channel were less than 1 and only trace amounts of ABM were found in this area. Based upon these comparisons, risks within the Connector Channel are acceptable.

In the Cove, surface sediment concentrations were generally similar among the 2010, 2009, and 2000/2002 sampling events (**Figure D-8**), although the maximum concentration of lead was higher in 2002 and the maximum concentration of zinc was higher in 2010. Mean HQs based upon the TEL and ER-L exceeded 1 for all of the COCs, except TBT (based upon the AET), with the ER-L HQs about 2.5 or less (**Table D-17**). Copper, however, did not exceed background and the maximum background ratio for tin was just 1.51 (the mean ratio was less than 1). Based upon calculated total tin to TBT ratios (**Table D-19**), “adjusted” tin concentrations did not exceed the AET (3.4 mg/kg) or the more conservative equilibrium partitioning-based TEL (Buchman, 2008) of 0.048 mg/kg. Except for zinc (HQ of 1.44 for the PEL), the mean COC concentrations did not exceed the PEL or the ER-M. Except for one 2010 sample (LW07-K4), all zinc concentrations were less than 1.5 times background and 18 of 22 were less than background. Except for one 2009 sample for which AVS was below the detection limit, the SEM/AVS ratio was less than 1 for all samples for which zinc exceeded background. Only trace amounts (≤1 percent) of ABM were found in the Cove based upon 2010 quantitative measurements. Based upon these comparisons, risks within the Cove are generally acceptable.

[1] TEL values are equal to the Region 3 Biological Technical Assistance Group (BTAG) marine screening values for the primary COCs, with the exception of tin, which does not have a Region 3 BTAG marine screening value.

In the Pier Area, surface sediment concentrations were generally similar among the 2010, 2009, and 2000/2002 sampling events (not including 2002 samples within the area that was affected by the MILCON action) based upon mean concentrations (**Figure D-8**), although mercury tended to be higher in 2002 than in 2009 or 2010. Maximum concentrations were more variable and were higher in 2009 for copper and lead, higher in 2002 for mercury, and higher in 2009 and 2010 for tin and zinc. Mean HQs based upon the TEL and ER-L exceeded 1 for all of the COCs, except TBT (based upon the AET), with the ER-L HQs about 3.5 or less (**Table D-17**). Copper exceeded background in only one sample at a maximum ratio of 1.37 (the mean ratio was less than 1). Based upon calculated total tin to TBT ratios (**Table D-19**), "adjusted" tin concentrations did not exceed the AET (3.4 mg/kg) or the more conservative equilibrium partitioning-based TEL (Buchman, 2008) of 0.048 mg/kg. Except for zinc, the mean COC concentrations did not exceed the PEL or the ER-M. The SEM/AVS ratio was less than 1 for all samples except LW07-H5 (2002), LW07-301 (2009), LW07-304 (2009), LW07-M1-302 (2009), and LW07-M1-304 (2009). Except for the northeast corner of the Pier Area, only trace amounts (≤1 percent) of ABM were found in the Pier Area based upon 2010 quantitative measurements. In 2010, ABM in the northeast corner was 1.5 to 2.5 percent but was qualitatively estimated at up to 10 percent in 2009.

The northeast corner of the Pier Area (sample locations LW07-M1, LW07-301, LW07-403, and LW07-404) consistently had the highest COC concentrations outside of the area affected by the MILCON action (**Table D-18**) and also consistently had the highest concentrations of ABM. Of note, the 2004 interim removal action that occurred in the upland portion of SWMU 7a was adjacent to this area. This area was also near the boundary of the MILCON action. Also of interest, the 2002 results from LW07-M1 were generally lower than in 2009 and 2010, and the 2002 concentrations in subsurface sediments at LW07-M1 (see Section D.5.1.2) were higher than in surface sediments. This suggests that the MILCON action may have encroached upon this area to some extent and exposed some of the more contaminated subsurface sediments (which then became surface sediments during the 2009 and 2010 sampling events). Also of note, SEM/AVS ratios for three of the five 2009 samples from this area exceeded 1, although none of the three 2010 samples did.

One other area of note was LW07-L5, located near the southeast corner of the Pier Area and outside of the 2008 dredged area. Based upon the 2002 composite surface sample, mercury was elevated (the maximum site concentration of 4.10 mg/kg occurred in this sample). However, the 2002 discrete sample from this area was about one order of magnitude lower, and the 2009 and 2010 samples from LW07-L5 were more than one order of magnitude lower. Copper, lead, total tin, and zinc concentrations, however, were similar among these samples. Therefore, risks in this area are likely to be acceptable.

In summary, mean HQs based upon the PEL and ER-M did not exceed 1 for any of the metal COCs in the Connector Channel (**Figure D-9**). In the Cove, the mean PEL-based HQ exceeded 1 only for zinc (all sampling events), but was less than 1.5 in 2009 and 2010, and less than 2 in 2002. Relative to the ER-M, the mean HQ for zinc did not exceed 1 in 2009 or 2010, and the 2002 mean HQ was less than 1.3. In the Pier Area, the mean HQ exceeded 1 based upon the PEL for zinc (all events) and mercury (2002 only), but the zinc HQ did not exceed 2 and the mercury HQ did not exceed 1.25. The mean HQ exceeded 1 based upon the ER-M for zinc (all events) and mercury (2002 only), but the zinc HQ did not exceed 1.3 and the mercury HQ did not exceed 1.25. The northeast corner of the Pier Area (sample locations LW07-M1, LW07-301, LW07-403, and LW07-404) consistently had the highest COC concentrations outside of the area affected by the 2008 MILCON action.

Subsurface Sediment

The subsurface sediment evaluation was conducted using the data groupings discussed in Section D.3.2 and is summarized in **Table D-20. Table D-21** shows the sample-specific HQs. Subsurface sediment samples were only collected in 2002 and were generally from the 6-inch depth increment immediately below the extent of visible ABM.

For all samples combined, HQs exceeded 1 for all of the metal COCs based upon all of the EPCs (maximum, arithmetic mean, and 95 percent UCL) when compared to the TEL and the ER-L (the AET for tin) except for lead, whose mean HQ based upon both the TEL and ER-L was less than 1 (**Table D-20**). Relative to the PEL, only the maximum concentration exceeded for copper, lead, and mercury (tin did not have a PEL); the maximum and 95 percent UCL concentrations, but not the mean concentration, exceeded the PEL for zinc. Copper and lead did

not exceed the ER-M. Only the maximum HQ exceeded 1 based upon the ER-M for mercury and zinc (tin did not have an ER-M) and only in a single sample (**Table D-20**). Copper, tin, and zinc exceeded background in only 1 of 15 samples and mean ratios were less than 1.

In the Connector Channel, maximum HQs based upon the ER-L (AET for tin) exceeded 1 only for mercury. However, the mean HQs for all COCs based upon both the TEL and ER-L were less than 1. There were no exceedances for any of the COCs based upon the PEL or ER-M. Only mercury exceeded background, in a single sample at a maximum ratio of 1.75 (the mean ratio was less than 1). Therefore, subsurface sediments in the Connector Channel do not appear to have been affected by site activities.

In the Cove, maximum HQs based upon the TEL and ER-L (AET for tin) exceeded 1 for all of the metals, although the mean HQs were all less than, or equal to, 1. Except for zinc (maximum PEL HQ of 1.41), there were no exceedances based upon the PEL or ER-M. Only mercury exceeded background, in a single sample at a maximum ratio of 1.40 (the mean ratio was less than 1). Therefore, subsurface sediments in the Cove do not appear to have been affected by site activities.

In the Pier Area (not including 2002 samples within the area that was affected by the MILCON action), maximum and mean HQs based upon the TEL and ER-L (the AET for tin) exceeded 1 for all of the COCs, with the ER-L HQs about 3.5 or less (**Table D-20**). Copper exceeded background in only one sample, at a maximum ratio of 1.2 (the mean ratio was less than 1). Based upon calculated total tin to TBT ratios (**Table D-19**), "adjusted" tin concentrations did not exceed the AET (3.4 mg/kg) or the more conservative equilibrium partitioning-based TEL (Buchman, 2008) of 0.048 mg/kg. Except for zinc, the mean COC concentrations did not exceed the PEL or the ER-M, and copper and lead did not exceed the ER-M.

Except for the samples within the area affected by the MILCON action, only the sample from location LW07-M1 appeared to be significantly affected by site activities. The maximum concentrations of all COCs occurred in this sample, and the concentrations were higher at this location in subsurface sediments relative to surface sediments. As discussed in the previous section, the 2004 interim removal action that occurred in the upland portion of SWMU 7a was adjacent to this area, and surface sediment data from 2009 and 2010 suggest that the MILCON action may have encroached upon this area to some extent and exposed some of the more-contaminated subsurface sediments.

D.5.2 Benthic Invertebrate Surveys

Benthic invertebrate surveys were conducted in 2002 at 19 locations and again in 2010 at 19 locations (15 of which overlapped 2002). The 2002 samples were single grab samples from the center of the sampling grid using a standard 9- x 9-inch Ponar dredge (81-in^2 sampling area). The 2010 samples were composites of three samples collected around the center point of the sampling grid using a petite Ponar dredge (36-in^2 sampling area); the total sampled area was 108 in^2 (3 x 36 in^2). As a result, the results from the two events are not directly comparable for some metrics, such as number of taxa, but are generally comparable for metrics, such as total density, that can account for the differential in area sampled. In 2010, replicate samples (three per sampling grid) were collected from 3 of the 19 sampling grids (LW07-H1, LW07-L2, and LW07-403; **Figure D-4**). Each replicate sample consisted of three grabs collected from the <u>same</u> location within the sampling grid (rather than at three different locations within the same sampling grid) and composited. Because each of the three samples (each composed of three grabs from the same location) were collected from within the same sampling grid, but in different areas of the grid, they are replicate samples for that sampling grid.

The benthic invertebrate community found in the Desert Cove system, based upon 2002 and 2010 sampling, is generally typical of what is expected for this geographical area and type of habitat (urban harbor). The dominant organisms are generally characterized as tolerant of pollutants and low DO concentrations, and opportunistic; are indicative of organic enrichment and depositional environments; and are surface dwellers, inhabiting the sediment/water interface (deeper-dwelling organisms were generally low to absent, probably because of the anoxic conditions at depths more than a few centimeters below the sediment surface). In both 2002 and 2010, the benthic invertebrate community at the site was dominated by polychaetes, most of which are pollution tolerant. Polychaetes accounted for 84 percent of the total benthic invertebrate community in 2002 and 78

percent in 2010. In 2010, mollusks comprised about 12 percent of the total community (about 5 percent in 2002). Pollution sensitive organisms were uncommon (**Tables D-6 and D-7**). The results from the 2010 replicate samples (**Table D-22**) suggest that the sampling adequately captured the spatial variability in the Desert Cove system because the coefficients of variability were, with few exceptions, less than 1 (which indicates that the standard deviation, a measure of variability, is less than the mean value) for the metrics evaluated (see the following section).

Correlation between Benthic Metrics and Physical/Chemical Parameters

In Section D.1.3, the following environmental question was presented:

- Is the composition and condition of the existing benthic invertebrate community at SWMU 7b correlated with the concentration of the COCs and/or the presence of ABM?

In this section, the statistical evaluation of the 2010 benthic invertebrate data is discussed in order to answer this question. During the December 2010 partnering team meeting, the Navy, USEPA, and VDEQ agreed to include the following benthic invertebrate metrics in the statistical evaluation:

- Number of taxa (taxa richness)
- Total density
- Percent contribution of dominant taxon
- Density of dominant taxon
- Percent Spionid polychaetes
- Percent *Mediomastus* and *Capitella* polychaetes
- Density of pollution tolerant organisms
- Percent pollution tolerant organisms
- Density of pollution sensitive organisms
- Percent pollution sensitive organisms

The metrics were selected based on professional judgment and represent both “general” community metrics (such as number of taxa and total density) and more specific metrics relevant to the community at SWMU 7B (such as percent Spionid polychaetes and percent *Mediomastus* and *Capitella* polychaetes). Most of the metrics focused on evaluating pollution- and disturbance-related community factors (e.g., density of pollution sensitive organisms). As part of the statistical evaluation, the 10 metrics listed above were examined for correlations with the physical and chemical parameters of the surface sediments and the bottom of the water column. These parameters included, for surface sediment, the concentrations of the COCs, grain size, TOC, pH, SEM/AVS ratio, and percent ABM, and, for the water column (measured just above the sediment surface), DO, ORP, salinity, temperature, specific conductivity, turbidity, and pH.

As agreed to at the December 2010 partnering team meeting, the values for the following metrics were reported but not included in the statistical evaluation:

- Diversity (Shannon-Weiner Index)
- Percent amphipods
- Percent bivalves
- Percent deposit feeders

The values for these metrics, as well as for the 10 primary metrics, are shown in **Table D-7**. For the three samples with replicates, the mean value was used in the statistical evaluation to represent the sample.

Both statistical and observational methods were used to identify chemical and/or physical parameters that were potentially associated (correlated) with differences in the values of the benthic invertebrate metrics. Observational methods included examination of scatter plots for each benthic metric with each physical and chemical parameter. Correlations (linear) were investigated statistically using both parametric (Pearson product-moment) and non-parametric (Spearman rank) correlation coefficients. Because Pearson correlation coefficients (which use the actual data values) are more influenced by outliers, unequal variances, non-normality, and

nonlinearities than are Spearman-rank correlation coefficients (which use ranks and not the actual data values themselves), the Spearman coefficients were given more weight if the results of the two methods differed. The significance level (α) was set at 0.05 for both tests. The following categories were used to describe the relative strength of the resulting correlations (R^2 values): (1) weak: < 0.50; (2) moderate: 0.50 to 0.80; and (3) strong: >0.80.

Figure D-10 shows scatter plots of each benthic metric for each physical and chemical parameter. Correlation coefficients are summarized in **Table D-23**. **Table D-24** lists only the statistically significant correlations. Six of the benthic metrics (number of taxa, total density, percent contribution of the dominant taxon, percent Spionid polychaetes, percent pollution tolerant organisms, and density of pollution sensitive organisms) had 5 or more statistically significant correlations (out of 23 possibilities; see **Table D-23**) with the physical and chemical parameters based upon the Spearman test. These correlations, although statistically significant, were typically weak, with very few R^2 values (these values indicate the proportion of the variability explained, a measure of the strength of the relationship) above 0.50. Bottom DO had the most (6 out of a possible 10) statistically significant correlations and generally the strongest correlations (maximum R^2 of 0.532) based upon the Spearman test. TOC and percent fine sand were significantly correlated (statistically) with 5 of the 10 benthic metrics. Among the chemicals, copper was significantly correlated (statistically) with 6 of the 10 benthic metrics, and tin and zinc were each significantly correlated (statistically) with 4, although the strength of the correlations were higher for tin than zinc. Percent ABM was only significantly correlated (statistically) with 1 of the 10 benthic metrics (density of dominant taxon) and this correlation was weak (R^2 of 0.233).

Based upon the results of the individual correlations, multiple regression analysis was conducted for the six benthic metrics (number of taxa, total density, percent contribution of the dominant taxon, percent Spionid polychaetes, percent pollution tolerant organisms, and density of pollution sensitive organisms) with the highest number of statistically significant correlations with the individual physical and chemical parameters. All of these benthic metrics, except total density, were significant correlated (statistically) with one another (**Table D-25**), although very few of these correlations were strong (R^2 values rarely exceeded 0.80).

The physical and chemical parameters (copper, tin, TOC, fine sand, and bottom DO) with the highest number of statistically significant correlations with the individual benthic invertebrate metrics were included in the multiple regression analysis. **Table D-25** shows the correlations among these parameters. All the parameters, except tin, were significantly correlated (statistically) with one another. Tin was significantly correlated (statistically) with copper, but not with the other three parameters. Although statistically significant, most of these correlations were weak, with very few R^2 values above 0.50. This indicates that each of these parameters did not co-vary strongly with any other parameter. As a result, there are no redundancies among this set of five parameters for the purposes of multiple regression analysis (pairs of strongly correlated variables would be redundant in a multiple regression model if both were included).

The results of the multiple regression are summarized in **Table D-26**. Four variations of multiple regression were employed, as follows:

- Stepwise – the stepwise method removes and adds variables (physical/chemical parameters) to the model in a series of steps to identify those parameters that are most useful in predicting the response variable (benthic metric). Variables accepted in earlier steps can be removed in later steps if they are no longer statistically significant.
- Forward – the forward method adds variables to the model one at a time and retains them if they are useful (statistically significant). Unlike the stepwise method, variables cannot be removed once they are added to the model.
- Backward – the backward method begins with all variables included in the model and removes them one at a time until all remaining variables are statistically significant. Once removed, a variable cannot re-enter the model.

- None – this method employs no variable selection mechanism. All variables are included (forced into the model) regardless of their usefulness (statistical significance).

As noted earlier, the significance level (α) was set at 0.05 for all statistical tests.

For number of taxa, bottom DO was the only variable accepted into the model using the stepwise method and the only variable retained using the backward method. The resulting models were relatively poor predictors, with adjusted R^2 values of 0.512 (the adjusted R^2 accounts for having multiple variables in the model [including the intercept term] whereas R^2 does not). The forward method included several other variables (bottom DO was the first to enter the model), but none were statistically significant in the final model ($p > 0.05$) except bottom DO. With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$) except bottom DO. Neither the forward model nor the model with all variables included notably improved the adjusted R^2 value over the model with only bottom DO.

For total density, bottom DO was the only variable accepted into the model using the stepwise and forward methods and the only variable retained using the backward method. The resulting models were relatively poor predictors, with adjusted R^2 values of 0.370. With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$), even bottom DO, and the adjusted R^2 value decreased.

For percent contribution of the dominant taxon, bottom DO was the only variable accepted into the model using the stepwise method and the only variable retained using the backward method. The resulting models were relatively poor predictors, with adjusted R^2 values of 0.459. The forward method included several other variables (bottom DO was the first to enter the model), but none were statistically significant in the final model ($p > 0.05$), even bottom DO. With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$), even bottom DO. Neither the forward model nor the model with all variables included improved the adjusted R^2 value over the model with only bottom DO.

For percent Spionid polychaetes, bottom DO and fine sand were the only variables accepted into the model using the stepwise and forward methods (bottom DO was the first to enter the models) and the only variables retained in the backward model, although fine sand was not statistically significant in the final models ($p = 0.066$). The resulting models were fairly good predictors, with adjusted R^2 values of 0.638. With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$), even bottom DO, and the adjusted R^2 value decreased.

For percent pollution tolerant organisms, bottom DO was the only variable accepted into the model using the stepwise method and the only variable retained using the backward method. The resulting models were relatively poor predictors, with adjusted R^2 values of 0.443. The forward method included several other variables (bottom DO was the first to enter the model) but none were statistically significant in the final model ($p > 0.05$), even bottom DO. With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$), even bottom DO. Neither the forward model nor the model with all variables included notably improved the adjusted R^2 value over the model with only bottom DO.

For density of pollution sensitive organisms, bottom DO was the only variable retained in the model using the backward method. The resulting model was a relatively poor predictor, with an adjusted R^2 value of 0.343. The stepwise and forward methods also included tin (bottom DO was the first to enter the models) but tin was not statistically significant in the final model ($p > 0.05$). With all variables included, none of the variables were statistically significant in the final model ($p > 0.05$), even bottom DO, and the adjusted R^2 value decreased.

In summary, bottom DO was the best predictor of the benthic invertebrate metrics, but predictive ability was generally poor. Only the Spionid polychaete model, with bottom DO and fine sand, was a reasonable predictor (adjusted R^2 value of 0.638), although fine sand was not statistically significant in the final model ($p = 0.066$). The metal COCs were not statistically significant components in any of the multiple regression models.

Spatial Analysis

In Section D.1.3, the following environmental question was presented:

- What is the composition and condition of the existing benthic invertebrate community at SWMU 7b and how does it vary spatially throughout the site?

In this section, a statistical evaluation of the 2010 benthic invertebrate data is discussed in order to answer this question. The composition and condition of the benthic invertebrate community was described at the beginning of Section D.5.2. Scatter plots and box-and-whisker plots of the benthic invertebrate metric data, by area, are shown in **Figure D-11**.

For each of the 10 benthic metrics, an analysis of variance (ANOVA) was conducted to identify any differences among 2010 area (Channel, Cove, and Pier Area) means. The ANOVA is a parametric test, and therefore assumes normality and homogeneity of variances, but assumptions were often not met. As a result, the non-parametric Kruskal-Wallis ANOVA on ranks was also conducted on the medians of the response variables (benthic metrics). This non-parametric method offered a more consistent view of the data because all cases can be treated the same regardless of whether they support an assumption of normality or not. If the ANOVA was significant (i.e., differences in mean or median values among the areas were greater than would be expected by chance), pair-wise comparisons were conducted to isolate the area or areas that differed from the others. Tukey's procedure was the multiple comparison procedure used, both for the ANOVA and (using ranks) for the Kruskal-Wallis ANOVA. If the ANOVA was not significant, no pair-wise comparisons were made because it was concluded that there were no significant differences among the areas. The significance level (α) was set at 0.05 for all tests.

Table D-27 summarizes the results of the statistical analysis. For each metric or parameter, the group with the largest mean value was assigned the letter A in **Table D-27**. If the mean value in all areas was statistically similar to one another, all areas were assigned the letter A. If the mean value of an area was statistically lower than the one designated as A, it was designated as B. If the mean value was statistically lower in the third area, it was designated as C. If the mean value was not statistically different between two different areas (A or B), it was given the designation AB. Therefore, an area designated as AB lies between two areas significantly different from each other, but the AB area is not significantly different from either.

Five of the benthic invertebrate metrics differed statistically among areas based upon the 2010 data (**Table D-27**). Number of taxa in the Pier Area, but not the Cove, was statistically lower than in the Channel based upon ranks; based upon the parametric test, both the Pier Area and the Cove were statistically lower than the Channel. However, only two of the Pier Area samples (LW07-H1 and LW07-L5) were outside of the range of values found in the Channel (**Table D-28; Figure D-12**) and all Cove samples were within range. In the northeast corner of the Pier Area (LW07-M1, LW07-403, and LW07-404), the area with the highest concentrations of metals and ABM, number of taxa was within the range of values observed in the Connector Channel, although at the low end (i.e., less than the mean Channel value).

Percent contribution of the dominant taxon in the Pier Area, but not the Cove, was statistically higher (indicating a more affected community) than in the Channel based upon both tests (the Pier Area and the Cove were also statistically different in the parametric test but not in the non-parametric test). All but one of the Pier Area samples exceeded the maximum value for this parameter in Channel samples (and therefore were outside the range of values found in the Channel; **Table D-28; Figure D-12**).

Percent Spionid polychaetes in the Pier Area, but not the Cove, was statistically higher (indicating a more affected community) based upon ranks; based upon the parametric test, both the Pier Area and the Cove were statistically higher than the Channel. All Pier Area samples, and four of six Cove samples, exceeded the maximum value for this parameter in Channel samples (and therefore were outside the range of values found in the Channel; **Table D-28; Figure D-12**).

Percent pollution tolerant organisms in the Pier Area, but not the Cove, was statistically higher (indicating a more affected community) than in the Channel based upon both tests. All Pier Area samples exceeded the maximum

value for this parameter in Channel samples (and therefore were outside the range of values found in the Channel; **Table D-28; Figure D-12**).

Density of pollution sensitive organisms in the Pier Area, but not the Cove, was statistically lower than in the Channel based upon ranks; based upon the parametric test, both the Pier Area and the Cove were statistically lower than the Channel. However, all of the Pier Area samples were within the range of values found in the Channel, although at the low end (i.e., less than the mean Channel value), and all Cove samples were also within range, again at the low end (**Table D-28; Figure D-12**). In the northeast corner of the Pier Area (LW07-M1, LW07-403, and LW07-404), the area with the highest concentrations of metals and ABM, the density of pollution tolerant organisms was within the range of values observed in the Connector Channel, although at the low end (i.e., less than the mean Channel value).

In summary, five of the benthic metrics differed between the Channel and the Pier Area. Because risks in the Channel are considered acceptable (Section D.5.1.1), the Channel samples can be considered representative of reference conditions in this system (the Tier 1 partnering team agreed to the use of the Connector Channel as reference at the December 2010 partnering meeting). Values for three of the five metrics were consistently outside the range of values found in the Channel. As a result, some impacts to the benthic community in portions of the Pier Area are evident. However, the portion of the Pier Area with the highest metals concentrations and ABM (northeast corner) was not consistently the most affected. Based upon the correlation analysis, physical factors, particularly bottom DO, were most strongly correlated with the benthic metrics. Bottom DO was significantly higher (statistically) in the Channel than in the Cove or Pier Area (**Table D-27**). In the Cove, there were no statistically significant differences in the benthic metrics with the Channel based upon the non-parametric test, but three metrics differed for the parametric test. Of these, all Cove samples were within the range of values found in the Channel for two, and one-third of samples were in range for the third. Therefore, on balance, the benthic community in the Cove is not significantly affected and risks are generally acceptable (which is a similar conclusion reached for the comparison to screening values and background). Although the benthic community in the Pier Area differs from that in the Channel for some metrics, the lower DO concentrations, rather than elevated COC concentrations in sediment, is most likely the primary contributor to the difference in community characteristics. Based upon the regression analyses, bottom DO was the best (and often only) statistically significant predictor of the benthic invertebrate metrics. Site-related factors, such as the concentrations of the COCs and ABM, were not important predictors, although several of these parameters (particularly copper and tin) were significantly correlated (statistically) with some of the benthic invertebrate metrics (based upon individual comparisons). However, SEM/AVS ratios, which were all less than 1 in 2010, suggest that the metals have low bioavailability.

Temporal Analysis

Although not an environmental question in the SAP, a qualitative comparison of the benthic invertebrate community between the 2002 and 2010 sampling events was conducted to see how stable the community was between the two time periods. As discussed in Section D.5.1.1, the COC concentrations in surface sediment were similar among the 2002, 2009, and 2010 sampling events.

In both 2002 and 2010, the benthic invertebrate community was dominated by polychaetes, most of which are pollution tolerant (**Tables D-6 and D-7**). Polychaetes accounted for 84 percent of the total benthic invertebrate community in 2002 and 78 percent in 2010. Mollusks (bivalves such as clams and gastropods such as snails) were the next most numerous group in both 2002 and 2010. In 2010, mollusks comprised about 12 percent of the total community and about 5 percent in 2002. The three most numerous taxa observed in 2002 and 2010 (all polychaetes) were the same: (1) *Streblospio benedicti* was the most numerous, comprising 59 percent of the total community in 2002 and 29 percent of the total community in 2010; (2) *Paraprionospio pinnata* comprised 11 percent of the total community in 2002 and 6 percent of the total community in 2010; and (3) *Mediomastus spp*. comprised 10 percent of the total community in 2002 and 18 percent of the total community in 2010. These three taxa combined accounted for 80 percent of the total community in 2002 and 53 percent in 2010.

Among individual stations, 15 of which (out of 19) overlapped between 2002 and 2010, total density was generally consistent between events, except at LW07-B7 (Channel) were it was notably higher in 2010 (**Figure D-13**). The percent contribution of the dominant taxon was also generally consistent between events,

although the value for this metric tended to be higher in 2002 at most of the Channel stations. The density of the dominant taxon, however, was more consistent, except at LW07-F3 (Channel) and LW07-L5 (Pier Area), where it was notably higher in 2002 (**Figure D-13**).

In summary, the benthic invertebrate community at SWMU 7b appears to be temporally stable on a gross scale, showing a large degree of consistency between 2002 and 2010. This was expected, given the low level of deposition and the relative uniformity in chemical concentrations from 2002, 2009, and 2010 in the area not directly affected by the 2008 MILCON action. The same taxonomic groups (polychaetes, followed by mollusks) dominated the community in both 2002 and 2010, and the three most dominant taxa (all polychaetes) were the same between 2002 and 2010.

D.5.3 Risk Evaluation

In Section D.1.3, the following environmental question was presented:

- Is further investigation or action required for the Cove, Connector Channel, and/or Pier Area at SWMU 7b?

In this section, the results for the lines of evidence evaluated in the ERA are integrated to answer this question. The other two environmental questions from the 2010 SAP were addressed in Sections D.5.2.1 and D.5.2.2.

The MILCON action generally removed the ABM from those portions of the Pier Area initially identified as having the highest concentrations of ABM. Based upon the relative consistency in metal concentrations between 2002 (pre-action) and 2009 and 2010 (post-action) in the Cove and Channel, the MILCON action did not have any negative impacts (i.e., no evidence of sediment migration) to these areas. Based upon the comparison to screening values and background, risks in the Channel are acceptable, and the benthic community inhabiting this portion of the site can generally be considered representative of the Desert Cove system, absent significant site influences. Based upon the comparison to screening values and background, risks in the Cove are generally acceptable. A similar conclusion was reached for the Cove based upon the 2010 benthic community data relative to the community found in the Channel.

The northeast corner of the Pier Area (sample locations LW07-M1, LW07-301, LW07-403, and LW07-404) consistently had the highest COC concentrations outside of the area affected by the MILCON action and also consistently had the highest concentrations of ABM. Of note, the 2004 interim removal action that occurred in the upland portion of SWMU 7a was adjacent to this area. This area was also near the boundary of the MILCON action. Of interest, the 2002 results from LW07-M1 were generally lower than in 2009 and 2010, and the 2002 concentrations in subsurface sediments at LW07-M1 were higher than in surface sediments. This suggests that the MILCON action may have encroached upon this area to some extent and exposed some of the more contaminated subsurface sediments (which then became surface sediments during the 2009 and 2010 sampling events). Five of the benthic metrics differed statistically between the Channel and the Pier Area. Values for three of the five metrics were outside of the range of values found in the Channel. As a result, some impacts to the benthic community in portions of the Pier Area are evident. However, the portion of the Pier Area with the highest metals concentrations and ABM (northeast corner) was not consistently the most affected for these benthic metrics.

Based upon the correlation analysis, physical factors not related to the CERCLA activities (sandblasting), particularly bottom DO, were most strongly correlated with the benthic metrics. Bottom DO was significantly higher (statistically) in the Channel than in the Cove or Pier Area. Copper and tin were the site-related parameters most significantly correlated (statistically) with the benthic invertebrate metrics, although the strength of these correlations was weak. However, copper exceeded background in only one Pier Area sample and tin did not exceed screening values when adjusted to the TBT fraction, suggesting that they are not responsible for any impacts to the benthic community and that physical factors are as or more important. In addition, routine Navy operations in the Desert Cove system (which include activities such as boat traffic, where prop wash may disturb the bottom of the cove especially near the piers during mooring operations), which are focused in the Pier Area, may have direct physical impacts to the benthic community at the site, as may storm water inputs (which enter the system in the Pier Area).

Because ABM is inert (essentially is coarse sand) and the paint residue has little, if any, organic content, site-related parameters will not induce any sediment oxygen demand and will not contribute to depressed DO levels. The most common cause of lower DO concentrations at the bottom of a water body is high organic loading (of nitrogen and phosphorous, typically from urban and agricultural runoff, wastewater systems, and atmospheric deposition) which induces a large biomass of phytoplankton/algae which, when it dies and drops to the bottom of the water column, is decomposed by bacteria which use of much of the available oxygen. This is typically most acute in July/August, when high water temperatures enhance decomposition while retaining the minimum amount of DO (since warmer water holds less DO at saturation than colder water).

D.5.4 Conclusions

Ecological risks are acceptable within the Connector Channel and Cove Area. The available data suggest that some impacts to the benthic community are occurring in portions of the Pier Area. The northeast corner of the Pier Area (sample locations LW07-M1, LW07-301, LW07-403, and LW07-404) consistently had the highest COC concentrations outside of the area affected by the MILCON action and also consistently had the highest concentrations of ABM. However, this potentially affected area is relatively small (about one acre) relative to the size of the Desert Cove system and non-site-related physical factors (particularly bottom DO) were most strongly correlated with the values of the benthic metrics. The existing benthic community was frequently within the range of values found in the Channel for many (7 of 10) of the metrics (including total density, density of pollution sensitive taxa, and number of taxa).

D.6 Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based upon incomplete information. The uncertainty in the ERA is attributable primarily to the following factors:

- Duplicate Analyses - When evaluating samples with field duplicates, the value used in the ERA was always the detected value when one result was a detect and the duplicate was a non-detect, regardless of whether or not the non-detected value (sample detection limit) was higher. In these cases, the use of the detected value has less uncertainty because it represents an actual measured value (versus an upper-limit bound) and the two samples will typically have identical or similar reporting limits.
- Sediment Screening Values - Most of the sediment screening values used in the ERA did not consider site-specific bioavailability to ecological receptors and typically were based upon correlational studies (termed the Screening Level Concentration approach). These factors tend to make the resulting screening values very conservative and likely overestimate potential risk.
- Chemical Mixtures - Information on the ecotoxicological effects of chemical interactions is generally lacking, which required (as is standard for ERAs) that the chemicals be evaluated on a compound-by-compound basis during the comparison to screening values. This could result in an underestimation of risk (if there are additive or synergistic effects among chemicals) or an overestimation of risks (if there are antagonistic effects among chemicals).
- Discrete and Composite Samples – Both discrete and composite surface sediment samples were collected in 2002, only discrete samples were collected in 2000 and 2009, and only composite samples were collected in 2010. The data from all of these samples were pooled for the comparison to screening values and background. This introduces some uncertainty into the ERA because these samples may represent different spatial areas. However, a comparison of 2002 discrete and 2002 composite samples collected from the same sampling grid suggests that these samples are comparable to one another and therefore could be pooled. The evaluation of the benthic invertebrate data was not affected by this uncertainty because a quantitative evaluation of these data relative to the physical and chemical properties of the sediment was restricted to within the same sampling event (2010), and both sets of samples (sediment and benthic invertebrates) were collected in the same manner from the same locations.

- Comparison to Background Concentrations - Background concentrations were used to judge the degree of site-relatedness of individual chemicals in particular media. If site chemical concentrations were consistent with these levels, it was assumed that the concentrations were not site-related. It is possible that concentrations below background were indeed site-related, rendering the assumption false. However the impact of this possibility is minimal because chemicals at concentrations consistent with background conditions should exhibit no different ecological effects than commonly occurring in areas not affected by releases, regardless of their source.

  The background sediment concentrations used in this assessment as an additional line of evidence were not specifically collected to support the SWMU 7b ERA but were rather collected for use in developing the remediation goals for SWMU 3. Because impacts to SWMU 3 and SWMU 7b have similar site COCs resulting from the same type of historic release, the urban background data set was considered for use when evaluating SWMU 7b. The northern portion of Little Creek Cove was identified as a potentially suitable area to characterize urban background conditions at Little Creek as, similar to both SWMU 3 and SWMU 7b, Little Creek Cove receives storm water runoff from various locations within the facility, including other CERCLA (but non-ABM) sites within the ER Program. The background sediment samples were broadly similar in terms of physical characteristics to SWMU 7b sediment samples (**Table D-14**) but tended to be higher in TOC and composed of a higher percentage of fines (silt/clay). This introduces some uncertainty into their use at SWMU 7b since higher levels of TOC and fines suggest higher levels of deposition in the background area relative to SWMU 7b. However, the range of concentrations in the background sediment samples was narrow (low variability), which suggests that these samples represent urban background for this general geographical area. During the scoping of the post-MILCON investigation, the use of these urban background sediment data in the evaluation of SWMU 7b was considered by the partnering team, and the uncertainties associated with their use at SWMU 7b were deemed acceptable and the data were thus deemed suitable for comparison against site data.

D.7 References

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Tables

TABLE D-1

2002 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	EH/ORP (MV)	Salinity (ppt)
LW07-B5-SD201-00-02C	Channel	9/27/2002	16.5	--	--	--	--	--	--	--
LW07-B5-SD202-00-02C	Channel	9/27/2002	16.1, 16.4, 16.4	--	--	--	--	--	--	--
LW07-B5-SD201-02-02C	Channel	9/30/2002	Surface	7.71	23.6	11.20	37.8	0.0	5.0	23.5
			14.7	8.23	23.9	9.61	38.8	0.0	-78	23.4
LW07-B7-SD201-00-02C	Channel	9/27/2002	10.5	--	--	--	--	--	--	--
LW07-B7-SD202-00-02C	Channel	9/27/2002	15.1, 13.5, 14.1	--	--	--	--	--	--	--
LW07-B7-SD201-02-02C	Channel	9/29/2002	Surface	5.48	24.2	10.84	40.0	0.0	62	25.7
			14.7	5.70	23.6	9.26	40.8	0.0	9.0	26.2
LW07-D5-SD201-00-02C	Channel	9/27/2002	16.0	--	--	--	--	--	--	--
LW07-D5-SD202-00-02C	Channel	9/27/2002	16.4, 16.4, ?	--	--	--	--	--	--	--
LW07-D5-SD201-02-02C	Channel	9/30/2002	Surface	6.74	23.6	11.07	37.7	0.0	88	24.3
			14.9	9.94	23.7	8.37	26.6	0.0	-169	16.5
LW07-F3-SD201-00-02C	Channel	9/27/2002	8.50	--	--	--	--	--	--	--
LW07-F3-SD202-00-02C	Channel	9/27/2002	13.4, 14.1, 14.1	--	--	--	--	--	--	--
LW07-F3-SD201-02-02C	Channel	9/29/2002	Surface	5.50	24.0	10.06	39.4	0.0	39	25.3
			12.4	5.63	23.6	9.40	40.5	0.0	19	26.1
LW07-F5-SD201-00-02C	Channel	9/27/2002	14.7	--	--	--	--	--	--	--
LW07-F5-SD202-00-02C	Channel	9/27/2002	15.2, 15.1, 11.5	--	--	--	--	--	--	--
LW07-F5-SD201-02-02C	Channel	9/29/2002	Surface	5.27	24.2	10.30	41.3	0.0	86	26.6
			14.4	5.40	23.8	8.90	42.4	0.0	71	27.5
LW07-H1-SD201-00-02C	Pier	9/27/2002	14.1	--	--	--	--	--	--	--
LW07-H1-SD202-00-02C	Pier	9/27/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-H1-SD201-02-02C	Pier	9/29/2002	Surface	5.45	23.4	8.35	40.9	0.0	116	26.3
			12.4	6.93	23.7	8.01	39.3	0.0	-280	25.2
LW07-H3-SD201-00-02C	Cove	9/27/2002	?	--	--	--	--	--	--	--
LW07-H3-SD202-00-02C	Cove	9/27/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-H3-SD201-02-02C	Cove	9/30/2002	Surface	7.37	23.9	12.14	38.2	0.5	88	24.4
			?	7.64	23.8	9.76	38.4	17	7.0	24.9

TABLE D-1

2002 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	EH/ORP (MV)	Salinity (ppt)
LW07-H5-SD201-00-02C	Pier	9/26/2002	12.0	--	--	--	--	--	--	--
LW07-H5-SD202-00-02C	Pier	9/26/2002	16.0, 15.0, 15.7	--	--	--	--	--	--	--
LW07-H5-SD201-02-02C	Pier	9/26/2002	Surface	5.14	23.9	8.02	40.0	0.0	289	25.7
			15.3	5.39	23.4	7.83	40.3	0.9	274	25.9
LW07-J4-SD201-00-02C	Cove	9/28/2002	?	--	--	--	--	--	--	--
LW07-J4-SD202-00-02C	Cove	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-J4-SD201-02-02C	Cove	9/30/2002	Surface	7.31	23.7	13.09	38.2	0.0	102	24.4
			16.7	9.39	23.9	9.97	38.0	0.0	-114	18.7
LW07-K1-SD201-00-02C	Pier	9/27/2002	?	--	--	--	--	--	--	--
LW07-K1-SD202-00-02C	Pier	9/27/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-K1-SD201-02-02C	Pier	9/28/2002	Surface	5.68	24.2	7.66	42.0	0.0	73	27.2
			14.7	6.05	24.2	6.95	42.9	0.0	-44	27.8
LW07-K3-SD201-00-02C	Cove	9/28/2002	?	--	--	--	--	--	--	--
LW07-K3-SD202-00-02C	Cove	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-K3-SD201-02-02C	Cove	9/29/2002	Surface	6.46	23.1	9.01	40.5	0.0	-211	26.0
			13.7	6.22	23.9	7.89	41.5	0.0	-172	26.7
LW07-K4-SD201-00-02C	Cove	9/28/2002	?	--	--	--	--	--	--	--
LW07-K4-SD202-00-02C	Cove	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-K4-SD201-02-02C	Cove	9/30/2002	Surface	7.46	23.7	12.45	38.1	0.0	83	24.4
			?	7.61	23.8	10.02	38.7	6.0	61	24.8
LW07-K5-SD201-00-02C	Cove	9/28/2002	?	--	--	--	--	--	--	--
LW07-K5-SD202-00-02C	Cove	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-K5-SD201-02-02C	Cove	9/30/2002	Surface	7.33	23.5	12.06	38.3	0.5	89	24.5
			14.7	9.53	23.7	9.87	38.7	24	-70	24.9
LW07-K6-SD201-00-02C	Pier	9/28/2002	?	--	--	--	--	--	--	--
LW07-K6-SD202-00-02C	Pier	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-K6-SD201-02-02C	Pier	9/28/2002	Surface	5.63	24.2	7.48	39.5	0.0	157	25.4
			15.5	6.08	24.0	6.30	43.2	0.0	-8.0	28.0

TABLE D-1

2002 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	EH/ORP (MV)	Salinity (ppt)
LW07-L2-SD201-00-02C	Cove	10/1/2002	?	--	--	--	--	--	--	--
LW07-L2-SD201-02-02C	Cove	10/1/2002	Surface	5.96	22.9	9.74	20.6	0.0	101	14.0
			?	6.11	23.8	7.61	29.0	0.0	-34	18.3
LW07-L5-SD201-00-02C	Pier	9/28/2002	?	--	--	--	--	--	--	--
LW07-L5-SD202-00-02C	Pier	9/28/2002	?, 13.4, ?	--	--	--	--	--	--	--
LW07-L5-SD201-02-02C	Pier	9/29/2002	Surface	5.41	24.2	11.0	41.2	0.0	103	26.6
			14.7	7.19	24.1	7.78	30.6	0.0	-232	19.3
LW07-L6-SD201-00-02C	Pier	10/1/2002	?	--	--	--	--	--	--	--
LW07-L6-SD201-02-02C	Pier	10/1/2002	Surface	5.54	22.4	9.18	27.4	0.0	204	16.9
			?	8.77	23.7	7.18	27.9	0.0	-133	18.9
LW07-M1-SD201-00-02C	Pier	9/27/2002	?	--	--	--	--	--	--	--
LW07-M1-SD202-00-02C	Pier	9/27/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-M1-SD201-02-02C	Pier	9/29/2002	Surface	5.43	23.5	7.56	41.9	0.0	114	26.5
			11.8	5.72	23.7	7.34	35.0	0.0	-21	22.7
LW07-M3-SD201-00-02C	Pier	9/28/2002	?	--	--	--	--	--	--	--
LW07-M3-SD202-00-02C	Pier	9/28/2002	?, ?, ?	--	--	--	--	--	--	--
LW07-M3-SD201-02-02C	Pier	9/28/2002	Surface	5.69	24.3	7.60	39.3	0.0	70	25.3
			13.4	6.07	24.1	6.96	41.1	0.0	-56	26.5

Yellow highlighted cells indicate questionable measurement values

TABLE D-2

2009 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	Depth Stratum	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	ORP (mV)	Salinity (ppt)
LW07-B5-SD301-00-09D	Channel	11/24/2009	NS	Top	7.4	13.5	9.46	26.3	0.0	155	12.0
			NS	Middle	7.7	13.8	8.73	32.0	0.0	156	20.0
			NS	Bottom	7.8	14.1	8.06	36.4	257	139	23.0
LW07-B7-SD301-00-09D	Channel	11/24/2009	NS	Top	6.3	13.5	8.87	29.2	0.0	16.2	18.0
			NS	Middle	6.9	13.8	8.71	30.4	0.0	16.2	20.0
			NS	Bottom	7.3	14.1	8.28	32.0	0.0	16.2	21.0
LW07-D5-SD301-00-09D	Channel	11/24/2009	NS	Top	7.9	13.3	9.33	27.5	0.0	147	17.0
			NS	Middle	7.9	13.9	8.67	31.9	0.0	147	21.0
			NS	Bottom	7.9	14.1	8.14	35.6	0.0	49.0	22.0
LW07-F3-SD301-00-09D	Channel	11/24/2009	NS	Top	7.9	13.3	9.28	25.8	0.0	140	16.0
			NS	Middle	7.9	13.3	9.14	25.8	0.0	140	16.0
			NS	Bottom	7.9	13.3	9.14	25.8	0.0	146	16.0
LW07-F5-SD301-00-09D	Channel	11/24/2009	NS	Top	8.2	13.4	9.23	27.5	0.0	126	17.0
			NS	Middle	7.9	13.9	8.43	32.3	0.0	126	20.0
			NS	Bottom	7.9	14.0	8.07	33.7	0.0	125	21.0
LW07-H1-SD301-00-09D	Pier	11/24/2009	NS	Top	7.9	13.7	9.29	29.4	0.0	77.0	18.0
			NS	Middle	7.9	14.0	8.89	31.0	0.0	82.0	20.0
			NS	Bottom	7.9	14.6	7.57	34.7	0.0	174	20.0
LW07-H3-SD301-00-09D	Cove	11/24/2009	NS	Top	7.9	13.4	9.55	26.2	0.0	140	43.0
			NS	Middle	7.9	13.8	8.82	32.4	0.0	140	20.0
			NS	Bottom	7.9	14.3	7.84	35.4	135	25.0	23.0
LW07-J4-SD301-00-09D	Cove	11/24/2009	NS	Top	7.9	13.3	9.45	26.2	0.0	117	16.0
			NS	Middle	8.0	13.9	8.73	33.4	0.0	118	21.0
			NS	Bottom	7.9	14.2	8.03	35.6	0.0	82.0	22.0
LW07-K1-SD301-00-09D	Pier	11/24/2009	NS	Top	7.9	13.7	9.23	29.7	0.0	139	19.0
			NS	Middle	7.9	14.2	8.60	33.6	0.0	140	21.0
			NS	Bottom	7.9	14.3	7.89	34.8	0.0	130	21.0
LW07-K1-SD302-00-09D	Pier	11/24/2009	NS	Top	8.2	13.6	9.53	27.8	0.0	132	16.0
			NS	Middle	8.0	13.8	9.03	31.6	0.0	135	20.0
			NS	Bottom	7.9	14.1	8.49	32.1	0.0	135	21.0

TABLE D-2

2009 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	Depth Stratum	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	ORP (mV)	Salinity (ppt)
LW07-K1-SD303-00-09D	Pier	11/24/2009	NS	Top	8.0	13.8	9.38	30.0	0.0	141	14.0
			NS	Middle	7.9	13.8	8.88	31.7	0.0	141	20.0
			NS	Bottom	7.9	14.4	8.49	32.8	0.0	142	21.0
LW07-K1-SD304-00-09D	Pier	11/24/2009	NS	Top	7.9	13.7	9.36	29.8	0.0	141	18.0
			NS	Middle	7.9	14.1	8.83	31.4	0.0	144	21.0
			NS	Bottom	7.9	14.5	7.73	34.5	0.0	216	21.0
LW07-K3-SD301-00-09D	Cove	11/24/2009	NS	Top	8.0	13.5	9.59	26.0	0.0	149	17.0
			NS	Middle	8.0	13.8	13.8	32.1	0.0	149	20.0
			NS	Bottom	7.9	14.4	14.4	32.6	0.0	129	21.0
LW07-K4-SD301-00-09D	Cove	11/23/2009	NS	Top	5.0	13.7	9.28	34.0	0.4	140	21.0
			NS	Middle	7.0	13.8	8.77	34.9	0.5	13.7	22.0
			NS	Bottom	7.3	14.5	7.51	37.3	140	12.8	23.0
LW07-K5-SD301-00-09D	Cove	11/23/2009	NS	Top	7.7	13.7	9.02	34.0	1.3	222	21.0
			NS	Middle	7.6	13.7	8.80	34.5	0.0	216	21.0
			NS	Bottom	7.4	14.5	7.30	36.8	181	133	23.0
LW07-L2-SD301-00-09D	Cove	11/24/2009	NS	Top	8.1	13.5	9.50	27.1	0.0	141	16.0
			NS	Middle	7.9	13.8	9.50	31.7	0.0	142	20.0
			NS	Bottom	7.9	14.4	8.45	32.7	0.0	143	22.0
LW07-L5-SD301-00-09D	Pier	11/23/2009	NS	Top	7.8	13.8	9.49	34.4	4.5	131	21.0
			NS	Middle	7.6	13.9	9.21	35.6	2.2	131	22.0
			NS	Bottom	7.3	14.8	7.34	36.6	0.0	-109	23.0
LW07-M1-SD301-00-09D	Pier	11/24/2009	NS	Top	8.2	13.4	9.42	24.9	0.0	139	15.0
			NS	Middle	7.9	13.8	8.42	30.5	0.0	139	19.0
			NS	Bottom	7.9	14.2	7.18	35.2	370	108	21.0
LW07-M1-SD302-00-09D	Pier	11/24/2009	NS	Top	7.9	13.8	9.41	24.6	0.0	150	15.0
			NS	Middle	7.9	13.8	8.81	30.9	0.0	129	19.0
			NS	Bottom	7.9	13.8	8.44	37.4	0.0	127	19.0
LW07-M1-SD303-00-09D	Pier	11/24/2009	NS	Top	7.9	13.5	4.19	26.6	0.0	133	16.0
			NS	Middle	7.9	13.8	8.82	29.4	0.0	133	20.0
			NS	Bottom	7.9	13.9	8.57	31.8	0.0	133	20.0

TABLE D-2

2009 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Water Depth (feet)	Depth Stratum	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	ORP (mV)	Salinity (ppt)
LW07-M1-SD304-00-09D	Pier	11/24/2009	NS	Top	7.9	13.5	9.38	26.8	0.0	139	17.0
			NS	Middle	7.9	13.8	8.81	31.6	0.0	139	20.0
			NS	Bottom	7.9	14.3	8.35	26.7	0.0	137	27.0
LW07-SD301-00-09D	Pier	11/23/2009	NS	Top	7.5	13.9	9.18	35.6	3.2	132	22.0
			NS	Middle	7.6	14.0	9.00	35.7	2.3	132	22.0
			NS	Bottom	7.6	14.7	8.46	37.2	6.3	137	23.0
LW07-SD302-00-09D	Pier	11/23/2009	NS	Top	7.4	13.9	8.82	35.1	0.8	191	22.0
			NS	Middle	7.5	14.1	8.42	36.0	0.7	187	23.0
			NS	Bottom	7.6	14.4	8.07	36.5	0.0	141	23.0
LW07-SD303-00-09D	Pier	11/23/2009	NS	Top	7.3	13.8	9.28	34.7	4.0	159	21.0
			NS	Middle	7.5	14.0	8.68	35.3	2.9	158	22.0
			NS	Bottom	7.5	14.6	7.42	36.9	87.3	120	23.0
LW07-SD304-00-09D	Pier	11/23/2009	NS	Top	7.6	13.7	9.40	34.0	47.6	124	21.0
			NS	Middle	7.6	13.7	9.26	34.0	42.4	124	21.0
			NS	Bottom	7.6	14.3	8.81	36.3	25.0	125	23.0
LW07-SD305-00-09D	Pier	11/23/2009	NS	Top	7.8	13.7	9.31	32.4	2.2	144	20.0
			NS	Middle	7.6	13.7	8.99	34.2	0.6	145	22.0
			NS	Bottom	7.5	14.2	8.31	35.9	0.0	22.0	22.0
LW07-SD306-00-09D	Pier	11/23/2009	NS	Top	7.4	13.5	9.44	32.3	1.6	159	20.0
			NS	Middle	7.6	13.6	8.75	34.3	0.0	159	21.0
			NS	Bottom	7.5	14.2	8.26	36.3	8.8	113	23.0
LW07-SD307-00-09D	Pier	11/23/2009	NS	Top	7.7	13.7	9.42	32.5	4.2	148	30.0
			NS	Middle	7.6	13.9	8.97	33.1	2.4	150	22.0
			NS	Bottom	7.6	14.5	7.89	36.5	4.0	140	23.0

Yellow highlighted cells indicate questionable measurement values; red highlighted cells indicate likely erroneous measurement values

TABLE D-3

2010 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Total Depth - Composite Points (feet)	Total Depth - Center Point (feet)	Sample Depth (feet)	pH	Temperature (^{o}C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	ORP (mV)	Salinity (ppt)
LW07-B5-SD401-00-10C	Channel	9/12/2010	14.8	14.8	0.8	7.85	24.66	6.40	36.23	2.5	183.6	22.87
			15.4		7.1	7.87	24.70	6.43	36.31	2.4	182.9	22.93
			15.2		13.6	7.81	24.51	6.04	36.45	10.7	182.8	23.03
LW07-B7-SD401-00-10C	Channel	9/12/2010	14.5	13.7	0.9	7.86	24.65	6.56	36.24	1.8	178.4	22.88
			14.3		7.6	7.87	24.64	6.54	36.23	1.7	177.9	22.88
			9.67		12.3	7.85	24.63	6.32	36.23	7.5	176.7	22.88
LW07-D5-SD401-00-10C	Channel	9/11/2010	13.1	13.2	0.8	7.90	25.33	7.02	35.47	3.9	164.7	22.33
			12.8		6.6	7.90	25.27	6.87	35.48	3.7	164.6	22.34
			14.7		11.9	7.82	24.68	5.67	35.45	13.8	164.0	22.33
LW07-F3-SD401-00-10C	Channel	9/11/2010	12.8	13.2	0.9	7.85	25.13	6.32	35.44	3.5	161.4	22.31
			13.3		6.2	7.85	24.77	6.18	35.46	7.0	161.5	22.33
			13.2		11.9	7.83	24.62	5.84	35.46	8.2	161.0	22.33
LW07-F5-SD401-00-10C	Channel	9/11/2010	12.9	10.9	0.9	7.87	24.99	6.62	35.46	2.6	164.1	22.33
			12.6		5.4	7.88	25.01	6.71	35.46	3.2	163.1	22.33
			7.25		9.9	7.86	24.85	6.31	35.46	9.6	162.8	22.33
LW07-H1-SD401-00-10C	Pier	9/10/2010	14.5	13.6	0.8	7.72	25.05	4.86	38.02	4.1	164.9	24.13
			13.3		7.0	7.73	25.07	4.83	38.05	3.7	162.4	24.14
			13.4		12.8	7.73	25.07	4.69	38.05	9.8	163.2	24.15
LW07-H3-SD401-00-10C	Cove	9/11/2010	15.3	15.3	0.5	7.83	25.04	6.31	35.44	3.2	160.7	22.32
			14.7		8.2	7.84	24.62	6.09	35.44	3.6	160.4	22.32
			14.7		13.8	7.76	24.49	5.24	35.41	12.0	160.1	22.31
LW07-J4-SD401-00-10C	Cove	9/11/2010	16.3	16.2	0.6	7.81	25.05	6.13	35.43	3.2	161.9	22.31
			16.5		8.5	7.83	24.68	6.04	35.45	3.3	161.1	22.32
			16.2		15.0	7.78	24.42	5.44	35.40	9.5	157.5	22.30
LW07-K1-SD401-00-10C	Pier	9/10/2010	14.3	14.3	0.6	7.74	25.17	4.96	38.14	4.7	149.3	24.20
			14.1		7.5	7.78	25.10	5.26	38.14	4.3	149.4	24.21
			14.3		13.6	7.78	25.08	5.28	38.16	21.4	144.4	24.22
LW07-K3-SD401-00-10C	Cove	9/11/2010	14.2	14.5	0.9	7.77	24.51	5.44	35.37	3.6	174.0	22.28
			15.4		7.4	7.78	24.48	5.54	35.37	3.9	173.7	22.28
			15.7		13.8	7.80	24.42	5.57	35.39	6.5	172.9	22.29

TABLE D-3

2010 Water Column Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Area	Date	Total Depth - Composite Points (feet)	Total Depth - Center Point (feet)	Sample Depth (feet)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	ORP (mV)	Salinity (ppt)
LW07-K4-SD401-00-10C	Cove	9/11/2010	16.3	16.0	0.7	7.78	24.56	5.76	35.39	4.1	169.1	22.30
			16.3		8.1	7.78	24.43	5.60	35.39	4.8	168.6	22.29
			16.8		14.5	7.77	24.34	5.35	35.40	7.1	167.6	22.30
LW07-K5-SD401-00-10C	Cove	9/11/2010	16.4	16.3	0.5	7.79	24.89	5.71	35.43	3.3	166.3	22.31
			16.3		8.9	7.81	24.61	5.85	35.41	3.5	165.0	22.31
			16.0		14.7	7.78	24.38	5.51	35.39	13.7	164.4	22.30
LW07-L2-SD401-00-10C	Cove	9/11/2010	14.8	14.8	1.2	7.77	24.53	5.42	35.36	4.2	181.3	22.27
			14.8		7.8	7.80	24.45	5.57	35.38	4.4	180.9	22.29
			14.6		14.0	7.80	24.42	5.57	35.37	14.8	179.7	22.28
LW07-L5-SD401-00-10C	Pier	9/11/2010	16.7	16.5	0.6	7.80	24.70	5.79	35.41	4.0	166.3	22.30
			16.3		8.4	7.80	24.47	5.68	35.40	3.4	166.1	22.30
			16.7		14.8	7.82	24.38	5.52	35.40	4.9	165.8	22.30
LW07-M1-SD401-00-10C	Pier	9/10/2010	14.5	14.4	0.5	7.76	25.10	5.18	38.14	5.4	144.3	24.20
			15.8		7.1	7.74	25.11	4.86	38.14	4.0	144.4	24.21
			14.7		13.2	7.77	25.05	5.15	38.13	5.9	144.2	24.20
LW07-SD401-00-10C	Pier	9/11/2010	16.1	16.6	1.2	7.81	24.95	6.02	35.42	3.4	164.0	22.31
			16.3		8.7	7.80	24.77	5.82	35.42	4.6	163.5	22.31
			15.8		15.1	7.77	24.44	5.34	35.41	11.6	160.8	22.30
LW07-SD402-00-10C	Pier	9/11/2010	16.1	14.9	0.5	7.79	24.47	5.88	35.40	4.9	171.1	22.30
			16.1		6.7	7.81	24.48	5.72	35.40	4.8	170.2	22.30
			14.8		14.4	7.81	24.42	5.75	35.39	5.7	170.2	22.29
LW07-SD403-00-10C	Pier	9/11/2010	13.4	13.3	0.8	7.76	24.54	5.33	35.37	4.6	199.2	22.28
			14.1		5.6	7.79	24.52	5.39	35.38	4.6	198.0	22.29
			14.1		12.2	7.80	24.48	5.47	35.38	5.4	196.0	24.48
LW07-SD404-00-10C	Pier	9/10/2010	16.4	16.4	0.8	7.77	25.10	5.49	38.14	4.3	146.3	25.11
			16.1		7.7	7.78	25.10	5.44	38.14	4.5	145.9	24.21
			15.8		15.1	7.80	24.99	5.47	38.18	14.1	144.1	24.20

TABLE D-4

Sediment Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Top Depth (in)	Bottom Depth (in)	Percent ABM	Redox (mV)	Cation Exchange Capacity (meq/100g)\	Average Redox Depth (mm)	pH	SEM/AVS Ratio	Total Organic Carbon (MG/KG)	Grain Size (percent)						
													Large Gravel	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay
Surface Sediments																			
LW07-SD01-00	6/2/2000	Discrete	Channel	0	4	NS	NS	NS	--	8.25	NS	4,400	NS	NS	NS	NS	NS	NS	NS
LW07-SD02-00	6/1/2000	Discrete	Pier	0	4	NS	NS	NS	--	8.09	NS	7,880	NS	NS	NS	NS	NS	NS	NS
LW07-SD03-00	6/1/2000	Discrete	Pier	0	4	NS	NS	NS	--	7.88	NS	7,580	NS	NS	NS	NS	NS	NS	NS
LW07-SD04-00	6/1/2000	Discrete	Pier	0	4	NS	NS	NS	--	8.04	NS	10,600	NS	NS	NS	NS	NS	NS	NS
LW07-SD05-00	6/1/2000	Discrete	Pier	0	4	NS	NS	NS	--	7.60	NS	21,200	NS	NS	NS	NS	NS	NS	NS
LW07-SD05-00P	6/1/2000	Discrete	Pier	0	4	NS	NS	NS	--	7.64	NS	18,900	NS	NS	NS	NS	NS	NS	NS
LW07-B5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	10.2	--	7.94	0.40	16,830	0.00	0.00	0.00	0.08	4.47	33.29	62.17
LW07-B5-SD201P-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	NS	--	7.85	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-B5-SD202-00-02C	9/27/2002	Composite	Channel	0	4	Present (2 of 3)	NS	NS	--	7.85	NS	24,160	0.00	0.00	0.00	0.08	4.06	30.22	65.64
LW07-B7-SD201-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	5.9	--	8.18	**>1**[a]	3,125	NS	NS	NS	NS	NS	NS	NS
LW07-B7-SD202-00-02C	9/27/2002	Composite	Channel	0	4	Present (1 of 3)	NS	NS	--	7.86	NS	18,670	0.00	0.00	6.28	1.40	4.24	29.19	58.89
LW07-D5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	9.6	--	7.78	0.21	29,330	0.00	0.00	0.00	0.11	1.66	9.07	89.16
LW07-D5-SD202-00-02C	9/27/2002	Composite	Channel	0	4	Present (3 of 3)	NS	NS	--	7.69	NS	30,490	0.00	0.00	0.70	0.14	3.05	13.58	82.54
LW07-F3-SD201-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	15.0	--	8.05	0.21	12,900	0.00	0.00	5.21	3.78	16.05	44.38	30.58
LW07-F3-SD202-00-02C	9/27/2002	Composite	Channel	0	4	Present (2 of 3)	NS	NS	--	8.06	NS	22,230	0.00	0.00	2.04	2.49	3.28	33.87	58.32
LW07-F5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4	Present	NS	11.5	--	8.14	0.60	24,170	0.00	0.00	0.92	0.89	22.77	45.89	29.53
LW07-F5-SD202-00-02C	9/27/2002	Composite	Channel	0	4	Present (1 of 3)	NS	NS	--	7.96	NS	8,024	0.00	0.00	0.06	0.61	8.96	54.35	36.03
LW07-H1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4	Present	NS	10.6	--	7.90	0.24	20,310	0.00	0.00	0.03	0.27	6.92	26.87	65.91
LW07-H1-SD201P-00-02C	9/27/2002	Discrete	Pier	0	4	Present	NS	NS	--	7.93	NS	21,790	NS	NS	NS	NS	NS	NS	NS
LW07-H1-SD202-00-02C	9/27/2002	Composite	Pier	0	4	Present (1 of 3)	NS	NS	--	7.95	NS	21,790	0.00	0.00	0.00	0.26	2.43	16.71	80.59
LW07-H3-SD201-00-02C	9/27/2002	Discrete	Cove	0	4	Present	NS	15.0	--	7.98	0.15	22,280	0.00	0.00	0.54	0.10	0.79	23.29	75.28
LW07-H3-SD201P-00-02C	9/27/2002	Discrete	Cove	0	4	Present	NS	NS	--	8.08	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-H3-SD202-00-02C	9/27/2002	Composite	Cove	0	4	Present (2 of 3)	NS	NS	--	8.13	NS	23,260	NS	NS	NS	NS	NS	NS	NS
LW07-H5-SD201-00-02C	9/26/2002	Discrete	Pier	0	4	Present	NS	5.4	--	8.35	**2.43**	3,463	0.00	0.00	2.17	2.52	30.06	54.18	11.07
LW07-H5-SD202-00-02C	9/26/2002	Composite	Pier	0	4	Present (2 of 3)	NS	NS	--	8.03	NS	15,590	NS	NS	NS	NS	NS	NS	NS
LW07-J4-SD201-00-02C	9/28/2002	Discrete	Cove	0	4	0.0	NS	14.0	--	8.00	0.14	14,950	0.00	0.00	0.00	0.07	2.50	23.15	74.28
LW07-J4-SD202-00-02C	9/28/2002	Composite	Cove	0	4	0.0	NS	NS	--	7.86	NS	15,900	0.00	0.00	0.28	0.19	2.38	21.36	75.80
LW07-K1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4	0.0	NS	9.7	--	8.36	0.10	28,880	0.00	0.00	0.01	0.16	1.16	6.71	91.96
LW07-K1-SD202-00-02C	9/27/2002	Composite	Pier	0	4	Present (1 of 3)	NS	NS	--	8.35	NS	23,400	NS	NS	NS	NS	NS	NS	NS
LW07-K3-SD201-00-02C	9/28/2002	Discrete	Cove	0	4	Present	NS	18.6	--	7.89	0.29	10,780	0.00	0.00	0.63	0.44	15.17	43.19	40.56
LW07-K3-SD202-00-02C	9/28/2002	Composite	Cove	0	4	Present (1 of 3)	NS	NS	--	7.80	NS	10,800	0.00	0.00	0.46	0.85	22.85	32.91	42.93
LW07-K4-SD201-00-02C	9/28/2002	Discrete	Cove	0	4	Present (trace)	NS	17.6	--	7.80	0.36	13,870	0.00	0.00	1.30	0.91	9.27	41.77	46.75
LW07-K4-SD202-00-02C	9/28/2002	Composite	Cove	0	4	Present (1 of 3)	NS	NS	--	7.79	NS	13,940	0.00	0.00	0.77	0.35	8.99	38.23	51.67
LW07-K5-SD201-00-02C	9/28/2002	Discrete	Cove	0	4	0.0	NS	13.4	--	7.92	0.15	22,360	0.00	0.00	0.00	0.02	1.29	11.81	86.88
LW07-K5-SD202-00-02C	9/28/2002	Composite	Cove	0	4	0.0	NS	NS	--	7.82	NS	18,450	0.00	0.00	0.13	0.13	2.85	20.65	76.25
LW07-K6-SD201-00-02C	9/28/2002	Discrete	Pier	0	4	Present	NS	4.7	--	8.20	0.13	2,245	0.00	0.00	0.86	2.48	19.13	44.93	32.60
LW07-K6-SD202-00-02C	9/28/2002	Composite	Pier	0	4	Present (3 of 3) Abundant at K6-2	NS	NS	--	8.04	NS	2,937	0.00	9.80	7.80	2.69	24.61	40.17	14.92
LW07-L2-SD201-00-02C	10/1/2002	Discrete	Cove	0	4	Present	NS	8.9	--	7.80	0.28	22,230	0.00	0.00	0.00	0.43	1.18	18.25	80.14
LW07-L5-SD201-00-02C	9/28/2002	Discrete	Pier	0	4	0.0	NS	8.0	--	7.89	0.13	20,410	0.00	0.00	0.00	0.03	0.49	17.44	82.04
LW07-L5-SD202-00-02C	9/28/2002	Composite	Pier	0	4	Present (1 of 3)	NS	NS	--	8.01	NS	19,870	0.00	0.00	2.51	2.92	5.38	24.67	64.51
LW07-L6-SD201-00-02C	10/1/2002	Discrete	Pier	0	4	0.0	NS	8.3	--	7.65	0.17	23,790	0.00	0.00	0.00	0.06	1.10	11.99	86.85
LW07-M1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4	Present	NS	7.8	--	8.32	0.30	20,080	0.00	0.00	1.51	0.80	5.16	29.16	63.37

TABLE D-4

Sediment Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Top Depth (in)	Bottom Depth (in)	Percent ABM	Redox (mV)	Cation Exchange Capacity (meq/100g)\	Average Redox Depth (mm)	pH	SEM/AVS Ratio	Total Organic Carbon (MG/KG)	Grain Size (percent)						
													Large Gravel	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay
LW07-M1-SD202-00-02C	9/27/2002	Composite	Pier	0	4	Present (3 of 3)	NS	NS	--	7.86	NS	17,030	NS	NS	NS	NS	NS	NS	NS
LW07-M3-SD201-00-02C	9/28/2002	Discrete	Pier	0	4	Present	NS	14.2	--	7.81	0.25	20,080	0.00	0.00	2.48	1.94	11.78	35.51	48.29
LW07-M3-SD202-00-02C	9/28/2002	Composite	Pier	0	4	Present (1 of 3)	NS	NS	--	7.92	NS	19,110	0.00	0.00	0.18	0.97	4.75	24.67	69.43
LW07-B5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4	<1.0	NS	NS	--	7.77	0.61	14,100	0.0	0.0	0.0	0.0	3.0	29.0	68.0
LW07-B5-SD301P-00-09D	11/24/2009	Discrete	Channel	0	4	<1.0	NS	NS	--	NS	NS	NS	0.0	0.0	0.0	0.2	4.8	23.0	72.0
LW07-B7-SD301-00-09D	11/24/2009	Discrete	Channel	0	4	<1.0	NS	NS	--	8.22	0.92	20,300	NS	NS	NS	NS	NS	NS	NS
LW07-D5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4	<1.0	NS	NS	--	7.45	0.95	28,000	0.0	0.0	0.0	0.0	0.0	15.0	85.0
LW07-F3-SD301-00-09D	11/24/2009	Discrete	Channel	0	4	1.0	NS	NS	--	7.83	0.21	13,300	0.0	0.0	0.0	0.0	2.0	29.0	69.0
LW07-F5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4	<1.0	NS	NS	--	8.07	0.40	13,300	0.0	0.0	0.7	0.1	5.2	30.0	64.0
LW07-H1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4	1.0	NS	NS	--	7.85	0.21	21,400	0.0	0.0	0.0	0.0	14.0	21.0	65.0
LW07-H3-SD301-00-09D	11/24/2009	Discrete	Cove	0	4	1.0	NS	NS	--	7.82	**1.83**	10,800	0.0	0.0	0.0	0.0	2.0	22.0	76.0
LW07-J4-SD301-00-09D	11/24/2009	Discrete	Cove	0	4	1.0	NS	NS	--	8.22	0.13	20,600	0.0	0.0	0.0	0.0	1.0	8.0	91.0
LW07-K1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4	1.0	NS	NS	--	8.08	0.59	19,600	0.0	0.0	0.0	0.0	0.0	7.0	93.0
LW07-K1-SD302-00-09D	11/24/2009	Discrete	Pier	0	4	<1.0	NS	NS	--	7.76	0.82	25,600	0.0	0.0	0.0	0.0	1.0	8.0	91.0
LW07-K1-SD303-00-09D	11/24/2009	Discrete	Pier	0	4	<1.0	NS	NS	--	8.17	0.52	29,000	0.0	0.0	0.0	0.0	0.0	6.0	94.0
LW07-K1-SD304-00-09D	11/24/2009	Discrete	Pier	0	4	1.0	NS	NS	--	7.48	0.57	22,400	0.0	0.0	0.0	0.0	0.0	9.0	91.0
LW07-K3-SD301-00-09D	11/24/2009	Discrete	Cove	0	4	5.0	NS	NS	--	7.26	**4.52**	11,300	0.0	0.0	0.0	0.9	15.1	20.0	64.0
LW07-K4-SD301-00-09D	11/23/2009	Discrete	Cove	0	4	5.0	NS	NS	--	8.15	0.47	20,600	0.0	0.0	0.7	0.3	7.0	28.0	64.0
LW07-K5-SD301-00-09D	11/23/2009	Discrete	Cove	0	4	1.0	NS	NS	--	8.22	0.91	30,900	0.0	0.0	0.0	0.0	1.0	5.0	94.0
LW07-L2-SD301-00-09D	11/24/2009	Discrete	Cove	0	4	5.0	NS	NS	--	7.63	**>1[a]**	12,100	0.0	0.0	0.0	0.3	9.7	38.0	52.0
LW07-L2-SD301P-00-09D	11/24/2009	Discrete	Cove	0	4	5.0	NS	NS	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-L5-SD301-00-09D	11/23/2009	Discrete	Pier	0	4	1.0	NS	NS	--	8.06	0.50	16,300	0.0	0.0	0.0	0.0	3.0	7.0	90.0
LW07-M1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4	5.0	NS	NS	--	8.06	0.25	24,000	0.0	0.0	0.0	0.0	2.0	12.0	86.0
LW07-M1-SD302-00-09D	11/24/2009	Discrete	Pier	0	4	5.0	NS	NS	--	8.18	**1.77**	6,890	0.0	0.0	0.0	0.0	21.0	59.0	20.0
LW07-M1-SD303-00-09D	11/24/2009	Discrete	Pier	0	4	5.0	NS	NS	--	7.89	0.72	15,100	0.0	0.0	0.0	0.0	2.0	9.0	89.0
LW07-M1-SD304-00-09D	11/24/2009	Discrete	Pier	0	4	7.0	NS	NS	--	8.81	**1.21**	15,700	1.5	0.3	0.0	0.9	17.3	22.0	58.0
LW07-SD301-00-09D	11/23/2009	Discrete	Pier	0	4	10	NS	NS	--	8.61	NS	9,360	NS	NS	NS	NS	NS	NS	NS
LW07-SD301P-00-09D	11/23/2009	Discrete	Pier	0	4	10	NS	NS	--	NS	**19.1**	NS	NS	NS	NS	NS	NS	NS	NS
LW07-SD302-00-09D	11/23/2009	Discrete	Pier	0	4	3.0	NS	NS	--	8.17	0.69	6,910	0.0	0.0	9.4	0.0	0.0	0.6	90.0
LW07-SD303-00-09D	11/23/2009	Discrete	Pier	0	4	5.0	NS	NS	--	8.07	0.47	8,580	0.0	0.0	2.4	1.6	50.0	32.0	14.0
LW07-SD304-00-09D	11/23/2009	Discrete	Pier	0	4	5.0	NS	NS	--	8.34	**1.28**	12,100	0.0	0.0	0.7	0.5	19.8	18.0	61.0
LW07-SD305-00-09D	11/23/2009	Discrete	Pier	0	4	3.0	NS	NS	--	7.93	0.64	23,500	0.0	0.0	0.0	0.0	1.0	5.0	94.0
LW07-SD306-00-09D	11/23/2009	Discrete	Pier	0	4	8.0	NS	NS	--	8.24	0.45	15,800	0.0	0.0	0.0	0.2	9.8	19.0	71.0
LW07-SD307-00-09D	11/23/2009	Discrete	Pier	0	4	5.0	NS	NS	--	8.04	0.75	6,160	0.0	0.0	13.8	2.3	17.9	32.0	34.0
LW07-B5-SD401-00-10C	9/12/2010	Discrete	Channel	0	4	0.05	NS	NS	3.0	7.99	0.02	17,200	0.0	0.0	0.0	0.0	4.0	33.0	63.0
LW07-B5-SD401P-00-10C	9/12/2010	Discrete	Channel	0	4	0.05	NS	NS	3.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-B7-SD401-00-10C	9/12/2010	Discrete	Channel	0	4	0.01	NS	NS	2.5	8.19	0.01	13,600	0.0	0.0	0.0	1.0	4.0	33.0	62.0
LW07-D5-SD401-00-10C	9/11/2010	Discrete	Channel	0	4	0.0	NS	NS	1.0	7.73	0.01	15,500	0.0	0.0	0.0	0.0	1.0	11.0	88.0
LW07-F3-SD401-00-10C	9/11/2010	Discrete	Channel	0	4	0.0	NS	NS	1.3	8.36	0.01	12,400	0.0	0.0	0.0	0.0	1.0	31.0	68.0
LW07-F5-SD401-00-10C	9/12/2010	Discrete	Channel	0	4	0.75	NS	NS	3.5	7.05	0.003	7,250	0.0	0.0	0.0	1.0	19.0	57.0	23.0
LW07-H1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4	0.0	NS	NS	3.3	7.93	0.01	30,300	0.0	0.0	0.0	0.0	7.0	18.0	75.0
LW07-H3-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	0.01	NS	NS	1.25	8.33	0.01	18,100	0.0	0.0	0.0	0.0	1.0	24.0	75.0
LW07-J4-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	0.01	NS	NS	1.3	8.06	0.01	15,500	0.0	0.0	0.0	0.0	3.0	27.0	70.0
LW07-K1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4	0.01	NS	NS	0.5	8.24	0.03	31,600	0.0	0.0	0.0	0.0	1.0	6.0	93.0

TABLE D-4

Sediment Parameter Measurements - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Top Depth (in)	Bottom Depth (in)	Percent ABM	Redox (mV)	Cation Exchange Capacity (meq/100g)\	Average Redox Depth (mm)	pH	SEM/AVS Ratio	Total Organic Carbon (MG/KG)	Grain Size (percent)						
													Large Gravel	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay
LW07-K3-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	1.0	NS	NS	2.0	7.87	0.04	20,500	0.0	0.0	0.0	1.0	11.0	37.0	51.0
LW07-K4-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	0.60	NS	NS	2.0	8.04	0.03	17,300	0.0	0.0	0.0	0.0	11.0	32.0	57.0
LW07-K5-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	0.01	NS	NS	NV	8.01	0.01	20,800	0.0	0.0	0.0	0.0	2.0	17.0	81.0
LW07-L2-SD401-00-10C	9/11/2010	Discrete	Cove	0	4	1.0	NS	NS	0.5	8.12	0.01	13,400	0.0	0.0	0.0	3.0	8.0	29.0	60.0
LW07-L5-SD401-00-10C	9/11/2010	Discrete	Pier	0	4	0.001	NS	NS	1.5	7.99	0.01	27,600	0.0	0.0	0.0	0.0	4.0	17.0	79.0
LW07-M1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4	1.5	NS	NS	1.25	8.29	0.01	24,700	0.0	0.0	0.0	3.0	10.0	21.0	66.0
LW07-SD401-00-10C	9/11/2010	Discrete	Pier	0	4	0.01	NS	NS	1.2	8.31	0.004	19,200	0.0	0.0	0.0	0.0	6.0	29.0	65.0
LW07-SD402-00-10C	9/11/2010	Discrete	Pier	0	4	0.20	NS	NS	4.0	7.79	0.01	17,300	0.0	0.0	0.0	1.0	12.0	22.0	65.0
LW07-SD402P-00-10C	9/11/2010	Discrete	Pier	0	4	0.20	NS	NS	4.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-SD403-00-10C	9/11/2010	Discrete	Pier	0	4	1.5	NS	NS	1.2	7.88	0.01	20,800	0.0	0.0	0.0	1.0	10.0	21.0	68.0
LW07-SD404-00-10C	9/10/2010	Discrete	Pier	0	4	2.5	NS	NS	1.5	7.87	0.02	13,500	0.0	0.0	1.0	1.0	8.0	26.0	64.0
Subsurface Sediments																			
LW07-B5-SD201-02-02C	9/30/2002	Discrete	Channel	6	12	Trace (0-3")	-252.1	NS	--	8.15	NS	14,690	0.00	0.00	0.00	0.01	1.42	38.61	59.95
LW07-B5-SD201P-02-02C	9/30/2002	Discrete	Channel	6	12	Trace (0-3")	-252.1	NS	--	8.24	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-B7-SD201-02-02C	9/29/2002	Discrete	Channel	12	18	0.0	-532.1	NS	13	8.15	NS	5,591	0.00	0.00	0.40	0.98	31.73	42.28	24.60
LW07-D5-SD201-02-02C	9/30/2002	Discrete	Channel	7	13	0.0	-259.1	NS	--	8.18	NS	7,718	0.00	0.00	0.00	0.30	11.17	25.42	63.10
LW07-F3-SD201-02-02C	9/29/2002	Discrete	Channel	12	18	0.0	-181.4	NS	1.0	8.52	NS	12,870	0.00	0.00	0.00	0.00	8.07	38.24	53.69
LW07-F5-SD201-02-02C	9/29/2002	Discrete	Channel	9	16	Trace (5-7.5")	-299.1	NS	<25	7.99	NS	1,337	0.00	0.00	0.00	0.05	3.70	78.33	17.92
LW07-H1-SD201-02-02C	9/29/2002	Discrete	Pier	12	16	0.0	-292.2	NS	1.0	8.58	NS	24,430	NS	NS	NS	NS	NS	NS	NS
LW07-H3-SD201-02-02C	9/30/2002	Discrete	Cove	7	13	0.0	-324.9	NS	--	8.15	NS	21,800	0.00	0.00	0.00	0.07	1.71	4.76	93.46
LW07-H5-SD201-02-02C	9/26/2002	Discrete	Pier	7	13	Present (0-6")	0	NS	NV	8.17	NS	8,387	0.00	0.00	0.08	0.51	10.88	16.98	71.54
LW07-J4-SD201-02-02C	9/30/2002	Discrete	Cove	7	13	0.0	-305.9	NS	--	8.05	NS	15,150	0.00	0.00	0.02	0.02	4.92	57.72	37.32
LW07-K1-SD201-02-02C	9/28/2002	Discrete	Pier	6	12	0.0	-294.0	NS	--	8.65	NS	9,591	NS	NS	NS	NS	NS	NS	NS
LW07-K3-SD201-02-02C	9/29/2002	Discrete	Cove	8	15	Trace (0-5")	-1.2	NS	13	8.36	NS	9,016	0.00	0.00	0.00	0.10	2.31	14.54	83.05
LW07-K3-SD201P-02-02C	9/29/2002	Discrete	Cove	8	15	Trace (0-5")	-1.2	NS	13	8.12	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-K4-SD201-02-02C	9/30/2002	Discrete	Cove	7	13	Present (0-6")	-325.1	NS	--	8.15	NS	6,321	0.00	0.00	0.39	0.06	16.92	50.56	32.07
LW07-K4-SD201P-02-02C	9/30/2002	Discrete	Cove	7	13	Present (0-6")	-325.1	NS	--	8.26	NS	NS	NS	NS	NS	NS	NS	NS	NS
LW07-K5-SD201-02-02C	9/30/2002	Discrete	Cove	7	20	Present (0-3")	-385.5	NS	--	8.15	NS	12,710	0.00	0.00	0.00	0.02	1.14	30.03	68.82
LW07-K6-SD201-02-02C	9/28/2002	Discrete	Pier	6	12	Trace (0-5")	-6.9	NS	13	8.44	NS	21,690	0.00	0.00	0.51	1.37	11.45	28.54	58.13
LW07-L2-SD201-02-02C	10/1/2002	Discrete	Cove	7	13	0.0	-170.3	NS	--	8.12	NS	12,820	0.00	0.00	0.00	0.08	5.76	21.70	72.46
LW07-L5-SD201-02-02C	9/29/2002	Discrete	Pier	13	20	Trace (9-12")	-412.8	NS	<25	7.80	NS	17,070	0.00	0.00	0.70	0.17	1.27	30.83	67.02
LW07-L6-SD201-02-02C	10/1/2002	Discrete	Pier	6	12	0.0	-196.3	NS	--	8.14	NS	14,280	0.00	0.00	0.00	0.19	3.57	15.83	80.40
LW07-M1-SD201-02-02C	9/29/2002	Discrete	Pier	17	25	Present (0-15")	-250.1	NS	~25	8.64	NS	27,940	0.00	0.00	0.26	0.74	3.63	27.82	67.55
LW07-M3-SD201-02-02C	9/28/2002	Discrete	Pier	11	18	Present (0-8")	-172.0	NS	13	8.16	NS	34,450	NS	NS	NS	NS	NS	NS	NS

Shaded cells are field duplicates

NS - Not Sampled

NV - Not Visible

a - SEM not detected

TABLE D-5

Characteristics of Outfalls Discharging to Desert Cove and the Connector Channel
Post-MILCON Action Ecological Risk Assessment
Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Area	Outfall	Drainage (sq ft)	Drainage (percent)	Drainage Characteristics
Northwest	NR-009	117,500	4.2	Road - Potential Fuel
	NR-008	25,000	0.9	Road - Potential Fuel
	NR-004	11,973	0.4	Road - Potential Fuel
SubTotal		**154,473**	**5.5**	
Northeast	NR-007b	1,042,734	37.2	Road - Parking
	NR-011	148,613	5.3	Road - Potential Fuel
	NR-010	64,941	2.3	Road - Potential Fuel
SubTotal		**1,256,289**	**44.8**	
East-Central	NR-012	151,445	5.4	Road - Potential ABM
SubTotal		**151,445**	**5.4**	
Southeast	NR-034	473,426	16.9	Road - Parking
	00X	224,512	8.0	Road - Parking
	NR-033	197,797	7.1	Road - Parking
	NR-035	79,521	2.8	Road - Parking
	NR-032	67,705	2.4	Road - Parking
	NR-031	24,023	0.9	Road - Parking
SubTotal		**1,066,984**	**38.1**	
Connector	NR-007a	145,767	5.2	Road - Potential ABM
	NR-005	13,854	0.5	Road - Grass
	NR-006	13,854	0.5	Road - Grass
SubTotal		**173,475**	**6.2**	
TOTAL		**2,802,666**	**100.0**	

TABLE D-6

2002 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Taxonomic Group	Taxon	Pollution Sensitivity[1]	B5-201 Channel	B7-201 Channel	D5-201 Channel	F3-201 Channel	F5-201 Channel	H3-201 Cove	J4-201 Cove	K3-201 Cove	K4-201 Cove	K5-201 Cove	L2-201 Cove	H1-201 Pier	K1-204 Pier	L5-201 Pier	M1-201 Pier	H5-201 Pier[2]	K6-201 Pier[2]	L6-201 Pier[2]	M3-201 Pier[2]	Total
Bivalvia	Gemma gemma (Totten)	OP	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3	0	1	7
Bivalvia	Mercenaria mercenaria (Linnaeus)	PS,EQ	0	0	0	3	2	0	0	13	0	0	0	0	0	0	0	1	0	0	0	19
Bivalvia	Tagelus divisus (Spengler)	PS,EQ	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cumacea	Leucon americanus Zimmer	--	0	0	0	0	0	1	0	0	3	1	0	0	0	0	1	0	0	0	6	12
Gastropoda	Acteocina canaliculata (Say)	PS	0	0	3	1	2	0	0	0	0	0	0	0	0	1	0	0	0	2	0	9
Gastropoda	Ilyanassa obsoleta (Say)	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Mysidacea	Mysidopsis bigelowi Tattersall	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Nemertea	Nemertea spp.	--	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Oligochaeta	Tubificoides spp. Group I	OP	5	1	0	1	8	1	0	4	0	1	3	1	1	0	1	2	0	0	1	30
Oligochaeta	Tubificoides wasselli Brinkhurst	OP	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	18
Phoronida	Phoronis psammophila Cori	--	3	3	0	4	14	0	1	0	1	0	2	0	0	1	1	0	0	1	0	31
Polychaeta	Glycinde solitaria (Webster)	PS,OP	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Gyptis brevipalpa (Hartmann-Schroder)	--	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3
Polychaeta	Eteone heteropoda Hartman	PI,OP	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Polychaeta	Spiochaetopterus oculatus Webster	PS	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	3
Polychaeta	Apoprionospio pygmaea (Hartman)	--	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Polychaeta	Paraprionospio pinnata (Ehlers)	PI,OP	13	8	2	2	1	2	12	0	9	7	2	7	4	7	4	0	0	3	2	85
Polychaeta	Prionospio heterobranchia Moore	--	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Polychaeta	Polydora cornuta Bosc	OP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Polychaeta	Streblospio benedicti Webster	PI,OP	31	39	12	66	41	11	19	25	18	0	19	29	18	24	36	25	3	9	54	479
Polychaeta	Capitella capitata (Fabricius)	PI,OP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Polychaeta	Heteromastus filiformis (Claparede)	OP	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4
Polychaeta	Mediomastus ambiseta (Hartman)	PS,OP	3	3	1	7	39	3	0	15	3	0	1	2	0	1	1	0	0	0	1	80
Polychaeta	Leitoscoloplos spp.	PI,OP	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
Polychaeta	Sigambra tentaculata (Treadwell)	--	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Clymenella torquata (Leidy)	PS,EQ	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Nephtys picta Ehlers	PS	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Polychaeta	Nephtys sp.	PS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Notomastus sp.	--	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Polychaeta	Paleanotus heteroseta Hartman	PS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Parahesione luteola (Webster)	--	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Phyllodoce arenae Webster	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE D-6

2002 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Taxonomic Group	Taxon	Pollution Sensitivity[1]	B5-201 Channel	B7-201 Channel	D5-201 Channel	F3-201 Channel	F5-201 Channel	H3-201 Cove	J4-201 Cove	K3-201 Cove	K4-201 Cove	K5-201 Cove	L2-201 Cove	H1-201 Pier	K1-204 Pier	L5-201 Pier	M1-201 Pier	H5-201 Pier[2]	K6-201 Pier[2]	L6-201 Pier[2]	M3-201 Pier[2]	Total
	Total Organisms		61	55	19	90	114	19	32	80	35	13	27	39	23	36	47	29	8	15	65	807
	Number of Taxa (Taxa Richness)		9	6	5	11	14	6	3	8	6	5	5	4	3	7	8	4	4	4	6	
	Total Density (Number per Square Meter)		1,166	1,052	363	1,721	2,180	363	612	1,530	669	249	516	746	440	688	899	554	153	287	1,243	
	Percent Contribution of Dominant Taxon		50.8	70.9	63.2	73.3	36.0	57.9	59.4	31.3	51.4	53.8	70.4	74.4	78.3	66.7	76.6	86.2	37.5	60.0	83.1	
	Density (No./Square Meter) Dominant Taxon		593	746	229	1,262	784	210	363	478	344	134	363	554	344	459	688	478	57.4	172	1,033	
	Percent Spionid Polychaetes		72.1	85.5	73.7	75.6	37.7	68.4	96.9	35.0	77.1	53.8	77.8	92.3	95.7	86.1	85.1	89.7	37.5	80.0	86.2	
	Percent Mediomastus and Capitella Polychaetes		4.92	5.45	5.26	10.0	34.2	15.8	0.00	21.3	8.57	0.00	3.70	5.13	0.00	2.78	2.13	0.00	12.5	0.00	1.54	
	Density of Pollution Tolerant Organisms		994	994	287	1,491	1,721	325	593	1,224	574	172	478	746	440	631	803	535	76.5	229	1,109	
	Percent Pollution Tolerant Organisms		85.2	94.5	78.9	86.7	78.9	89.5	96.9	80.0	85.7	69.2	92.6	100	100	91.7	89.4	96.6	50.0	80.0	89.2	
	Density of Pollution Sensitive Organisms		57.4	0.00	57.4	95.6	95.6	0.00	0.00	249	19.1	57.4	0.00	0.00	0.00	38.2	0.00	19.1	0.00	38.2	0.00	
	Percent Pollution Sensitive Organisms		4.92	0.00	15.8	5.56	4.39	0.00	0.00	16.3	2.86	23.1	0.00	0.00	0.00	5.56	0.00	3.45	0.00	13.3	0.00	
	Ratio Pollution Sensitive/ Pollution Tolerant		0.06	0.00	0.20	0.06	0.06	0.00	0.00	0.20	0.03	0.33	0.00	0.00	0.00	0.06	0.00	0.04	0.00	0.17	0.00	
	Percent Amphipods		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Percent Bivalves		1.64	0.00	0.00	5.56	2.63	0.00	0.00	16.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.45	37.5	0.00	1.54	
	Percent Molluscs		1.64	0.00	15.8	6.67	4.39	0.00	0.00	16.3	0.00	0.00	0.00	0.00	0.00	2.78	0.00	3.45	50.0	13.3	1.54	

Identifiable headless fragments were included with an abundance value of zero (0). These are highlighted yellow in the table.

Non-zero counts are highlighted gray

1 - Pollution sensitivity rankings:

EQ - Equilibrium (large deep dwelling and long lived taxa that tend to dominate unstressed habitats; generally correlates to pollution-sensitive

OP - Opportunistic (relatively stress tolerant, short lived taxa with an ability to rapidly colonize stressed habitats; generally correlates to pollution-indicative)

PI - Pollution Indicative (relatively stress tolerant, short lived taxa; based on correlations of taxa with sediment contaminants and dissolved oxygen)

PS - Pollution Sensitive (large deep dwelling and long lived taxa; based on correlations of taxa with sediment contaminants and dissolved oxygen)

Not all taxa have available ratings

2 - Sample is in the area impacted by the 2008 MILCON action

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401	LW07-H3-SD401	LW07-J4-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C	LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C
					Channel	Channel	Channel	Channel	Channel	Cove	Cove
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
Porifera											
			Porifera (LPIL)		0	0	1	0	0	0	0
Cnidaria											
	Hydrozoa										
			Hydrozoa (LPIL)		0	0	0	0	0	0	0
	Anthozoa										
			Actiniaria (LPIL)		0	1	0	0	0	0	0
			Anthozoa (LPIL)		0	4	0	0	0	0	0
Nemertea											
			Nemertea (LPIL)		1	1	0	1	5	0	0
			Nemertea sp. A (LPIL)		2	0	1	0	0	0	0
			Nemertea sp. B (LPIL)		1	0	0	2	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	1	0	0
			Nemertea sp. D (LPIL)		0	0	0	1	0	0	0
Annelida											
	Polychaeta										
			Dorvillea (Schistomeringos) rudolphi		0	15	0	0	1	0	0
			Dorvilleidae (LPIL)		0	2	0	0	0	0	0
			Glycera americana	PS, EQ	0	1	0	1	0	0	0
			Glycera dibranchiata		0	0	0	0	0	0	0
			Glycera sp.		0	1	0	0	0	0	0
			Glycinde solitaria	PS, OP	3	3	1	1	3	2	1
			Gyptis crypta		0	3	0	1	0	0	0
			Podarke obscura		0	29	0	0	2	0	2
			Neanthes succinea	PI, OP	0	2	0	0	3	0	0
			Nereididae (LPIL)		0	2	0	0	1	0	0
			Platynereis dumerilii		0	9	0	1	0	0	0
			Drilonereis longa		0	0	0	0	0	0	0
			Eteone sp.		0	0	0	0	0	0	0
			Eumida sanguinea		0	1	0	0	0	0	0
			Lepidonotus sp.		0	1	0	0	0	0	0
			Grubeosyllis clavata		0	4	0	0	0	0	0
			Spiochaetopterus costarum	PS	1	2	0	1	0	0	0
			Aphelochaeta sp.		0	0	0	0	1	0	0
			Cirratulidae (LPIL)		7	4	0	9	8	4	0
			Tharyx sp.		3	4	3	9	4	0	2
			Pectinaria gouldii		0	2	0	0	1	1	1
			Demonax microphthalmus		0	3	0	0	0	0	0
			Sabellaria vulgaris		0	1	0	0	0	0	0
			Sabellidae (LPIL)		0	2	0	0	0	0	0
			Hydroides dianthus		0	36	0	0	1	0	0
			Hydroides sp.		0	10	0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	1	0	0
			Dipolydora cauleri		0	1	0	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401	LW07-H3-SD401	LW07-J4-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C	LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C
					Channel	Channel	Channel	Channel	Channel	Cove	Cove
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
			Dipolydora socialis		0	1	0	0	0	0	0
			Minuspio sp.		0	1	0	0	0	0	0
			Paraprionospio pinnata	PI, OP	14	11	6	4	0	7	18
			Polydora cornuta	PI, OP	2	0	0	0	0	0	0
			Spionidae (LPIL)		0	0	0	0	0	0	0
			Streblospio benedicti	PI, OP	0	1	0	5	9	14	22
			Loimia medusa	PS	3	1	0	3	0	0	0
			Loimia sp.		1	0	0	0	0	0	0
			Terebellidae (LPIL)		0	1	0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0	0	0
			Capitella jonesi	PI, OP	0	1	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0	0	0
			Heteromastus filiformis	PI, OP	1	0	0	0	1	1	0
			Mediomastus ambiseta	PS, PI, OP	0	18	0	2	13	1	1
			Mediomastus californiensis		0	11	0	0	0	0	0
			Mediomastus sp.		1	47	1	0	36	5	8
			Leitoscoloplos fragilis	PI, OP	1	1	0	0	3	0	1
			Leitoscoloplos sp.		0	0	0	0	0	0	0
			Scoloplos rubra		0	0	0	0	1	0	0
			Sigambra tentaculata		2	1	1	0	0	1	1
	Clitellata										
			Tubificoid Naididae imm. w/o hair setae (LPIL)	PI	0	6	0	1	2	1	4
			Tubificoides sp.		0	6	0	0	0	0	0
Arthropoda											
	Malacostraca										
		Amphipoda									
			Monocorophium sp.		0	0	0	0	0	0	0
		Cumacea									
			Cyclaspis varians		0	0	0	0	0	0	0
			Leucon americanus		0	0	0	1	0	1	0
			Cumacea (LPIL)		0	0	0	0	0	0	0
		Decapoda									
			Alpheus sp.	PS, EQ?	0	0	0	0	0	0	0
			Panopeidae (LPIL)		0	2	0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0	0	0
		Isopoda									
			Edotia triloba		0	0	0	0	1	1	0
		Mysida									
			Americamysis bigelowi		0	0	0	0	0	1	0
			Americamysis sp.		0	0	0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0	0	0
	Entognatha										
			Collembola (LPIL)		0	0	1	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401	LW07-H3-SD401	LW07-J4-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C	LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C
					Channel	Channel	Channel	Channel	Channel	Cove	Cove
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
Mollusca											
	Gastropoda										
			Acteocina canaliculata	PS	21	7	0	20	6	5	5
			Odostomia engonia		1	0	1	0	1	2	1
			Turbonilla interrupta		0	0	0	0	1	0	0
			Crepidula fornicata		3	18	0	0	0	0	0
			Crepidula plana		1	1	0	0	0	0	0
			Gastropoda (LPIL)		2	2	0	0	0	0	0
	Bivalvia										
			Anadara transversa	PS, EQ	0	3	0	0	0	0	0
			Anomia simplex		0	14	0	0	0	0	0
			Lyonsia hyalina		1	0	0	0	0	0	0
			Mactridae (LPIL)		0	0	0	3	1	2	0
			Petricolaria pholadiformis		1	0	0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0	1	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0	0	0
			Macoma tenta		0	0	0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0	0	0
			Gemma gemma	OP	0	0	0	1	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0	0	0
			Pitar sp.		0	0	0	0	0	0	0
			Veneridae (LPIL)		5	12	0	0	2	0	1
			Bivalvia (LPIL)		3	1	0	0	0	0	0
Phoronida											
			Phoronida (LPIL)		25	8	0	5	12	2	3
Echinodermata											
			Ophiuroidea (LPIL)		0	0	0	0	0	0	0
			Total Organisms		106	319	16	72	121	52	71
			Number of Taxa (Taxa Richness)		25	50	9	20	27	18	15
			Total Density (Number per Square Meter)		1,523	4,583	230	1,034	1,739	747	1,020
			Percent Contribution of Dominant Taxon		23.6	14.7	37.5	27.8	29.8	26.9	31.0
			Density (No./Square Meter) Dominant Taxon		359	675	86	287	517	201	316
			Percent Spionid Polychaetes		15.1	4.70	37.5	12.5	8.26	40.4	56.3
			Percent Mediomastus and Capitella Polychaetes		1.89	24.1	6.25	2.78	41.3	13.5	12.7
			Density of Pollution Tolerant Organisms		259	575	86	172	445	345	661
			Percent Pollution Tolerant Organisms		17.0	12.5	37.5	16.7	25.6	46.2	64.8
			Density of Pollution Sensitive Organisms		402	244	14	374	129	101	86
			Percent Pollution Sensitive Organisms		26.4	5.33	6.25	36.1	7.44	13.5	8.45
			Ratio Pollution Sensitive/ Pollution Tolerant		1.56	0.43	0.17	2.17	0.29	0.29	0.13

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-B5-SD401	LW07-B7-SD401	LW07-D5-SD401	LW07-F3-SD401	LW07-F5-SD401	LW07-H3-SD401	LW07-J4-SD401
					LW07-B5-SD401-00-10C	LW07-B7-SD401-00-10C	LW07-D5-SD401-00-10C	LW07-F3-SD401-00-10C	LW07-F5-SD401-00-10C	LW07-H3-SD401-00-10C	LW07-J4-SD401-00-10C
					Channel	Channel	Channel	Channel	Channel	Cove	Cove
					09/12/2010	09/12/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010
			Shannon Diversity Index (Base e)		2.540	3.217	1.895	2.465	2.589	2.456	2.061
			Shannon Diversity Index (Base 2)		3.665	4.641	2.733	3.556	3.736	3.543	2.973
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		9.43	9.40	0.00	5.56	2.48	5.77	1.41
			Percent Molluscs		35.8	18.2	6.25	33.3	9.09	19.2	9.86
			Percent Deposit Feeders		22.2	36.2	50.0	38.9	63.2	45.2	52.1

1 - Pollution classifications:
PS = Pollution Sensitive (Weisberg et al, 1997)
PI = Polution Indicator (Weisberg et al. 1997)
OP = Opportunistic (Ranasinghe et al. 1994)
EQ = Equlibrium (Ranasinghe et al. 1994)
? = Uncertanty due to taxonomic identification level

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401	LW07-L2-SD401-01	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-01
					LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C	LW07-L2-SD401-01-10C-01	LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-01
					Cove	Cove	Cove	Cove	Cove	Cove	Pier
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/10/2010
Porifera											
			Porifera (LPIL)		0	0	1	0	1	0	1
Cnidaria											
	Hydrozoa										
			Hydrozoa (LPIL)		0	0	0	0	0	0	0
	Anthozoa										
			Actiniaria (LPIL)		0	0	0	0	0	0	0
			Anthozoa (LPIL)		0	0	0	0	0	0	0
Nemertea											
			Nemertea (LPIL)		1	0	0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0	1	0
			Nemertea sp. D (LPIL)		0	0	0	0	0	0	0
Annelida											
	Polychaeta										
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	0	0	0
			Glycera sp.		0	0	0	0	0	0	0
			Glycinde solitaria	PS, OP	1	1	1	0	0	1	0
			Gyptis crypta		0	0	2	0	0	0	0
			Podarke obscura		0	0	0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0	0	0
			Drilonereis longa		0	0	0	0	0	0	0
			Eteone sp.		0	0	0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	1	0	0	0	0
			Aphelochaeta sp.		0	0	0	0	0	0	0
			Cirratulidae (LPIL)		28	27	2	0	1	0	0
			Tharyx sp.		5	14	0	1	1	9	0
			Pectinaria gouldii		0	0	0	0	0	0	0
			Demonax microphthalmus		0	0	0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0	0	0
			Hydroides sp.		0	0	0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401	LW07-L2-SD401-01	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-01
					LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C	LW07-L2-SD401-01-10C-01	LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-01
					Cove	Cove	Cove	Cove	Cove	Cove	Pier
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/10/2010
			Dipolydora socialis		0	0	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0	0	0
			Paraprionospio pinnata	PI, OP	6	4	11	4	3	3	0
			Polydora cornuta	PI, OP	0	0	0	0	0	0	0
			Spionidae (LPIL)		0	1	0	0	0	0	0
			Streblospio benedicti	PI, OP	13	2	7	4	16	31	34
			Loimia medusa	PS	0	0	0	0	0	0	0
			Loimia sp.		0	0	0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	0	0	0	0	1	0
			Capitella jonesi	PI, OP	0	0	0	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0	0	1
			Heteromastus filiformis	PI, OP	0	0	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	0	1	4	0	6	6	2
			Mediomastus californiensis		0	0	0	0	0	0	0
			Mediomastus sp.		7	0	3	9	4	12	0
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0	0	0
			Leitoscoloplos sp.		0	0	0	0	0	0	0
			Scoloplos rubra		0	0	0	0	0	0	0
			Sigambra tentaculata		0	2	2	1	1	0	0
	Clitellata										
			Tubificoid Naididae imm. w/o hair setae (LPIL)	PI	0	0	0	1	1	0	0
			Tubificoides sp.		0	0	0	0	0	0	0
Arthropoda											
	Malacostraca										
		Amphipoda									
			Monocorophium sp.		0	0	0	0	0	0	0
		Cumacea									
			Cyclaspis varians		0	0	0	0	0	0	0
			Leucon americanus		1	0	1	0	0	1	0
			Cumacea (LPIL)		0	0	0	0	0	0	0
		Decapoda									
			Alpheus sp.	PS, EQ?	0	0	0	0	0	0	0
			Panopeidae (LPIL)		0	0	0	0	0	0	0
			Decapoda (LPIL)		0	0	0	0	0	0	0
		Isopoda									
			Edotia triloba		0	0	0	0	0	0	0
		Mysida									
			Americamysis bigelowi		2	0	1	0	0	1	0
			Americamysis sp.		0	0	0	0	0	0	0
			Mysidacea (LPIL)		0	0	0	0	0	0	0
	Entognatha										
			Collembola (LPIL)		0	0	0	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401	LW07-L2-SD401-01	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-01
					LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C	LW07-L2-SD401-01-10C-01	LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-01
					Cove	Cove	Cove	Cove	Cove	Cove	Pier
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/10/2010
Mollusca											
	Gastropoda										
			Acteocina canaliculata	PS	4	1	2	6	0	1	2
			Odostomia engonia		0	0	0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0	0	0
			Crepidula plana		0	0	0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0	0	0
	Bivalvia										
			Anadara transversa	PS, EQ	0	0	0	0	0	0	0
			Anomia simplex		0	0	0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0	0	0
			Mactridae (LPIL)		0	1	1	1	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0	0	0
			Macoma tenta		0	0	0	0	0	1	0
			Tellinidae (LPIL)		0	1	0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	1	0	0	0	0	0
			Pitar sp.		0	0	0	0	0	1	0
			Veneridae (LPIL)		0	0	0	1	0	1	0
			Bivalvia (LPIL)		1	0	0	0	1	0	0
Phoronida											
			Phoronida (LPIL)		5	3	0	1	1	1	0
Echinodermata											
			Ophiuroidea (LPIL)		1	0	0	0	0	0	0
			Total Organisms		75	59	39	29	36	71	40
			Number of Taxa (Taxa Richness)		13	13	14	10	11	15	5
			Total Density (Number per Square Meter)		1,078	848	560	417	517	1,020	575
			Percent Contribution of Dominant Taxon		37.3	45.8	28.2	31.0	44.4	43.7	85.0
			Density (No./Square Meter) Dominant Taxon		402	388	158	129	230	445	489
			Percent Spionid Polychaetes		25.3	11.9	46.2	27.6	52.8	47.9	85.0
			Percent Mediomastus and Capitella Polychaetes		9.33	1.69	17.9	31.0	27.8	26.8	7.50
			Density of Pollution Tolerant Organisms		273	101	316	129	374	589	532
			Percent Pollution Tolerant Organisms		25.3	11.9	56.4	31.0	72.2	57.7	92.5
			Density of Pollution Sensitive Organisms		72	43	57	86	0	29	29
			Percent Pollution Sensitive Organisms		6.67	5.08	10.3	20.7	0.00	2.82	5.00
			Ratio Pollution Sensitive/ Pollution Tolerant		0.26	0.43	0.18	0.67	0.00	0.05	0.05

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-K3-SD401	LW07-K4-SD401	LW07-K5-SD401	LW07-L2-SD401-01	LW07-L2-SD401-02	LW07-L2-SD401-03	LW07-H1-SD401-01
					LW07-K3-SD401-00-10C	LW07-K4-SD401-00-10C	LW07-K5-SD401-00-10C	LW07-L2-SD401-01-10C-01	LW07-L2-SD401-02-10C-02	LW07-L2-SD401-03-10C-03	LW07-H1-SD401-00-10C-01
					Cove	Cove	Cove	Cove	Cove	Cove	Pier
					09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/11/2010	09/10/2010
			Shannon Diversity Index (Base e)		1.997	1.746	2.269	1.932	1.807	1.867	0.622
			Shannon Diversity Index (Base 2)		2.881	2.519	3.274	2.788	2.607	2.693	0.898
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		1.33	5.08	2.56	6.90	2.78	4.23	0.00
			Percent Molluscs		6.67	6.78	7.69	27.6	2.78	5.63	5.00
			Percent Deposit Feeders		66.0	77.1	47.4	51.7	62.5	63.4	50.0

1 - Pollution classifications:

PS = Pollution Sensitive (Weisberg et al, 1997)

PI = Polution Indicator (Weisberg et al. 1997)

OP = Opportunistic (Ranasinghe et al. 1994)

EQ = Equlibrium (Ranasinghe et al. 1994)

? = Uncertanty due to taxonomic identification level

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-H1-SD401-02	LW07-H1-SD401-03	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401	LW07-SD401	LW07-SD402
					LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C	LW07-SD401-00-10C	LW07-SD402-00-10C
					Pier	Pier	Pier	Pier	Pier	Pier	Pier
					09/10/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010	09/11/2010	09/11/2010
Porifera											
			Porifera (LPIL)		0	0	1	0	1	0	0
Cnidaria											
	Hydrozoa										
			Hydrozoa (LPIL)		0	0	0	0	1	0	1
	Anthozoa										
			Actiniaria (LPIL)		0	0	1	0	0	1	0
			Anthozoa (LPIL)		0	0	0	0	0	0	0
Nemertea											
			Nemertea (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. A (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. B (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. C (LPIL)		0	0	0	0	0	0	0
			Nemertea sp. D (LPIL)		0	0	0	0	0	0	0
Annelida											
	Polychaeta										
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	0	0	0
			Dorvilleidae (LPIL)		0	0	0	0	0	0	0
			Glycera americana	PS, EQ	0	0	0	0	0	0	0
			Glycera dibranchiata		0	0	0	0	1	0	0
			Glycera sp.		0	0	0	0	0	0	0
			Glycinde solitaria	PS, OP	0	0	1	0	0	0	2
			Gyptis crypta		0	1	0	0	0	1	1
			Podarke obscura		0	0	0	0	0	0	0
			Neanthes succinea	PI, OP	0	0	0	0	0	0	0
			Nereididae (LPIL)		0	0	0	0	0	0	0
			Platynereis dumerilii		0	0	0	0	0	0	0
			Drilonereis longa		0	0	0	0	0	0	1
			Eteone sp.		0	0	0	0	0	0	0
			Eumida sanguinea		0	0	0	0	0	0	0
			Lepidonotus sp.		0	0	0	0	0	0	0
			Grubeosyllis clavata		0	0	0	0	0	0	0
			Spiochaetopterus costarum	PS	0	0	0	0	1	0	0
			Aphelochaeta sp.		0	0	0	0	0	0	0
			Cirratulidae (LPIL)		0	0	0	0	0	1	1
			Tharyx sp.		0	0	0	0	13	0	5
			Pectinaria gouldii		0	0	0	0	1	0	2
			Demonax microphthalmus		0	0	0	0	0	0	0
			Sabellaria vulgaris		0	0	0	0	0	0	0
			Sabellidae (LPIL)		0	0	0	0	0	0	0
			Hydroides dianthus		0	0	0	0	0	0	0
			Hydroides sp.		0	0	0	0	0	0	0
			Apoprionospio pygmaea		0	0	0	0	0	0	0
			Dipolydora cauleri		0	0	0	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-H1-SD401-02	LW07-H1-SD401-03	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401	LW07-SD401	LW07-SD402
					LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C	LW07-SD401-00-10C	LW07-SD402-00-10C
					Pier	Pier	Pier	Pier	Pier	Pier	Pier
					09/10/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010	09/11/2010	09/11/2010
			Dipolydora socialis		0	0	0	0	0	0	0
			Minuspio sp.		0	0	0	0	0	0	0
			Paraprionospio pinnata	PI, OP	1	2	0	3	1	1	6
			Polydora cornuta	PI, OP	0	1	2	0	1	0	0
			Spionidae (LPIL)		0	0	0	0	0	0	0
			Streblospio benedicti	PI, OP	13	20	41	4	52	31	67
			Loimia medusa	PS	0	0	0	0	0	0	0
			Loimia sp.		0	0	0	0	0	0	0
			Terebellidae (LPIL)		0	0	0	0	0	0	0
			Capitella capitata complex Blake	PI, OP	0	3	1	0	1	0	0
			Capitella jonesi	PI, OP	0	0	2	0	0	0	0
			Capitella sp.	PI, OP	0	0	0	0	0	0	0
			Heteromastus filiformis	PI, OP	0	0	0	0	0	0	0
			Mediomastus ambiseta	PS, PI, OP	4	1	0	0	7	0	29
			Mediomastus californiensis		0	0	0	0	0	0	0
			Mediomastus sp.		0	0	2	0	2	1	19
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	0	0	1
			Leitoscoloplos sp.		0	0	0	1	0	0	0
			Scoloplos rubra		0	0	0	0	0	0	0
			Sigambra tentaculata		0	1	0	0	0	0	0
	Clitellata										
			Tubificoid Naididae imm. w/o hair setae (LPIL)	PI	0	1	1	0	2	3	4
			Tubificoides sp.		0	0	0	0	0	0	0
Arthropoda											
	Malacostraca										
		Amphipoda									
			Monocorophium sp.		0	0	0	0	0	0	0
		Cumacea									
			Cyclaspis varians		0	0	0	0	1	0	0
			Leucon americanus		0	0	0	0	0	0	0
			Cumacea (LPIL)		0	0	0	0	0	1	0
		Decapoda									
			Alpheus sp.	PS, EQ?	0	0	0	0	0	1	0
			Panopeidae (LPIL)		0	0	0	0	0	0	0
			Decapoda (LPIL)		0	0	0	1	0	1	0
		Isopoda									
			Edotia triloba		0	0	0	0	0	0	0
		Mysida									
			Americamysis bigelowi		0	1	0	0	0	0	0
			Americamysis sp.		0	0	0	0	0	0	1
			Mysidacea (LPIL)		0	0	1	0	0	0	0
	Entognatha										
			Collembola (LPIL)		0	0	0	0	0	0	0

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-H1-SD401-02	LW07-H1-SD401-03	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401	LW07-SD401	LW07-SD402
					LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C	LW07-SD401-00-10C	LW07-SD402-00-10C
					Pier	Pier	Pier	Pier	Pier	Pier	Pier
					09/10/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010	09/11/2010	09/11/2010
Mollusca											
	Gastropoda										
			Acteocina canaliculata	PS	1	1	0	3	1	2	2
			Odostomia engonia		0	0	0	0	0	0	0
			Turbonilla interrupta		0	0	0	0	0	0	0
			Crepidula fornicata		0	0	0	0	0	0	0
			Crepidula plana		0	0	0	0	0	0	0
			Gastropoda (LPIL)		0	0	0	0	0	1	0
	Bivalvia										
			Anadara transversa	PS, EQ	0	0	0	0	0	0	0
			Anomia simplex		0	0	0	0	0	0	0
			Lyonsia hyalina		0	0	0	0	0	0	0
			Mactridae (LPIL)		0	0	0	2	0	0	0
			Petricolaria pholadiformis		0	0	0	0	0	0	0
			Tagelus plebeius	EQ	0	0	0	0	0	0	0
			Tagelus sp.	PS, EQ?	0	0	0	0	0	0	0
			Macoma tenta		0	0	0	0	0	0	0
			Tellinidae (LPIL)		0	0	0	0	0	0	0
			Gemma gemma	OP	0	0	0	0	0	0	0
			Mercenaria mercenaria	PS, EQ	0	0	0	0	0	0	0
			Pitar sp.		0	0	0	0	0	0	0
			Veneridae (LPIL)		0	1	1	1	0	0	1
			Bivalvia (LPIL)		0	0	0	0	1	0	0
Phoronida											
			Phoronida (LPIL)		0	0	0	0	0	0	3
Echinodermata											
			Ophiuroidea (LPIL)		0	0	0	0	0	0	0
			Total Organisms		19	33	54	15	87	45	146
			Number of Taxa (Taxa Richness)		4	11	11	7	16	12	17
			Total Density (Number per Square Meter)		273	474	776	216	1,250	647	2,098
			Percent Contribution of Dominant Taxon		68.4	60.6	75.9	26.7	59.8	68.9	45.9
			Density (No./Square Meter) Dominant Taxon		187	287	589	57	747	445	963
			Percent Spionid Polychaetes		73.7	69.7	79.6	46.7	62.1	71.1	50.0
			Percent Mediomastus and Capitella Polychaetes		21.1	12.1	9.26	0.00	11.5	2.22	32.9
			Density of Pollution Tolerant Organisms		259	402	675	101	920	503	1537
			Percent Pollution Tolerant Organisms		94.7	84.8	87.0	46.7	73.6	77.8	73.3
			Density of Pollution Sensitive Organisms		14	14	14	43	29	43	57
			Percent Pollution Sensitive Organisms		5.26	3.03	1.85	20.0	2.30	6.67	2.74
			Ratio Pollution Sensitive/ Pollution Tolerant		0.06	0.04	0.02	0.43	0.03	0.09	0.04

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-H1-SD401-02	LW07-H1-SD401-03	LW07-K1-SD401	LW07-L5-SD401	LW07-M1-SD401	LW07-SD401	LW07-SD402
					LW07-H1-SD401-00-10C-02	LW07-H1-SD401-00-10C-03	LW07-K1-SD401-00-10C	LW07-L5-SD401-00-10C	LW07-M1-SD401-00-10C	LW07-SD401-00-10C	LW07-SD402-00-10C
					Pier	Pier	Pier	Pier	Pier	Pier	Pier
					09/10/2010	09/10/2010	09/10/2010	09/11/2010	09/10/2010	09/11/2010	09/11/2010
			Shannon Diversity Index (Base e)		0.898	1.539	1.092	1.807	1.533	1.337	1.784
			Shannon Diversity Index (Base 2)		1.295	2.220	1.576	2.606	2.211	1.929	2.574
			Percent Amphipods		0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Percent Bivalves		0.00	3.03	1.85	20.0	1.15	0.00	0.68
			Percent Molluscs		5.26	6.06	1.85	40.0	2.30	6.67	2.05
			Percent Deposit Feeders		57.9	50.0	50.9	30.0	61.5	46.7	66.8

1 - Pollution classifications:

PS = Pollution Sensitive (Weisberg et al, 1997)

PI = Polution Indicator (Weisberg et al. 1997)

OP = Opportunistic (Ranasinghe et al. 1994)

EQ = Equlibrium (Ranasinghe et al. 1994)

? = Uncertanty due to taxonomic identification level

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-SD403-01 LW07-SD403-00-10C-01 Pier 09/11/2010	LW07-SD403-02 LW07-SD403-00-10C-02 Pier 09/11/2010	LW07-SD403-03 LW07-SD403-00-10C-03 Pier 09/11/2010	LW07-SD404 LW07-SD404-00-10C Pier 09/10/2010	Total
Porifera									
			Porifera (LPIL)		0	0	0	0	6
Cnidaria									
	Hydrozoa								
			Hydrozoa (LPIL)		0	0	0	0	2
	Anthozoa								
			Actiniaria (LPIL)		0	0	0	0	3
			Anthozoa (LPIL)		0	0	0	0	4
Nemertea									
			Nemertea (LPIL)		0	0	0	0	9
			Nemertea sp. A (LPIL)		0	0	0	0	3
			Nemertea sp. B (LPIL)		0	0	0	0	3
			Nemertea sp. C (LPIL)		0	0	0	0	2
			Nemertea sp. D (LPIL)		0	0	0	0	1
Annelida									
	Polychaeta								
			Dorvillea (Schistomeringos) rudolphi		0	0	0	0	16
			Dorvilleidae (LPIL)		0	0	0	0	2
			Glycera americana	PS, EQ	0	0	0	0	2
			Glycera dibranchiata		0	0	0	0	1
			Glycera sp.		0	0	0	0	1
			Glycinde solitaria	PS, OP	0	0	0	0	21
			Gyptis crypta		0	0	0	0	9
			Podarke obscura		0	0	0	0	33
			Neanthes succinea	PI, OP	0	0	0	0	5
			Nereididae (LPIL)		0	0	0	0	3
			Platynereis dumerilii		0	0	0	0	10
			Drilonereis longa		0	0	0	0	1
			Eteone sp.		0	0	0	1	1
			Eumida sanguinea		0	0	0	0	1
			Lepidonotus sp.		0	0	0	0	1
			Grubeosyllis clavata		0	0	0	0	4
			Spiochaetopterus costarum	PS	0	0	0	0	6
			Aphelochaeta sp.		0	0	0	0	1
			Cirratulidae (LPIL)		0	0	0	10	102
			Tharyx sp.		0	1	8	3	85
			Pectinaria gouldii		0	0	1	0	9
			Demonax microphthalmus		0	0	0	0	3
			Sabellaria vulgaris		0	0	0	0	1
			Sabellidae (LPIL)		1	0	0	0	3
			Hydroides dianthus		0	0	0	0	37
			Hydroides sp.		0	0	0	0	10
			Apoprionospio pygmaea		0	0	0	0	1
			Dipolydora cauleri		0	0	0	0	1

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-SD403-01 LW07-SD403-00-10C-01 Pier 09/11/2010	LW07-SD403-02 LW07-SD403-00-10C-02 Pier 09/11/2010	LW07-SD403-03 LW07-SD403-00-10C-03 Pier 09/11/2010	LW07-SD404 LW07-SD404-00-10C Pier 09/10/2010	Total
			Dipolydora socialis		0	0	0	0	1
			Minuspio sp.		0	0	0	0	1
			Paraprionospio pinnata	PI, OP	0	1	0	5	111
			Polydora cornuta	PI, OP	0	0	0	0	6
			Spionidae (LPIL)		0	0	0	0	1
			Streblospio benedicti	PI, OP	31	4	28	44	493
			Loimia medusa	PS	0	0	0	0	7
			Loimia sp.		0	0	0	0	1
			Terebellidae (LPIL)		0	0	0	0	1
			Capitella capitata complex Blake	PI, OP	0	1	0	0	7
			Capitella jonesi	PI, OP	0	0	0	0	3
			Capitella sp.	PI, OP	0	0	0	0	1
			Heteromastus filiformis	PI, OP	0	0	0	0	3
			Mediomastus ambiseta	PS, PI, OP	0	1	12	0	108
			Mediomastus californiensis		0	0	0	0	11
			Mediomastus sp.		1	0	3	35	196
			Leitoscoloplos fragilis	PI, OP	0	0	0	0	7
			Leitoscoloplos sp.		0	0	0	0	1
			Scoloplos rubra		0	0	0	0	1
			Sigambra tentaculata		0	0	0	0	13
	Clitellata								
			Tubificoid Naididae imm. w/o hair setae (LPIL)	PI	1	1	2	0	31
			Tubificoides sp.		0	0	0	0	6
Arthropoda									
	Malacostraca								
		Amphipoda							
			Monocorophium sp.		1	0	1	0	2
		Cumacea							
			Cyclaspis varians		1	0	0	0	2
			Leucon americanus		1	0	0	0	6
			Cumacea (LPIL)		0	0	0	0	1
		Decapoda							
			Alpheus sp.	PS, EQ?	0	0	0	0	1
			Panopeidae (LPIL)		0	0	0	0	2
			Decapoda (LPIL)		0	0	0	0	2
		Isopoda							
			Edotia triloba		0	0	0	0	2
		Mysida							
			Americamysis bigelowi		0	0	0	0	6
			Americamysis sp.		0	0	0	0	1
			Mysidacea (LPIL)		0	0	0	0	1
	Entognatha								
			Collembola (LPIL)		0	0	0	0	1

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-SD403-01 LW07-SD403-00-10C-01 Pier 09/11/2010	LW07-SD403-02 LW07-SD403-00-10C-02 Pier 09/11/2010	LW07-SD403-03 LW07-SD403-00-10C-03 Pier 09/11/2010	LW07-SD404 LW07-SD404-00-10C Pier 09/10/2010	Total
Mollusca									
	Gastropoda								
			Acteocina canaliculata	PS	0	2	0	3	95
			Odostomia engonia		0	0	0	0	6
			Turbonilla interrupta		0	0	0	0	1
			Crepidula fornicata		0	0	0	0	21
			Crepidula plana		0	0	0	0	2
			Gastropoda (LPIL)		0	0	0	0	5
	Bivalvia								
			Anadara transversa	PS, EQ	0	0	0	0	3
			Anomia simplex		0	0	0	0	14
			Lyonsia hyalina		0	0	0	0	1
			Mactridae (LPIL)		3	1	1	0	16
			Petricolaria pholadiformis		0	0	0	0	1
			Tagelus plebeius	EQ	0	0	0	0	1
			Tagelus sp.	PS, EQ?	1	0	0	0	1
			Macoma tenta		0	0	0	0	1
			Tellinidae (LPIL)		0	0	0	0	1
			Gemma gemma	OP	0	0	0	0	1
			Mercenaria mercenaria	PS, EQ	0	0	0	0	1
			Pitar sp.		0	0	0	0	1
			Veneridae (LPIL)		1	0	1	1	29
			Bivalvia (LPIL)		0	0	0	2	9
Phoronida									
			Phoronida (LPIL)		0	0	0	0	69
Echinodermata									
			Ophiuroidea (LPIL)		0	0	0	0	1
			Total Organisms		42	12	57	104	1,720
			Number of Taxa (Taxa Richness)		10	8	9	9	
			Total Density (Number per Square Meter)		603	172	819	1,494	
			Percent Contribution of Dominant Taxon		73.8	33.3	49.1	42.3	
			Density (No./Square Meter) Dominant Taxon		445	57	402	632	
			Percent Spionid Polychaetes		73.8	41.7	49.1	47.1	
			Percent Mediomastus and Capitella Polychaetes		2.38	16.7	26.3	33.7	
			Density of Pollution Tolerant Organisms		460	115	603	704	
			Percent Pollution Tolerant Organisms		76.2	66.7	73.7	47.1	
			Density of Pollution Sensitive Organisms		14	29	0	43	
			Percent Pollution Sensitive Organisms		2.38	16.7	0.00	2.88	
			Ratio Pollution Sensitive/ Pollution Tolerant		0.03	0.25	0.00	0.06	

TABLE D-7

2010 Benthic Invertebrate Sampling Results - SWMU 7b

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Phylum	Class	Order	Taxon	Pollution Classification[1]	LW07-SD403-01 LW07-SD403-00-10C-01 Pier 09/11/2010	LW07-SD403-02 LW07-SD403-00-10C-02 Pier 09/11/2010	LW07-SD403-03 LW07-SD403-00-10C-03 Pier 09/11/2010	LW07-SD404 LW07-SD404-00-10C Pier 09/10/2010	Total
			Shannon Diversity Index (Base e)		1.125	1.907	1.509	1.471	
			Shannon Diversity Index (Base 2)		1.622	2.752	2.177	2.123	
			Percent Amphipods		2.38	0.00	1.75	0.00	
			Percent Bivalves		11.9	8.33	3.51	2.88	
			Percent Molluscs		11.9	25.0	3.51	5.77	
			Percent Deposit Feeders		41.7	54.2	70.2	69.7	

1 - Pollution classifications:
PS = Pollution Sensitive (Weisberg et al, 1997)
PI = Polution Indicator (Weisberg et al. 1997)
OP = Opportunistic (Ranasinghe et al. 1994)
EQ = Equlibrium (Ranasinghe et al. 1994)
? = Uncertanty due to taxonomic identification level

TABLE D-8

Summary of Non-IRP Sediment Data in the Desert Cove System - Relevant Constituents

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Station:	**LC1-04-S-1**	**LC-8**	**LC-9**	**ST-3**	**ST-3 Replicate**	**LC1-04**	**ST-3**	**ST-3 Replicate**
Location:	**Desert Cove**	**Desert Cove**	**Desert Cove**	**Desert Cove**	**Desert Cove**	**Desert Cove**	**Desert Cove**	**Desert Cove**
Date:	**5/29/1984**	**11/89-1/90**	**11/89-1/90**	**8/12/1992**	**8/12/1992**	**10/17/1990**	**7/30/1996**	**7/30/1996**
Organotin (UG/KG)								
Total organic tin	0.50 U	NA	NA	NA	NA	NA	NA	NA
Total tributyltin	NA	NA	NA	12.9	17.6	52.0	NA	NA
Total dibutyltin	NA	NA	NA	7.03	5.80	63.0	NA	NA
Total monobutyltin	NA	NA	NA	NA	NA	55.0	NA	NA
Inorganics (MG/KG)								
Copper	NA	28.4	99.3	56.0	51.3	NA	36.3	34.5
Lead	NA	51.1	105	33.0	33.0	NA	24.0	27.0
Mercury	NA	0.18	0.68	2.82	2.67	NA	0.40	0.30
Zinc	NA	102	1,010	183	169	NA	167	142
Other (MG/KG)								
Total Organic Carbon	NA	44,000	45,000	15,800	15,800	NA	110	110

NA - Not Analyzed

Shaded cells indicate detections

TABLE D-9

Samples Used in the ERA

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Sample Date	Type	Area	Top Depth (inches)	Bottom Depth (inches)
Surface Sediment					
LW07-SD01-00	6/2/2000	Discrete	Channel	0	4
LW07-SD02-00	6/1/2000	Discrete	Pier*	0	4
LW07-SD03-00	6/1/2000	Discrete	Pier*	0	4
LW07-SD04-00	6/1/2000	Discrete	Pier*	0	4
LW07-SD05-00	6/1/2000	Discrete	Pier*	0	4
LW07-SD05-00P	6/1/2000	Discrete	Pier*	0	4
LW07-B5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-B5-SD201P-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-B5-SD202-00-02C	9/27/2002	Composite	Channel	0	4
LW07-B7-SD201-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-B7-SD202-00-02C	9/27/2002	Composite	Channel	0	4
LW07-D5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-D5-SD202-00-02C	9/27/2002	Composite	Channel	0	4
LW07-F3-SD201-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-F3-SD202-00-02C	9/27/2002	Composite	Channel	0	4
LW07-F5-SD201-00-02C	9/27/2002	Discrete	Channel	0	4
LW07-F5-SD202-00-02C	9/27/2002	Composite	Channel	0	4
LW07-H1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4
LW07-H1-SD201P-00-02C	9/27/2002	Discrete	Pier	0	4
LW07-H1-SD202-00-02C	9/27/2002	Composite	Pier	0	4
LW07-H3-SD201-00-02C	9/27/2002	Discrete	Cove	0	4
LW07-H3-SD201P-00-02C	9/27/2002	Discrete	Cove	0	4
LW07-H3-SD202-00-02C	9/27/2002	Composite	Cove	0	4
LW07-H5-SD201-00-02C	9/26/2002	Discrete	Pier*	0	4
LW07-H5-SD202-00-02C	9/26/2002	Composite	Pier*	0	4
LW07-J4-SD201-00-02C	9/28/2002	Discrete	Cove	0	4
LW07-J4-SD202-00-02C	9/28/2002	Composite	Cove	0	4
LW07-K1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4
LW07-K1-SD202-00-02C	9/27/2002	Composite	Pier	0	4
LW07-K3-SD201-00-02C	9/28/2002	Discrete	Cove	0	4
LW07-K3-SD202-00-02C	9/28/2002	Composite	Cove	0	4
LW07-K4-SD201-00-02C	9/28/2002	Discrete	Cove	0	4
LW07-K4-SD202-00-02C	9/28/2002	Composite	Cove	0	4
LW07-K5-SD201-00-02C	9/28/2002	Discrete	Cove	0	4
LW07-K5-SD202-00-02C	9/28/2002	Composite	Cove	0	4
LW07-K6-SD201-00-02C	9/28/2002	Discrete	Pier*	0	4
LW07-K6-SD202-00-02C	9/28/2002	Composite	Pier*	0	4
LW07-L2-SD201-00-02C	10/1/2002	Discrete	Cove	0	4
LW07-L5-SD201-00-02C	9/28/2002	Discrete	Pier	0	4
LW07-L5-SD202-00-02C	9/28/2002	Composite	Pier	0	4
LW07-L6-SD201-00-02C	10/1/2002	Discrete	Pier*	0	4
LW07-M1-SD201-00-02C	9/27/2002	Discrete	Pier	0	4
LW07-M1-SD202-00-02C	9/27/2002	Composite	Pier	0	4
LW07-M3-SD201-00-02C	9/28/2002	Discrete	Pier*	0	4
LW07-M3-SD202-00-02C	9/28/2002	Composite	Pier*	0	4
LW07-B5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4
LW07-B5-SD301P-00-09D	11/24/2009	Discrete	Channel	0	4

TABLE D-9

Samples Used in the ERA

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Sample Date	Type	Area	Top Depth (inches)	Bottom Depth (inches)
LW07-B7-SD301-00-09D	11/24/2009	Discrete	Channel	0	4
LW07-D5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4
LW07-F3-SD301-00-09D	11/24/2009	Discrete	Channel	0	4
LW07-F5-SD301-00-09D	11/24/2009	Discrete	Channel	0	4
LW07-H1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-H3-SD301-00-09D	11/24/2009	Discrete	Cove	0	4
LW07-J4-SD301-00-09D	11/24/2009	Discrete	Cove	0	4
LW07-K1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-K1-SD302-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-K1-SD303-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-K1-SD304-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-K3-SD301-00-09D	11/24/2009	Discrete	Cove	0	4
LW07-K4-SD301-00-09D	11/23/2009	Discrete	Cove	0	4
LW07-K5-SD301-00-09D	11/23/2009	Discrete	Cove	0	4
LW07-L2-SD301-00-09D	11/24/2009	Discrete	Cove	0	4
LW07-L2-SD301P-00-09D	11/24/2009	Discrete	Cove	0	4
LW07-L5-SD301-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-M1-SD301-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-M1-SD302-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-M1-SD303-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-M1-SD304-00-09D	11/24/2009	Discrete	Pier	0	4
LW07-SD301-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD301P-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD302-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD303-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD304-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD305-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD306-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-SD307-00-09D	11/23/2009	Discrete	Pier	0	4
LW07-B5-SD401-00-10C	9/12/2010	Discrete	Channel	0	4
LW07-B5-SD401P-00-10C	9/12/2010	Discrete	Channel	0	4
LW07-B7-SD401-00-10C	9/12/2010	Discrete	Channel	0	4
LW07-D5-SD401-00-10C	9/11/2010	Discrete	Channel	0	4
LW07-F3-SD401-00-10C	9/11/2010	Discrete	Channel	0	4
LW07-F5-SD401-00-10C	9/12/2010	Discrete	Channel	0	4
LW07-H1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4
LW07-H3-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-J4-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-K1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4
LW07-K3-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-K4-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-K5-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-L2-SD401-00-10C	9/11/2010	Discrete	Cove	0	4
LW07-L5-SD401-00-10C	9/11/2010	Discrete	Pier	0	4
LW07-M1-SD401-00-10C	9/10/2010	Discrete	Pier	0	4
LW07-SD401-00-10C	9/11/2010	Discrete	Pier	0	4
LW07-SD402-00-10C	9/11/2010	Discrete	Pier	0	4
LW07-SD402P-00-10C	9/11/2010	Discrete	Pier	0	4

TABLE D-9

Samples Used in the ERA

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample ID	Sample Date	Type	Area	Top Depth (inches)	Bottom Depth (inches)
LW07-SD403-00-10C	9/11/2010	Discrete	Pier	0	4
LW07-SD404-00-10C	9/10/2010	Discrete	Pier	0	4
Subsurface Sediment					
LW07-B5-SD201-02-02C	9/30/2002	Discrete	Channel	6	12
LW07-B5-SD201P-02-02C	9/30/2002	Discrete	Channel	6	12
LW07-B7-SD201-02-02C	9/29/2002	Discrete	Channel	12	18
LW07-D5-SD201-02-02C	9/30/2002	Discrete	Channel	7	13
LW07-F3-SD201-02-02C	9/29/2002	Discrete	Channel	12	18
LW07-F5-SD201-02-02C	9/29/2002	Discrete	Channel	9	16
LW07-H1-SD201-02-02C	9/29/2002	Discrete	Pier	12	16
LW07-H3-SD201-02-02C	9/30/2002	Discrete	Cove	7	13
LW07-H5-SD201-02-02C	9/26/2002	Discrete	Pier*	7	13
LW07-J4-SD201-02-02C	9/30/2002	Discrete	Cove	7	13
LW07-K1-SD201-02-02C	9/28/2002	Discrete	Pier	6	12
LW07-K3-SD201-02-02C	9/29/2002	Discrete	Cove	8	15
LW07-K3-SD201P-02-02C	9/29/2002	Discrete	Cove	8	15
LW07-K4-SD201-02-02C	9/30/2002	Discrete	Cove	7	13
LW07-K4-SD201P-02-02C	9/30/2002	Discrete	Cove	7	13
LW07-K5-SD201-02-02C	9/30/2002	Discrete	Cove	7	20
LW07-K6-SD201-02-02C	9/28/2002	Discrete	Pier*	6	12
LW07-L2-SD201-02-02C	10/1/2002	Discrete	Cove	7	13
LW07-L5-SD201-02-02C	9/29/2002	Discrete	Pier	13	20
LW07-L6-SD201-02-02C	10/1/2002	Discrete	Pier*	6	12
LW07-M1-SD201-02-02C	9/29/2002	Discrete	Pier	17	25
LW07-M3-SD201-02-02C	9/28/2002	Discrete	Pier*	11	18

* - Sample location impacted by the 2008 MILCON action

Shaded cells indicate field duplicates

TABLE D-10

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Relative health of benthic invertebrate communities	Are site-related chemical concentrations in sediment sufficient to adversely effect benthic invertebrate communities?	Comparison of chemical concentrations in sediment with literature-based screening values and facility-specific background concentrations	Benthic invertebrates
		Intra-site comparison of benthic invertebrate metric values calculated using site-specific 2010 benthic invertebrate sampling data	

TABLE D-11

Literature-Based Sediment Screening Values

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Screening Value	Units	Type	Reference
Copper	34.0	mg/kg	ER-L	Long et al. 1995
Lead	46.7	mg/kg	ER-L	Long et al. 1995
Mercury	0.15	mg/kg	ER-L	Long et al. 1995
Tin (as TBT)	3.40	mg/kg	AET	Buchman 2008
TBT	0.048	mg/kg	EqP TEL	Buchman 2008
Zinc	150	mg/kg	ER-L	Long et al. 1995
Copper	270	mg/kg	ER-M	Long et al. 1995
Lead	218	mg/kg	ER-M	Long et al. 1995
Mercury	0.71	mg/kg	ER-M	Long et al. 1995
Zinc	410	mg/kg	ER-M	Long et al. 1995
Copper	18.7	mg/kg	TEL[1]	MacDonald 1994
Lead	30.2	mg/kg	TEL[1]	MacDonald 1994
Mercury	0.13	mg/kg	TEL[1]	MacDonald 1994
Zinc	124	mg/kg	TEL[1]	MacDonald 1994
Copper	108	mg/kg	PEL	MacDonald 1994
Lead	112	mg/kg	PEL	MacDonald 1994
Mercury	0.70	mg/kg	PEL	MacDonald 1994
Zinc	271	mg/kg	PEL	MacDonald 1994

1 - The BTAG Region 3 marine screening values are the same as the TEL values

TABLE D-12

Historical Surface Sediment Data - North Little Creek Cove

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	91-8	LC-17	91-9	LC-16	5-S	LC-1	LC-1-Top	ST-7	ST-7 Replicate	LC1-06-S-1
	6/26/1991	11/89-1/90	6/27/1991	11/89-1/90	01/24/95	11/89-1/90	9/13/1996	7/29/1996	7/29/1996	5/29/1984
Organotin (UG/KG)										
Total organic tin	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.5
Total tributyltin	NA	NA	NA	NA	100	NA	NA	NA	NA	NA
Total dibutyltin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total monobutyltin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)										
Copper	75.2	NA	65.1	NA	NA	151	114	19.2	17.1	NA
Lead	34.0	NA	31.2	NA	NA	91.3	119	5.00 U	5.00 U	NA
Mercury	0.29	NA	0.38	NA	0.10	0.91	0.36	0.20	0.20	NA
Zinc	212	NA	187	NA	NA	343	587	31.8	30.5	NA
Other Parameters										
Total Organic Carbon (MG/KG)	NA	NA	NA	NA	NA	68,000	NA	160	120	NA
Percent Fines	NA	66.6	NA	65.9	NA	72.1	NA	NA	NA	NA

Shaded cells indicate detected values

NA - Not Analyzed

TABLE D-13

Unvalidated Background Surface Sediment Data From Little Creek Cove - July 2007

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Constituent	LREF-SD401	LREF-SD402	LREF-SD404	LREF-SD406	LREF-SD407	LREF-SD408	LREF-SD409	LREF-SD409P	LREF-SD410
	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007
Total Metals (MG/KG)									
Copper	174	184	110	155	152	161	128	154	150
Lead	50.2 *	67.6 *	37.7 *	50.3 *	38.6 *	40.4 *	34.7 *	40.4 *	36.3 *
Mercury	0.088 *	0.16 *	0.13 *	0.17 *	0.20 *	0.16 *	0.15 *	0.18 *	0.15 *
Nickel	18.3	22.7	21.9	25.8	26.5	25.5	21.2	24.8	19.8
Tin	6.80	8.80	9.50	9.00	9.80	9.20	7.20	9.00	6.80
Zinc	241 *	421 *	229 *	307 *	281 *	288 *	242 *	287 *	264 *
Other Parameters									
pH	7.50	8.20	8.10	8.00	7.90	8.10	8.20	7.90	8.10
Total organic carbon (MG/KG)	78,000	39,000	34,000	47,000	41,000	39,000	42,000	40,000	31,000
Percent fines	75.2	91.6	65.1	94.3	91.7	92.9	91.4	NA	79.2
AVS/SEM (UMOL/G)									
Acid volatile sulfide	NA	5.4	NA	NA	7.4	NA	0.5 U	12	NA
Cadmium	NA	0.0057 U	NA	NA	0.0057 U	NA	0.0053 U	0.0053 U	NA
Copper	NA	0.33	NA	NA	0.86	NA	0.016 U	0.11	NA
Lead	NA	0.14	NA	NA	0.14	NA	0.0048 U	0.11	NA
Mercury	NA	0.00011 U	NA	NA	0.0001 U	NA	0.0001 U	0.0016	NA
Nickel	NA	0.062	NA	NA	0.075	NA	0.017 U	0.055	NA
Zinc	NA	3.4	NA	NA	2.9	NA	0.03 U	2.6	NA

Shaded cells indicate detected values

NA - Not Analyzed

TABLE D-14

Comparison of Reference and SWMU 7b Sediment Parameters

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Constituent	Little Creek Cove Reference				SWMU 7b Surface Sediment				SWMU 7b Subsurface Sediment			
	Frequency of Detection	Minimum	Maximum	Mean	Frequency of Detection	Minimum	Maximum	Mean	Frequency of Detection	Minimum	Maximum	Mean
Total Metals (MG/KG)												
Copper	8 / 8	110	184	155	77 / 77	9.20	252	82.7	15 / 15	3.50	220	34.3
Lead	8 / 8	36.3	67.6	45.2	77 / 77	5.70	587	74.9	15 / 15	1.60	139	28.3
Mercury	8 / 8	0.09	0.20	0.15	75 / 77	0.05	4.10	0.35	11 / 15	0.040	1.50	0.21
Tin	8 / 8	6.80	9.80	8.61	54 / 76	1.00	29.9	6.12	11 / 15	1.40	23.5	3.45
Zinc	8 / 8	229	421	290	77 / 77	34.8	1,440	378	14 / 15	21.6	1,390	178
Other Parameters												
Total organic carbon (mg/kg)	8 / 8	31,000	78,000	43,875	77 / 77	3,125	31,600	18,008	15 / 15	1,337	27,940	13,270
pH	8 / 8	7.50	8.20	8.01	77 / 77	7.05	8.81	8.00	15 / 15	7.80	8.65	8.26
Percent fines	8 / 8	65.1	94.3	85.2	70 / 70	14.0	94.0	68.0	13 / 13	17.9	93.5	57.0
SEM/AVS Ratio	3 / 3	0.24	0.73	0.50	60 / 62	0.003	19.1	0.75	-- / --	--	--	--

TABLE D-15

Correlation Evaluation of 2002 Surface Sediment Parameters for Discrete Versus Composite Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sediment Parameter[1]	Pearson (parametric)				Spearman (non-parametric)			
	Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2
Copper	0.836	0.00003	S	0.699	0.860	0.00001	S	0.739
Lead	0.367	0.148	NS	0.134	0.764	0.0004	S	0.584
Mercury	0.318	0.214	NS	0.101	0.794	0.0001	S	0.631
Tin	0.842	0.00002	S	0.708	0.885	0.000002	S	0.784
Zinc	0.925	0.0000001	S	0.855	0.865	0.00001	S	0.747
Sediment pH	0.611	0.009	S	0.373	0.655	0.004	S	0.429
Total Organic Carbon	0.557	0.020	S	0.310	0.509	0.037	S	0.259
Large Gravel	--	--	--	--	--	--	--	--
Coarse Gravel	--	--	--	--	--	--	--	--
Fine Gravel	0.132	0.683	NS	0.017	0.222	0.489	NS	0.049
Coarse Sand	0.604	0.038	S	0.364	0.538	0.071	NS	0.290
Medium Sand	0.607	0.036	S	0.368	0.559	0.059	NS	0.313
Fine Sand	0.821	0.001	S	0.675	0.923	0.00002	S	0.852
Silt/Clay	0.781	0.003	S	0.611	0.839	0.001	S	0.704

1 - No comparison could be conducted for percent ABM, which was only qualitatively measured, or SEM/AVS ratio, which was only measured in the discrete samples

S - Significant ($p \leq 0.05$) NS - Not Significant ($p > 0.05$)

R^2 - represents the percentage of variability explained

TABLE D-16

Two-Sample Comparisons (Paired) Between 2002 Discrete and Composite Surface Sediment Parameters

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Area	Wilcoxon Signed Rank Test Probability		Wilcoxon Signed Rank Test Decision
Copper	All Samples	0.854	NS	--
Lead	All Samples	0.963	NS	--
Mercury	All Samples	0.046	S	Composite > Discrete
Tin	All Samples	0.826	NS	--
Zinc	All Samples	0.548	NS	--
Sediment pH	All Samples	0.034	S	Discrete > Composite
Total Organic Carbon	All Samples	0.528	NS	--
Large Gravel	All Samples	--	--	--
Coarse Gravel	All Samples	1.000	NS	--
Fine Gravel	All Samples	0.966	NS	--
Coarse Sand	All Samples	1.000	NS	--
Medium Sand	All Samples	0.733	NS	--
Fine Sand	All Samples	0.301	NS	--
Silt/Clay	All Samples	0.622	NS	--
Copper	Channel	0.125	NS	--
Lead	Channel	0.313	NS	--
Mercury	Channel	0.188	NS	--
Tin	Channel	0.250	NS	--
Zinc	Channel	0.125	NS	--
Sediment pH	Channel	0.125	NS	--
Total Organic Carbon	Channel	0.625	NS	--
Large Gravel	Channel	--	--	--
Coarse Gravel	Channel	--	--	--
Fine Gravel	Channel	0.500	NS	--
Coarse Sand	Channel	0.625	NS	--
Medium Sand	Channel	0.375	NS	--
Fine Sand	Channel	1.000	NS	--
Silt/Clay	Channel	0.625	NS	--
Copper	Cove	0.625	NS	--
Lead	Cove	0.313	NS	--
Mercury	Cove	0.625	NS	--
Tin	Cove	1.000	NS	--
Zinc	Cove	0.063	NS	--
Sediment pH	Cove	0.188	NS	--
Total Organic Carbon	Cove	0.625	NS	--
Large Gravel	Cove	--	--	--
Coarse Gravel	Cove	--	--	--
Fine Gravel	Cove	0.875	NS	--
Coarse Sand	Cove	0.875	NS	--
Medium Sand	Cove	0.625	NS	--
Fine Sand	Cove	0.625	NS	--
Silt/Clay	Cove	0.875	NS	--

TABLE D-16

Two-Sample Comparisons (Paired) Between 2002 Discrete and Composite Surface Sediment Parameters

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Area	Wilcoxon Signed Rank Test Probability		Wilcoxon Signed Rank Test Decision
Copper	Pier	0.813	NS	--
Lead	Pier	0.375	NS	--
Mercury	Pier	0.188	NS	--
Tin	Pier	0.375	NS	--
Zinc	Pier	0.297	NS	--
Sediment pH	Pier	0.469	NS	--
Total Organic Carbon	Pier	0.688	NS	--
Large Gravel	Pier	--	--	--
Coarse Gravel	Pier	1.000	NS	--
Fine Gravel	Pier	0.625	NS	--
Coarse Sand	Pier	0.875	NS	--
Medium Sand	Pier	1.000	NS	--
Fine Sand	Pier	0.375	NS	--
Silt/Clay	Pier	1.000	NS	--

S - Significant ($p \leq 0.05$) NS - Not Significant ($p > 0.05$)

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	95% UCL (Norm)	Arithmetic Mean	Standard Deviation of Mean	TEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-L or AET	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
All Samples[1]																			
Copper	MG/KG	-- - --	77 / 77	9.20	252	LW07-SD301-00-09D	89.8	82.7	37.8	18.7	76 / 77	13.5	4.80	4.42	34.0	72 / 77	7.41	2.64	2.43
Lead	MG/KG	-- - --	77 / 77	5.70	587	LW07-SD301-00-09D	89.7	74.9	78.0	30.2	66 / 77	19.4	2.97	2.48	46.7	49 / 77	12.6	1.92	1.60
Mercury	MG/KG	0.04 - 0.09	75 / 77	0.046	4.10	LW07-L5-SD202-00-02C	0.44	0.35	0.50	0.13	65 / 77	31.5	3.42	2.69	0.15	62 / 77	27.3	2.96	2.33
Tin	MG/KG	3.90 - 11.7	54 / 76	1.00	29.9	LW07-M1-SD304-00-09D	7.18	6.12	5.57	--	-- / --	--	--	--	3.40	39 / 76	8.79	2.11	1.80
TBT	UG/KG	-- - --	13 / 13	2.00	7.60	LW07-M1-SD303-00-09D	5.41	4.71	1.42	48.0	0 / 13	0.16	0.11	0.10	3,400	0 / 13	0.002	0.002	0.001
Zinc	MG/KG	-- - --	77 / 77	34.8	1,440	LW07-SD301-00-09D	422	378	234	124	73 / 77	11.6	3.40	3.05	150	69 / 77	9.60	2.81	2.52
2010 Samples																			
Copper	MG/KG	-- - --	19 / 19	24.7	166	LW07-H1-SD401-00-10C	99.4	84.8	36.8	18.7	19 / 19	8.88	5.32	4.53	34.0	18 / 19	4.88	2.92	2.49
Lead	MG/KG	-- - --	19 / 19	14.9	236	LW07-M1-SD401-00-10C	97.8	73.9	60.0	30.2	16 / 19	7.81	3.24	2.45	46.7	12 / 19	5.05	2.09	1.58
Mercury	MG/KG	-- - --	19 / 19	0.05	1.21	LW07-M1-SD401-00-10C	0.40	0.30	0.24	0.13	17 / 19	9.31	3.05	2.32	0.15	17 / 19	8.07	2.64	2.01
Tin	MG/KG	-- - --	19 / 19	2.50	19.7	LW07-SD403-00-10C	9.28	7.61	4.19	--	-- / --	--	--	--	3.40	18 / 19	5.79	2.73	2.24
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	19 / 19	92.7	987	LW07-SD403-00-10C	520	422	247	124	18 / 19	7.96	4.20	3.40	150	18 / 19	6.58	3.47	2.81
2009 Samples																			
Copper	MG/KG	-- - --	28 / 28	19.8	252	LW07-SD301-00-09D	104	89.3	45.7	18.7	28 / 28	13.5	5.56	4.78	34.0	26 / 28	7.41	3.06	2.63
Lead	MG/KG	-- - --	28 / 28	18.6	587	LW07-SD301-00-09D	118	83.2	107	30.2	25 / 28	19.4	3.89	2.75	46.7	19 / 28	12.6	2.52	1.78
Mercury	MG/KG	-- - --	28 / 28	0.06	1.77	LW07-SD301-00-09D	0.42	0.32	0.32	0.13	22 / 28	13.6	3.24	2.46	0.15	21 / 28	11.8	2.81	2.13
Tin	MG/KG	3.90 - 11.7	6 / 28	10.1	29.9	LW07-M1-SD304-00-09D	9.55	7.00	7.91	--	-- / --	--	--	--	3.40	6 / 28	8.79	2.81	2.06
TBT	UG/KG	-- - --	13 / 13	2.00	7.60	LW07-M1-SD303-00-09D	5.41	4.71	1.42	48.0	0 / 13	0.16	0.11	0.10	3,400	0 / 13	0.002	0.002	0.001
Zinc	MG/KG	-- - --	28 / 28	85.4	1,440	LW07-SD301-00-09D	526	434	287	124	27 / 28	11.6	4.24	3.50	150	26 / 28	9.60	3.51	2.89
2000/2002 Samples[1]																			
Copper	MG/KG	-- - --	30 / 30	9.20	134	LW07-H1-SD202-00-02C	84.2	75.1	29.2	18.7	29 / 30	7.17	4.50	4.02	34.0	28 / 30	3.94	2.48	2.21
Lead	MG/KG	-- - --	30 / 30	5.70	255	LW07-K3-SD201-00-02C	84.6	67.8	54.1	30.2	25 / 30	8.44	2.80	2.24	46.7	18 / 30	5.46	1.81	1.45
Mercury	MG/KG	0.04 - 0.09	28 / 30	0.12	4.10	LW07-L5-SD202-00-02C	0.63	0.41	0.72	0.13	26 / 30	31.5	4.85	3.14	0.15	24 / 30	27.3	4.21	2.72
Tin	MG/KG	-- - --	29 / 29	1.00	9.40	LW07-K4-SD201-00-02C	5.05	4.29	2.41	--	-- / --	--	--	--	3.40	15 / 29	2.76	1.49	1.26
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	30 / 30	34.8	628	LW07-M1-SD201-00-02C	338	297	132	124	28 / 30	5.06	2.73	2.40	150	25 / 30	4.19	2.25	1.98
2000/2002 Samples in MILCON-Impacted Area																			
Copper	MG/KG	-- - --	11 / 11	19.4	142	LW07-SD05-00	96.9	72.6	44.4	18.7	11 / 11	7.59	5.18	3.88	34.0	8 / 11	4.18	2.85	2.14
Lead	MG/KG	-- - --	11 / 11	12.7	1,810	LW07-SD03-00	511	223	527	30.2	9 / 11	59.9	16.9	7.38	46.7	9 / 11	38.8	10.9	4.77
Mercury	MG/KG	0.17 - 0.56	8 / 11	0.050	0.45	LW07-M3-SD201-00-02C	0.29	0.21	0.14	0.13	5 / 11	3.46	2.21	1.62	0.15	4 / 11	3.00	1.92	1.40
Tin	MG/KG	1.50 - 1.50	6 / 7	1.60	14.5	LW07-M3-SD201-00-02C	8.98	5.41	4.86	--	-- / --	--	--	--	3.40	3 / 7	4.26	2.64	1.59
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	205 - 205	10 / 11	73.1	1,360	LW07-M3-SD201-00-02C	606	391	394	124	7 / 11	11.0	4.89	3.15	150	7 / 11	9.07	4.04	2.61

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	95% UCL (Norm)	Arithmetic Mean	Standard Deviation of Mean	TEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-L or AET	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Pier - All Samples[1]																			
Copper	MG/KG	-- - --	33 / 33	30.7	252	LW07-SD301-00-09D	115	102	44.2	18.7	33 / 33	13.5	6.17	5.47	34.0	32 / 33	7.41	3.39	3.01
Lead	MG/KG	-- - --	33 / 33	20.8	587	LW07-SD301-00-09D	134	104	103	30.2	32 / 33	19.4	4.43	3.43	46.7	28 / 33	12.6	2.87	2.22
Mercury	MG/KG	-- - --	33 / 33	0.073	4.10	LW07-L5-SD202-00-02C	0.72	0.50	0.72	0.13	30 / 33	31.5	5.50	3.87	0.15	29 / 33	27.3	4.77	3.35
Tin	MG/KG	3.90 - 11.7	20 / 33	2.60	29.9	LW07-M1-SD304-00-09D	10.1	7.96	7.25	--	-- / --	--	--	--	3.40	18 / 33	8.79	2.97	2.34
TBT	UG/KG	-- - --	11 / 11	2.00	7.60	LW07-M1-SD303-00-09D	5.67	4.86	1.48	48.0	0 / 11	0.16	0.12	0.10	3,400	0 / 11	0.002	0.002	0.001
Zinc	MG/KG	-- - --	33 / 33	143	1,440	LW07-SD301-00-09D	575	497	265	124	33 / 33	11.6	4.64	4.01	150	32 / 33	9.60	3.83	3.31
Pier - 2010 Samples																			
Copper	MG/KG	-- - --	8 / 8	52.6	166	LW07-H1-SD401-00-10C	134	105	43.6	18.7	8 / 8	8.88	7.17	5.61	34.0	8 / 8	4.88	3.95	3.09
Lead	MG/KG	-- - --	8 / 8	43.2	236	LW07-M1-SD401-00-10C	150	98.2	78.0	30.2	8 / 8	7.81	4.98	3.25	46.7	7 / 8	5.05	3.22	2.10
Mercury	MG/KG	-- - --	8 / 8	0.16	1.21	LW07-M1-SD401-00-10C	0.62	0.39	0.34	0.13	8 / 8	9.31	4.75	2.99	0.15	8 / 8	8.07	4.11	2.59
Tin	MG/KG	-- - --	8 / 8	5.81	19.7	LW07-SD403-00-10C	12.6	9.53	4.63	--	-- / --	--	--	--	3.40	8 / 8	5.79	3.72	2.80
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	8 / 8	279	987	LW07-SD403-00-10C	653	488	247	124	8 / 8	7.96	5.27	3.94	150	8 / 8	6.58	4.36	3.25
Pier - 2009 Samples																			
Copper	MG/KG	-- - --	17 / 17	30.7	252	LW07-SD301-00-09D	122	99.0	54.4	18.7	17 / 17	13.5	6.52	5.29	34.0	16 / 17	7.41	3.59	2.91
Lead	MG/KG	-- - --	17 / 17	20.8	587	LW07-SD301-00-09D	163	107	132	30.2	16 / 17	19.4	5.41	3.55	46.7	13 / 17	12.6	3.50	2.30
Mercury	MG/KG	-- - --	17 / 17	0.07	1.77	LW07-SD301-00-09D	0.55	0.39	0.39	0.13	14 / 17	13.6	4.23	2.96	0.15	13 / 17	11.8	3.67	2.57
Tin	MG/KG	3.90 - 11.7	4 / 17	12.7	29.9	LW07-M1-SD304-00-09D	12.5	8.52	9.45	--	-- / --	--	--	--	3.40	4 / 17	8.79	3.68	2.51
TBT	UG/KG	-- - --	11 / 11	2.00	7.60	LW07-M1-SD303-00-09D	5.67	4.86	1.48	48.0	0 / 11	0.16	0.12	0.10	3,400	0 / 11	0.002	0.002	0.001
Zinc	MG/KG	-- - --	17 / 17	143	1,440	LW07-SD301-00-09D	668	529	328	124	17 / 17	11.6	5.39	4.27	150	16 / 17	9.60	4.45	3.53
Pier - 2000/2002 Samples[1]																			
Copper	MG/KG	-- - --	8 / 8	88.0	134	LW07-H1-SD202-00-02C	117	107	14.8	18.7	8 / 8	7.17	6.25	5.72	34.0	8 / 8	3.94	3.44	3.14
Lead	MG/KG	-- - --	8 / 8	65.2	177	LW07-M1-SD201-00-02C	131	101	45.7	30.2	8 / 8	5.86	4.35	3.33	46.7	8 / 8	3.79	2.81	2.15
Mercury	MG/KG	-- - --	8 / 8	0.30	4.10	LW07-L5-SD202-00-02C	1.74	0.87	1.31	0.13	8 / 8	31.5	13.4	6.66	0.15	8 / 8	27.3	11.6	5.78
Tin	MG/KG	-- - --	8 / 8	2.60	6.70	LW07-H1-SD202-00-02C	6.29	5.20	1.63	--	-- / --	--	--	--	3.40	6 / 8	1.97	1.85	1.53
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	8 / 8	362	628	LW07-M1-SD201-00-02C	493	437	82.5	124	8 / 8	5.06	3.97	3.53	150	8 / 8	4.19	3.28	2.92
Pier - 2000/2002 Samples in MILCON-Impacted Area																			
Copper	MG/KG	-- - --	11 / 11	19.4	142	LW07-SD05-00	96.9	72.6	44.4	18.7	11 / 11	7.59	5.18	3.88	34.0	8 / 11	4.18	2.85	2.14
Lead	MG/KG	-- - --	11 / 11	12.7	1,810	LW07-SD03-00	511	223	527	30.2	9 / 11	59.9	16.9	7.38	46.7	9 / 11	38.8	10.9	4.77
Mercury	MG/KG	0.17 - 0.56	8 / 11	0.05	0.45	LW07-M3-SD201-00-02C	0.29	0.21	0.14	0.13	5 / 11	3.46	2.21	1.62	0.15	4 / 11	3.00	1.92	1.40
Tin	MG/KG	1.50 - 1.50	6 / 7	1.60	14.5	LW07-M3-SD201-00-02C	8.98	5.41	4.86	--	-- / --	--	--	--	3.40	3 / 7	4.26	2.64	1.59
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	205 - 205	10 / 11	73.1	1,360	LW07-M3-SD201-00-02C	606	391	394	124	7 / 11	11.0	4.89	3.15	150	7 / 11	9.07	4.04	2.61

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	95% UCL (Norm)	Arithmetic Mean	Standard Deviation of Mean	TEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-L or AET	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Cove - All Samples																			
Copper	MG/KG	-- - --	23 / 23	55.0	117	LW07-L2-SD201-00-02C	88.1	82.3	16.2	18.7	23 / 23	6.26	4.71	4.40	34.0	23 / 23	3.44	2.59	2.42
Lead	MG/KG	-- - --	23 / 23	37.4	255	LW07-K3-SD201-00-02C	91.7	74.1	49.1	30.2	23 / 23	8.44	3.04	2.45	46.7	20 / 23	5.46	1.96	1.59
Mercury	MG/KG	-- - --	23 / 23	0.15	0.76	LW07-H3-SD202-00-02C	0.36	0.31	0.15	0.13	23 / 23	5.85	2.77	2.37	0.15	23 / 23	5.07	2.40	2.05
Tin	MG/KG	5.78 - 7.50	19 / 23	2.10	14.8	LW07-L2-SD301-00-09D	7.80	6.59	3.39	--	-- / --	--	--	--	3.40	17 / 23	4.35	2.29	1.94
TBT	UG/KG	-- - --	1 / 1	3.40	3.40	LW07-H3-SD301-00-09D	--	3.40	--	48.0	0 / 1	0.07	--	0.07	3,400	0 / 1	0.001	--	0.001
Zinc	MG/KG	-- - --	23 / 23	283	974	LW07-K4-SD401-00-10C	444	390	151	124	23 / 23	7.85	3.58	3.15	150	23 / 23	6.49	2.96	2.60
Cove - 2010 Samples																			
Copper	MG/KG	-- - --	6 / 6	75.4	96.1	LW07-K3-SD401-00-10C	92.6	85.9	8.14	18.7	6 / 6	5.14	4.95	4.59	34.0	6 / 6	2.83	2.72	2.53
Lead	MG/KG	-- - --	6 / 6	37.4	131	LW07-J4-SD401-00-10C	109	78.5	36.9	30.2	6 / 6	4.34	3.61	2.60	46.7	5 / 6	2.81	2.33	1.68
Mercury	MG/KG	-- - --	6 / 6	0.19	0.43	LW07-K3-SD401-00-10C	0.34	0.28	0.08	0.13	6 / 6	3.28	2.65	2.14	0.15	6 / 6	2.84	2.29	1.86
Tin	MG/KG	-- - --	6 / 6	5.43	13.6	LW07-L2-SD401-00-10C	11.0	8.21	3.38	--	-- / --	--	--	--	3.40	6 / 6	4.00	3.23	2.41
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	6 / 6	294	974	LW07-K4-SD401-00-10C	725	522	247	124	6 / 6	7.85	5.85	4.21	150	6 / 6	6.49	4.83	3.48
Cove - 2009 Samples																			
Copper	MG/KG	-- - --	6 / 6	65.2	101	LW07-J4-SD301-00-09D	98.6	86.1	15.2	18.7	6 / 6	5.40	5.27	4.61	34.0	6 / 6	2.97	2.90	2.53
Lead	MG/KG	-- - --	6 / 6	42.1	76.4	LW07-K3-SD301-00-09D	65.7	56.1	11.7	30.2	6 / 6	2.53	2.18	1.86	46.7	5 / 6	1.64	1.41	1.20
Mercury	MG/KG	-- - --	6 / 6	0.21	0.38	LW07-K5-SD301-00-09D	0.33	0.28	0.06	0.13	6 / 6	2.93	2.51	2.12	0.15	6 / 6	2.54	2.17	1.83
Tin	MG/KG	5.78 - 7.50	2 / 6	10.1	14.8	LW07-L2-SD301-00-09D	10.4	6.39	4.93	--	-- / --	--	--	--	3.40	2 / 6	4.35	3.07	1.88
TBT	UG/KG	-- - --	1 / 1	3.40	3.40	LW07-H3-SD301-00-09D	--	3.40	--	48.0	0 / 1	0.07	--	0.07	3,400	0 / 1	0.001	--	0.001
Zinc	MG/KG	-- - --	6 / 6	304	466	LW07-L2-SD301-00-09D	411	364	57.6	124	6 / 6	3.76	3.31	2.93	150	6 / 6	3.11	2.74	2.42
Cove - 2000/2002 Samples																			
Copper	MG/KG	-- - --	11 / 11	55.0	117	LW07-L2-SD201-00-02C	89.2	78.3	19.9	18.7	11 / 11	6.26	4.77	4.19	34.0	11 / 11	3.44	2.62	2.30
Lead	MG/KG	-- - --	11 / 11	40.1	255	LW07-K3-SD201-00-02C	117	81.5	65.5	30.2	11 / 11	8.44	3.88	2.70	46.7	10 / 11	5.46	2.51	1.74
Mercury	MG/KG	-- - --	11 / 11	0.15	0.76	LW07-H3-SD202-00-02C	0.45	0.34	0.20	0.13	11 / 11	5.85	3.46	2.63	0.15	11 / 11	5.07	3.00	2.28
Tin	MG/KG	-- - --	11 / 11	2.10	9.40	LW07-K4-SD201-00-02C	7.05	5.81	2.27	--	-- / --	--	--	--	3.40	9 / 11	2.76	2.07	1.71
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	11 / 11	283	491	LW07-L2-SD201-00-02C	367	333	61.2	124	11 / 11	3.96	2.96	2.69	150	11 / 11	3.27	2.44	2.22

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	95% UCL (Norm)	Arithmetic Mean	Standard Deviation of Mean	TEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-L or AET	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Channel - All Samples																			
Copper	MG/KG	-- - --	21 / 21	9.20	82.4	LW07-D5-SD401-00-10C	59.6	52.2	19.9	18.7	20 / 21	4.41	3.19	2.79	34.0	17 / 21	2.42	1.75	1.53
Lead	MG/KG	-- - --	21 / 21	5.70	50.4	LW07-F3-SD301-00-09D	34.9	30.8	10.8	30.2	11 / 21	1.67	1.15	1.02	46.7	1 / 21	1.08	0.75	0.66
Mercury	MG/KG	0.04 - 0.09	19 / 21	0.046	0.35	LW07-F3-SD401-00-10C	0.19	0.15	0.083	0.13	12 / 21	2.67	1.43	1.19	0.15	10 / 21	2.31	1.24	1.03
Tin	MG/KG	4.00 - 6.27	15 / 20	1.00	5.64	LW07-D5-SD401-00-10C	2.96	2.55	1.07	--	-- / --	--	--	--	3.40	4 / 20	1.66	0.87	0.75
TBT	UG/KG	-- - --	1 / 1	4.30	4.30	LW07-B5-SD301-00-09D	--	4.30	--	48.0	0 / 1	0.09	--	0.09	3,400	0 / 1	0.001	--	0.001
Zinc	MG/KG	-- - --	21 / 21	34.8	283	LW07-D5-SD401-00-10C	202	176	67.3	124	17 / 21	2.28	1.63	1.42	150	14 / 21	1.89	1.35	1.18
Channel - 2010 Samples																			
Copper	MG/KG	-- - --	5 / 5	24.7	82.4	LW07-D5-SD401-00-10C	71.5	51.1	21.3	18.7	5 / 5	4.41	3.82	2.73	34.0	4 / 5	2.42	2.10	1.50
Lead	MG/KG	-- - --	5 / 5	14.9	45.6	LW07-F3-SD401-00-10C	42.0	29.5	13.1	30.2	2 / 5	1.51	1.39	0.98	46.7	0 / 5	0.98	0.90	0.63
Mercury	MG/KG	-- - --	5 / 5	0.05	0.35	LW07-F3-SD401-00-10C	0.30	0.19	0.12	0.13	3 / 5	2.67	2.32	1.45	0.15	3 / 5	2.31	2.01	1.26
Tin	MG/KG	-- - --	5 / 5	2.50	5.64	LW07-D5-SD401-00-10C	4.91	3.83	1.13	--	-- / --	--	--	--	3.40	4 / 5	1.66	1.44	1.13
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	5 / 5	92.7	283	LW07-D5-SD401-00-10C	267	197	73.0	124	4 / 5	2.28	2.15	1.59	150	4 / 5	1.89	1.78	1.31
Channel - 2009 Samples																			
Copper	MG/KG	-- - --	5 / 5	19.8	71.1	LW07-F3-SD301-00-09D	82.0	60.4	22.7	18.7	5 / 5	3.80	4.39	3.23	34.0	4 / 5	2.09	2.41	1.78
Lead	MG/KG	-- - --	5 / 5	18.6	50.4	LW07-F3-SD301-00-09D	44.7	33.4	11.8	30.2	3 / 5	1.67	1.48	1.11	46.7	1 / 5	1.08	0.96	0.72
Mercury	MG/KG	-- - --	5 / 5	0.06	0.24	LW07-D5-SD301-00-09D	0.23	0.15	0.08	0.13	2 / 5	1.82	1.73	1.15	0.15	2 / 5	1.57	1.50	1.00
Tin[2]	MG/KG	4.00 - 6.27	0 / 5	--	--	--	3.00	2.59	0.43	--	-- / --	--	--	--	3.40	-- / --	--	--	0.76
TBT	UG/KG	-- - --	1 / 1	4.30	4.30	LW07-B5-SD301-00-09D	--	4.30	--	48.0	0 / 1	0.09	--	0.09	3,400	0 / 1	0.001	--	0.001
Zinc	MG/KG	-- - --	5 / 5	85.4	277	LW07-F3-SD301-00-09D	265	194	74.5	124	4 / 5	2.23	2.14	1.56	150	4 / 5	1.85	1.77	1.29
Channel - 2000/2002 Samples																			
Copper	MG/KG	-- - --	11 / 11	9.20	72.5	LW07-D5-SD201-00-02C	59.2	48.9	18.8	18.7	10 / 11	3.88	3.17	2.61	34.0	9 / 11	2.13	1.74	1.44
Lead	MG/KG	-- - --	11 / 11	5.70	38.5	LW07-D5-SD202-00-02C	35.8	30.2	10.1	30.2	6 / 11	1.27	1.19	1.00	46.7	0 / 11	0.82	0.77	0.65
Mercury	MG/KG	0.04 - 0.09	9 / 11	0.12	0.25	LW07-D5-SD201-00-02C	0.18	0.14	0.07	0.13	7 / 11	1.92	1.38	1.09	0.15	5 / 11	1.67	1.19	0.94
Tin	MG/KG	-- - --	10 / 10	1.00	3.00	LW07-D5-SD201-00-02C	2.23	1.89	0.59	--	-- / --	--	--	--	3.40	0 / 10	0.88	0.66	0.56
TBT	UG/KG	-- - --	-- / --	--	--	--	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--
Zinc	MG/KG	-- - --	11 / 11	34.8	223	LW07-D5-SD201-00-02C	194	159	63.4	124	9 / 11	1.80	1.56	1.28	150	6 / 11	1.49	1.29	1.06

1 - 2000/2002 samples within the area impacted by the MILCON action are not included

2 - The 2009 connector channel mean value for tin is the average of one-half of the detection limits for the 5 samples

Shaded cells indicate HQ or ratio >1

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	PEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-M	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background	Mean Background	Frequency of Exceedance	Maximum Ratio	Mean Ratio
All Samples[1]																
Copper	MG/KG	108	16 / 77	2.33	0.83	0.77	270	0 / 77	0.93	0.33	0.31	184	155	1 / 77	1.37	0.53
Lead	MG/KG	112	11 / 77	5.24	0.80	0.67	218	4 / 77	2.69	0.41	0.34	67.6	45.2	25 / 77	8.68	1.66
Mercury	MG/KG	0.70	4 / 77	5.86	0.63	0.50	0.71	4 / 77	5.77	0.63	0.49	0.20	0.15	51 / 77	20.5	2.26
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	11 / 76	3.05	0.71
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	54 / 77	5.31	1.56	1.39	410	24 / 77	3.51	1.03	0.92	421	290	22 / 77	3.42	1.30
2010 Samples																
Copper	MG/KG	108	4 / 19	1.54	0.92	0.78	270	0 / 19	0.61	0.37	0.31	184	155	0 / 19	0.90	0.55
Lead	MG/KG	112	3 / 19	2.11	0.87	0.66	218	1 / 19	1.08	0.45	0.34	67.6	45.2	5 / 19	3.49	1.64
Mercury	MG/KG	0.70	1 / 19	1.73	0.57	0.43	0.71	1 / 19	1.70	0.56	0.42	0.20	0.15	13 / 19	6.05	1.95
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	5 / 19	2.01	0.88
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	15 / 19	3.64	1.92	1.56	410	7 / 19	2.41	1.27	1.03	421	290	7 / 19	2.34	1.46
2009 Samples																
Copper	MG/KG	108	7 / 28	2.33	0.96	0.83	270	0 / 28	0.93	0.39	0.33	184	155	1 / 28	1.37	0.58
Lead	MG/KG	112	3 / 28	5.24	1.05	0.74	218	2 / 28	2.69	0.54	0.38	67.6	45.2	10 / 28	8.68	1.84
Mercury	MG/KG	0.70	1 / 28	2.53	0.60	0.46	0.71	1 / 28	2.49	0.59	0.45	0.20	0.15	20 / 28	8.85	2.07
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	6 / 28	3.05	0.81
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	20 / 28	5.31	1.94	1.60	410	11 / 28	3.51	1.28	1.06	421	290	11 / 28	3.42	1.50
2000/2002 Samples[1]																
Copper	MG/KG	108	5 / 30	1.24	0.78	0.70	270	0 / 30	0.50	0.31	0.28	184	155	0 / 30	0.73	0.48
Lead	MG/KG	112	5 / 30	2.28	0.76	0.61	218	1 / 30	1.17	0.39	0.31	67.6	45.2	10 / 30	3.77	1.50
Mercury	MG/KG	0.70	2 / 30	5.86	0.90	0.58	0.71	2 / 30	5.77	0.89	0.57	0.20	0.15	18 / 30	20.5	2.64
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 29	0.96	0.50
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	19 / 30	2.32	1.25	1.10	410	6 / 30	1.53	0.82	0.72	421	290	4 / 30	1.49	1.03
2000/2002 Samples in MILCON-Impacted Area																
Copper	MG/KG	108	3 / 11	1.31	0.90	0.67	270	0 / 11	0.53	0.36	0.27	184	155	0 / 11	0.77	0.47
Lead	MG/KG	112	1 / 11	16.2	4.56	1.99	218	1 / 11	8.30	2.34	1.02	67.6	45.2	5 / 11	26.8	4.93
Mercury	MG/KG	0.70	0 / 11	0.64	0.41	0.30	0.71	0 / 11	0.63	0.41	0.30	0.20	0.15	4 / 11	2.25	1.36
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	1 / 7	1.48	0.63
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	6 / 11	5.02	2.24	1.44	410	4 / 11	3.32	1.48	0.95	421	290	4 / 11	3.23	1.35

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	PEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-M	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background	Mean Background	Frequency of Exceedance	Maximum Ratio	Mean Ratio
Pier - All Samples[1]																
Copper	MG/KG	108	15 / 33	2.33	1.07	0.95	270	0 / 33	0.93	0.43	0.38	184	155	1 / 33	1.37	0.66
Lead	MG/KG	112	8 / 33	5.24	1.19	0.92	218	3 / 33	2.69	0.61	0.47	67.6	45.2	18 / 33	8.68	2.29
Mercury	MG/KG	0.70	3 / 33	5.86	1.02	0.72	0.71	3 / 33	5.77	1.01	0.71	0.20	0.15	26 / 33	20.5	3.25
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	7 / 33	3.05	0.92
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	29 / 33	5.31	2.12	1.83	410	19 / 33	3.51	1.40	1.21	421	290	17 / 33	3.42	1.71
Pier - 2010 Samples																
Copper	MG/KG	108	4 / 8	1.54	1.24	0.97	270	0 / 8	0.61	0.50	0.39	184	155	0 / 8	0.90	0.68
Lead	MG/KG	112	2 / 8	2.11	1.34	0.88	218	1 / 8	1.08	0.69	0.45	67.6	45.2	2 / 8	3.49	2.17
Mercury	MG/KG	0.70	1 / 8	1.73	0.88	0.55	0.71	1 / 8	1.70	0.87	0.55	0.20	0.15	6 / 8	6.05	2.51
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	3 / 8	2.01	1.11
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	8 / 8	3.64	2.41	1.80	410	4 / 8	2.41	1.59	1.19	421	290	4 / 8	2.34	1.68
Pier - 2009 Samples																
Copper	MG/KG	108	7 / 17	2.33	1.13	0.92	270	0 / 17	0.93	0.45	0.37	184	155	1 / 17	1.37	0.64
Lead	MG/KG	112	3 / 17	5.24	1.46	0.96	218	2 / 17	2.69	0.75	0.49	67.6	45.2	9 / 17	8.68	2.38
Mercury	MG/KG	0.70	1 / 17	2.53	0.79	0.55	0.71	1 / 17	2.49	0.78	0.54	0.20	0.15	12 / 17	8.85	2.49
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	4 / 17	3.05	0.99
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	13 / 17	5.31	2.46	1.95	410	10 / 17	3.51	1.63	1.29	421	290	10 / 17	3.42	1.83
Pier - 2000/2002 Samples[1]																
Copper	MG/KG	108	4 / 8	1.24	1.08	0.99	270	0 / 8	0.50	0.43	0.40	184	155	0 / 8	0.73	0.69
Lead	MG/KG	112	3 / 8	1.58	1.17	0.90	218	0 / 8	0.81	0.60	0.46	67.6	45.2	7 / 8	2.62	2.23
Mercury	MG/KG	0.70	1 / 8	5.86	2.49	1.24	0.71	1 / 8	5.77	2.46	1.22	0.20	0.15	8 / 8	20.5	5.60
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 8	0.68	0.60
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	8 / 8	2.32	1.82	1.61	410	5 / 8	1.53	1.20	1.07	421	290	3 / 8	1.49	1.51
Pier - 2000/2002 Samples in MILCON-Impacted Area																
Copper	MG/KG	108	3 / 11	1.31	0.90	0.67	270	0 / 11	0.53	0.36	0.27	184	155	0 / 11	0.77	0.47
Lead	MG/KG	112	1 / 11	16.2	4.56	1.99	218	1 / 11	8.30	2.34	1.02	67.6	45.2	5 / 11	26.8	4.93
Mercury	MG/KG	0.70	0 / 11	0.64	0.41	0.30	0.71	0 / 11	0.63	0.41	0.30	0.20	0.15	4 / 11	2.25	1.36
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	1 / 7	1.48	0.63
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	6 / 11	5.02	2.24	1.44	410	4 / 11	3.32	1.48	0.95	421	290	4 / 11	3.23	1.35

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	PEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-M	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background	Mean Background	Frequency of Exceedance	Maximum Ratio	Mean Ratio
Cove - All Samples																
Copper	MG/KG	108	1 / 23	1.08	0.82	0.76	270	0 / 23	0.43	0.33	0.30	184	155	0 / 23	0.64	0.53
Lead	MG/KG	112	3 / 23	2.28	0.82	0.66	218	1 / 23	1.17	0.42	0.34	67.6	45.2	7 / 23	3.77	1.64
Mercury	MG/KG	0.70	1 / 23	1.09	0.51	0.44	0.71	1 / 23	1.07	0.51	0.43	0.20	0.15	19 / 23	3.80	1.99
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	4 / 23	1.51	0.76
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	23 / 23	3.59	1.64	1.44	410	5 / 23	2.38	1.08	0.95	421	290	5 / 23	2.31	1.35
Cove - 2010 Samples																
Copper	MG/KG	108	0 / 6	0.89	0.86	0.80	270	0 / 6	0.36	0.34	0.32	184	155	0 / 6	0.52	0.55
Lead	MG/KG	112	1 / 6	1.17	0.97	0.70	218	0 / 6	0.60	0.50	0.36	67.6	45.2	3 / 6	1.94	1.74
Mercury	MG/KG	0.70	0 / 6	0.61	0.49	0.40	0.71	0 / 6	0.60	0.48	0.39	0.20	0.15	5 / 6	2.13	1.80
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	2 / 6	1.39	0.95
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	6 / 6	3.59	2.68	1.92	410	3 / 6	2.38	1.77	1.27	421	290	3 / 6	2.31	1.80
Cove - 2009 Samples																
Copper	MG/KG	108	0 / 6	0.94	0.91	0.80	270	0 / 6	0.37	0.37	0.32	184	155	0 / 6	0.55	0.56
Lead	MG/KG	112	0 / 6	0.68	0.59	0.50	218	0 / 6	0.35	0.30	0.26	67.6	45.2	1 / 6	1.13	1.24
Mercury	MG/KG	0.70	0 / 6	0.54	0.47	0.39	0.71	0 / 6	0.54	0.46	0.39	0.20	0.15	6 / 6	1.91	1.78
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	2 / 6	1.51	0.74
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	6 / 6	1.72	1.52	1.34	410	1 / 6	1.14	1.00	0.89	421	290	1 / 6	1.11	1.25
Cove - 2000/2002 Samples																
Copper	MG/KG	108	1 / 11	1.08	0.83	0.72	270	0 / 11	0.43	0.33	0.29	184	155	0 / 11	0.64	0.51
Lead	MG/KG	112	2 / 11	2.28	1.05	0.73	218	1 / 11	1.17	0.54	0.37	67.6	45.2	3 / 11	3.77	1.80
Mercury	MG/KG	0.70	1 / 11	1.09	0.64	0.49	0.71	1 / 11	1.07	0.63	0.48	0.20	0.15	8 / 11	3.80	2.21
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 11	0.96	0.67
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	11 / 11	1.81	1.35	1.23	410	1 / 11	1.20	0.89	0.81	421	290	1 / 11	1.17	1.15

TABLE D-17

Summary Statistics - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	PEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-M	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background	Mean Background	Frequency of Exceedance	Maximum Ratio	Mean Ratio
Channel - All Samples																
Copper	MG/KG	108	0 / 21	0.76	0.55	0.48	270	0 / 21	0.31	0.22	0.19	184	155	0 / 21	0.45	0.34
Lead	MG/KG	112	0 / 21	0.45	0.31	0.28	218	0 / 21	0.23	0.16	0.14	67.6	45.2	0 / 21	0.75	0.68
Mercury	MG/KG	0.70	0 / 21	0.50	0.27	0.22	0.71	0 / 21	0.49	0.26	0.22	0.20	0.15	6 / 21	1.74	1.00
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 20	0.58	0.30
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	2 / 21	1.04	0.74	0.65	410	0 / 21	0.69	0.49	0.43	421	290	0 / 21	0.67	0.61
Channel - 2010 Samples																
Copper	MG/KG	108	0 / 5	0.76	0.66	0.47	270	0 / 5	0.31	0.26	0.19	184	155	0 / 5	0.45	0.33
Lead	MG/KG	112	0 / 5	0.41	0.37	0.26	218	0 / 5	0.21	0.19	0.14	67.6	45.2	0 / 5	0.67	0.65
Mercury	MG/KG	0.70	0 / 5	0.50	0.43	0.27	0.71	0 / 5	0.49	0.43	0.27	0.20	0.15	2 / 5	1.74	1.22
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 5	0.58	0.44
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	1 / 5	1.04	0.98	0.73	410	0 / 5	0.69	0.65	0.48	421	290	0 / 5	0.67	0.68
Channel - 2009 Samples																
Copper	MG/KG	108	0 / 5	0.66	0.76	0.56	270	0 / 5	0.26	0.30	0.22	184	155	0 / 5	0.39	0.39
Lead	MG/KG	112	0 / 5	0.45	0.40	0.30	218	0 / 5	0.23	0.20	0.15	67.6	45.2	0 / 5	0.75	0.74
Mercury	MG/KG	0.70	0 / 5	0.34	0.32	0.21	0.71	0 / 5	0.33	0.32	0.21	0.20	0.15	2 / 5	1.18	0.97
Tin[2]	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	-- / --	--	0.30
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	1 / 5	1.02	0.98	0.72	410	0 / 5	0.68	0.65	0.47	421	290	0 / 5	0.66	0.67
Channel - 2000/2002 Samples																
Copper	MG/KG	108	0 / 11	0.67	0.55	0.45	270	0 / 11	0.27	0.22	0.18	184	155	0 / 11	0.39	0.32
Lead	MG/KG	112	0 / 11	0.34	0.32	0.27	218	0 / 11	0.18	0.16	0.14	67.6	45.2	0 / 11	0.57	0.67
Mercury	MG/KG	0.70	0 / 11	0.36	0.26	0.20	0.71	0 / 11	0.35	0.25	0.20	0.20	0.15	2 / 11	1.25	0.91
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 10	0.31	0.22
TBT	UG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	--	--	-- / --	--	--
Zinc	MG/KG	271	0 / 11	0.82	0.72	0.59	410	0 / 11	0.54	0.47	0.39	421	290	0 / 11	0.53	0.55

1 - 2000/2002 samples within the area impacted by the MILCON action are not included

2 - The 2009 connector channel mean value for tin is the average of one-half of the detection limits for the 5 samples

Shaded cells indicate HQ or ratio >1

TABLE D-18

Sample-Specific Hazard Quotients - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Depth (in)	Copper (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Lead (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Mercury (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Tin (MG/KG)	HQ-AET	Adj. Tin (MG/KG)	HQ-TEL	HQ-AET	TBT (UG/KG)	HQ-TEL	HQ-AET	Zinc (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM
LW07-SD01-00	6/2/2000	Discrete	Channel	0 - 4	30.9	1.65	0.29	0.91	0.11	19.0	0.63	0.17	0.41	0.09	0.09	0.69	0.13	0.60	0.13	NS	--	NS	--	--	NS	--	--	64.2	0.52	0.24	0.43	0.16
LW07-SD02-00	6/1/2000	Discrete	Pier*	0 - 4	55.2	2.95	0.51	1.62	0.20	48.5	1.61	0.43	1.04	0.22	0.36	2.77	0.51	2.40	0.51	NS	--	NS	--	--	NS	--	--	205	1.65	0.76	1.37	0.50
LW07-SD03-00	6/1/2000	Discrete	Pier*	0 - 4	80.9	4.33	0.75	2.38	0.30	1,810	59.9	16.2	38.8	8.30	0.17	1.31	0.24	1.13	0.24	NS	--	NS	--	--	NS	--	--	284	2.29	1.05	1.89	0.69
LW07-SD04-00	6/1/2000	Discrete	Pier*	0 - 4	87.9	4.70	0.81	2.59	0.33	78.7	2.61	0.70	1.69	0.36	0.30	2.31	0.43	2.00	0.42	NS	--	NS	--	--	NS	--	--	497	4.01	1.83	3.31	1.21
LW07-SD05-00	6/1/2000	Discrete	Pier*	0 - 4	141	7.54	1.31	4.15	0.52	90.3	2.99	0.81	1.93	0.41	0.44	3.38	0.63	2.93	0.62	NS	--	NS	--	--	NS	--	--	532	4.29	1.96	3.55	1.30
LW07-SD05-00P	6/1/2000	Discrete	Pier*	0 - 4	142	7.59	1.31	4.18	0.53	76.9	2.55	0.69	1.65	0.35	0.56	4.31	0.80	3.73	0.79	NS	--	NS	--	--	NS	--	--	534	4.31	1.97	3.56	1.30
LW07-B5-SD201-00-02C	9/27/2002	Discrete	Channel	0 - 4	39.7	2.12	0.37	1.17	0.15	20.2	0.67	0.18	0.43	0.09	0.13	1.00	0.19	0.87	0.18	1.40	0.41	0.0002	0.005	0.0001	NS	--	--	139	1.12	0.51	0.93	0.34
LW07-B5-SD201P-00-02C	9/27/2002	Discrete	Channel	0 - 4	48.9	2.61	0.45	1.44	0.18	27.9	0.92	0.25	0.60	0.13	0.12	0.92	0.17	0.80	0.17	1.30	0.38	0.0002	0.005	0.0001	NS	--	--	149	1.20	0.55	0.99	0.36
LW07-B5-SD202-00-02C	9/27/2002	Composite	Channel	0 - 4	53.5	2.86	0.50	1.57	0.20	28.4	0.94	0.25	0.61	0.13	0.15	1.15	0.21	1.00	0.21	2.10	0.62	0.0004	0.007	0.0001	NS	--	--	174	1.40	0.64	1.16	0.42
LW07-B7-SD201-00-02C	9/27/2002	Discrete	Channel	0 - 4	9.20	0.49	0.09	0.27	0.03	5.70	0.19	0.05	0.12	0.03	0.04	0.31	0.06	0.27	0.06	1.00	0.29	0.0002	0.004	0.0001	NS	--	--	34.8	0.28	0.13	0.23	0.08
LW07-B7-SD202-00-02C	9/27/2002	Composite	Channel	0 - 4	68.7	3.67	0.64	2.02	0.25	37.8	1.25	0.34	0.81	0.17	0.16	1.23	0.23	1.07	0.23	1.60	0.47	0.0003	0.006	0.0001	NS	--	--	223	1.80	0.82	1.49	0.54
LW07-D5-SD201-00-02C	9/27/2002	Discrete	Channel	0 - 4	72.5	3.88	0.67	2.13	0.27	38.1	1.26	0.34	0.82	0.17	0.25	1.92	0.36	1.67	0.35	3.00	0.88	0.0005	0.011	0.0002	NS	--	--	223	1.80	0.82	1.49	0.54
LW07-D5-SD202-00-02C	9/27/2002	Composite	Channel	0 - 4	70.3	3.76	0.65	2.07	0.26	38.5	1.27	0.34	0.82	0.18	0.23	1.77	0.33	1.53	0.32	2.50	0.74	0.0004	0.009	0.0001	NS	--	--	222	1.79	0.82	1.48	0.54
LW07-F3-SD201-00-02C	9/27/2002	Discrete	Channel	0 - 4	42.7	2.28	0.40	1.26	0.16	30.1	1.00	0.27	0.64	0.14	0.12	0.92	0.17	0.80	0.17	1.60	0.47	0.0003	0.006	0.0001	NS	--	--	146	1.18	0.54	0.97	0.36
LW07-F3-SD202-00-02C	9/27/2002	Composite	Channel	0 - 4	55.9	2.99	0.52	1.64	0.21	38.1	1.26	0.34	0.82	0.17	0.19	1.46	0.27	1.27	0.27	1.70	0.50	0.0003	0.006	0.0001	NS	--	--	212	1.71	0.78	1.41	0.52
LW07-F5-SD201-00-02C	9/27/2002	Discrete	Channel	0 - 4	37.6	2.01	0.35	1.11	0.14	36.2	1.20	0.32	0.78	0.17	0.12	0.92	0.17	0.80	0.17	1.80	0.53	0.0003	0.006	0.0001	NS	--	--	142	1.15	0.52	0.95	0.35
LW07-F5-SD202-00-02C	9/27/2002	Composite	Channel	0 - 4	47.7	2.55	0.44	1.40	0.18	32.9	1.09	0.29	0.70	0.15	0.14	1.08	0.20	0.93	0.20	2.30	0.68	0.0004	0.008	0.0001	NS	--	--	162	1.31	0.60	1.08	0.40
LW07-H1-SD201-00-02C	9/27/2002	Discrete	Pier	0 - 4	110	5.88	1.02	3.24	0.41	58.9	1.95	0.53	1.26	0.27	0.46	3.54	0.66	3.07	0.65	6.20	1.82	0.0011	0.022	0.0003	NS	--	--	397	3.20	1.46	2.65	0.97
LW07-H1-SD201P-00-02C	9/27/2002	Discrete	Pier	0 - 4	108	5.78	1.00	3.18	0.40	69.1	2.29	0.62	1.48	0.32	0.33	2.54	0.47	2.20	0.46	5.50	1.62	0.0009	0.019	0.0003	NS	--	--	351	2.83	1.30	2.34	0.86
LW07-H1-SD202-00-02C	9/27/2002	Composite	Pier	0 - 4	134	7.17	1.24	3.94	0.50	70.1	2.32	0.63	1.50	0.32	0.46	3.54	0.66	3.07	0.65	6.70	1.97	0.0011	0.024	0.0003	NS	--	--	445	3.59	1.64	2.97	1.09
LW07-H3-SD201-00-02C	9/27/2002	Discrete	Cove	0 - 4	78.7	4.21	0.73	2.31	0.29	56.9	1.88	0.51	1.22	0.26	0.27	2.08	0.39	1.80	0.38	2.40	0.71	0.0004	0.009	0.0001	NS	--	--	299	2.41	1.10	1.99	0.73
LW07-H3-SD201P-00-02C	9/27/2002	Discrete	Cove	0 - 4	90.0	4.81	0.83	2.65	0.33	53.5	1.77	0.48	1.15	0.25	0.27	2.08	0.39	1.80	0.38	2.50	0.74	0.0004	0.009	0.0001	NS	--	--	328	2.65	1.21	2.19	0.80
LW07-H3-SD202-00-02C	9/27/2002	Composite	Cove	0 - 4	83.5	4.47	0.77	2.46	0.31	50.8	1.68	0.45	1.09	0.23	0.76	5.85	1.09	5.07	1.07	2.10	0.62	0.0004	0.007	0.0001	NS	--	--	310	2.50	1.14	2.07	0.76
LW07-H5-SD201-00-02C	9/26/2002	Discrete	Pier*	0 - 4	35.2	1.88	0.33	1.04	0.13	56.4	1.87	0.50	1.21	0.26	0.05	0.38	0.07	0.33	0.07	1.60	0.47	0.0003	0.006	0.0001	NS	--	--	157	1.27	0.58	1.05	0.38
LW07-H5-SD202-00-02C	9/26/2002	Composite	Pier*	0 - 4	21.6	1.16	0.20	0.64	0.08	63.1	2.09	0.56	1.35	0.29	0.14	1.08	0.20	0.93	0.20	1.50	0.44	0.0003	0.005	0.0001	NS	--	--	97.0	0.78	0.36	0.65	0.24
LW07-J4-SD201-00-02C	9/28/2002	Discrete	Cove	0 - 4	65.7	3.51	0.61	1.93	0.24	50.7	1.68	0.45	1.09	0.23	0.66	5.08	0.94	4.40	0.93	4.80	1.41	0.0008	0.017	0.0002	NS	--	--	308	2.48	1.14	2.05	0.75
LW07-J4-SD202-00-02C	9/28/2002	Composite	Cove	0 - 4	55.0	2.94	0.51	1.62	0.20	46.9	1.55	0.42	1.00	0.22	0.24	1.85	0.34	1.60	0.34	6.60	1.94	0.0011	0.023	0.0003	NS	--	--	299	2.41	1.10	1.99	0.73
LW07-K1-SD201-00-02C	9/27/2002	Discrete	Pier	0 - 4	118	6.31	1.09	3.47	0.44	65.2	2.16	0.58	1.40	0.30	0.30	2.31	0.43	2.00	0.42	2.80	0.82	0.0005	0.010	0.0001	NS	--	--	415	3.35	1.53	2.77	1.01
LW07-K1-SD202-00-02C	9/27/2002	Composite	Pier	0 - 4	102	5.45	0.94	3.00	0.38	67.6	2.24	0.60	1.45	0.31	0.31	2.38	0.44	2.07	0.44	2.60	0.76	0.0004	0.009	0.0001	NS	--	--	383	3.09	1.41	2.55	0.93
LW07-K3-SD201-00-02C	9/28/2002	Discrete	Cove	0 - 4	65.0	3.48	0.60	1.91	0.24	255	8.44	2.28	5.46	1.17	0.15	1.15	0.21	1.00	0.21	5.80	1.71	0.0010	0.021	0.0003	NS	--	--	402	3.24	1.48	2.68	0.98
LW07-K3-SD202-00-02C	9/28/2002	Composite	Cove	0 - 4	63.2	3.38	0.59	1.86	0.23	40.1	1.33	0.36	0.86	0.18	0.25	1.92	0.36	1.67	0.35	5.20	1.53	0.0009	0.018	0.0003	NS	--	--	283	2.28	1.04	1.89	0.69
LW07-K4-SD201-00-02C	9/28/2002	Discrete	Cove	0 - 4	70.1	3.75	0.65	2.06	0.26	152	5.03	1.36	3.25	0.70	0.19	1.46	0.27	1.27	0.27	9.40	2.76	0.0016	0.033	0.0005	NS	--	--	303	2.44	1.12	2.02	0.74
LW07-K4-SD202-00-02C	9/28/2002	Composite	Cove	0 - 4	58.6	3.13	0.54	1.72	0.22	49.5	1.64	0.44	1.06	0.23	0.19	1.46	0.27	1.27	0.27	5.00	1.47	0.0009	0.018	0.0003	NS	--	--	299	2.41	1.10	1.99	0.73
LW07-K5-SD201-00-02C	9/28/2002	Discrete	Cove	0 - 4	90.0	4.81	0.83	2.65	0.33	51.1	1.69	0.46	1.09	0.23	0.29	2.23	0.41	1.93	0.41	6.60	1.94	0.0011	0.023	0.0003	NS	--	--	336	2.71	1.24	2.24	0.82
LW07-K5-SD202-00-02C	9/28/2002	Composite	Cove	0 - 4	103	5.51	0.95	3.03	0.38	59.3	1.96	0.53	1.27	0.27	0.33	2.54	0.47	2.20	0.46	8.80	2.59	0.0015	0.031	0.0004	NS	--	--	305	2.46	1.13	2.03	0.74
LW07-K6-SD201-00-02C	9/28/2002	Discrete	Pier*	0 - 4	24.5	1.31	0.23	0.72	0.09	14.0	0.46	0.13	0.30	0.06	0.07	0.54	0.10	0.47	0.10	3.20	0.94	0.0005	0.011	0.0002	NS	--	--	75.9	0.61	0.28	0.51	0.19
LW07-K6-SD202-00-02C	9/28/2002	Composite	Pier*	0 - 4	19.4	1.04	0.18	0.57	0.07	12.7	0.42	0.11	0.27	0.06	0.08	0.62	0.11	0.53	0.11	3.30	0.97	0.0006	0.012	0.0002	NS	--	--	73.1	0.59	0.27	0.49	0.18
LW07-L2-SD201-00-02C	10/1/2002	Discrete	Cove	0 - 4	117	6.26	1.08	3.44	0.43	83.9	2.78	0.75	1.80	0.38	0.43	3.31	0.61	2.87	0.61	7.10	2.09	0.0012	0.025	0.0004	NS	--	--	491	3.96	1.81	3.27	1.20
LW07-L5-SD201-00-02C	9/28/2002	Discrete	Pier	0 - 4	90.1	4.82	0.83	2.65	0.33	69.8	2.31	0.62	1.49	0.32	0.41	3.15	0.59	2.73	0.58	5.60	1.65	0.0010	0.020	0.0003	NS	--	--	362	2.92	1.34	2.41	0.88
LW07-L5-SD202-00-02C	9/28/2002	Composite	Pier	0 - 4	104	5.56	0.96	3.06	0.39	143	4.74	1.28	3.06	0.66	4.10	31.5	5.86	27.3	5.77	6.00	1.76	0.0010	0.021	0.0003	NS	--	--	419	3.38	1.55	2.79	1.02
LW07-L6-SD201-00-02C	10/1/2002	Discrete	Pier*	0 - 4	87.0	4.65	0.81	2.56	0.32	60.0	1.99	0.54	1.28	0.28	0.29	2.23	0.41	1.93	0.41	5.40	1.59	0.0009	0.019	0.0003	NS	--	--	354	2.85	1.31	2.36	0.86
LW07-M1-SD201-00-02C	9/27/2002	Discrete	Pier	0 - 4	109	5.83	1.01	3.21	0.40	177	5.86	1.58	3.79	0.81	0.33	2.54	0.47	2.20	0.46	6.60	1.94	0.0011	0.023	0.0003	NS	--	--	628	5.06	2.32	4.19	1.53
LW07-M1-SD202-00-02C	9/27/2002	Composite	Pier	0 - 4	88.0	4.71	0.81	2.59	0.33	143	4.74	1.28	3.06	0.66	0.56	4.31	0.80	3.73	0.79	5.10	1.50	0.0009	0.018	0.0003	NS	--	--	449	3.62	1.66	2.99	1.10
LW07-M3-SD201-00-02C	9/28/2002	Discrete	Pier*	0 - 4	121	6.47	1.12	3.56	0.45	107	3.54	0.96	2.29	0.49	0.45	3.46	0.64	3.00	0.63	14.5	4.26	0.0025	0.051	0.0007	NS	--	--	1,360	11.0	5.02	9.07	3.32
LW07-M3-SD202-00-02C	9/28/2002	Composite	Pier*	0 - 4	124	6.63	1.15	3.65	0.46	110	3.64	0.98	2.36	0.50	0.36	2.77	0.51	2.40	0.51	9.10	2.68	0.0015	0.032	0.0005	NS	--	--	767	6.19	2.83	5.11	1.87
LW07-B5-SD301-00-09D	11/24/2009	Discrete	Channel	0 - 4	49.2	2.63	0.46	1.45	0.18	27.3	0.90	0.24	0.58	0.13	0.12	0.94	0.17	0.81	0.17	5.06	1.49	0.0009	0.018	0.0003	4.30	0.09	0.001	160	1.29	0.59	1.07	0.39
LW07-B5-SD301P-00-09D	11/24/2009	Discrete	Channel	0 - 4	70.1	3.75	0.65	2.06	0.26	22.6	0.75	0.20	0.48	0.10	0.12	0.92	0.17	0.79	0.17	4.07	1.20	0.0007	0.014	0.0002	3.50	0.07	0.001	156	1.26	0.58	1.04	0.38
LW07-B7-SD301-00-09D	11/24/2009	Discrete	Channel	0 - 4	70.2	3.75	0.65	2.06	0.26	34.2	1.13	0.31	0.73	0.16	0.10	0.79	0.15	0.69	0.15	4.88	1.44	0.0008	0.017	0.0002	NS	--	--	206	1.66	0.76	1.37	0.50
LW07-D5-SD301-00-09D	11/24/2009	Discrete	Channel	0 - 4	70.7	3.78	0.65	2.08	0.26	36.6	1.21	0.33	0.78	0.17	0.24	1.82	0.34	1.57	0.33	6.27	1.84	0.0011	0.022	0.0003	NS	--	--	241	1.94	0.89	1.61	0.59
LW07-F3-SD301-00-09D	11/24/2009	Discrete	Channel	0 - 4	71.1	3.80	0.66	2.09	0.26	50.4	1.67	0.45	1.08	0.23	0.23	1.76	0.33	1.53	0.32	5.72	1.68	0.0010	0.020	0.0003	NS	--	--	277	2.23	1.02	1.85	0.68
LW07-F5-SD301-00-09D	11/24/2009	Discrete	Channel	0 - 4	19.8	1.06	0.18	0.58	0.07	18.6	0.62	0.17	0.40	0.09	0.06	0.45	0.08	0.39	0.08	4.00	1.18	0.0007	0.014	0.0002	NS	--	--	85.4	0.69	0.32	0.57	0.21
LW07-H1-SD301-00-09D	11/24/2009	Discrete	Pier	0 - 4	51.7	2.76	0.48	1.52	0.19	70.3	2.33	0.63	1.51	0.32	0.13	0.99	0.18	0.86	0.18	8.67	2.55	0.0015	0.031	0.0004	5.80	0.12	0.002	943	7.60	3.48	6.29	2.30
LW07-H3-SD301-00-09D	11/24/2009	Discrete	Cove	0 - 4	87.8	4.70	0.81	2.58	0.33	57.9	1.92	0.52	1.24	0.27	0.26	2.01	0.37	1.74	0.37	6.38	1.88	0.0011	0.023	0.0003	3.40	0.07	0.001	343	2.77	1.27	2.29	0.84
LW07-J4-SD301-00-09D	11/24/2009	Discrete	Cove	0 - 4	101	5.40	0.94	2.97	0.37	53.4	1.77	0.48	1.14	0.24	0.32	2.42	0.45	2.10	0.44	7.50	2.21	0.0013	0.027	0.0004	NS	--	--	366	2.95	1.35	2.44	0.89
LW07-K1-SD301-00-09D	11/24/2009	Discrete	Pier	0 - 4	101	5.40	0.94	2.97	0.37	72.1	2.39	0.64	1.54	0.33	0.36	2.77	0.51	2.40	0.51	7.81	2.30	0.0013	0.028	0.0004	3.60	0.08	0.001	461	3.72	1.70	3.07	1.12
LW07-K1-SD302-00-09D	11/24/2009	Discrete	Pier	0 - 4	110	5.88	1.02	3.24	0.41	80.7	2.67	0.72	1.73	0.37	0.38	2.95	0.55	2.55	0.54	10.8	3.18	0.0018	0.038	0.0005	5.20	0.11	0.002	540	4.35	1.99	3.60	1.32

TABLE D-18

Sample-Specific Hazard Quotients - SWMU 7b Surface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Depth (in)	Copper (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Lead (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Mercury (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Tin (MG/KG)	HQ-AET	Adj. Tin (MG/KG)	HQ-TEL	HQ-AET	TBT (UG/KG)	HQ-TEL	HQ-AET	Zinc (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM
LW07-K1-SD303-00-09D	11/24/2009	Discrete	Pier	0 - 4	114	6.10	1.06	3.35	0.42	72.6	2.40	0.65	1.55	0.33	0.35	2.71	0.50	2.35	0.50	8.34	2.45	0.0014	0.030	0.0004	4.80	0.10	0.001	479	3.86	1.77	3.19	1.17
LW07-K1-SD304-00-09D	11/24/2009	Discrete	Pier	0 - 4	121	6.47	1.12	3.56	0.45	61.2	2.03	0.55	1.31	0.28	0.31	2.39	0.44	2.07	0.44	7.40	2.18	0.0013	0.026	0.0004	5.60	0.12	0.002	449	3.62	1.66	2.99	1.10
LW07-K3-SD301-00-09D	11/24/2009	Discrete	Cove	0 - 4	70.4	3.76	0.65	2.07	0.26	76.4	2.53	0.68	1.64	0.35	0.24	1.88	0.35	1.63	0.34	10.1	2.97	0.0017	0.036	0.0005	NS	--	--	321	2.59	1.18	2.14	0.78
LW07-K4-SD301-00-09D	11/23/2009	Discrete	Cove	0 - 4	65.2	3.49	0.60	1.92	0.24	42.1	1.39	0.38	0.90	0.19	0.24	1.82	0.34	1.57	0.33	5.78	1.70	0.0010	0.020	0.0003	NS	--	--	304	2.45	1.12	2.03	0.74
LW07-K5-SD301-00-09D	11/23/2009	Discrete	Cove	0 - 4	91.3	4.88	0.85	2.69	0.34	48.5	1.61	0.43	1.04	0.22	0.38	2.93	0.54	2.54	0.54	7.21	2.12	0.0012	0.026	0.0004	NS	--	--	381	3.07	1.41	2.54	0.93
LW07-L2-SD301-00-09D	11/24/2009	Discrete	Cove	0 - 4	84.6	4.52	0.78	2.49	0.31	44.4	1.47	0.40	0.95	0.20	0.21	1.65	0.31	1.43	0.30	12.5	3.68	0.0021	0.044	0.0006	NS	--	--	466	3.76	1.72	3.11	1.14
LW07-L2-SD301P-00-09D	11/24/2009	Discrete	Cove	0 - 4	101	5.40	0.94	2.97	0.37	58.4	1.93	0.52	1.25	0.27	0.17	1.32	0.25	1.15	0.24	14.8	4.35	0.0025	0.052	0.0007	NS	--	--	432	3.48	1.59	2.88	1.05
LW07-L5-SD301-00-09D	11/23/2009	Discrete	Pier	0 - 4	94.6	5.06	0.88	2.78	0.35	55.3	1.83	0.49	1.18	0.25	0.31	2.38	0.44	2.06	0.44	8.40	2.47	0.0014	0.030	0.0004	4.80	0.10	0.001	401	3.23	1.48	2.67	0.98
LW07-M1-SD301-00-09D	11/24/2009	Discrete	Pier	0 - 4	136	7.27	1.26	4.00	0.50	233	7.72	2.08	4.99	1.07	0.50	3.87	0.72	3.35	0.71	22.8	6.71	0.0039	0.081	0.0011	5.20	0.11	0.002	794	6.40	2.93	5.29	1.94
LW07-M1-SD302-00-09D	11/24/2009	Discrete	Pier	0 - 4	69.4	3.71	0.64	2.04	0.26	98.6	3.26	0.88	2.11	0.45	0.18	1.39	0.26	1.21	0.25	12.7	3.74	0.0022	0.045	0.0006	2.00	0.04	0.001	349	2.81	1.29	2.33	0.85
LW07-M1-SD303-00-09D	11/24/2009	Discrete	Pier	0 - 4	110	5.88	1.02	3.24	0.41	97.8	3.24	0.87	2.09	0.45	0.53	4.11	0.76	3.56	0.75	11.7	3.44	0.0020	0.041	0.0006	7.60	0.16	0.002	504	4.06	1.86	3.36	1.23
LW07-M1-SD304-00-09D	11/24/2009	Discrete	Pier	0 - 4	170	9.09	1.57	5.00	0.63	131	4.34	1.17	2.81	0.60	0.63	4.85	0.90	4.20	0.89	29.9	8.79	0.0051	0.106	0.0015	3.30	0.07	0.001	840	6.77	3.10	5.60	2.05
LW07-SD301-00-09D	11/23/2009	Discrete	Pier	0 - 4	252	13.5	2.33	7.41	0.93	526	17.4	4.70	11.3	2.41	0.34	2.64	0.49	2.29	0.48	29.7	8.74	0.0050	0.105	0.0015	5.60	0.12	0.002	1,170	9.44	4.32	7.80	2.85
LW07-SD301P-00-09D	11/23/2009	Discrete	Pier	0 - 4	187	10.0	1.73	5.50	0.69	587	19.4	5.24	12.6	2.69	1.77	13.6	2.53	11.8	2.49	23.9	7.03	0.0041	0.085	0.0012	3.40	0.07	0.001	1,440	11.6	5.31	9.60	3.51
LW07-SD302-00-09D	11/23/2009	Discrete	Pier	0 - 4	61.5	3.29	0.57	1.81	0.23	48.6	1.61	0.43	1.04	0.22	0.30	2.34	0.43	2.03	0.43	6.84	2.01	0.0012	0.024	0.0003	NS	--	--	252	2.03	0.93	1.68	0.61
LW07-SD303-00-09D	11/23/2009	Discrete	Pier	0 - 4	30.7	1.64	0.28	0.90	0.11	20.8	0.69	0.19	0.45	0.10	0.08	0.65	0.12	0.56	0.12	4.60	1.35	0.0008	0.016	0.0002	NS	--	--	143	1.15	0.53	0.95	0.35
LW07-SD304-00-09D	11/23/2009	Discrete	Pier	0 - 4	60.6	3.24	0.56	1.78	0.22	40.8	1.35	0.36	0.87	0.19	0.20	1.54	0.29	1.33	0.28	5.90	1.74	0.0010	0.021	0.0003	NS	--	--	319	2.57	1.18	2.13	0.78
LW07-SD305-00-09D	11/23/2009	Discrete	Pier	0 - 4	107	5.72	0.99	3.15	0.40	65.7	2.18	0.59	1.41	0.30	0.29	2.26	0.42	1.96	0.41	8.69	2.56	0.0015	0.031	0.0004	NS	--	--	659	5.31	2.43	4.39	1.61
LW07-SD306-00-09D	11/23/2009	Discrete	Pier	0 - 4	58.2	3.11	0.54	1.71	0.22	44.9	1.49	0.40	0.96	0.21	0.13	1.03	0.19	0.89	0.19	6.38	1.88	0.0011	0.023	0.0003	NS	--	--	218	1.76	0.80	1.45	0.53
LW07-SD307-00-09D	11/23/2009	Discrete	Pier	0 - 4	34.7	1.86	0.32	1.02	0.13	44.6	1.48	0.40	0.96	0.20	0.07	0.56	0.10	0.48	0.10	3.90	1.15	0.0007	0.014	0.0002	NS	--	--	205	1.65	0.76	1.37	0.50
LW07-B5-SD401-00-10C	9/12/2010	Discrete	Channel	0 - 4	43.7	2.34	0.40	1.29	0.16	21.5	0.71	0.19	0.46	0.10	0.13	0.97	0.18	0.84	0.18	3.72	1.09	0.0006	0.013	0.0002	NS	--	--	173	1.40	0.64	1.15	0.42
LW07-B5-SD401P-00-10C	9/12/2010	Discrete	Channel	0 - 4	36.9	1.97	0.34	1.09	0.14	18.0	0.60	0.16	0.39	0.08	0.16	1.22	0.23	1.06	0.22	3.33	0.98	0.0006	0.012	0.0002	NS	--	--	141	1.14	0.52	0.94	0.34
LW07-B7-SD401-00-10C	9/12/2010	Discrete	Channel	0 - 4	45.8	2.45	0.42	1.35	0.17	24.8	0.82	0.22	0.53	0.11	0.13	0.96	0.18	0.83	0.18	3.61	1.06	0.0006	0.013	0.0002	NS	--	--	190	1.53	0.70	1.27	0.46
LW07-D5-SD401-00-10C	9/11/2010	Discrete	Channel	0 - 4	82.4	4.41	0.76	2.42	0.31	40.7	1.35	0.36	0.87	0.19	0.27	2.05	0.38	1.78	0.38	5.64	1.66	0.0010	0.020	0.0003	NS	--	--	283	2.28	1.04	1.89	0.69
LW07-F3-SD401-00-10C	9/11/2010	Discrete	Channel	0 - 4	59.0	3.16	0.55	1.74	0.22	45.6	1.51	0.41	0.98	0.21	0.35	2.67	0.50	2.31	0.49	3.69	1.09	0.0006	0.013	0.0002	NS	--	--	246	1.98	0.91	1.64	0.60
LW07-F5-SD401-00-10C	9/12/2010	Discrete	Channel	0 - 4	24.7	1.32	0.23	0.73	0.09	14.9	0.49	0.13	0.32	0.07	0.05	0.36	0.07	0.31	0.07	2.50	0.74	0.0004	0.009	0.0001	NS	--	--	92.7	0.75	0.34	0.62	0.23
LW07-H1-SD401-00-10C	9/10/2010	Discrete	Pier	0 - 4	166	8.88	1.54	4.88	0.61	62.0	2.05	0.55	1.33	0.28	0.32	2.49	0.46	2.16	0.46	7.04	2.07	0.0012	0.025	0.0004	NS	--	--	491	3.96	1.81	3.27	1.20
LW07-H3-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	84.8	4.53	0.79	2.49	0.31	52.6	1.74	0.47	1.13	0.24	0.28	2.15	0.40	1.87	0.39	5.53	1.63	0.0009	0.020	0.0003	NS	--	--	366	2.95	1.35	2.44	0.89
LW07-J4-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	86.3	4.61	0.80	2.54	0.32	131	4.34	1.17	2.81	0.60	0.27	2.08	0.39	1.81	0.38	5.43	1.60	0.0009	0.019	0.0003	NS	--	--	479	3.86	1.77	3.19	1.17
LW07-K1-SD401-00-10C	9/10/2010	Discrete	Pier	0 - 4	111	5.94	1.03	3.26	0.41	67.0	2.22	0.60	1.43	0.31	0.37	2.82	0.52	2.44	0.52	6.72	1.98	0.0011	0.024	0.0003	NS	--	--	450	3.63	1.66	3.00	1.10
LW07-K3-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	96.1	5.14	0.89	2.83	0.36	88.6	2.93	0.79	1.90	0.41	0.43	3.28	0.61	2.84	0.60	10.7	3.15	0.0018	0.038	0.0005	NS	--	--	615	4.96	2.27	4.10	1.50
LW07-K4-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	75.4	4.03	0.70	2.22	0.28	52.6	1.74	0.47	1.13	0.24	0.19	1.47	0.27	1.27	0.27	8.39	2.47	0.0014	0.030	0.0004	NS	--	--	974	7.85	3.59	6.49	2.38
LW07-K5-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	93.9	5.02	0.87	2.76	0.35	109	3.61	0.97	2.33	0.50	0.27	2.08	0.39	1.81	0.38	5.59	1.64	0.0010	0.020	0.0003	NS	--	--	401	3.23	1.48	2.67	0.98
LW07-L2-SD401-00-10C	9/11/2010	Discrete	Cove	0 - 4	78.7	4.21	0.73	2.31	0.29	37.4	1.24	0.33	0.80	0.17	0.23	1.80	0.33	1.56	0.33	13.6	4.00	0.0023	0.048	0.0007	NS	--	--	294	2.37	1.08	1.96	0.72
LW07-L5-SD401-00-10C	9/11/2010	Discrete	Pier	0 - 4	98.7	5.28	0.91	2.90	0.37	63.1	2.09	0.56	1.35	0.29	0.27	2.05	0.38	1.77	0.37	6.68	1.96	0.0011	0.024	0.0003	NS	--	--	396	3.19	1.46	2.64	0.97
LW07-M1-SD401-00-10C	9/10/2010	Discrete	Pier	0 - 4	127	6.79	1.18	3.74	0.47	236	7.81	2.11	5.05	1.08	1.21	9.31	1.73	8.07	1.70	10.3	3.03	0.0018	0.036	0.0005	NS	--	--	711	5.73	2.62	4.74	1.73
LW07-SD401-00-10C	9/11/2010	Discrete	Pier	0 - 4	72.5	3.88	0.67	2.13	0.27	43.2	1.43	0.39	0.93	0.20	0.22	1.68	0.31	1.45	0.31	5.81	1.71	0.0010	0.021	0.0003	NS	--	--	279	2.25	1.03	1.86	0.68
LW07-SD402-00-10C	9/11/2010	Discrete	Pier	0 - 4	55.1	2.95	0.51	1.62	0.20	35.2	1.17	0.31	0.75	0.16	0.14	1.05	0.20	0.91	0.19	7.77	2.29	0.0013	0.028	0.0004	NS	--	--	294	2.37	1.08	1.96	0.72
LW07-SD402P-00-10C	9/11/2010	Discrete	Pier	0 - 4	49.0	2.62	0.45	1.44	0.18	50.5	1.67	0.45	1.08	0.23	0.16	1.25	0.23	1.08	0.23	4.86	1.43	0.0008	0.017	0.0002	NS	--	--	227	1.83	0.84	1.51	0.55
LW07-SD403-00-10C	9/11/2010	Discrete	Pier	0 - 4	157	8.40	1.45	4.62	0.58	211	6.99	1.88	4.52	0.97	0.37	2.87	0.53	2.49	0.53	19.7	5.79	0.0033	0.070	0.0010	NS	--	--	987	7.96	3.64	6.58	2.41
LW07-SD404-00-10C	9/10/2010	Discrete	Pier	0 - 4	52.6	2.81	0.49	1.55	0.19	53.1	1.76	0.47	1.14	0.24	0.19	1.45	0.27	1.25	0.26	12.2	3.59	0.0021	0.043	0.0006	NS	--	--	296	2.39	1.09	1.97	0.72

Shaded samples are field duplicates

Shaded cells = detects

Unshaded cells = U or B (at full DL)

NS - Not Sampled

* - Sample location impacted by the 2008 MILCON action

	ER-L	ER-M	TEL	PEL
Copper	34.0	270	18.7	108
Lead	46.7	218	30.2	112
Mercury	0.15	0.71	0.13	0.70
Tin	3.40	--	0.048	--
Zinc	150	410	124	271

HQ ≤ 1	
HQ 1-5	
HQ 5-10	
HQ 10-25	
HQ >25	

TABLE D-19

Total Tin/TBT Ratios

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Tin (MG/KG)	TBT (UG/KG)	TBT (MG/KG)	Ratio TBT to Total Tin
Surface Sediment (0-4 inches)							
LW07-B5-SD301-00-09D	11/24/2009	Discrete	Channel	5.06	4.30	0.0043	
LW07-B5-SD301P-00-09D	11/24/2009	Discrete	Channel	4.07	3.50	0.0035	
Average of duplicates				4.57	3.90	0.0039	0.00085
LW07-H3-SD301-00-09D	11/24/2009	Discrete	Cove	6.38	3.40	0.0034	0.00053
LW07-H1-SD301-00-09D	11/24/2009	Discrete	Pier	8.67	5.80	0.0058	0.00067
LW07-K1-SD301-00-09D	11/24/2009	Discrete	Pier	7.81	3.60	0.0036	0.00046
LW07-K1-SD302-00-09D	11/24/2009	Discrete	Pier	10.8	5.20	0.0052	0.00048
LW07-K1-SD303-00-09D	11/24/2009	Discrete	Pier	8.34	4.80	0.0048	0.00058
LW07-K1-SD304-00-09D	11/24/2009	Discrete	Pier	7.40	5.60	0.0056	0.00076
LW07-L5-SD301-00-09D	11/23/2009	Discrete	Pier	8.40	4.80	0.0048	0.00057
LW07-M1-SD301-00-09D	11/24/2009	Discrete	Pier	22.8	5.20	0.0052	0.00023
LW07-M1-SD302-00-09D	11/24/2009	Discrete	Pier	12.7	2.00	0.0020	0.00016
LW07-M1-SD303-00-09D	11/24/2009	Discrete	Pier	11.7	7.60	0.0076	0.00065
LW07-M1-SD304-00-09D	11/24/2009	Discrete	Pier	29.9	3.30	0.0033	0.00011
LW07-SD301-00-09D	11/23/2009	Discrete	Pier	29.7	5.60	0.0056	
LW07-SD301P-00-09D	11/23/2009	Discrete	Pier	23.9	3.40	0.0034	
Average of duplicates				26.8	4.50	0.0045	0.00017
Average ratio (all data)							0.00048
Average ratio (detects only)							0.00017

Shaded cells = detects
Unshaded cells = B (at full value)

TABLE D-20

Summary Statistics - SWMU 7b Subsurface Sediment

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	95% UCL (Norm)	Arithmetic Mean	Standard Deviation of Mean	TEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-L or AET	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
2002 Samples[1]																			
Copper	MG/KG	-- - --	15 / 15	3.50	220	LW07-M1-SD201-02-02C	60.7	34.3	57.9	18.7	5 / 15	11.8	3.24	1.84	34.0	3 / 15	6.47	1.78	1.01
Lead	MG/KG	-- - --	15 / 15	1.60	139	LW07-M1-SD201-02-02C	46.6	28.3	40.3	30.2	3 / 15	4.60	1.54	0.94	46.7	3 / 15	2.98	1.00	0.61
Mercury	MG/KG	0.06 - 0.12	11 / 15	0.040	1.50	LW07-M1-SD201-02-02C	0.39	0.21	0.38	0.13	4 / 15	11.5	2.97	1.65	0.15	4 / 15	10.0	2.57	1.43
Tin	MG/KG	1.00 - 1.80	11 / 15	1.40	23.5	LW07-M1-SD201-02-02C	6.04	3.45	5.71	--	-- / --	--	--	--	3.40	3 / 15	6.91	1.78	1.01
Zinc	MG/KG	1.30 - 1.30	14 / 15	21.6	1,390	LW07-M1-SD201-02-02C	340	178	356	124	4 / 15	11.2	2.74	1.44	150	3 / 15	9.27	2.27	1.19
2002 Samples in MILCON-Impacted Area																			
Copper	MG/KG	-- - --	4 / 4	20.3	145	LW07-M3-SD201-02-02C	162	93.0	58.4	18.7	4 / 4	7.75	8.64	4.97	34.0	3 / 4	4.26	4.75	2.73
Lead	MG/KG	-- - --	4 / 4	19.3	156	LW07-M3-SD201-02-02C	170	98.9	60.8	30.2	3 / 4	5.17	5.64	3.27	46.7	3 / 4	3.34	3.65	2.12
Mercury	MG/KG	-- - --	4 / 4	0.090	1.10	LW07-K6-SD201-02-02C	1.19	0.60	0.51	0.13	3 / 4	8.46	9.18	4.60	0.15	3 / 4	7.33	7.96	3.98
Tin	MG/KG	1.30 - 1.30	3 / 4	1.70	16.7	LW07-M3-SD201-02-02C	15.1	6.51	7.34	--	-- / --	--	--	--	3.40	2 / 4	4.91	4.46	1.92
Zinc	MG/KG	-- - --	4 / 4	81.4	828	LW07-M3-SD201-02-02C	863	485	321	124	3 / 4	6.68	6.96	3.91	150	3 / 4	5.52	5.76	3.23
Pier - 2002 Samples[1]																			
Copper	MG/KG	-- - --	4 / 4	7.70	220	LW07-M1-SD201-02-02C	204	85.2	101	18.7	2 / 4	11.8	10.9	4.56	34.0	2 / 4	6.47	6.00	2.51
Lead	MG/KG	-- - --	4 / 4	6.80	139	LW07-M1-SD201-02-02C	144	64.7	67.2	30.2	2 / 4	4.60	4.76	2.14	46.7	2 / 4	2.98	3.08	1.38
Mercury	MG/KG	-- - --	4 / 4	0.060	1.50	LW07-M1-SD201-02-02C	1.31	0.52	0.67	0.13	2 / 4	11.5	10.1	4.00	0.15	2 / 4	10.0	8.75	3.47
Tin	MG/KG	1.80 - 1.80	3 / 4	1.40	23.5	LW07-M1-SD201-02-02C	20.0	7.10	11.0	--	-- / --	--	--	--	3.40	1 / 4	6.91	5.88	2.09
Zinc	MG/KG	-- - --	4 / 4	21.6	1,390	LW07-M1-SD201-02-02C	1,213	455	644	124	2 / 4	11.2	9.79	3.67	150	2 / 4	9.27	8.09	3.03
Cove - 2002 Samples																			
Copper	MG/KG	-- - --	6 / 6	7.50	54.7	LW07-L2-SD201-02-02C	33.8	18.7	18.3	18.7	2 / 6	2.93	1.81	1.00	34.0	1 / 6	1.61	0.99	0.55
Lead	MG/KG	-- - --	6 / 6	8.70	52.7	LW07-L2-SD201-02-02C	33.7	19.3	17.4	30.2	1 / 6	1.75	1.12	0.64	46.7	1 / 6	1.13	0.72	0.41
Mercury	MG/KG	0.06 - 0.12	4 / 6	0.050	0.28	LW07-L2-SD201-02-02C	0.18	0.10	0.092	0.13	1 / 6	2.15	1.36	0.78	0.15	1 / 6	1.87	1.18	0.68
Tin	MG/KG	1.00 - 1.40	4 / 6	2.00	5.60	LW07-L2-SD201-02-02C	4.14	2.57	1.92	--	-- / --	--	--	--	3.40	2 / 6	1.65	1.22	0.75
Zinc	MG/KG	-- - --	6 / 6	29.3	382	LW07-L2-SD201-02-02C	217	103	138	124	1 / 6	3.08	1.75	0.83	150	1 / 6	2.55	1.45	0.69
Channel - 2002 Samples																			
Copper	MG/KG	-- - --	5 / 5	3.50	31.9	LW07-F3-SD201-02-02C	23.0	12.4	11.2	18.7	1 / 5	1.71	1.23	0.66	34.0	0 / 5	0.94	0.68	0.36
Lead	MG/KG	-- - --	5 / 5	1.60	20.1	LW07-F3-SD201-02-02C	16.4	9.92	6.74	30.2	0 / 5	0.67	0.54	0.33	46.7	0 / 5	0.43	0.35	0.21
Mercury	MG/KG	0.09 - 0.11	3 / 5	0.040	0.35	LW07-F3-SD201-02-02C	0.24	0.11	0.14	0.13	1 / 5	2.69	1.82	0.82	0.15	1 / 5	2.33	1.57	0.71
Tin	MG/KG	1.10 - 1.10	4 / 5	1.40	2.30	LW07-B5-SD201-02-02C	2.26	1.59	0.71	--	-- / --	--	--	--	3.40	0 / 5	0.68	0.67	0.47
Zinc	MG/KG	1.30 - 1.30	4 / 5	31.9	127	LW07-F3-SD201-02-02C	92.1	46.9	47.5	124	1 / 5	1.02	0.74	0.38	150	0 / 5	0.85	0.61	0.31

1 - Samples within the area impacted by the MILCON action are not included

Shaded cells indicate HQ or ratio >1

TABLE D-20

Summary Statistics - SWMU 7b Subsurface Sediment

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Chemical	Units	PEL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	ER-M	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background	Mean Background	Frequency of Exceedance	Maximum Ratio	Mean Ratio
2002 Samples[1]																
Copper	MG/KG	108	1 / 15	2.04	0.56	0.32	270	0 / 15	0.81	0.22	0.13	184	155	1 / 15	1.20	0.22
Lead	MG/KG	112	1 / 15	1.24	0.42	0.25	218	0 / 15	0.64	0.21	0.13	67.6	45.2	2 / 15	2.06	0.63
Mercury	MG/KG	0.70	1 / 15	2.14	0.55	0.31	0.71	1 / 15	2.11	0.54	0.30	0.20	0.15	4 / 15	7.50	1.39
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	1 / 15	2.40	0.40
Zinc	MG/KG	271	3 / 15	5.13	1.26	0.66	410	1 / 15	3.39	0.83	0.43	421	290	1 / 15	3.30	0.62
2002 Samples in MILCON-Impacted Area																
Copper	MG/KG	108	2 / 4	1.34	1.50	0.86	270	0 / 4	0.54	0.60	0.34	184	155	0 / 4	0.79	0.60
Lead	MG/KG	112	2 / 4	1.39	1.52	0.88	218	0 / 4	0.72	0.78	0.45	67.6	45.2	3 / 4	2.31	2.19
Mercury	MG/KG	0.70	2 / 4	1.57	1.70	0.85	0.71	2 / 4	1.55	1.68	0.84	0.20	0.15	3 / 4	5.50	3.86
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	1 / 4	1.70	0.76
Zinc	MG/KG	271	3 / 4	3.06	3.19	1.79	410	2 / 4	2.02	2.11	1.18	421	290	2 / 4	1.97	1.67
Pier - 2002 Samples[1]																
Copper	MG/KG	108	1 / 4	2.04	1.89	0.79	270	0 / 4	0.81	0.76	0.32	184	155	1 / 4	1.20	0.55
Lead	MG/KG	112	1 / 4	1.24	1.28	0.58	218	0 / 4	0.64	0.66	0.30	67.6	45.2	2 / 4	2.06	1.43
Mercury	MG/KG	0.70	1 / 4	2.14	1.87	0.74	0.71	1 / 4	2.11	1.85	0.73	0.20	0.15	2 / 4	7.50	3.36
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	1 / 4	2.40	0.82
Zinc	MG/KG	271	2 / 4	5.13	4.48	1.68	410	1 / 4	3.39	2.96	1.11	421	290	1 / 4	3.30	1.57
Cove - 2002 Samples																
Copper	MG/KG	108	0 / 6	0.51	0.31	0.17	270	0 / 6	0.20	0.13	0.07	184	155	0 / 6	0.30	0.12
Lead	MG/KG	112	0 / 6	0.47	0.30	0.17	218	0 / 6	0.24	0.15	0.09	67.6	45.2	0 / 6	0.78	0.43
Mercury	MG/KG	0.70	0 / 6	0.40	0.25	0.15	0.71	0 / 6	0.39	0.25	0.14	0.20	0.15	1 / 6	1.40	0.66
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 6	0.57	0.30
Zinc	MG/KG	271	1 / 6	1.41	0.80	0.38	410	0 / 6	0.93	0.53	0.25	421	290	0 / 6	0.91	0.36
Channel - 2002 Samples																
Copper	MG/KG	108	0 / 5	0.30	0.21	0.11	270	0 / 5	0.12	0.09	0.05	184	155	0 / 5	0.17	0.08
Lead	MG/KG	112	0 / 5	0.18	0.15	0.09	218	0 / 5	0.09	0.08	0.05	67.6	45.2	0 / 5	0.30	0.22
Mercury	MG/KG	0.70	0 / 5	0.50	0.34	0.15	0.71	0 / 5	0.49	0.33	0.15	0.20	0.15	1 / 5	1.75	0.68
Tin	MG/KG	--	-- / --	--	--	--	--	-- / --	--	--	--	9.80	8.61	0 / 5	0.23	0.18
Zinc	MG/KG	271	0 / 5	0.47	0.34	0.17	410	0 / 5	0.31	0.22	0.11	421	290	0 / 5	0.30	0.16

1 - Samples within the area impacted by the MILCON action are not included

Shaded cells indicate HQ or ratio >1

TABLE D-21

Sample-Specific Hazard Quotients - SWMU 7b Subsurface Sediments

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Type	Area	Depth (in)	Copper (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Lead (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Mercury (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM	Tin (MG/KG)	HQ-AET	Adj. Tin (MG/KG)	HQ-TEL	HQ-AET	TBT (UG/KG)	HQ-TEL	HQ-AET	Zinc (MG/KG)	HQ-TEL	HQ-PEL	HQ-ERL	HQ-ERM
LW07-B5-SD201-02-02C	9/30/2002	Discrete	Channel	6 - 12	9.70	0.52	0.09	0.29	0.04	11.6	0.38	0.10	0.25	0.05	0.09	0.69	0.13	0.60	0.13	2.30	0.68	0.0004	0.008	0.00012	NS	--	--	42.7	0.34	0.16	0.28	0.10
LW07-B5-SD201P-02-02C	9/30/2002	Discrete	Channel	6 - 12	7.90	0.42	0.07	0.23	0.03	8.40	0.28	0.08	0.18	0.04	0.05	0.38	0.07	0.33	0.07	1.10	0.32	0.0002	0.004	0.00006	NS	--	--	32.9	0.27	0.12	0.22	0.08
LW07-B7-SD201-02-02C	9/29/2002	Discrete	Channel	12 - 18	9.30	0.50	0.09	0.27	0.03	8.10	0.27	0.07	0.17	0.04	0.11	0.85	0.16	0.73	0.15	1.10	0.32	0.0002	0.004	0.00006	NS	--	--	31.9	0.26	0.12	0.21	0.08
LW07-D5-SD201-02-02C	9/30/2002	Discrete	Channel	7 - 13	7.40	0.40	0.07	0.22	0.03	8.20	0.27	0.07	0.18	0.04	0.04	0.31	0.06	0.27	0.06	1.40	0.41	0.0002	0.005	0.00007	NS	--	--	32.0	0.26	0.12	0.21	0.08
LW07-F3-SD201-02-02C	9/29/2002	Discrete	Channel	12 - 18	31.9	1.71	0.30	0.94	0.12	20.1	0.67	0.18	0.43	0.09	0.35	2.69	0.50	2.33	0.49	2.20	0.65	0.0004	0.008	0.00011	NS	--	--	127	1.02	0.47	0.85	0.31
LW07-F5-SD201-02-02C	9/29/2002	Discrete	Channel	9 - 16	3.50	0.19	0.03	0.10	0.01	1.60	0.05	0.01	0.03	0.01	0.04	0.31	0.06	0.27	0.06	1.50	0.44	0.0003	0.005	0.00008	NS	--	--	1.30	0.01	0.005	0.01	0.003
LW07-H1-SD201-02-02C	9/29/2002	Discrete	Pier	12 - 16	105	5.61	0.97	3.09	0.39	104	3.44	0.93	2.23	0.48	0.42	3.23	0.60	2.80	0.59	2.60	0.76	0.0004	0.009	0.00013	NS	--	--	375	3.02	1.38	2.50	0.91
LW07-H3-SD201-02-02C	9/30/2002	Discrete	Cove	7 - 13	21.3	1.14	0.20	0.63	0.08	24.4	0.81	0.22	0.52	0.11	0.12	0.92	0.17	0.80	0.17	3.20	0.94	0.0005	0.011	0.00016	NS	--	--	87.5	0.71	0.32	0.58	0.21
LW07-H5-SD201-02-02C	9/26/2002	Discrete	Pier*	7 - 13	20.3	1.09	0.19	0.60	0.08	19.3	0.64	0.17	0.41	0.09	0.09	0.69	0.13	0.60	0.13	1.30	0.38	0.0002	0.005	0.00007	NS	--	--	81.4	0.66	0.30	0.54	0.20
LW07-J4-SD201-02-02C	9/30/2002	Discrete	Cove	7 - 13	7.50	0.40	0.07	0.22	0.03	8.70	0.29	0.08	0.19	0.04	0.11	0.85	0.16	0.73	0.15	3.40	1.00	0.0006	0.012	0.00017	NS	--	--	36.3	0.29	0.13	0.24	0.09
LW07-K1-SD201-02-02C	9/28/2002	Discrete	Pier	6 - 12	8.20	0.44	0.08	0.24	0.03	6.80	0.23	0.06	0.15	0.03	0.06	0.46	0.09	0.40	0.08	1.40	0.41	0.0002	0.005	0.00007	NS	--	--	21.6	0.17	0.08	0.14	0.05
LW07-K3-SD201-02-02C	9/29/2002	Discrete	Cove	8 - 15	5.60	0.30	0.05	0.16	0.02	6.50	0.22	0.06	0.14	0.03	0.05	0.38	0.07	0.33	0.07	0.96	0.28	0.0002	0.003	0.00005	NS	--	--	27.6	0.22	0.10	0.18	0.07
LW07-K3-SD201P-02-02C	9/29/2002	Discrete	Cove	8 - 15	8.20	0.44	0.08	0.24	0.03	8.90	0.29	0.08	0.19	0.04	0.08	0.62	0.11	0.53	0.11	1.40	0.41	0.0002	0.005	0.00007	NS	--	--	38.3	0.31	0.14	0.26	0.09
LW07-K4-SD201-02-02C	9/30/2002	Discrete	Cove	7 - 13	11.1	0.59	0.10	0.33	0.04	12.6	0.42	0.11	0.27	0.06	0.06	0.46	0.09	0.40	0.08	2.00	0.59	0.0003	0.007	0.00010	NS	--	--	45.1	0.36	0.17	0.30	0.11
LW07-K4-SD201P-02-02C	9/30/2002	Discrete	Cove	7 - 13	8.90	0.48	0.08	0.26	0.03	10.1	0.33	0.09	0.22	0.05	0.05	0.38	0.07	0.33	0.07	1.70	0.50	0.0003	0.006	0.00009	NS	--	--	34.7	0.28	0.13	0.23	0.08
LW07-K5-SD201-02-02C	9/30/2002	Discrete	Cove	7 - 20	9.40	0.50	0.09	0.28	0.03	8.70	0.29	0.08	0.19	0.04	0.06	0.46	0.09	0.40	0.08	1.00	0.29	0.0002	0.004	0.00005	NS	--	--	29.3	0.24	0.11	0.20	0.07
LW07-K6-SD201-02-02C	9/28/2002	Discrete	Pier*	6 - 12	135	7.22	1.25	3.97	0.50	135	4.47	1.21	2.89	0.62	1.10	8.46	1.57	7.33	1.55	7.00	2.06	0.0012	0.025	0.00035	NS	--	--	633	5.10	2.34	4.22	1.54
LW07-L2-SD201-02-02C	10/1/2002	Discrete	Cove	7 - 13	54.7	2.93	0.51	1.61	0.20	52.7	1.75	0.47	1.13	0.24	0.28	2.15	0.40	1.87	0.39	5.60	1.65	0.0010	0.020	0.00028	NS	--	--	382	3.08	1.41	2.55	0.93
LW07-L5-SD201-02-02C	9/29/2002	Discrete	Pier	13 - 20	7.70	0.41	0.07	0.23	0.03	8.90	0.29	0.08	0.19	0.04	0.10	0.77	0.14	0.67	0.14	1.80	0.53	0.0003	0.006	0.00009	NS	--	--	33.9	0.27	0.13	0.23	0.08
LW07-L6-SD201-02-02C	10/1/2002	Discrete	Pier*	6 - 12	71.5	3.82	0.66	2.10	0.26	85.3	2.82	0.76	1.83	0.39	0.24	1.85	0.34	1.60	0.34	1.70	0.50	0.0003	0.006	0.00009	NS	--	--	398	3.21	1.47	2.65	0.97
LW07-M1-SD201-02-02C	9/29/2002	Discrete	Pier	17 - 25	220	11.8	2.04	6.47	0.81	139	4.60	1.24	2.98	0.64	1.50	11.5	2.14	10.0	2.11	23.5	6.91	0.0040	0.083	0.00118	NS	--	--	1,390	11.2	5.13	9.27	3.39
LW07-M3-SD201-02-02C	9/28/2002	Discrete	Pier*	11 - 18	145	7.75	1.34	4.26	0.54	156	5.17	1.39	3.34	0.72	0.96	7.38	1.37	6.40	1.35	16.7	4.91	0.0028	0.059	0.00084	NS	--	--	828	6.68	3.06	5.52	2.02

Shaded samples are field duplicates

Shaded cells = detects

Unshaded cells = U or B (at full DL)

NS - Not Sampled

* - Sample location impacted by the 2008 MILCON action

	ER-L	ER-M	TEL	PEL
Copper	34.0	270	18.7	108
Lead	46.7	218	30.2	112
Mercury	0.15	0.71	0.13	0.70
Tin	3.40	--	0.048	--
Zinc	150	410	124	271

HQ ≤ 1	
HQ 1-5	
HQ 5-10	
HQ 10-25	
HQ >25	

TABLE D-22

Statistical Summary of SWMU 7b Benthic Invertebrate Replicate Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Metric	Sample	Mean	Standard Deviation	Coefficient of Variation (percent)	Number of Replicates	Minimum Value	Median Value	Maximum Value
Total Count	403	--	--	--	--	12	42	57
Total Count	H1	--	--	--	--	19	33	40
Total Count	L2	--	--	--	--	29	36	71
Number of Taxa (Taxa Richness)	403	9.00	1.00	11.1	3	8	9	10
Number of Taxa (Taxa Richness)	H1	6.67	3.79	56.8	3	4	5	11
Number of Taxa (Taxa Richness)	L2	12.0	2.65	22.0	3	10	11	15
Total Density	403	532	329	61.9	3	172	603	819
Total Density	H1	441	154	34.9	3	273	474	575
Total Density	L2	651	323	49.6	3	417	517	1,020
Percent Contribution of Dominant Taxon	403	52.1	20.4	39.2	3	33.3	49.1	73.8
Percent Contribution of Dominant Taxon	H1	71.3	12.5	17.5	3	60.6	68.4	85.0
Percent Contribution of Dominant Taxon	L2	39.7	7.53	19.0	3	31.0	43.7	44.4
Density Dominant Taxon	403	302	213	70.5	3	57.5	402	445
Density Dominant Taxon	H1	321	154	47.9	3	187	287	489
Density Dominant Taxon	L2	268	161	60.2	3	129	230	445
Percent Spionid Polychaetes	403	54.9	16.8	30.6	3	41.7	49.1	73.8
Percent Spionid Polychaetes	H1	76.1	7.93	10.4	3	69.7	73.7	85.0
Percent Spionid Polychaetes	L2	42.8	13.4	31.2	3	27.6	47.9	52.8
Percent Mediomastus and Capitella Polychaetes	403	15.1	12.0	79.6	3	2.38	16.7	26.3
Percent Mediomastus and Capitella Polychaetes	H1	13.6	6.89	50.8	3	7.50	12.1	21.1
Percent Mediomastus and Capitella Polychaetes	L2	28.5	2.23	7.83	3	26.8	27.8	31.0
Percent Pollution Tolerant Organisms	403	72.2	4.94	6.84	3	66.7	73.7	76.2
Percent Pollution Tolerant Organisms	H1	90.7	5.19	5.72	3	84.8	92.5	94.7
Percent Pollution Tolerant Organisms	L2	53.7	20.9	38.9	3	31.0	57.7	72.2
Density of Pollution Tolerant Organisms	403	393	251	63.9	3	115	460	603
Density of Pollution Tolerant Organisms	H1	398	137	34.4	3	259	402	532
Density of Pollution Tolerant Organisms	L2	364	230	63.2	3	129	374	589

TABLE D-22

Statistical Summary of SWMU 7b Benthic Invertebrate Replicate Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Metric	Sample	Mean	Standard Deviation	Coefficient of Variation (percent)	Number of Replicates	Minimum Value	Median Value	Maximum Value
Percent Pollution Sensitive Organisms	403	6.35	9.01	142	3	0.00	2.38	16.7
Percent Pollution Sensitive Organisms	H1	4.43	1.22	27.5	3	3.03	5.00	5.26
Percent Pollution Sensitive Organisms	L2	7.84	11.2	143	3	0.00	2.82	20.7
Density of Pollution Sensitive Organisms	403	14.4	14.4	100	3	0.00	14.4	28.7
Density of Pollution Sensitive Organisms	H1	19.2	8.30	43.3	3	14.4	14.4	28.7
Density of Pollution Sensitive Organisms	L2	38.3	43.9	115	3	0.00	28.7	86.2

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Copper	Sediment	Number of Taxa (Taxa Richness)	-0.566	0.012	S	0.320	-0.616	0.005	S	0.379	Weak	Negative
Lead	Sediment	Number of Taxa (Taxa Richness)	-0.294	0.223	NS	0.086	-0.408	0.083	NS	0.166	--	--
Mercury	Sediment	Number of Taxa (Taxa Richness)	-0.213	0.381	NS	0.045	-0.341	0.153	NS	0.117	--	--
Tin	Sediment	Number of Taxa (Taxa Richness)	-0.473	0.041	S	0.224	-0.638	0.003	S	0.407	Weak	Negative
Zinc	Sediment	Number of Taxa (Taxa Richness)	-0.419	0.074	NS	0.175	-0.498	0.030	S	0.248	Weak	Negative
SEM/AVS Ratio	Sediment	Number of Taxa (Taxa Richness)	-0.183	0.453	NS	0.034	-0.140	0.568	NS	0.020	--	--
Percent ABM	Sediment	Number of Taxa (Taxa Richness)	-0.214	0.379	NS	0.046	0.083	0.736	NS	0.007	--	--
Sediment pH	Sediment	Number of Taxa (Taxa Richness)	-0.010	0.967	NS	0.0001	0.251	0.299	NS	0.063	--	--
Total Organic Carbon	Sediment	Number of Taxa (Taxa Richness)	-0.475	0.040	S	0.226	-0.499	0.030	S	0.249	Weak	Negative
Large Gravel	Sediment	Number of Taxa (Taxa Richness)	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Number of Taxa (Taxa Richness)	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Number of Taxa (Taxa Richness)	-0.170	0.486	NS	0.029	-0.259	0.285	NS	0.067	--	--
Coarse Sand	Sediment	Number of Taxa (Taxa Richness)	0.101	0.681	NS	0.010	0.157	0.521	NS	0.025	--	--
Medium Sand	Sediment	Number of Taxa (Taxa Richness)	0.038	0.878	NS	0.001	0.031	0.901	NS	0.001	--	--
Fine Sand	Sediment	Number of Taxa (Taxa Richness)	0.504	0.028	S	0.254	0.626	0.004	S	0.391	Weak	Positive
Silt/ Clay	Sediment	Number of Taxa (Taxa Richness)	-0.389	0.100	NS	0.151	-0.429	0.067	NS	0.184	--	--
Bottom Dissolved Oxygen	Water Column	Number of Taxa (Taxa Richness)	0.734	0.0003	S	0.539	0.498	0.030	S	0.248	Weak to Moderate	Positive
Bottom ORP	Water Column	Number of Taxa (Taxa Richness)	0.211	0.387	NS	0.044	0.073	0.766	NS	0.005	--	--
Bottom Salinity	Water Column	Number of Taxa (Taxa Richness)	-0.185	0.448	NS	0.034	-0.114	0.641	NS	0.013	--	--
Bottom Specific Conductivity	Water Column	Number of Taxa (Taxa Richness)	-0.096	0.697	NS	0.009	0.076	0.759	NS	0.006	--	--
Bottom Temperature	Water Column	Number of Taxa (Taxa Richness)	-0.028	0.909	NS	0.001	-0.011	0.963	NS	0.0001	--	--
Bottom Turbidity	Water Column	Number of Taxa (Taxa Richness)	-0.181	0.457	NS	0.033	-0.130	0.595	NS	0.017	--	--
Bottom Water pH	Water Column	Number of Taxa (Taxa Richness)	0.563	0.012	S	0.317	0.327	0.172	NS	0.107	Weak	Positive
Copper	Sediment	Total Density	-0.516	0.024	S	0.266	-0.656	0.002	S	0.431	Weak	Negative
Lead	Sediment	Total Density	-0.233	0.336	NS	0.055	-0.318	0.185	NS	0.101	--	--
Mercury	Sediment	Total Density	-0.186	0.445	NS	0.035	-0.423	0.071	NS	0.179	--	--
Tin	Sediment	Total Density	-0.272	0.260	NS	0.074	-0.251	0.300	NS	0.063	--	--
Zinc	Sediment	Total Density	-0.339	0.156	NS	0.115	-0.373	0.116	NS	0.139	--	--
SEM/AVS Ratio	Sediment	Total Density	-0.098	0.689	NS	0.010	0.109	0.658	NS	0.012	--	--
Percent ABM	Sediment	Total Density	0.014	0.954	NS	0.0002	0.434	0.063	NS	0.189	--	--
Sediment pH	Sediment	Total Density	-0.046	0.853	NS	0.002	-0.048	0.844	NS	0.002	--	--
Total Organic Carbon	Sediment	Total Density	-0.401	0.089	NS	0.161	-0.490	0.033	S	0.240	Weak	Negative
Large Gravel	Sediment	Total Density	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Total Density	--	--	--	--	--	--	--	--	--	--

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Fine Gravel	Sediment	Total Density	0.090	0.713	NS	0.008	0.215	0.376	NS	0.046	--	--
Coarse Sand	Sediment	Total Density	0.219	0.369	NS	0.048	0.465	0.045	S	0.216	Weak	Positive
Medium Sand	Sediment	Total Density	0.170	0.486	NS	0.029	0.375	0.114	NS	0.140	--	--
Fine Sand	Sediment	Total Density	0.407	0.084	NS	0.166	0.647	0.003	S	0.418	Weak	Positive
Silt/ Clay	Sediment	Total Density	-0.372	0.117	NS	0.138	-0.640	0.003	S	0.410	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Total Density	0.637	0.003	S	0.405	0.456	0.050	S	0.208	Weak	Positive
Bottom ORP	Water Column	Total Density	0.122	0.618	NS	0.015	-0.021	0.932	NS	0.0004	--	--
Bottom Salinity	Water Column	Total Density	-0.004	0.987	NS	0.00002	0.050	0.840	NS	0.002	--	--
Bottom Specific Conductivity	Water Column	Total Density	0.092	0.709	NS	0.008	0.299	0.214	NS	0.089	--	--
Bottom Temperature	Water Column	Total Density	0.083	0.736	NS	0.007	0.197	0.420	NS	0.039	--	--
Bottom Turbidity	Water Column	Total Density	-0.222	0.362	NS	0.049	-0.147	0.547	NS	0.022	--	--
Bottom Water pH	Water Column	Total Density	0.514	0.025	S	0.264	0.350	0.141	NS	0.123	Weak	Positive
Copper	Sediment	Percent Contribution of Dominant Taxon	0.591	0.008	S	0.349	0.458	0.049	S	0.210	Weak	Positive
Lead	Sediment	Percent Contribution of Dominant Taxon	0.301	0.211	NS	0.091	0.373	0.116	NS	0.139	--	--
Mercury	Sediment	Percent Contribution of Dominant Taxon	0.371	0.118	NS	0.138	0.365	0.124	NS	0.133	--	--
Tin	Sediment	Percent Contribution of Dominant Taxon	0.349	0.143	NS	0.122	0.633	0.004	S	0.401	Weak	Positive
Zinc	Sediment	Percent Contribution of Dominant Taxon	0.386	0.102	NS	0.149	0.498	0.030	S	0.248	Weak	Positive
SEM/AVS Ratio	Sediment	Percent Contribution of Dominant Taxon	0.155	0.527	NS	0.024	0.056	0.819	NS	0.003	--	--
Percent ABM	Sediment	Percent Contribution of Dominant Taxon	0.154	0.529	NS	0.024	0.229	0.346	NS	0.052	--	--
Sediment pH	Sediment	Percent Contribution of Dominant Taxon	0.162	0.507	NS	0.026	-0.044	0.858	NS	0.002	--	--
Total Organic Carbon	Sediment	Percent Contribution of Dominant Taxon	0.613	0.005	S	0.376	0.446	0.056	NS	0.199	Weak	Positive
Large Gravel	Sediment	Percent Contribution of Dominant Taxon	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Percent Contribution of Dominant Taxon	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Percent Contribution of Dominant Taxon	0.014	0.955	NS	0.0002	0.086	0.726	NS	0.007	--	--
Coarse Sand	Sediment	Percent Contribution of Dominant Taxon	0.083	0.737	NS	0.007	0.140	0.566	NS	0.020	--	--
Medium Sand	Sediment	Percent Contribution of Dominant Taxon	0.139	0.570	NS	0.019	0.308	0.200	NS	0.095	--	--
Fine Sand	Sediment	Percent Contribution of Dominant Taxon	-0.421	0.073	NS	0.177	-0.391	0.098	NS	0.153	--	--
Silt/ Clay	Sediment	Percent Contribution of Dominant Taxon	0.260	0.283	NS	0.067	0.134	0.583	NS	0.018	--	--
Bottom Dissolved Oxygen	Water Column	Percent Contribution of Dominant Taxon	-0.699	0.001	S	0.489	-0.635	0.004	S	0.403	Weak	Negative
Bottom ORP	Water Column	Percent Contribution of Dominant Taxon	-0.332	0.165	NS	0.110	-0.291	0.226	NS	0.085	--	--
Bottom Salinity	Water Column	Percent Contribution of Dominant Taxon	0.566	0.011	S	0.321	0.228	0.348	NS	0.052	Weak	Positive
Bottom Specific Conductivity	Water Column	Percent Contribution of Dominant Taxon	0.528	0.020	S	0.278	0.103	0.675	NS	0.011	Weak	Positive
Bottom Temperature	Water Column	Percent Contribution of Dominant Taxon	0.486	0.035	S	0.236	0.294	0.223	NS	0.086	Weak	Positive
Bottom Turbidity	Water Column	Percent Contribution of Dominant Taxon	0.271	0.261	NS	0.074	0.111	0.652	NS	0.012	--	--
Bottom Water pH	Water Column	Percent Contribution of Dominant Taxon	-0.623	0.004	S	0.388	-0.552	0.014	S	0.305	Weak	Negative

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Copper	Sediment	Density of Dominant Taxon	-0.240	0.322	NS	0.058	-0.300	0.212	NS	0.090	--	--
Lead	Sediment	Density of Dominant Taxon	0.072	0.771	NS	0.005	-0.055	0.822	NS	0.003	--	--
Mercury	Sediment	Density of Dominant Taxon	0.179	0.464	NS	0.032	-0.226	0.353	NS	0.051	--	--
Tin	Sediment	Density of Dominant Taxon	0.047	0.849	NS	0.002	0.114	0.642	NS	0.013	--	--
Zinc	Sediment	Density of Dominant Taxon	-0.059	0.812	NS	0.003	-0.056	0.819	NS	0.003	--	--
SEM/AVS Ratio	Sediment	Density of Dominant Taxon	0.048	0.845	NS	0.002	0.021	0.932	NS	0.0004	--	--
Percent ABM	Sediment	Density of Dominant Taxon	0.317	0.186	NS	0.100	0.482	0.036	S	0.233	Weak	Positive
Sediment pH	Sediment	Density of Dominant Taxon	-0.057	0.816	NS	0.003	-0.054	0.828	NS	0.003	--	--
Total Organic Carbon	Sediment	Density of Dominant Taxon	-0.076	0.758	NS	0.006	-0.047	0.847	NS	0.002	--	--
Large Gravel	Sediment	Density of Dominant Taxon	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Density of Dominant Taxon	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Density of Dominant Taxon	0.234	0.335	NS	0.055	0.258	0.286	NS	0.067	--	--
Coarse Sand	Sediment	Density of Dominant Taxon	0.414	0.078	NS	0.171	0.498	0.030	S	0.248	Weak	Positive
Medium Sand	Sediment	Density of Dominant Taxon	0.463	0.046	S	0.215	0.523	0.022	S	0.274	Weak	Positive
Fine Sand	Sediment	Density of Dominant Taxon	0.174	0.477	NS	0.030	0.313	0.192	NS	0.098	--	--
Silt/ Clay	Sediment	Density of Dominant Taxon	-0.310	0.196	NS	0.096	-0.474	0.040	S	0.225	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Density of Dominant Taxon	0.165	0.499	NS	0.027	0.012	0.960	NS	0.0002	--	--
Bottom ORP	Water Column	Density of Dominant Taxon	-0.245	0.312	NS	0.060	-0.200	0.412	NS	0.040	--	--
Bottom Salinity	Water Column	Density of Dominant Taxon	0.316	0.187	NS	0.100	0.242	0.318	NS	0.059	--	--
Bottom Specific Conductivity	Water Column	Density of Dominant Taxon	0.421	0.073	NS	0.177	0.424	0.071	NS	0.180	--	--
Bottom Temperature	Water Column	Density of Dominant Taxon	0.371	0.118	NS	0.138	0.388	0.101	NS	0.150	--	--
Bottom Turbidity	Water Column	Density of Dominant Taxon	-0.117	0.634	NS	0.014	-0.146	0.552	NS	0.021	--	--
Bottom Water pH	Water Column	Density of Dominant Taxon	0.110	0.655	NS	0.012	-0.002	0.994	NS	0.000003	--	--
Copper	Sediment	Percent Spionid Polychaetes	0.675	0.002	S	0.455	0.637	0.003	S	0.406	Weak	Positive
Lead	Sediment	Percent Spionid Polychaetes	0.428	0.068	NS	0.183	0.601	0.006	S	0.361	Weak	Positive
Mercury	Sediment	Percent Spionid Polychaetes	0.367	0.122	NS	0.135	0.468	0.043	S	0.219	Weak	Positive
Tin	Sediment	Percent Spionid Polychaetes	0.326	0.174	NS	0.106	0.442	0.058	NS	0.195	--	--
Zinc	Sediment	Percent Spionid Polychaetes	0.230	0.344	NS	0.053	0.469	0.043	S	0.220	Weak	Positive
SEM/AVS Ratio	Sediment	Percent Spionid Polychaetes	-0.127	0.605	NS	0.016	-0.147	0.547	NS	0.022	--	--
Percent ABM	Sediment	Percent Spionid Polychaetes	0.027	0.911	NS	0.001	-0.017	0.945	NS	0.0003	--	--
Sediment pH	Sediment	Percent Spionid Polychaetes	0.280	0.246	NS	0.078	0.133	0.586	NS	0.018	--	--
Total Organic Carbon	Sediment	Percent Spionid Polychaetes	0.703	0.001	S	0.494	0.652	0.002	S	0.425	Weak	Positive
Large Gravel	Sediment	Percent Spionid Polychaetes	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Percent Spionid Polychaetes	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Percent Spionid Polychaetes	0.059	0.812	NS	0.003	0.086	0.726	NS	0.007	--	--

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Coarse Sand	Sediment	Percent Spionid Polychaetes	0.017	0.944	NS	0.0003	-0.079	0.749	NS	0.006	--	--
Medium Sand	Sediment	Percent Spionid Polychaetes	-0.193	0.429	NS	0.037	-0.076	0.757	NS	0.006	--	--
Fine Sand	Sediment	Percent Spionid Polychaetes	-0.683	0.001	S	0.467	-0.662	0.002	S	0.438	Weak	Negative
Silt/ Clay	Sediment	Percent Spionid Polychaetes	0.566	0.012	S	0.320	0.536	0.018	S	0.287	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Spionid Polychaetes	-0.775	0.0001	S	0.600	-0.730	0.0004	S	0.532	Moderate	Negative
Bottom ORP	Water Column	Percent Spionid Polychaetes	-0.373	0.115	NS	0.139	-0.426	0.069	NS	0.182	--	--
Bottom Salinity	Water Column	Percent Spionid Polychaetes	0.482	0.037	S	0.232	0.232	0.340	NS	0.054	Weak	Positive
Bottom Specific Conductivity	Water Column	Percent Spionid Polychaetes	0.440	0.060	NS	0.193	0.114	0.643	NS	0.013	--	--
Bottom Temperature	Water Column	Percent Spionid Polychaetes	0.330	0.168	NS	0.109	0.224	0.357	NS	0.050	--	--
Bottom Turbidity	Water Column	Percent Spionid Polychaetes	0.325	0.175	NS	0.105	0.112	0.647	NS	0.013	--	--
Bottom Water pH	Water Column	Percent Spionid Polychaetes	-0.679	0.001	S	0.461	-0.597	0.007	S	0.357	Weak	Negative
Copper	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.328	0.171	NS	0.107	-0.207	0.395	NS	0.043	--	--
Lead	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.130	0.596	NS	0.017	-0.080	0.745	NS	0.006	--	--
Mercury	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.256	0.291	NS	0.065	-0.240	0.321	NS	0.058	--	--
Tin	Sediment	Percent Mediomastus and Capitella Polychaetes	0.135	0.582	NS	0.018	0.102	0.679	NS	0.010	--	--
Zinc	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.332	0.165	NS	0.110	-0.141	0.564	NS	0.020	--	--
SEM/AVS Ratio	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.265	0.273	NS	0.070	-0.179	0.464	NS	0.032	--	--
Percent ABM	Sediment	Percent Mediomastus and Capitella Polychaetes	0.426	0.069	NS	0.181	0.421	0.073	NS	0.177	--	--
Sediment pH	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.552	0.014	S	0.305	-0.342	0.151	NS	0.117	Weak	Negative
Total Organic Carbon	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.468	0.043	S	0.219	-0.339	0.156	NS	0.115	Weak	Negative
Large Gravel	Sediment	Percent Mediomastus and Capitella Polychaetes	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Percent Mediomastus and Capitella Polychaetes	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Percent Mediomastus and Capitella Polychaetes	0.377	0.112	NS	0.142	0.344	0.149	NS	0.119	--	--
Coarse Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.480	0.037	S	0.231	0.633	0.004	S	0.400	Weak	Positive
Medium Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.542	0.016	S	0.294	0.358	0.132	NS	0.128	Weak	Positive
Fine Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.371	0.117	NS	0.138	0.091	0.713	NS	0.008	--	--
Silt/ Clay	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.489	0.034	S	0.239	-0.249	0.303	NS	0.062	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Percent Mediomastus and Capitella Polychaetes	0.337	0.158	NS	0.114	0.183	0.452	NS	0.034	--	--
Bottom ORP	Water Column	Percent Mediomastus and Capitella Polychaetes	-0.014	0.955	NS	0.0002	-0.011	0.966	NS	0.0001	--	--
Bottom Salinity	Water Column	Percent Mediomastus and Capitella Polychaetes	0.078	0.751	NS	0.006	0.051	0.834	NS	0.003	--	--
Bottom Specific Conductivity	Water Column	Percent Mediomastus and Capitella Polychaetes	0.084	0.733	NS	0.007	-0.061	0.805	NS	0.004	--	--
Bottom Temperature	Water Column	Percent Mediomastus and Capitella Polychaetes	0.236	0.330	NS	0.056	0.222	0.361	NS	0.049	--	--
Bottom Turbidity	Water Column	Percent Mediomastus and Capitella Polychaetes	0.091	0.712	NS	0.008	0.172	0.482	NS	0.030	--	--
Bottom Water pH	Water Column	Percent Mediomastus and Capitella Polychaetes	0.339	0.155	NS	0.115	0.147	0.548	NS	0.022	--	--
Copper	Sediment	Density of Pollution Tolerant Organisms	-0.072	0.770	NS	0.005	-0.027	0.912	NS	0.001	--	--

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Lead	Sediment	Density of Pollution Tolerant Organisms	0.216	0.375	NS	0.047	0.206	0.398	NS	0.042	--	--
Mercury	Sediment	Density of Pollution Tolerant Organisms	0.197	0.420	NS	0.039	-0.047	0.850	NS	0.002	--	--
Tin	Sediment	Density of Pollution Tolerant Organisms	0.105	0.668	NS	0.011	0.160	0.514	NS	0.026	--	--
Zinc	Sediment	Density of Pollution Tolerant Organisms	-0.091	0.712	NS	0.008	0.045	0.856	NS	0.002	--	--
SEM/AVS Ratio	Sediment	Density of Pollution Tolerant Organisms	-0.188	0.442	NS	0.035	-0.207	0.395	NS	0.043	--	--
Percent ABM	Sediment	Density of Pollution Tolerant Organisms	0.192	0.432	NS	0.037	0.391	0.098	NS	0.153	--	--
Sediment pH	Sediment	Density of Pollution Tolerant Organisms	-0.020	0.934	NS	0.0004	0.061	0.804	NS	0.004	--	--
Total Organic Carbon	Sediment	Density of Pollution Tolerant Organisms	0.036	0.884	NS	0.001	0.060	0.807	NS	0.004	--	--
Large Gravel	Sediment	Density of Pollution Tolerant Organisms	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Density of Pollution Tolerant Organisms	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Density of Pollution Tolerant Organisms	0.168	0.491	NS	0.028	0.301	0.210	NS	0.091	--	--
Coarse Sand	Sediment	Density of Pollution Tolerant Organisms	0.372	0.117	NS	0.138	0.479	0.038	S	0.230	Weak	Positive
Medium Sand	Sediment	Density of Pollution Tolerant Organisms	0.296	0.218	NS	0.088	0.286	0.235	NS	0.082	--	--
Fine Sand	Sediment	Density of Pollution Tolerant Organisms	-0.093	0.704	NS	0.009	-0.061	0.804	NS	0.004	--	--
Silt/ Clay	Sediment	Density of Pollution Tolerant Organisms	-0.055	0.824	NS	0.003	-0.086	0.726	NS	0.007	--	--
Bottom Dissolved Oxygen	Water Column	Density of Pollution Tolerant Organisms	-0.021	0.934	NS	0.000	-0.238	0.326	NS	0.057	--	--
Bottom ORP	Water Column	Density of Pollution Tolerant Organisms	-0.260	0.283	NS	0.067	-0.413	0.079	NS	0.171	--	--
Bottom Salinity	Water Column	Density of Pollution Tolerant Organisms	0.248	0.307	NS	0.061	0.254	0.294	NS	0.064	--	--
Bottom Specific Conductivity	Water Column	Density of Pollution Tolerant Organisms	0.307	0.201	NS	0.094	0.302	0.208	NS	0.091	--	--
Bottom Temperature	Water Column	Density of Pollution Tolerant Organisms	0.244	0.313	NS	0.060	0.403	0.087	NS	0.163	--	--
Bottom Turbidity	Water Column	Density of Pollution Tolerant Organisms	-0.069	0.779	NS	0.005	0.034	0.889	NS	0.001	--	--
Bottom Water pH	Water Column	Density of Pollution Tolerant Organisms	-0.051	0.834	NS	0.003	-0.187	0.443	NS	0.035	--	--
Copper	Sediment	Percent Pollution Tolerant Organisms	0.652	0.002	S	0.425	0.574	0.010	S	0.329	Weak	Positive
Lead	Sediment	Percent Pollution Tolerant Organisms	0.452	0.052	NS	0.204	0.489	0.034	S	0.239	Weak	Positive
Mercury	Sediment	Percent Pollution Tolerant Organisms	0.340	0.154	NS	0.116	0.384	0.105	NS	0.147	--	--
Tin	Sediment	Percent Pollution Tolerant Organisms	0.336	0.160	NS	0.113	0.386	0.103	NS	0.149	--	--
Zinc	Sediment	Percent Pollution Tolerant Organisms	0.207	0.396	NS	0.043	0.358	0.132	NS	0.128	--	--
SEM/AVS Ratio	Sediment	Percent Pollution Tolerant Organisms	-0.246	0.310	NS	0.060	-0.286	0.235	NS	0.082	--	--
Percent ABM	Sediment	Percent Pollution Tolerant Organisms	0.028	0.908	NS	0.001	0.005	0.983	NS	0.00003	--	--
Sediment pH	Sediment	Percent Pollution Tolerant Organisms	0.172	0.482	NS	0.029	0.060	0.808	NS	0.004	--	--
Total Organic Carbon	Sediment	Percent Pollution Tolerant Organisms	0.626	0.004	S	0.392	0.590	0.008	S	0.348	Weak	Positive
Large Gravel	Sediment	Percent Pollution Tolerant Organisms	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Percent Pollution Tolerant Organisms	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Percent Pollution Tolerant Organisms	-0.020	0.935	NS	0.0004	0.000	1.000	NS	0.000	--	--
Coarse Sand	Sediment	Percent Pollution Tolerant Organisms	0.105	0.670	NS	0.011	0.039	0.875	NS	0.002	--	--

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Medium Sand	Sediment	Percent Pollution Tolerant Organisms	-0.052	0.833	NS	0.003	0.013	0.957	NS	0.0002	--	--
Fine Sand	Sediment	Percent Pollution Tolerant Organisms	-0.590	0.008	S	0.348	-0.632	0.004	S	0.399	Weak	Negative
Silt/ Clay	Sediment	Percent Pollution Tolerant Organisms	0.446	0.055	NS	0.199	0.476	0.039	S	0.227	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Pollution Tolerant Organisms	-0.689	0.001	S	0.474	-0.637	0.003	S	0.406	Weak	Negative
Bottom ORP	Water Column	Percent Pollution Tolerant Organisms	-0.282	0.243	NS	0.079	-0.360	0.130	NS	0.129	--	--
Bottom Salinity	Water Column	Percent Pollution Tolerant Organisms	0.482	0.037	S	0.232	0.190	0.436	NS	0.036	Weak	Positive
Bottom Specific Conductivity	Water Column	Percent Pollution Tolerant Organisms	0.391	0.098	NS	0.153	0.058	0.813	NS	0.003	--	--
Bottom Temperature	Water Column	Percent Pollution Tolerant Organisms	0.330	0.168	NS	0.109	0.260	0.282	NS	0.068	--	--
Bottom Turbidity	Water Column	Percent Pollution Tolerant Organisms	0.246	0.310	NS	0.061	0.147	0.547	NS	0.022	--	--
Bottom Water pH	Water Column	Percent Pollution Tolerant Organisms	-0.610	0.006	S	0.372	-0.535	0.018	S	0.287	Weak	Negative
Copper	Sediment	Density of Pollution Sensitive Organisms	-0.539	0.017	S	0.291	-0.659	0.002	S	0.434	Weak	Negative
Lead	Sediment	Density of Pollution Sensitive Organisms	-0.367	0.122	NS	0.135	-0.425	0.069	NS	0.181	--	--
Mercury	Sediment	Density of Pollution Sensitive Organisms	-0.222	0.361	NS	0.049	-0.424	0.070	NS	0.180	--	--
Tin	Sediment	Density of Pollution Sensitive Organisms	-0.504	0.028	S	0.254	-0.689	0.001	S	0.474	Weak	Negative
Zinc	Sediment	Density of Pollution Sensitive Organisms	-0.461	0.047	S	0.212	-0.553	0.014	S	0.306	Weak	Negative
SEM/AVS Ratio	Sediment	Density of Pollution Sensitive Organisms	-0.074	0.763	NS	0.006	-0.122	0.619	NS	0.015	--	--
Percent ABM	Sediment	Density of Pollution Sensitive Organisms	-0.291	0.227	NS	0.085	-0.086	0.725	NS	0.007	--	--
Sediment pH	Sediment	Density of Pollution Sensitive Organisms	0.137	0.577	NS	0.019	0.148	0.544	NS	0.022	--	--
Total Organic Carbon	Sediment	Density of Pollution Sensitive Organisms	-0.419	0.074	NS	0.176	-0.528	0.020	S	0.279	Weak	Negative
Large Gravel	Sediment	Density of Pollution Sensitive Organisms	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Density of Pollution Sensitive Organisms	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Density of Pollution Sensitive Organisms	-0.110	0.653	NS	0.012	-0.065	0.792	NS	0.004	--	--
Coarse Sand	Sediment	Density of Pollution Sensitive Organisms	-0.196	0.422	NS	0.038	-0.089	0.716	NS	0.008	--	--
Medium Sand	Sediment	Density of Pollution Sensitive Organisms	-0.225	0.355	NS	0.050	-0.058	0.814	NS	0.003	--	--
Fine Sand	Sediment	Density of Pollution Sensitive Organisms	0.429	0.067	NS	0.184	0.708	0.001	S	0.501	Weak to Moderate	Positive
Silt/ Clay	Sediment	Density of Pollution Sensitive Organisms	-0.229	0.346	NS	0.052	-0.419	0.074	NS	0.176	--	--
Bottom Dissolved Oxygen	Water Column	Density of Pollution Sensitive Organisms	0.616	0.005	S	0.379	0.559	0.013	S	0.312	Weak	Positive
Bottom ORP	Water Column	Density of Pollution Sensitive Organisms	0.245	0.313	NS	0.060	0.116	0.637	NS	0.013	--	--
Bottom Salinity	Water Column	Density of Pollution Sensitive Organisms	-0.214	0.378	NS	0.046	-0.272	0.261	NS	0.074	--	--
Bottom Specific Conductivity	Water Column	Density of Pollution Sensitive Organisms	-0.126	0.607	NS	0.016	0.019	0.938	NS	0.0004	--	--
Bottom Temperature	Water Column	Density of Pollution Sensitive Organisms	-0.123	0.617	NS	0.015	-0.205	0.399	NS	0.042	--	--
Bottom Turbidity	Water Column	Density of Pollution Sensitive Organisms	-0.145	0.552	NS	0.021	-0.142	0.562	NS	0.020	--	--
Bottom Water pH	Water Column	Density of Pollution Sensitive Organisms	0.462	0.046	S	0.214	0.383	0.106	NS	0.146	Weak	Positive
Copper	Sediment	Percent Pollution Sensitive Organisms	-0.273	0.258	NS	0.075	-0.210	0.389	NS	0.044	--	--

TABLE D-23

Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Lead	Sediment	Percent Pollution Sensitive Organisms	-0.252	0.297	NS	0.064	-0.238	0.327	NS	0.057	--	--
Mercury	Sediment	Percent Pollution Sensitive Organisms	-0.143	0.560	NS	0.020	-0.086	0.726	NS	0.007	--	--
Tin	Sediment	Percent Pollution Sensitive Organisms	-0.373	0.116	NS	0.139	-0.492	0.032	S	0.242	Weak	Negative
Zinc	Sediment	Percent Pollution Sensitive Organisms	-0.314	0.190	NS	0.099	-0.363	0.127	NS	0.131	--	--
SEM/AVS Ratio	Sediment	Percent Pollution Sensitive Organisms	-0.155	0.526	NS	0.024	-0.162	0.507	NS	0.026	--	--
Percent ABM	Sediment	Percent Pollution Sensitive Organisms	-0.359	0.131	NS	0.129	-0.320	0.182	NS	0.102	--	--
Sediment pH	Sediment	Percent Pollution Sensitive Organisms	0.226	0.353	NS	0.051	0.201	0.410	NS	0.040	--	--
Total Organic Carbon	Sediment	Percent Pollution Sensitive Organisms	-0.196	0.422	NS	0.038	-0.301	0.211	NS	0.090	--	--
Large Gravel	Sediment	Percent Pollution Sensitive Organisms	--	--	--	--	--	--	--	--	--	--
Coarse Gravel	Sediment	Percent Pollution Sensitive Organisms	--	--	--	--	--	--	--	--	--	--
Fine Gravel	Sediment	Percent Pollution Sensitive Organisms	-0.180	0.461	NS	0.032	-0.258	0.286	NS	0.067	--	--
Coarse Sand	Sediment	Percent Pollution Sensitive Organisms	-0.341	0.153	NS	0.116	-0.370	0.119	NS	0.137	--	--
Medium Sand	Sediment	Percent Pollution Sensitive Organisms	-0.398	0.091	NS	0.158	-0.369	0.120	NS	0.136	--	--
Fine Sand	Sediment	Percent Pollution Sensitive Organisms	0.169	0.489	NS	0.029	0.293	0.223	NS	0.086	--	--
Silt/ Clay	Sediment	Percent Pollution Sensitive Organisms	0.030	0.902	NS	0.001	0.013	0.959	NS	0.0002	--	--
Bottom Dissolved Oxygen	Water Column	Percent Pollution Sensitive Organisms	0.312	0.193	NS	0.098	0.360	0.130	NS	0.129	--	--
Bottom ORP	Water Column	Percent Pollution Sensitive Organisms	0.201	0.410	NS	0.040	0.243	0.316	NS	0.059	--	--
Bottom Salinity	Water Column	Percent Pollution Sensitive Organisms	-0.335	0.161	NS	0.112	-0.354	0.137	NS	0.125	--	--
Bottom Specific Conductivity	Water Column	Percent Pollution Sensitive Organisms	-0.314	0.190	NS	0.099	-0.340	0.155	NS	0.115	--	--
Bottom Temperature	Water Column	Percent Pollution Sensitive Organisms	-0.298	0.215	NS	0.089	-0.441	0.059	NS	0.195	--	--
Bottom Turbidity	Water Column	Percent Pollution Sensitive Organisms	-0.163	0.506	NS	0.026	-0.012	0.960	NS	0.0002	--	--
Bottom Water pH	Water Column	Percent Pollution Sensitive Organisms	0.294	0.221	NS	0.087	0.270	0.264	NS	0.073	--	--

S - Statistically Significant ($p \leq 0.05$); NS - Not Statistically Significant ($p > 0.05$)

R^2 - Represents the percentage of variability explained

1 - Weak: $R^2 < 0.50$; Moderate: R^2 0.50 to 0.80; Strong: $R^2 > 0.80$

TABLE D-24

Statistically Significant Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Sorted by Benthic Invertebrate Metric												
Copper	Sediment	Number of Taxa (Taxa Richness)	-0.566	0.012	S	0.320	-0.616	0.005	S	0.379	Weak	Negative
Tin	Sediment	Number of Taxa (Taxa Richness)	-0.473	0.041	S	0.224	-0.638	0.003	S	0.407	Weak	Negative
Zinc	Sediment	Number of Taxa (Taxa Richness)	-0.419	0.074	NS	0.175	-0.498	0.030	S	0.248	Weak	Negative
Total Organic Carbon	Sediment	Number of Taxa (Taxa Richness)	-0.475	0.040	S	0.226	-0.499	0.030	S	0.249	Weak	Negative
Fine Sand	Sediment	Number of Taxa (Taxa Richness)	0.504	0.028	S	0.254	0.626	0.004	S	0.391	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Number of Taxa (Taxa Richness)	0.734	0.0003	S	0.539	0.498	0.030	S	0.248	Weak to Moderate	Positive
Bottom Water pH	Water Column	Number of Taxa (Taxa Richness)	0.563	0.012	S	0.317	0.327	0.172	NS	0.107	Weak	Positive
Copper	Sediment	Total Density	-0.516	0.024	S	0.266	-0.656	0.002	S	0.431	Weak	Negative
Total Organic Carbon	Sediment	Total Density	-0.401	0.089	NS	0.161	-0.490	0.033	S	0.240	Weak	Negative
Coarse Sand	Sediment	Total Density	0.219	0.369	NS	0.048	0.465	0.045	S	0.216	Weak	Positive
Fine Sand	Sediment	Total Density	0.407	0.084	NS	0.166	0.647	0.003	S	0.418	Weak	Positive
Silt/Clay	Sediment	Total Density	-0.372	0.117	NS	0.138	-0.640	0.003	S	0.410	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Total Density	0.637	0.003	S	0.405	0.456	0.050	S	0.208	Weak	Positive
Bottom Water pH	Water Column	Total Density	0.514	0.025	S	0.264	0.350	0.141	NS	0.123	Weak	Positive
Copper	Sediment	Percent Contribution of Dominant Taxon	0.591	0.008	S	0.349	0.458	0.049	S	0.210	Weak	Positive
Tin	Sediment	Percent Contribution of Dominant Taxon	0.349	0.143	NS	0.122	0.633	0.004	S	0.401	Weak	Positive
Zinc	Sediment	Percent Contribution of Dominant Taxon	0.386	0.102	NS	0.149	0.498	0.030	S	0.248	Weak	Positive
Total Organic Carbon	Sediment	Percent Contribution of Dominant Taxon	0.613	0.005	S	0.376	0.446	0.056	NS	0.199	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Contribution of Dominant Taxon	-0.699	0.001	S	0.489	-0.635	0.004	S	0.403	Weak	Negative
Bottom Salinity	Water Column	Percent Contribution of Dominant Taxon	0.566	0.011	S	0.321	0.228	0.348	NS	0.052	Weak	Positive
Bottom Specific Conductivity	Water Column	Percent Contribution of Dominant Taxon	0.528	0.020	S	0.278	0.103	0.675	NS	0.011	Weak	Positive
Bottom Temperature	Water Column	Percent Contribution of Dominant Taxon	0.486	0.035	S	0.236	0.294	0.223	NS	0.086	Weak	Positive
Bottom Water pH	Water Column	Percent Contribution of Dominant Taxon	-0.623	0.004	S	0.388	-0.552	0.014	S	0.305	Weak	Negative
Percent ABM	Sediment	Density of Dominant Taxon	0.317	0.186	NS	0.100	0.482	0.036	S	0.233	Weak	Positive
Coarse Sand	Sediment	Density of Dominant Taxon	0.414	0.078	NS	0.171	0.498	0.030	S	0.248	Weak	Positive
Medium Sand	Sediment	Density of Dominant Taxon	0.463	0.046	S	0.215	0.523	0.022	S	0.274	Weak	Positive
Silt/Clay	Sediment	Density of Dominant Taxon	-0.310	0.196	NS	0.096	-0.474	0.040	S	0.225	Weak	Negative
Copper	Sediment	Percent Spionid Polychaetes	0.675	0.002	S	0.455	0.637	0.003	S	0.406	Weak	Positive
Lead	Sediment	Percent Spionid Polychaetes	0.428	0.068	NS	0.183	0.601	0.006	S	0.361	Weak	Positive
Mercury	Sediment	Percent Spionid Polychaetes	0.367	0.122	NS	0.135	0.468	0.043	S	0.219	Weak	Positive
Zinc	Sediment	Percent Spionid Polychaetes	0.230	0.344	NS	0.053	0.469	0.043	S	0.220	Weak	Positive
Total Organic Carbon	Sediment	Percent Spionid Polychaetes	0.703	0.001	S	0.494	0.652	0.002	S	0.425	Weak	Positive
Fine Sand	Sediment	Percent Spionid Polychaetes	-0.683	0.001	S	0.467	-0.662	0.002	S	0.438	Weak	Negative
Silt/Clay	Sediment	Percent Spionid Polychaetes	0.566	0.012	S	0.320	0.536	0.018	S	0.287	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Spionid Polychaetes	-0.775	0.0001	S	0.600	-0.730	0.0004	S	0.532	Moderate	Negative

TABLE D-24

Statistically Significant Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Bottom Salinity	Water Column	Percent Spionid Polychaetes	0.482	0.037	S	0.232	0.232	0.340	NS	0.054	Weak	Positive
Bottom Water pH	Water Column	Percent Spionid Polychaetes	-0.679	0.001	S	0.461	-0.597	0.007	S	0.357	Weak	Negative
Sediment pH	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.552	0.014	S	0.305	-0.342	0.151	NS	0.117	Weak	Negative
Total Organic Carbon	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.468	0.043	S	0.219	-0.339	0.156	NS	0.115	Weak	Negative
Coarse Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.480	0.037	S	0.231	0.633	0.004	S	0.400	Weak	Positive
Medium Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.542	0.016	S	0.294	0.358	0.132	NS	0.128	Weak	Positive
Silt/Clay	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.489	0.034	S	0.239	-0.249	0.303	NS	0.062	Weak	Negative
Coarse Sand	Sediment	Density of Pollution Tolerant Organisms	0.372	0.117	NS	0.138	0.479	0.038	S	0.230	Weak	Positive
Copper	Sediment	Percent Pollution Tolerant Organisms	0.652	0.002	S	0.425	0.574	0.010	S	0.329	Weak	Positive
Lead	Sediment	Percent Pollution Tolerant Organisms	0.452	0.052	NS	0.204	0.489	0.034	S	0.239	Weak	Positive
Total Organic Carbon	Sediment	Percent Pollution Tolerant Organisms	0.626	0.004	S	0.392	0.590	0.008	S	0.348	Weak	Positive
Fine Sand	Sediment	Percent Pollution Tolerant Organisms	-0.590	0.008	S	0.348	-0.632	0.004	S	0.399	Weak	Negative
Silt/Clay	Sediment	Percent Pollution Tolerant Organisms	0.446	0.055	NS	0.199	0.476	0.039	S	0.227	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Pollution Tolerant Organisms	-0.689	0.001	S	0.474	-0.637	0.003	S	0.406	Weak	Negative
Bottom Salinity	Water Column	Percent Pollution Tolerant Organisms	0.482	0.037	S	0.232	0.190	0.436	NS	0.036	Weak	Positive
Bottom Water pH	Water Column	Percent Pollution Tolerant Organisms	-0.610	0.006	S	0.372	-0.535	0.018	S	0.287	Weak	Negative
Copper	Sediment	Density of Pollution Sensitive Organisms	-0.539	0.017	S	0.291	-0.659	0.002	S	0.434	Weak	Negative
Tin	Sediment	Density of Pollution Sensitive Organisms	-0.504	0.028	S	0.254	-0.689	0.001	S	0.474	Weak	Negative
Zinc	Sediment	Density of Pollution Sensitive Organisms	-0.461	0.047	S	0.212	-0.553	0.014	S	0.306	Weak	Negative
Total Organic Carbon	Sediment	Density of Pollution Sensitive Organisms	-0.419	0.074	NS	0.176	-0.528	0.020	S	0.279	Weak	Negative
Fine Sand	Sediment	Density of Pollution Sensitive Organisms	0.429	0.067	NS	0.184	0.708	0.001	S	0.501	Weak to Moderate	Positive
Bottom Dissolved Oxygen	Water Column	Density of Pollution Sensitive Organisms	0.616	0.005	S	0.379	0.559	0.013	S	0.312	Weak	Positive
Bottom Water pH	Water Column	Density of Pollution Sensitive Organisms	0.462	0.046	S	0.214	0.383	0.106	NS	0.146	Weak	Positive
Tin	Sediment	Percent Pollution Sensitive Organisms	-0.373	0.116	NS	0.139	-0.492	0.032	S	0.242	Weak	Negative
Sorted by Water/Sediment Parameter												
Bottom Dissolved Oxygen	Water Column	Number of Taxa (Taxa Richness)	0.734	0.0003	S	0.539	0.498	0.030	S	0.248	Weak to Moderate	Positive
Bottom Dissolved Oxygen	Water Column	Total Density	0.637	0.003	S	0.405	0.456	0.050	S	0.208	Weak	Positive
Bottom Dissolved Oxygen	Water Column	Percent Contribution of Dominant Taxon	-0.699	0.001	S	0.489	-0.635	0.004	S	0.403	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Percent Spionid Polychaetes	-0.775	0.0001	S	0.600	-0.730	0.0004	S	0.532	Moderate	Negative
Bottom Dissolved Oxygen	Water Column	Percent Pollution Tolerant Organisms	-0.689	0.001	S	0.474	-0.637	0.003	S	0.406	Weak	Negative
Bottom Dissolved Oxygen	Water Column	Density of Pollution Sensitive Organisms	0.616	0.005	S	0.379	0.559	0.013	S	0.312	Weak	Positive
Bottom Salinity	Water Column	Percent Contribution of Dominant Taxon	0.566	0.011	S	0.321	0.228	0.348	NS	0.052	Weak	Positive
Bottom Salinity	Water Column	Percent Spionid Polychaetes	0.482	0.037	S	0.232	0.232	0.340	NS	0.054	Weak	Positive
Bottom Salinity	Water Column	Percent Pollution Tolerant Organisms	0.482	0.037	S	0.232	0.190	0.436	NS	0.036	Weak	Positive
Bottom Specific Conductivity	Water Column	Percent Contribution of Dominant Taxon	0.528	0.020	S	0.278	0.103	0.675	NS	0.011	Weak	Positive

TABLE D-24

Statistically Significant Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Bottom Temperature	Water Column	Percent Contribution of Dominant Taxon	0.486	0.035	S	0.236	0.294	0.223	NS	0.086	Weak	Positive
Bottom Water pH	Water Column	Number of Taxa (Taxa Richness)	0.563	0.012	S	0.317	0.327	0.172	NS	0.107	Weak	Positive
Bottom Water pH	Water Column	Total Density	0.514	0.025	S	0.264	0.350	0.141	NS	0.123	Weak	Positive
Bottom Water pH	Water Column	Percent Contribution of Dominant Taxon	-0.623	0.004	S	0.388	-0.552	0.014	S	0.305	Weak	Negative
Bottom Water pH	Water Column	Percent Spionid Polychaetes	-0.679	0.001	S	0.461	-0.597	0.007	S	0.357	Weak	Negative
Bottom Water pH	Water Column	Percent Pollution Tolerant Organisms	-0.610	0.006	S	0.372	-0.535	0.018	S	0.287	Weak	Negative
Bottom Water pH	Water Column	Density of Pollution Sensitive Organisms	0.462	0.046	S	0.214	0.383	0.106	NS	0.146	Weak	Positive
Coarse Sand	Sediment	Total Density	0.219	0.369	NS	0.048	0.465	0.045	S	0.216	Weak	Positive
Coarse Sand	Sediment	Density of Dominant Taxon	0.414	0.078	NS	0.171	0.498	0.030	S	0.248	Weak	Positive
Coarse Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.480	0.037	S	0.231	0.633	0.004	S	0.400	Weak	Positive
Coarse Sand	Sediment	Density of Pollution Tolerant Organisms	0.372	0.117	NS	0.138	0.479	0.038	S	0.230	Weak	Positive
Copper	Sediment	Number of Taxa (Taxa Richness)	-0.566	0.012	S	0.320	-0.616	0.005	S	0.379	Weak	Negative
Copper	Sediment	Total Density	-0.516	0.024	S	0.266	-0.656	0.002	S	0.431	Weak	Negative
Copper	Sediment	Percent Contribution of Dominant Taxon	0.591	0.008	S	0.349	0.458	0.049	S	0.210	Weak	Positive
Copper	Sediment	Percent Spionid Polychaetes	0.675	0.002	S	0.455	0.637	0.003	S	0.406	Weak	Positive
Copper	Sediment	Percent Pollution Tolerant Organisms	0.652	0.002	S	0.425	0.574	0.010	S	0.329	Weak	Positive
Copper	Sediment	Density of Pollution Sensitive Organisms	-0.539	0.017	S	0.291	-0.659	0.002	S	0.434	Weak	Negative
Fine Sand	Sediment	Number of Taxa (Taxa Richness)	0.504	0.028	S	0.254	0.626	0.004	S	0.391	Weak	Positive
Fine Sand	Sediment	Total Density	0.407	0.084	NS	0.166	0.647	0.003	S	0.418	Weak	Positive
Fine Sand	Sediment	Percent Spionid Polychaetes	-0.683	0.001	S	0.467	-0.662	0.002	S	0.438	Weak	Negative
Fine Sand	Sediment	Percent Pollution Tolerant Organisms	-0.590	0.008	S	0.348	-0.632	0.004	S	0.399	Weak	Negative
Fine Sand	Sediment	Density of Pollution Sensitive Organisms	0.429	0.067	NS	0.184	0.708	0.001	S	0.501	Weak to Moderate	Positive
Lead	Sediment	Percent Spionid Polychaetes	0.428	0.068	NS	0.183	0.601	0.006	S	0.361	Weak	Positive
Lead	Sediment	Percent Pollution Tolerant Organisms	0.452	0.052	NS	0.204	0.489	0.034	S	0.239	Weak	Positive
Medium Sand	Sediment	Density of Dominant Taxon	0.463	0.046	S	0.215	0.523	0.022	S	0.274	Weak	Positive
Medium Sand	Sediment	Percent Mediomastus and Capitella Polychaetes	0.542	0.016	S	0.294	0.358	0.132	NS	0.128	Weak	Positive
Mercury	Sediment	Percent Spionid Polychaetes	0.367	0.122	NS	0.135	0.468	0.043	S	0.219	Weak	Positive
Percent ABM	Sediment	Density of Dominant Taxon	0.317	0.186	NS	0.100	0.482	0.036	S	0.233	Weak	Positive
Sediment pH	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.552	0.014	S	0.305	-0.342	0.151	NS	0.117	Weak	Negative
Silt/Clay	Sediment	Total Density	-0.372	0.117	NS	0.138	-0.640	0.003	S	0.410	Weak	Negative
Silt/Clay	Sediment	Density of Dominant Taxon	-0.310	0.196	NS	0.096	-0.474	0.040	S	0.225	Weak	Negative
Silt/Clay	Sediment	Percent Spionid Polychaetes	0.566	0.012	S	0.320	0.536	0.018	S	0.287	Weak	Positive
Silt/Clay	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.489	0.034	S	0.239	-0.249	0.303	NS	0.062	Weak	Negative
Silt/Clay	Sediment	Percent Pollution Tolerant Organisms	0.446	0.055	NS	0.199	0.476	0.039	S	0.227	Weak	Positive
Tin	Sediment	Number of Taxa (Taxa Richness)	-0.473	0.041	S	0.224	-0.638	0.003	S	0.407	Weak	Negative
Tin	Sediment	Percent Contribution of Dominant Taxon	0.349	0.143	NS	0.122	0.633	0.004	S	0.401	Weak	Positive

TABLE D-24

Statistically Significant Correlations of Sediment/Water Column Properties and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Medium	Benthic Invertebrate Metric	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
			Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Tin	Sediment	Density of Pollution Sensitive Organisms	-0.504	0.028	S	0.254	-0.689	0.001	S	0.474	Weak	Negative
Tin	Sediment	Percent Pollution Sensitive Organisms	-0.373	0.116	NS	0.139	-0.492	0.032	S	0.242	Weak	Negative
Total Organic Carbon	Sediment	Number of Taxa (Taxa Richness)	-0.475	0.040	S	0.226	-0.499	0.030	S	0.249	Weak	Negative
Total Organic Carbon	Sediment	Total Density	-0.401	0.089	NS	0.161	-0.490	0.033	S	0.240	Weak	Negative
Total Organic Carbon	Sediment	Percent Contribution of Dominant Taxon	0.613	0.005	S	0.376	0.446	0.056	NS	0.199	Weak	Positive
Total Organic Carbon	Sediment	Percent Spionid Polychaetes	0.703	0.001	S	0.494	0.652	0.002	S	0.425	Weak	Positive
Total Organic Carbon	Sediment	Percent Mediomastus and Capitella Polychaetes	-0.468	0.043	S	0.219	-0.339	0.156	NS	0.115	Weak	Negative
Total Organic Carbon	Sediment	Percent Pollution Tolerant Organisms	0.626	0.004	S	0.392	0.590	0.008	S	0.348	Weak	Positive
Total Organic Carbon	Sediment	Density of Pollution Sensitive Organisms	-0.419	0.074	NS	0.176	-0.528	0.020	S	0.279	Weak	Negative
Zinc	Sediment	Number of Taxa (Taxa Richness)	-0.419	0.074	NS	0.175	-0.498	0.030	S	0.248	Weak	Negative
Zinc	Sediment	Percent Contribution of Dominant Taxon	0.386	0.102	NS	0.149	0.498	0.030	S	0.248	Weak	Positive
Zinc	Sediment	Percent Spionid Polychaetes	0.230	0.344	NS	0.053	0.469	0.043	S	0.220	Weak	Positive
Zinc	Sediment	Density of Pollution Sensitive Organisms	-0.461	0.047	S	0.212	-0.553	0.014	S	0.306	Weak	Negative

S - Statistically Significant ($p \leq 0.05$); NS - Not Statistically Significant ($p > 0.05$)

R^2 - Represents the percentage of variability explained

1 - Weak: $R^2 < 0.50$; Moderate: R^2 0.50 to 0.80; Strong: $R^2 > 0.80$

TABLE D-25

Correlations of Among Key Sediment Parameters, Water Column Parameters, and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Parameter	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
		Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Copper	Tin	0.531	0.019	S	0.282	0.482	0.036	S	0.233	Weak	Positive
Copper	Fine Sand	-0.595	0.007	S	0.354	-0.659	0.002	S	0.434	Weak	Negative
Copper	Total Organic Carbon	0.773	0.0001	S	0.598	0.813	0.00002	S	0.662	Moderate	Positive
Copper	Bottom Dissolved Oxygen	-0.787	0.0001	S	0.619	-0.691	0.001	S	0.477	Weak to Moderate	Negative
Tin	Copper	0.531	0.019	S	0.282	0.482	0.036	S	0.233	Weak	Positive
Tin	Fine Sand	-0.212	0.383	NS	0.045	-0.271	0.262	NS	0.073	Weak	Negative
Tin	Total Organic Carbon	0.175	0.474	NS	0.031	0.362	0.128	NS	0.131	Weak	Positive
Tin	Bottom Dissolved Oxygen	-0.358	0.133	NS	0.128	-0.425	0.070	NS	0.181	Weak	Negative
Fine Sand	Copper	-0.595	0.007	S	0.354	-0.659	0.002	S	0.434	Weak	Negative
Fine Sand	Tin	-0.212	0.383	NS	0.045	-0.271	0.262	NS	0.073	Weak	Negative
Fine Sand	Total Organic Carbon	-0.704	0.001	S	0.495	-0.629	0.004	S	0.396	Weak	Negative
Fine Sand	Bottom Dissolved Oxygen	0.590	0.008	S	0.348	0.495	0.031	S	0.245	Weak	Positive
Total Organic Carbon	Copper	0.773	0.0001	S	0.598	0.813	0.00002	S	0.662	Moderate	Positive
Total Organic Carbon	Tin	0.175	0.474	NS	0.031	0.362	0.128	NS	0.131	Weak	Positive
Total Organic Carbon	Fine Sand	-0.704	0.001	S	0.495	-0.629	0.004	S	0.396	Weak	Negative
Total Organic Carbon	Bottom Dissolved Oxygen	-0.710	0.001	S	0.503	-0.659	0.002	S	0.434	Weak to Moderate	Negative
Bottom Dissolved Oxygen	Copper	-0.787	0.0001	S	0.619	-0.691	0.001	S	0.477	Weak to Moderate	Negative
Bottom Dissolved Oxygen	Tin	-0.358	0.133	NS	0.128	-0.425	0.070	NS	0.181	Weak	Negative
Bottom Dissolved Oxygen	Fine Sand	0.590	0.008	S	0.348	0.495	0.031	S	0.245	Weak	Positive
Bottom Dissolved Oxygen	Total Organic Carbon	-0.710	0.001	S	0.503	-0.659	0.002	S	0.434	Weak to Moderate	Negative
Number of Taxa (Taxa Richness)	Total Density	0.905	0.0000001	S	0.819	0.758	0.0002	S	0.575	Moderate to Strong	Positive
Number of Taxa (Taxa Richness)	Percent Contribution of Dominant Taxon	-0.553	0.014	S	0.305	-0.545	0.016	S	0.297	Weak	Negative
Number of Taxa (Taxa Richness)	Percent Spionid Polychaetes	-0.638	0.003	S	0.407	-0.580	0.009	S	0.336	Weak	Negative
Number of Taxa (Taxa Richness)	Percent Pollution Tolerant Organisms	-0.540	0.017	S	0.292	-0.485	0.035	S	0.236	Weak	Negative
Number of Taxa (Taxa Richness)	Density of Pollution Sensitive Organisms	0.632	0.004	S	0.400	0.821	0.00002	S	0.674	Weak to Moderate	Positive
Total Density	Number of Taxa (Taxa Richness)	0.905	0.0000001	S	0.819	0.758	0.0002	S	0.575	Moderate to Strong	Positive
Total Density	Percent Contribution of Dominant Taxon	-0.392	0.097	NS	0.153	-0.228	0.348	NS	0.052	Weak	Negative
Total Density	Percent Spionid Polychaetes	-0.487	0.035	S	0.237	-0.391	0.098	NS	0.153	Weak	Negative
Total Density	Percent Pollution Tolerant Organisms	-0.388	0.101	NS	0.150	-0.346	0.147	NS	0.119	Weak	Negative
Total Density	Density of Pollution Sensitive Organisms	0.443	0.057	NS	0.196	0.615	0.005	S	0.379	Weak	Positive

TABLE D-25

Correlations of Among Key Sediment Parameters, Water Column Parameters, and Benthic Invertebrates Metrics (2010 Samples)

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Parameter	Parameter	Pearson (parametric)				Spearman (non-parametric)				Relative Strength[1]	Direction
		Correlation Coefficient	Probability		R^2	Correlation Coefficient	Probability		R^2		
Percent Contribution of Dominant Taxon	Number of Taxa (Taxa Richness)	-0.553	0.014	S	0.305	-0.545	0.016	S	0.297	Weak	Negative
Percent Contribution of Dominant Taxon	Total Density	-0.392	0.097	NS	0.153	-0.228	0.348	NS	0.052	Weak	Negative
Percent Contribution of Dominant Taxon	Percent Spionid Polychaetes	0.779	0.0001	S	0.606	0.733	0.0004	S	0.538	Moderate	Positive
Percent Contribution of Dominant Taxon	Percent Pollution Tolerant Organisms	0.765	0.0001	S	0.585	0.737	0.0003	S	0.543	Moderate	Positive
Percent Contribution of Dominant Taxon	Density of Pollution Sensitive Organisms	-0.575	0.010	S	0.331	-0.769	0.0001	S	0.592	Weak to Moderate	Negative
Percent Spionid Polychaetes	Number of Taxa (Taxa Richness)	-0.638	0.003	S	0.407	-0.580	0.009	S	0.336	Weak	Negative
Percent Spionid Polychaetes	Total Density	-0.487	0.035	S	0.237	-0.391	0.098	NS	0.153	Weak	Negative
Percent Spionid Polychaetes	Percent Contribution of Dominant Taxon	0.779	0.0001	S	0.606	0.733	0.0004	S	0.538	Moderate	Positive
Percent Spionid Polychaetes	Percent Pollution Tolerant Organisms	0.967	<0.0000001	S	0.935	0.956	<0.0000001	S	0.914	Strong	Positive
Percent Spionid Polychaetes	Density of Pollution Sensitive Organisms	-0.652	0.003	S	0.425	-0.636	0.003	S	0.404	Weak	Negative
Percent Pollution Tolerant Organisms	Number of Taxa (Taxa Richness)	-0.540	0.017	S	0.292	-0.485	0.035	S	0.236	Weak	Negative
Percent Pollution Tolerant Organisms	Total Density	-0.388	0.101	NS	0.150	-0.346	0.147	NS	0.119	Weak	Negative
Percent Pollution Tolerant Organisms	Percent Contribution of Dominant Taxon	0.765	0.0001	S	0.585	0.737	0.0003	S	0.543	Moderate	Positive
Percent Pollution Tolerant Organisms	Percent Spionid Polychaetes	0.967	<0.0000001	S	0.935	0.956	<0.0000001	S	0.914	Strong	Positive
Percent Pollution Tolerant Organisms	Density of Pollution Sensitive Organisms	-0.633	0.004	S	0.401	-0.615	0.005	S	0.378	Weak	Negative
Density of Pollution Sensitive Organisms	Number of Taxa (Taxa Richness)	0.632	0.004	S	0.400	0.821	0.00002	S	0.674	Weak to Moderate	Positive
Density of Pollution Sensitive Organisms	Total Density	0.443	0.057	NS	0.196	0.615	0.005	S	0.379	Weak	Positive
Density of Pollution Sensitive Organisms	Percent Contribution of Dominant Taxon	-0.575	0.010	S	0.331	-0.769	0.0001	S	0.592	Weak to Moderate	Negative
Density of Pollution Sensitive Organisms	Percent Spionid Polychaetes	-0.652	0.003	S	0.425	-0.636	0.003	S	0.404	Weak	Negative
Density of Pollution Sensitive Organisms	Percent Pollution Tolerant Organisms	-0.633	0.004	S	0.401	-0.615	0.005	S	0.378	Weak	Negative

S - Statistically Significant ($p \leq 0.05$); NS - Not Statistically Significant ($p > 0.05$)

R^2 - Represents the percentage of variability explained

1 - Weak: $R^2 < 0.50$; Moderate: R^2 0.50 to 0.80; Strong: $R^2 > 0.80$

TABLE D-26

Multivariate Regression Evaluation of 2010 Benthic Invertebrate Metrics

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

	Dependent Variable	Method	R^2	Adjusted R^2	Intercept	Copper	Tin	Fine Sand	TOC	Bottom Dissolved Oxygen
Coefficients	Number of Taxa (Taxa Richness)	Stepwise	0.539	0.512	-88.0					18.7
Probabilities		Stepwise			**0.002**					**0.0003**
Coefficients	Number of Taxa (Taxa Richness)	Backward	0.539	0.512	-88.01					18.7
Probabilities		Backward			**0.002**					**0.0003**
Coefficients	Number of Taxa (Taxa Richness)	Forward	0.624	0.517	-96.2	0.08	-0.78	0.15		19.3
Probabilities		Forward			**0.041**	0.338	0.117	0.438		**0.015**
Coefficients	Number of Taxa (Taxa Richness)	None	0.624	0.480	-96.7	0.08	-0.77	0.16	0.00002	19.3
Probabilities		None			0.060	0.453	0.170	0.492	0.975	**0.021**
Coefficients	Total Density	Stepwise	0.405	0.370	-7741					1597
Probabilities		Stepwise			0.009					0.003
Coefficients	Total Density	Backward	0.405	0.370	-7741					1597
Probabilities		Backward			0.009					0.003
Coefficients	Total Density	Forward	0.405	0.370	-7741					1597
Probabilities		Forward			0.009					0.003
Coefficients	Total Density	None	0.423	0.201	-8278	-3.557084	2.034321	10.937285	0.036237	1572
Probabilities		None			0.172	0.784	0.975	0.690	0.591	0.103
Coefficients	Percent Contribution of Dominant Taxon	Stepwise	0.489	0.459	215					-31.2
Probabilities		Stepwise			0.0001					0.001
Coefficients	Percent Contribution of Dominant Taxon	Backward	0.489	0.459	215					-31.2
Probabilities		Backward			0.0001					0.001
Coefficients	Percent Contribution of Dominant Taxon	Forward	0.533	0.439	140		0.567		0.001	-20.9
Probabilities		Forward			0.093		0.484		0.325	0.099
Coefficients	Percent Contribution of Dominant Taxon	None	0.554	0.383	157	-0.121	0.948	0.220	0.001	-25.6
Probabilities		None			0.104	0.554	0.366	0.610	0.235	0.091
Coefficients	Percent Spionid Polychaetes	Stepwise	0.679	0.638	249			-0.730		-33.9
Probabilities		Stepwise			0.0002			0.066		0.005

TABLE D-26

Multivariate Regression Evaluation of 2010 Benthic Invertebrate Metrics

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

	Dependent Variable	Method	R^2	Adjusted R^2	Intercept	Copper	Tin	Fine Sand	TOC	Bottom Dissolved Oxygen
Coefficients	Percent Spionid Polychaetes	Backward	0.679	0.638	249			-0.730		-33.9
Probabilities		Backward			0.0002			0.066		0.005
Coefficients	Percent Spionid Polychaetes	Forward	0.679	0.638	249			-0.730		-33.9
Probabilities		Forward			0.0002			0.066		0.005
Coefficients	Percent Spionid Polychaetes	None	0.693	0.575	212	-0.075	0.604	-0.578	0.001	-30.4
Probabilities		None			0.052	0.738	0.598	0.235	0.488	0.071
Coefficients	Percent Pollution Tolerant Organisms	Stepwise	0.474	0.443	304					-45.9
Probabilities		Stepwise			0.0002					0.001
Coefficients	Percent Pollution Tolerant Organisms	Backward	0.474	0.443	304					-45.9
Probabilities		Backward			0.0002					0.001
Coefficients	Percent Pollution Tolerant Organisms	Forward	0.541	0.449	194	0.145		-0.565		-25.6
Probabilities		Forward			0.1240	0.493		0.302		0.208
Coefficients	Percent Pollution Tolerant Organisms	None	0.548	0.374	180	0.055	0.573	-0.480	0.001	-24.9
Probabilities		None			0.204	0.856	0.712	0.460	0.711	0.258
Coefficients	Density of Pollution Sensitive Organisms	Stepwise	0.472	0.406	-662		-9.027			149
Probabilities		Stepwise			0.069		0.114			0.021
Coefficients	Density of Pollution Sensitive Organisms	Backward	0.379	0.343	-924					184
Probabilities		Backward			0.010					0.005
Coefficients	Density of Pollution Sensitive Organisms	Forward	0.472	0.406	-662		-9.03			149
Probabilities		Forward			0.069		0.114			0.021
Coefficients	Density of Pollution Sensitive Organisms	None	0.484	0.285	-750	0.471	-10.2	1.29	-0.0003	154
Probabilities		None			0.265	0.746	0.182	0.676	0.967	0.150

Probability values in bold are statistically significant ($p \leq 0.05$)

TABLE D-27

Spatial Comparison of the Channel, Cove, and Pier Area - 2010 data

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Metric/Parameter	Kruskal-Wallis (ranks)					Analysis of Variance (values)							
	Probability	Decision	Channel	Cove	Pier	Probability	Decision	Channel	Mean	Cove	Mean	Pier	Mean
Number of Taxa (Taxa Richness)	0.020	Different	A	AB	B	0.013	Different	A	26.2	B	14.2	B	11.0
Total Density	0.352		A	A	A	0.182		A	1,822	A	817	A	932
Percent Contribution of Dominant Taxon	0.004	Different	B	AB	A	0.002	Different	B	26.7	B	34.8	A	55.4
Density Dominant Taxon	0.258		A	A	A	0.229		A	385	A	289	A	507
Percent Spionid Polychaetes	0.00005	Different	B	B	A	0.000	Different	C	15.6	B	37.1	A	61.0
Percent Mediomastus and Capitella Polychaetes	0.985		A	A	A	0.985		A	15.3	A	13.9	A	14.8
Percent Pollution Tolerant Organisms	0.0004	Different	B	B	A	0.000	Different	B	21.9	B	43.0	A	71.0
Density of Pollution Tolerant Organisms	0.082		A	A	A	0.120		A	307	A	343	A	654
Percent Pollution Sensitive Organisms	0.052		A	A	A	0.114		A	16.3	A	8.63	A	5.90
Density of Pollution Sensitive Organisms	0.019	Different	A	AB	B	0.002	Different	A	233	B	66.3	B	32.9
Copper	0.020	Different	B	AB	A	0.026	Different	B	51.1	AB	85.9	A	105
Lead	0.004	Different	B	A	A	0.127		A	29.5	A	78.5	A	98.2
Mercury	0.221		A	A	A	0.349		A	0.19	A	0.28	A	0.39
Tin	0.003	Different	B	A	A	0.042	Different	B	3.83	AB	8.21	A	9.53
Zinc	0.002	Different	B	A	A	0.048	Different	B	197	A	522	AB	488
SEM/AVS Ratio	0.492		A	A	A	0.515		A	0.010	A	0.016	A	0.010
Percent ABM	0.469		A	A	A	0.419		A	0.16	A	0.44	A	0.72
Sediment pH	0.760		A	A	A	0.497		A	7.86	A	8.07	A	8.04
TOC	0.007	Different	B	AB	A	0.009	Different	B	13,190	AB	17,600	A	23,125
Large Gravel	All Values = zero		A	A	A	All Values = zero		A	0.00	A	0.00	A	0.00
Coarse Gravel	All Values = zero		A	A	A	All Values = zero		A	0.00	A	0.00	A	0.00
Fine Gravel	0.530		A	A	A	0.530		A	0.00	A	0.00	A	0.13
Coarse Sand	0.867		A	A	A	0.826		A	0.40	A	0.67	A	0.75
Medium Sand	0.595		A	A	A	0.853		A	5.80	A	6.00	A	7.25
Fine Sand	0.059		A	A	A	0.098		A	33.0	A	27.7	A	20.0
Silt/Clay	0.482		A	A	A	0.437		A	60.8	A	65.7	A	71.9
Bottom Dissolved Oxygen	0.001	Different	A	B	B	0.001	Different	A	6.04	B	5.45	B	5.33
Bottom ORP	0.519		A	A	A	0.521		A	169	A	167	A	161
Bottom Salinity	0.021	Different	A	B	A	0.012	Different	AB	22.6	B	22.3	A	23.5
Bottom Specific Conductivity	0.037	Different	A	B	AB	0.056		A	35.8	A	35.4	A	36.8
Bottom Temperature	0.018	Different	A	B	A	0.052		A	24.7	A	24.4	A	24.7
Bottom Turbidity	0.725		A	A	A	0.949		A	9.96	A	10.6	A	9.85
Bottom Water pH	0.002	Different	A	B	B	0.003	Different	A	7.83	B	7.78	B	7.79

TABLE D-28

Comparison of Benthic Invertebrate Metric Values (2010) for the Channel With Cove and Pier Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Area	Benthic Invertebrate Metric		Sample	Benthic Invertebrate Metric		
			Number of Taxa (Taxa Richness)	Density of Pollution Sensitive Organisms		Percent Contribution of Dominant Taxon	Percent Spionid Polychaetes	Percent Pollution Tolerant Organisms
LW07-B5-SD401-00-10C	9/12/2010	Channel	25	402	LW07-B5-SD401-00-10C	23.6	15.1	17.0
LW07-B7-SD401-00-10C	9/12/2010	Channel	50	244	LW07-B7-SD401-00-10C	14.7	4.70	12.5
LW07-D5-SD401-00-10C	9/11/2010	Channel	9	14	LW07-D5-SD401-00-10C	37.5	37.5	37.5
LW07-F3-SD401-00-10C	9/11/2010	Channel	20	374	LW07-F3-SD401-00-10C	27.8	12.5	16.7
LW07-F5-SD401-00-10C	9/12/2010	Channel	27	129	LW07-F5-SD401-00-10C	29.8	8.30	25.6
Channel Minimum			9	14.4	Channel Minimum	14.7	4.70	12.5
Channel Mean			26.2	233	Channel Mean	27.4	15.8	23.1
Channel Maximum			50	402	Channel Maximum	37.5	37.5	37.5
LW07-H3-SD401-00-10C	9/11/2010	Cove	18	101	LW07-H3-SD401-00-10C	26.9	40.4	46.2
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	FALSE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	FALSE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-J4-SD401-00-10C	9/11/2010	Cove	15	86.2	LW07-J4-SD401-00-10C	31.0	56.3	64.8
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	FALSE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-K3-SD401-00-10C	9/11/2010	Cove	13	71.8	LW07-K3-SD401-00-10C	37.3	25.3	25.3
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	FALSE	FALSE	FALSE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-K4-SD401-00-10C	9/11/2010	Cove	13	43.1	LW07-K4-SD401-00-10C	45.8	11.9	11.9
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	FALSE	FALSE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	FALSE	FALSE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	FALSE

TABLE D-28

Comparison of Benthic Invertebrate Metric Values (2010) for the Channel With Cove and Pier Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Area	Benthic Invertebrate Metric: Number of Taxa (Taxa Richness)	Benthic Invertebrate Metric: Density of Pollution Sensitive Organisms	Sample	Benthic Invertebrate Metric: Percent Contribution of Dominant Taxon	Benthic Invertebrate Metric: Percent Spionid Polychaetes	Benthic Invertebrate Metric: Percent Pollution Tolerant Organisms
LW07-K5-SD401-00-10C	9/11/2010	Cove	14	57.5	LW07-K5-SD401-00-10C	28.2	46.2	56.4
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	FALSE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-L2-SD401-00-10C	9/11/2010	Cove	12	38.3	LW07-L2-SD401-00-10C	39.7	42.8	53.7
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-H1-SD401-00-10C	9/10/2010	Pier	6.7	19.2	LW07-H1-SD401-00-10C	71.3	76.1	90.7
Equals/Exceeds Minimum Channel			FALSE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-K1-SD401-00-10C	9/10/2010	Pier	11	14.4	LW07-K1-SD401-00-10C	75.9	79.6	87.0
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-L5-SD401-00-10C	9/11/2010	Pier	7	43.1	LW07-L5-SD401-00-10C	26.7	46.7	46.7
Equals/Exceeds Minimum Channel			FALSE	TRUE	Equals/Exceeds Maximum Channel	FALSE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	FALSE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-M1-SD401-00-10C	9/10/2010	Pier	16	28.7	LW07-M1-SD401-00-10C	59.8	62.1	73.6
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE

TABLE D-28

Comparison of Benthic Invertebrate Metric Values (2010) for the Channel With Cove and Pier Samples

Post-MILCON Action Ecological Risk Assessment

Joint Expeditionary Base Little Creek, Virginia Beach, Virginia

Sample	Date	Area	Benthic Invertebrate Metric		Sample	Benthic Invertebrate Metric		
			Number of Taxa (Taxa Richness)	Density of Pollution Sensitive Organisms		Percent Contribution of Dominant Taxon	Percent Spionid Polychaetes	Percent Pollution Tolerant Organisms
LW07-SD401-00-10C	9/11/2010	Pier	12	43.1	LW07-SD401-00-10C	68.9	71.1	77.8
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-SD402-00-10C	9/11/2010	Pier	17	57.5	LW07-SD402-00-10C	45.9	50.0	73.3
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-SD403-00-10C	9/11/2010	Pier	9	14.4	LW07-SD403-00-10C	52.1	54.9	72.2
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE
LW07-SD404-00-10C	9/10/2010	Pier	9	43.1	LW07-SD404-00-10C	42.3	47.1	47.1
Equals/Exceeds Minimum Channel			TRUE	TRUE	Equals/Exceeds Maximum Channel	TRUE	TRUE	TRUE
Equals/Exceeds Mean Channel			FALSE	FALSE	Equals/Exceeds Mean Channel	TRUE	TRUE	TRUE
Equals/Exceeds Maximum Channel			FALSE	FALSE	Equals/Exceeds Minimum Channel	TRUE	TRUE	TRUE

Figures

\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\FIGURE D-1 - SWMU 7 BOUNDARY AND IMMEDIATE VICINITY.MXD CBOWMAN 4/5/2011 14:25:12

Legend
- Outfall
- Storm Sewer Line
- Installation Boundary
- SWMU 7 Boundary
- Area Boundary Line
- Limits of 2008 MILCON Dredge

N
W E
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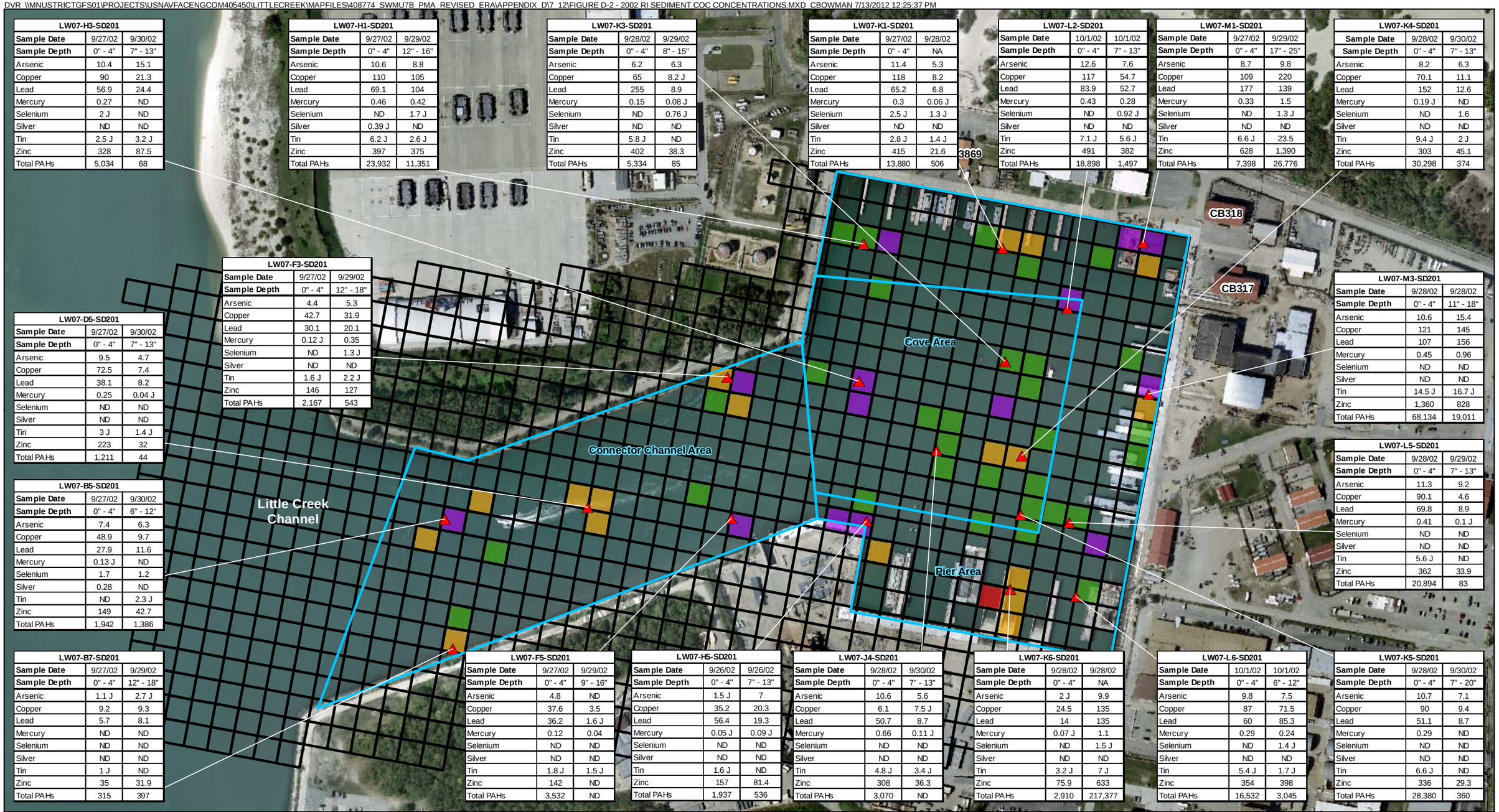
0 150 300
Feet

Figure D-1
SWMU 7 Boundary and Immediate Vicinity
Post-MILCON Action Ecological Risk Assessment
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\7_12\FIGURE D-2 - 2002 RI SEDIMENT COC CONCENTRATIONS.MXD CBOWMAN 7/13/2012 12:25:37 PM



LW07-H3-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	10.4	15.1
Copper	90	21.3
Lead	56.9	24.4
Mercury	0.27	ND
Selenium	2 J	ND
Silver	ND	ND
Tin	2.5 J	3.2 J
Zinc	328	87.5
Total PAHs	5,034	68

LW07-H1-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 16"
Arsenic	10.6	8.8
Copper	110	105
Lead	69.1	104
Mercury	0.46	0.42
Selenium	ND	1.7 J
Silver	0.39 J	ND
Tin	6.2 J	2.6 J
Zinc	397	375
Total PAHs	23,932	11,351

LW07-K3-SD201		
Sample Date	9/28/02	9/29/02
Sample Depth	0" - 4"	8" - 15"
Arsenic	6.2	6.3
Copper	65	8.2 J
Lead	255	8.9
Mercury	0.15	0.08 J
Selenium	ND	0.76 J
Silver	ND	ND
Tin	5.8 J	ND
Zinc	402	38.3
Total PAHs	5,334	85

LW07-K1-SD201		
Sample Date	9/27/02	9/28/02
Sample Depth	0" - 4"	NA
Arsenic	11.4	5.3
Copper	118	8.2
Lead	65.2	6.8
Mercury	0.3	0.06 J
Selenium	2.5 J	1.3 J
Silver	ND	ND
Tin	2.8 J	1.4 J
Zinc	415	21.6
Total PAHs	13,880	506

LW07-L2-SD201		
Sample Date	10/1/02	10/1/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	12.6	7.6
Copper	117	54.7
Lead	83.9	52.7
Mercury	0.43	0.28
Selenium	ND	0.92 J
Silver	ND	ND
Tin	7.1 J	5.6 J
Zinc	491	382
Total PAHs	18,898	1,497

LW07-M1-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	17" - 25"
Arsenic	8.7	9.8
Copper	109	220
Lead	177	139
Mercury	0.33	1.5
Selenium	ND	1.3 J
Silver	ND	ND
Tin	6.6 J	23.5
Zinc	628	1,390
Total PAHs	7,398	26,776

LW07-K4-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	8.2	6.3
Copper	70.1	11.1
Lead	152	12.6
Mercury	0.19 J	ND
Selenium	ND	1.6
Silver	ND	ND
Tin	9.4 J	2 J
Zinc	303	45.1
Total PAHs	30,298	374

LW07-F3-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 18"
Arsenic	4.4	5.3
Copper	42.7	31.9
Lead	30.1	20.1
Mercury	0.12 J	0.35
Selenium	ND	1.3 J
Silver	ND	ND
Tin	1.6 J	2.2 J
Zinc	146	127
Total PAHs	2,167	543

LW07-M3-SD201		
Sample Date	9/28/02	9/28/02
Sample Depth	0" - 4"	11" - 18"
Arsenic	10.6	15.4
Copper	121	145
Lead	107	156
Mercury	0.45	0.96
Selenium	ND	ND
Silver	ND	ND
Tin	14.5 J	16.7 J
Zinc	1,360	828
Total PAHs	68,134	19,011

LW07-D5-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	9.5	4.7
Copper	72.5	7.4
Lead	38.1	8.2
Mercury	0.25	0.04 J
Selenium	ND	ND
Silver	ND	ND
Tin	3 J	1.4 J
Zinc	223	32
Total PAHs	1,211	44

LW07-L5-SD201		
Sample Date	9/28/02	9/29/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	11.3	9.2
Copper	90.1	4.6
Lead	69.8	8.9
Mercury	0.41	0.1 J
Selenium	ND	ND
Silver	ND	ND
Tin	5.6 J	ND
Zinc	362	33.9
Total PAHs	20,894	83

LW07-B5-SD201		
Sample Date	9/27/02	9/30/02
Sample Depth	0" - 4"	6" - 12"
Arsenic	7.4	6.3
Copper	48.9	9.7
Lead	27.9	11.6
Mercury	0.13 J	ND
Selenium	1.7	1.2
Silver	0.28	ND
Tin	ND	2.3 J
Zinc	149	42.7
Total PAHs	1,942	1,386

LW07-B7-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	12" - 18"
Arsenic	1.1 J	2.7 J
Copper	9.2	9.3
Lead	5.7	8.1
Mercury	ND	ND
Selenium	ND	ND
Silver	ND	ND
Tin	1 J	ND
Zinc	35	31.9
Total PAHs	315	397

LW07-F5-SD201		
Sample Date	9/27/02	9/29/02
Sample Depth	0" - 4"	9" - 16"
Arsenic	4.8	ND
Copper	37.6	3.5
Lead	36.2	1.6 J
Mercury	0.12	0.04
Selenium	ND	ND
Silver	ND	ND
Tin	1.8 J	1.5 J
Zinc	142	ND
Total PAHs	3,532	ND

LW07-H5-SD201		
Sample Date	9/26/02	9/26/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	1.5 J	7
Copper	35.2	20.3
Lead	56.4	19.3
Mercury	0.05 J	0.09 J
Selenium	ND	ND
Silver	ND	ND
Tin	1.6 J	ND
Zinc	157	81.4
Total PAHs	1,937	536

LW07-J4-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 13"
Arsenic	10.6	5.6
Copper	6.1	7.5 J
Lead	50.7	8.7
Mercury	0.66	0.11 J
Selenium	ND	ND
Silver	ND	ND
Tin	4.8 J	3.4 J
Zinc	308	36.3
Total PAHs	3,070	ND

LW07-K6-SD201		
Sample Date	9/28/02	9/28/02
Sample Depth	0" - 4"	NA
Arsenic	2 J	9.9
Copper	24.5	135
Lead	14	135
Mercury	0.07 J	1.1
Selenium	ND	1.5 J
Silver	ND	ND
Tin	3.2 J	7 J
Zinc	75.9	633
Total PAHs	2,910	217,377

LW07-L6-SD201		
Sample Date	10/1/02	10/1/02
Sample Depth	0" - 4"	6" - 12"
Arsenic	9.8	7.5
Copper	87	71.5
Lead	60	85.3
Mercury	0.29	0.24
Selenium	ND	1.4 J
Silver	ND	ND
Tin	5.4 J	1.7 J
Zinc	354	398
Total PAHs	16,532	3,045

LW07-K5-SD201		
Sample Date	9/28/02	9/30/02
Sample Depth	0" - 4"	7" - 20"
Arsenic	10.7	7.1
Copper	90	9.4
Lead	51.1	8.7
Mercury	0.29	ND
Selenium	ND	ND
Silver	ND	ND
Tin	6.6 J	ND
Zinc	336	29.3
Total PAHs	28,380	360

Legend

▲ 2002 RI Discrete Sediment Sample Location

Area Boundary Line

2002 RI ABM Content

- No ABM
- Trace/Small ABM
- ABM Present
- Heavy ABM

NA - Not Available
ND - Not detected
J - Reported value is estimated

N
W E
S

0 150 300
Feet

Figure D-2
2002 RI Sediment COC Concentrations
Post-MILCON Action Evaluation
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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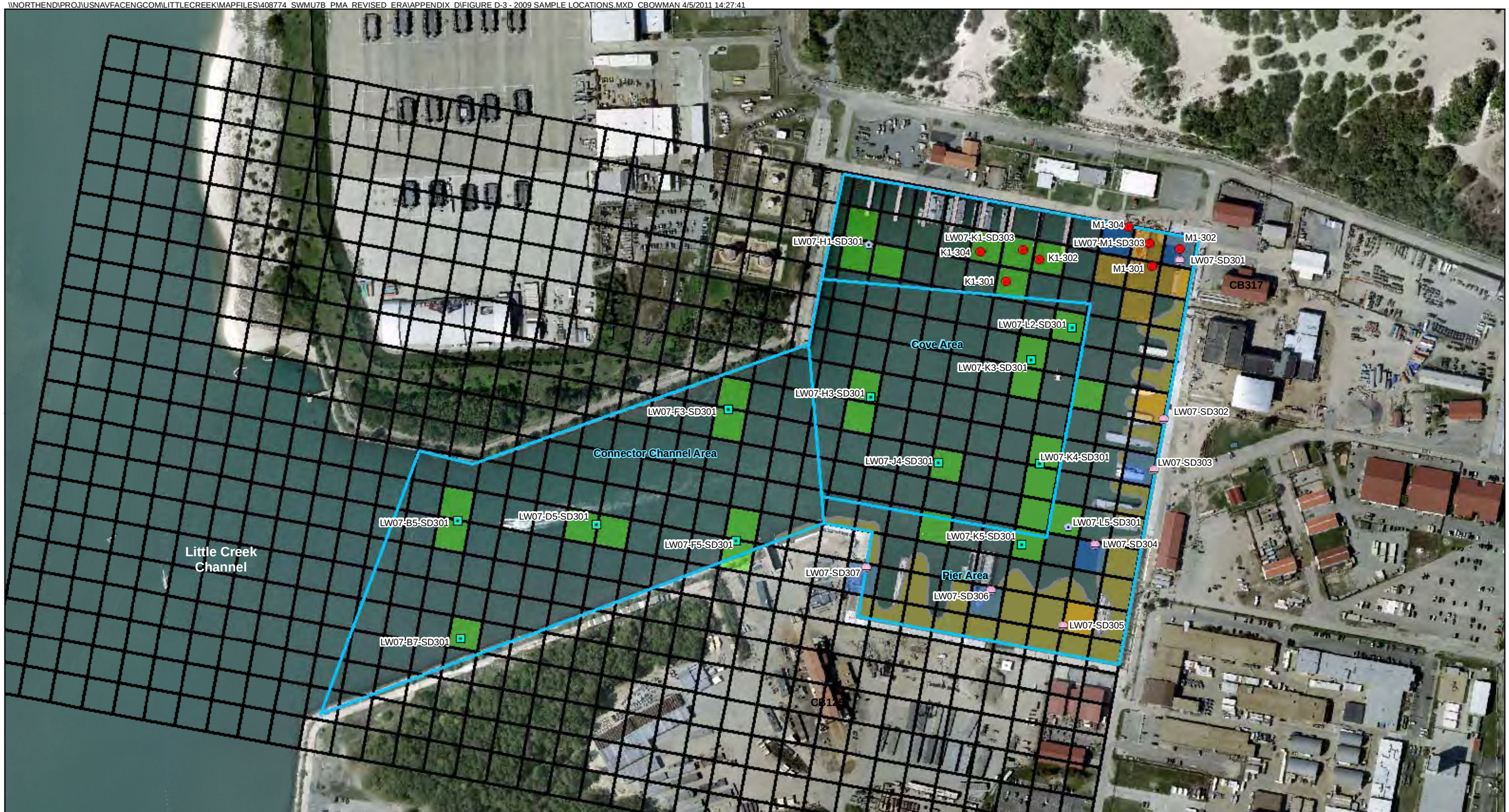
\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\FIGURE D-3 - 2009 SAMPLE LOCATIONS.MXD CBOWMAN 4/5/2011 14:27:41



Legend

- 2009 Pier Area Sediment Sample Location (previous RI sample location) - Low Concentrations
- 2009 Pier Area Sediment Sample Location (previous RI sample location) - High Concentrations
- 2009 Dredged Area Sediment Sample Location
- 2009 Cove/Connector Channel Sediment Sample Location (previous RI sample location)
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)

- ≤ 1%
- 1-5%
- 5-10%

N
W E
S

0 150 300
Feet

Figure D-3
2009 Sediment Sample Locations
Post-MILCON Action Ecological Risk Assessment
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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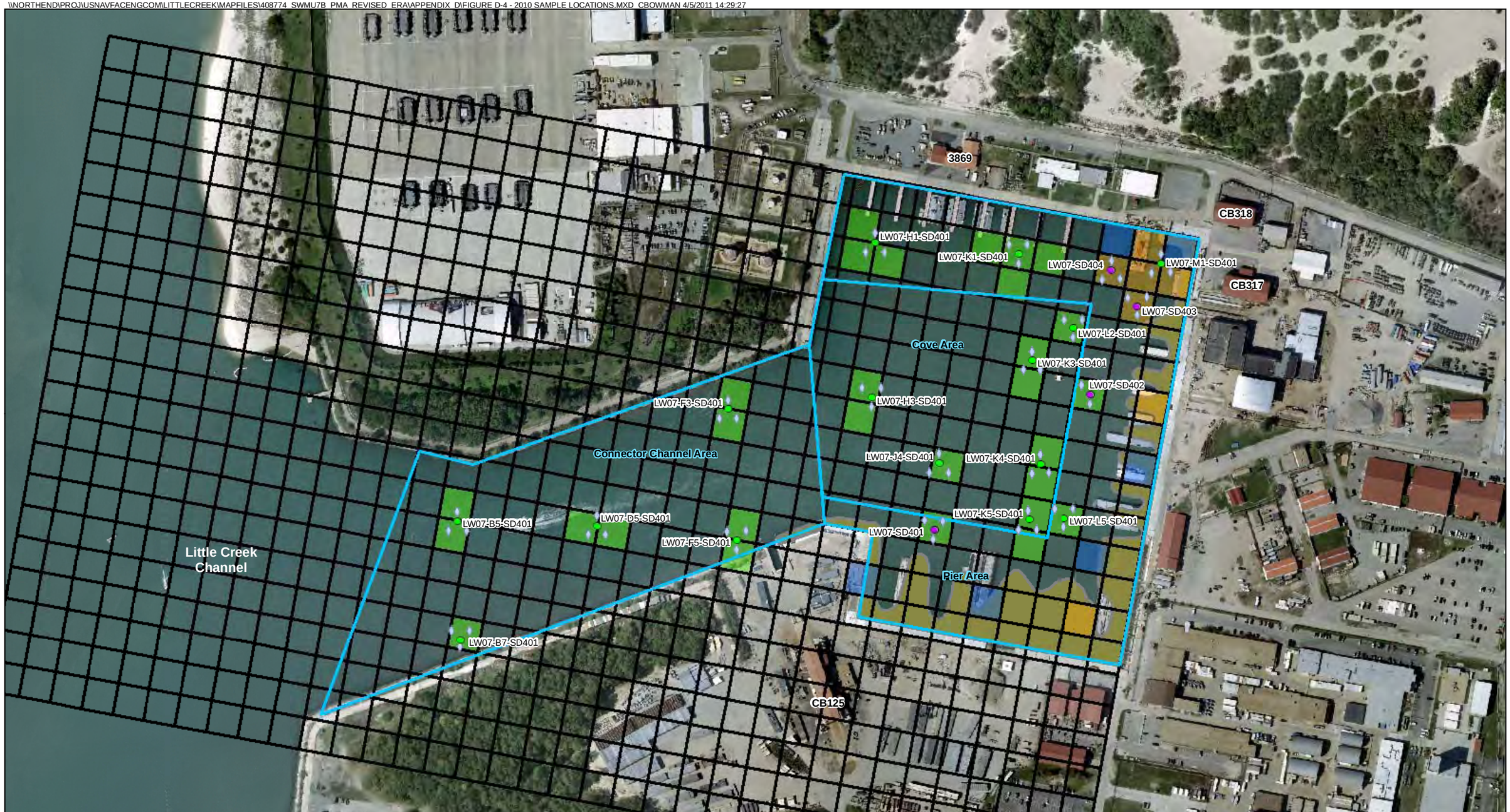
\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\FIGURE D-4 - 2010 SAMPLE LOCATIONS.MXD CBOWMAN 4/5/2011 14:29:27



Legend

- Sediment Sample Station Location (mid-point of grab samples) (new location, no surface sediment COC data currently available)
- Sediment Sample Station Location (mid-point of grab samples) (previous RI/2009 post-MILCON sample location)
- Grab Sample Location
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)

- ≤ 1%
- 1-5%
- 5-10%

N
W E
S

0 150 300
Feet

Figure D-4
2010 Sediment Sample Locations
Post-MILCON Action Ecological Risk Assessment
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

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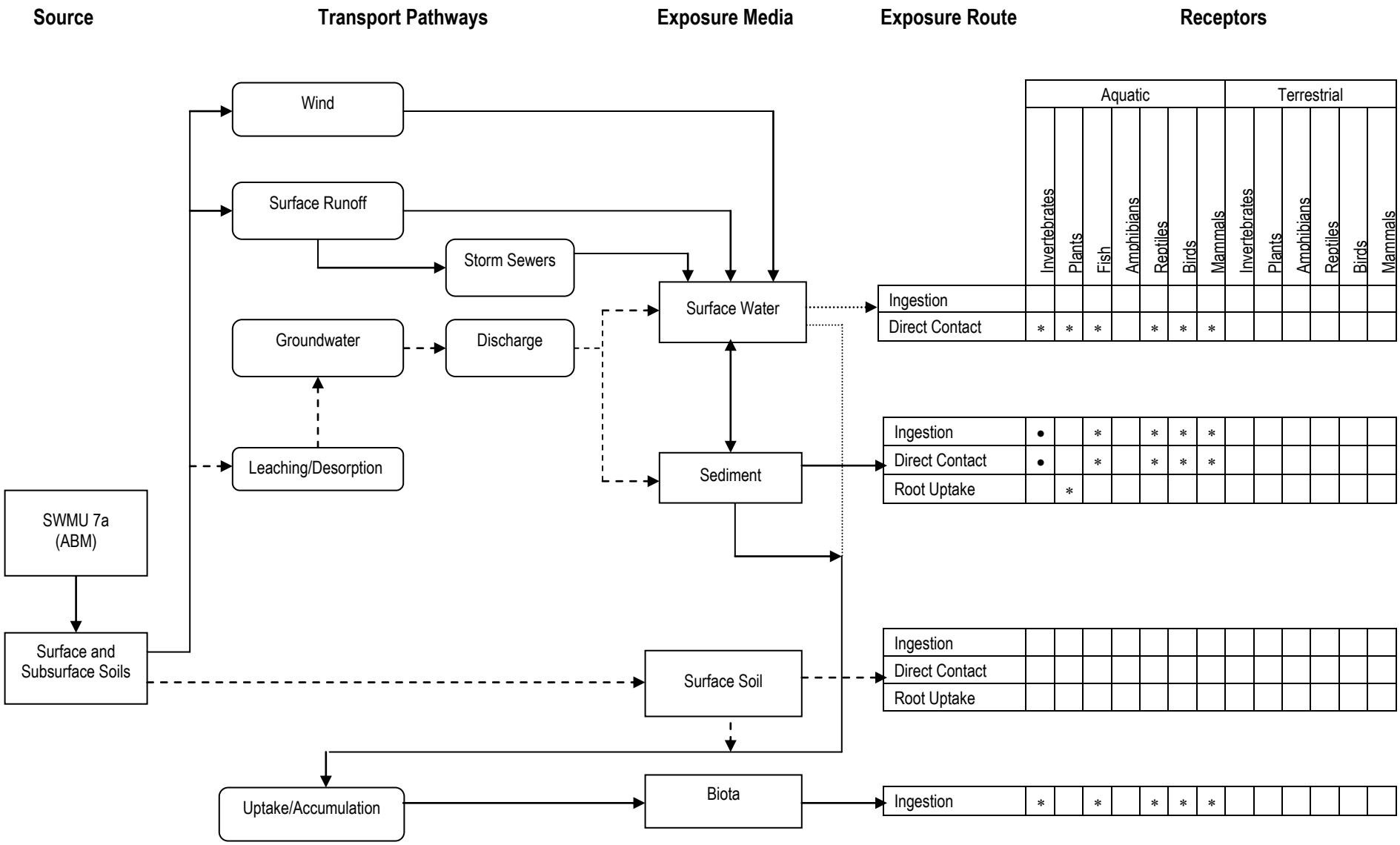


Complete pathway
Incomplete or insignificant pathway

FIGURE D-5
DIAGRAMMATIC CONCEPTUAL MODEL
POST-MILCON ACTION ECOLOGICAL RISK ASSESSMENT
JEB LITTLE CREEK, VIRGINIA BEACH, VIRGINIA

● - Receptor evaluated quantitatively
∗ - Receptor not evaluated quantitatively

\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\FIGURE D-6 - BACKGROUND SAMPLE LOCATIONS.MXD CBOWMAN 4/5/2011 14:34:14

Legend

- Background Sample Location
- Outfall
- Storm Sewer Line
- Reference Sample Location Area
- Installation Boundary
- SWMU 7 Boundary
- Area Boundary Line
- Limits of 2008 MILCON Dredge

N
W E
S

0 200 400
Feet

Figure D-6
Background Sample Locations
Post-MILCON Action Ecological Risk Assessment
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL

\\NORTHEND\PROJ\USNAVFACENGCOM\LITTLECREEK\MAPFILES\408774_SWMU7B_PMA_REVISED_ERA\APPENDIX_D\FIGURE D-7 - SPATIAL DISTRIBUTION OF BENTHIC TAXON.MXD CBOWMAN 4/5/2011 14:35:13

LW07-K1-SD301

Sample Date	11/24/09
Copper	101
Lead	72.1 J
Mercury	0.36
Tin	ND
Zinc	461

LW07-H1

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/10/10
Copper	110	51.7	166
Lead	69.1	70.3 J	62
Mercury	0.46	0.129	0.324
Tin	6.2 J*	ND	7.04*
Zinc	397	943	491

LW07-K1-SD304

Sample Date	11/24/09
Copper	121
Lead	61.2 J
Mercury	0.311
Tin	ND
Zinc	449

LW07-K1

Sample ID	SD201	SD303	SD401
Sample Date	9/27/02	11/24/09	9/10/10
Copper	118	114	111
Lead	65.2	72.6 J	67
Mercury	0.3	0.352	0.366
Tin	2.8 J*	ND	6.72*
Zinc	415	479	450

LW07-K1-SD302

Sample Date	11/24/09
Copper	110
Lead	80.7 J
Mercury	0.383
Tin	ND
Zinc	540

LW07-M1-SD304

Sample Date	11/24/09
Copper	170
Lead	131 L
Mercury	0.63
Tin	29.9
Zinc	840

LW07-M1

Sample ID	SD201	SD303
Sample Date	9/27/02	11/23/09
Copper	109	110
Lead	177	97.8 J
Mercury	0.33	0.534
Tin	6.6 J*	ND
Zinc	628	504

LW07-M1-SD302

Sample Date	11/22/09
Copper	69.4
Lead	98.6 J
Mercury	0.181
Tin	12.7*
Zinc	349

LW07-SD404

Sample Date	9/10/10
Copper	52.6
Lead	53.1 L
Mercury	0.188
Tin	12.2*
Zinc	296

LW07-SD403

Sample Date	9/11/10
Copper	157
Lead	211
Mercury	0.373
Tin	19.7*
Zinc	987

LW07-SD301**

Sample Date	11/23/09
Copper	252
Lead	587
Mercury	0.343 J
Tin	29.7
Zinc	1,440

LW07-L2

Sample ID	SD201	SD301**	SD401
Sample Date	10/1/02	11/24/09	9/11/10
Copper	117.0	101.0	78.7
Lead	83.9	58.4 L	37.4
Mercury	0.43	0.214	0.234
Tin	7.1 J*	14.8*	13.6*
Zinc	491	466	294

LW07-K3

Sample ID	SD201	SD301	SD401
Sample Date	9/28/02	11/24/09	9/11/10
Copper	65.0	70.4	96.1
Lead	255.0	76.4 J	88.6
Mercury	0.15	0.244	0.426
Tin	5.8 J*	10.1*	10.7*
Zinc	402	321	615

LW07-H3

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/11/10
Copper	90.0	87.8	84.8
Lead	56.9	57.9 J	52.6
Mercury	0.27	0.261	0.28
Tin	2.5 J*	ND	5.53*
Zinc	328	343	366

LW07-SD402**

Sample Date	9/11/10
Copper	55.1
Lead	50.5
Mercury	0.162
Tin	7.77 J*
Zinc	294

LW07-M1

Sample ID	SD301	SD401
Sample Date	11/24/09	9/10/10
Copper	136	127
Lead	233 J	236
Mercury	0.503	1.21
Tin	22.8	10.3*
Zinc	794	711

LW07-SD302

Sample Date	11/23/09
Copper	61.5
Lead	48.6
Mercury	0.304
Tin	ND
Zinc	252

LW07-SD303

Sample Date	11/23/09
Copper	30.7
Lead	20.8
Mercury	0.084
Tin	ND
Zinc	143

LW07-F3

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/11/10
Copper	42.7	71.1	59.0
Lead	30.1	50.4 J	45.6
Mercury	0.12 J	0.229	0.347
Tin	1.6 J*	ND	3.69*
Zinc	146	277	246

LW07-D5

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/11/10
Copper	72.5	70.7	82.4
Lead	38.1	36.6 J	5.7
Mercury	0.25	0.236	0.267
Tin	3 J*	ND	5.64*
Zinc	223	241	283

LW07-B5

Sample ID	SD201	SD301**	SD401**
Sample Date	9/27/02	11/24/09	9/12/10
Copper	48.9	70.1 J	43.7
Lead	27.9	27.3 J	21.5
Mercury	0.13 J	0.122	0.159
Tin	ND	ND	3.72*
Zinc	149	160	173

LW07-K4

Sample ID	SD201	SD301	SD401
Sample Date	9/28/02	11/23/09	9/11/10
Copper	70.1	65.2	75.4
Lead	152.0	42.1	52.6
Mercury	0.19 J	0.236	0.191
Tin	9.4 J*	ND	8.39*
Zinc	303	304	974

LW07-L5

Sample ID	SD201	SD301	SD401
Sample Date	9/28/02	11/24/09	9/11/10
Copper	90.1	94.6	98.7
Lead	69.8	55.3	63.1
Mercury	0.41	0.309	0.266
Tin	5.6 J*	ND	6.68*
Zinc	362	401	396

LW07-SD304

Sample Date	11/23/09
Copper	60.6
Lead	40.8
Mercury	0.2
Tin	ND
Zinc	319

LW07-SD307

Sample Date	11/23/09
Copper	34.7
Lead	44.6
Mercury	0.0726
Tin	ND
Zinc	205

LW07-K5

Sample ID	SD201	SD301	SD401
Sample Date	9/28/02	11/23/09	9/11/10
Copper	90.0	91.3	93.9
Lead	51.1	48.5	109.0
Mercury	0.29	0.381	0.271
Tin	6.6 J*	ND	5.59*
Zinc	336	381	401

LW07-B7

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/12/10
Copper	9.2	70.2	45.8
Lead	5.7	34.2 J	24.8
Mercury	ND	0.103	0.125
Tin	1 J*	ND	3.61*
Zinc	35	206	190

LW07-F5

Sample ID	SD201	SD301	SD401
Sample Date	9/27/02	11/24/09	9/12/10
Copper	37.6	19.8	24.7
Lead	36.2	18.6 J	14.9
Mercury	0.12	0.0581	0.0463
Tin	1.8 J*	ND	2.5*
Zinc	142	85	93

LW07-J4

Sample ID	SD201	SD301	SD401
Sample Date	9/28/02	11/24/09	9/11/10
Copper	6.1	101.0	86.3
Lead	50.7	53.4 J	131.0
Mercury	0.66	0.315	0.271
Tin	4.8 J*	ND	5.43*
Zinc	308	366	479

LW07-SD401

Sample Date	9/11/10
Copper	72.5
Lead	43.2
Mercury	0.218
Tin	5.81*
Zinc	279

LW07-SD306

Sample Date	11/23/09
Copper	58.2
Lead	44.9
Mercury	0.134
Tin	ND
Zinc	218

LW07-SD305

Sample Date	11/23/09
Copper	107
Lead	65.7
Mercury	0.294
Tin	ND
Zinc	659

COPC	Screening Value				
	ER-L	ER-M	TEL	PEL	Maximum Background
Copper	34.0	270	18.7	108	184
Lead	46.7	218	30.2	112	67.6
Mercury	0.15	0.71	0.13	0.70	0.2
Tin	3.4	--	3.4	--	9.8
Zinc	150	410	124	271	421

COPC < TEL, ER-L, PEL, ER-M
TEL < COPC < ER-L, PEL, ER-M
TEL, ER-L < COPC < PEL, ER-M
TEL, ER-L, PEL < COPC < ER-M
TEL, ER-L, PEL, ER-M < COPC

Bold text indicates exceedance of background.
L - Analyte present. Value may be biased low.
J - Reported value is estimated
ND - Not detected
* TBT fraction below screening level based upon calculated TBT : Total Tin ratio calculated using the 2009 data (0.17).
**Duplicate sample collected at this location, most conservative value reported

Legend

- 2002 RI Discrete Sediment Sample Location
- 2009 Pier Area Sediment Sample Location - Low Concentrations
- 2009 Pier Area Sediment Sample Location - High Concentrations
- 2009 Dredged Area Sediment Sample Location
- 2009 Cove/Connector Channel Sediment Sample Location
- 2010 Sediment Sample Station Location (mid-point of grab samples)
- Limits of 2008 MILCON Dredge
- Area Boundary Line

Surface Sediment ABM Content (per 2009 and 2010 Sampling)

- ≤ 1%
- 1-5%
- 5-10%

N W E S

0 150 300 Feet

Figure D-7
Surface Sediment COC Concentrations
Post-MILCON Action Ecological Risk Assessment
SWMU 7b – Small Boats Sandblast Yard (Desert Cove)
Joint Expeditionary Base Little Creek
Virginia Beach, Virginia

CH2MHILL

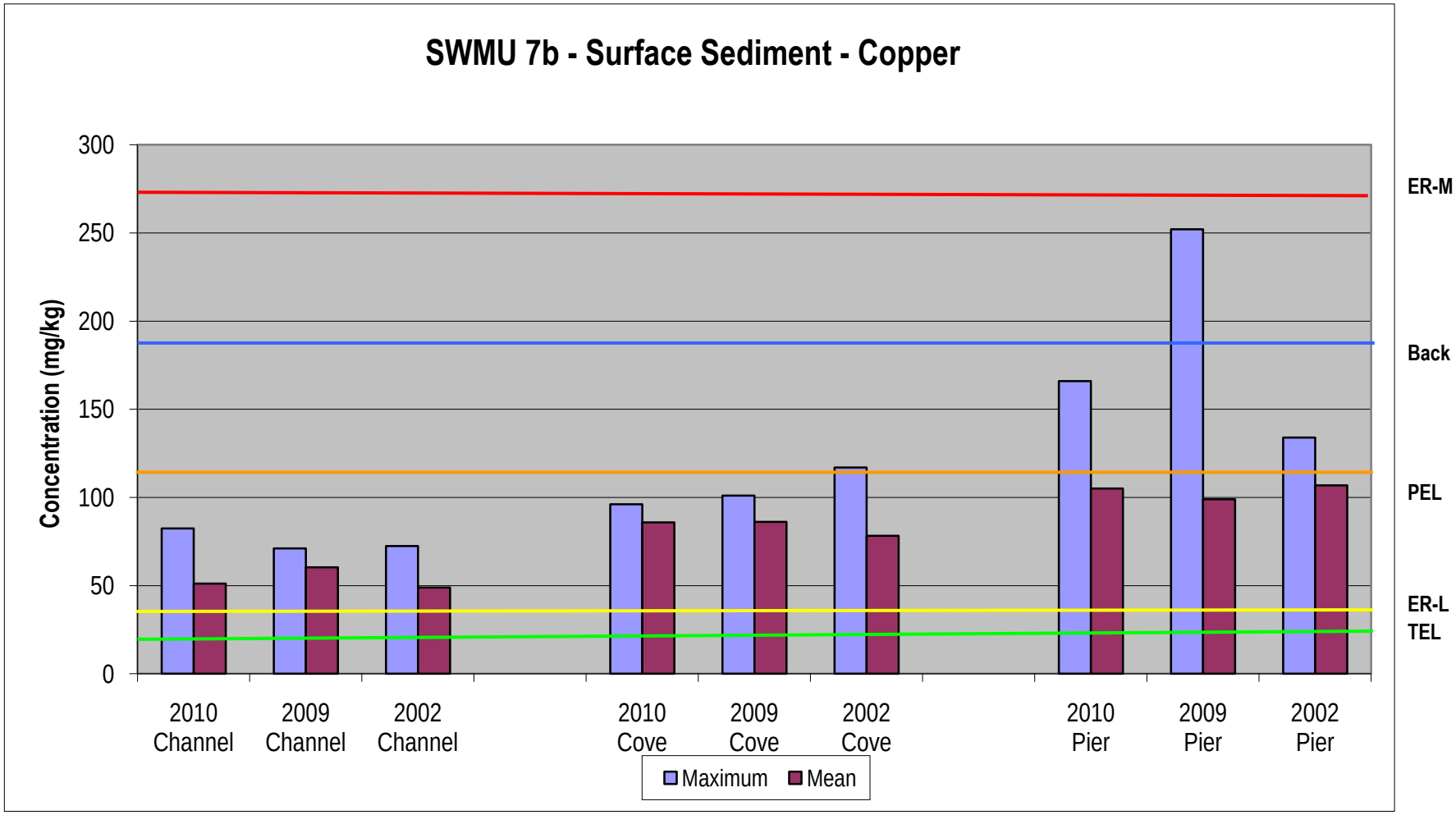


Figure D-8a. Surface Sediment Concentrations by Area and Year - Copper

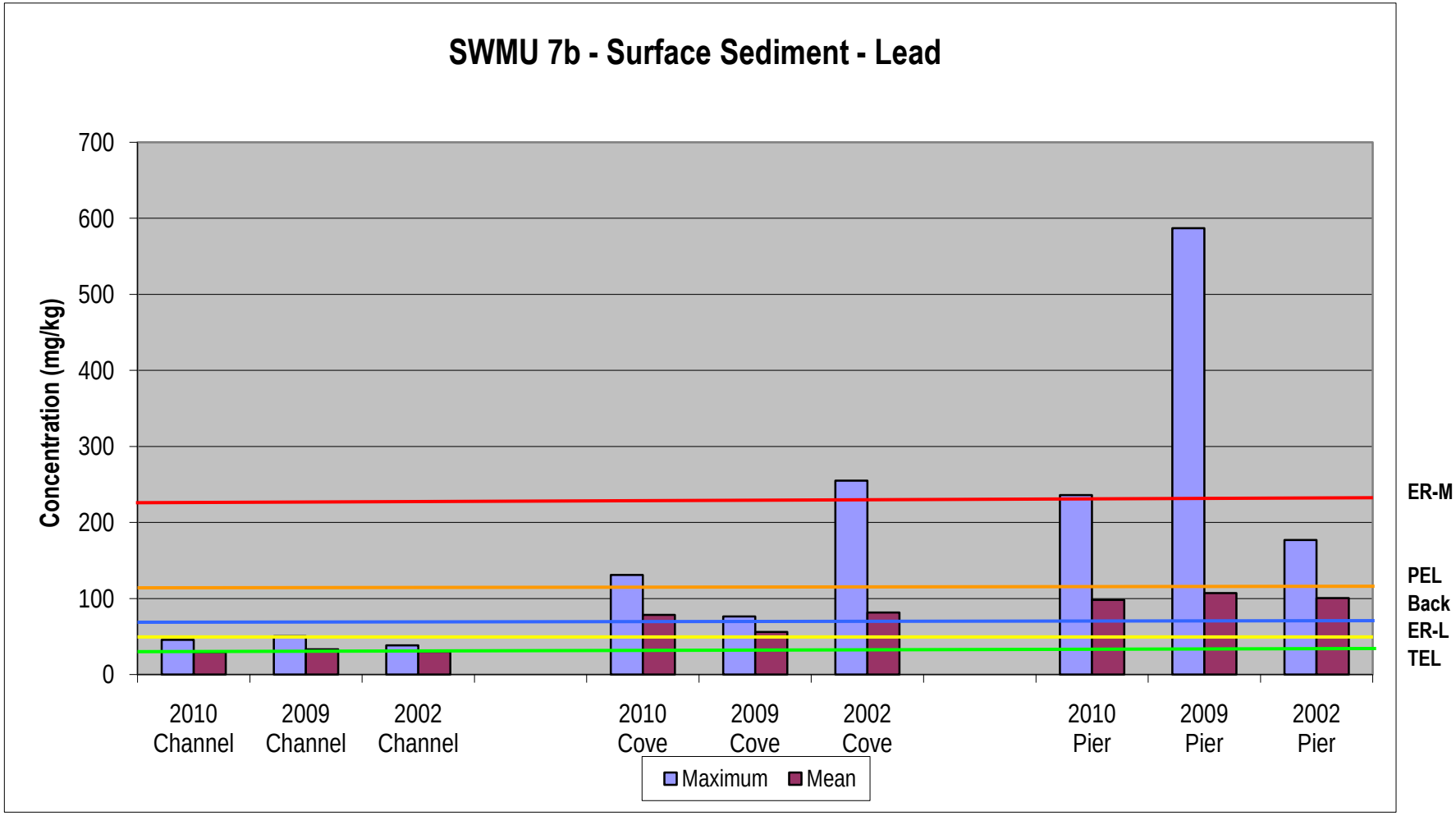


Figure D-8b. Surface Sediment Concentrations by Area and Year - Lead

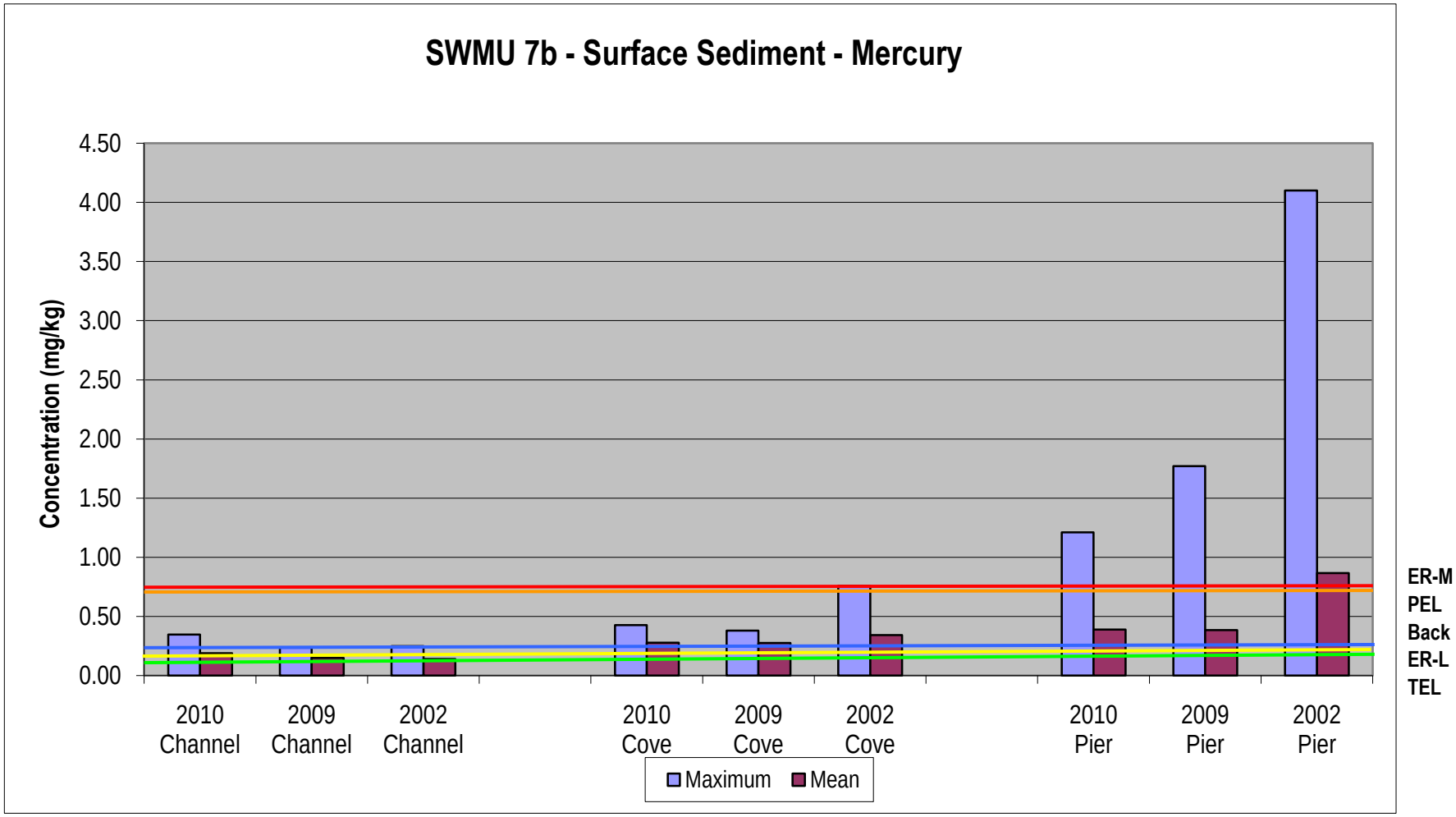


Figure D-8c. Surface Sediment Concentrations by Area and Year - Mercury

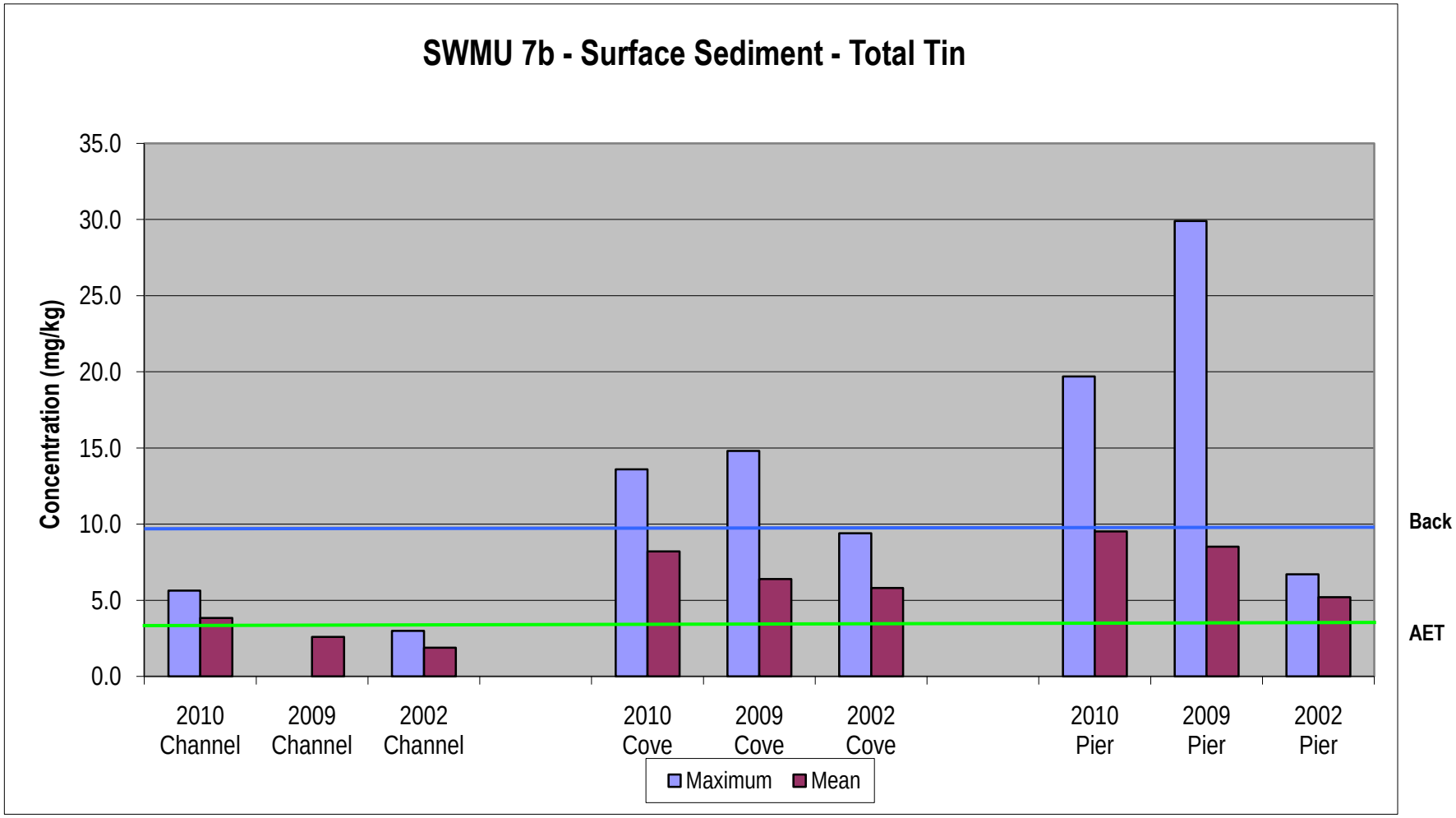


Figure D-8d. Surface Sediment Concentrations by Area and Year - Total Tin

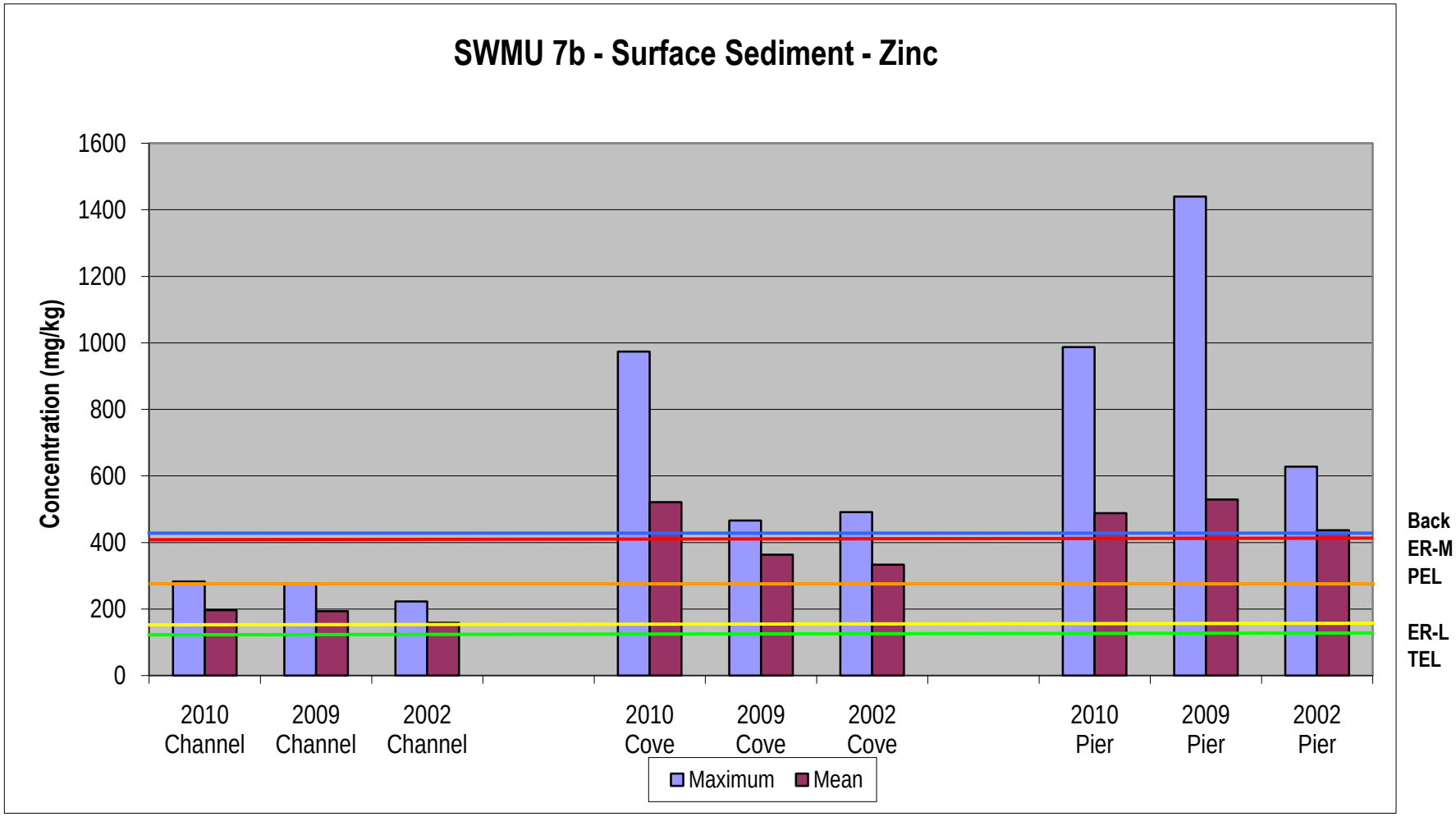


Figure D-8e. Surface Sediment Concentrations by Area and Year - Zinc

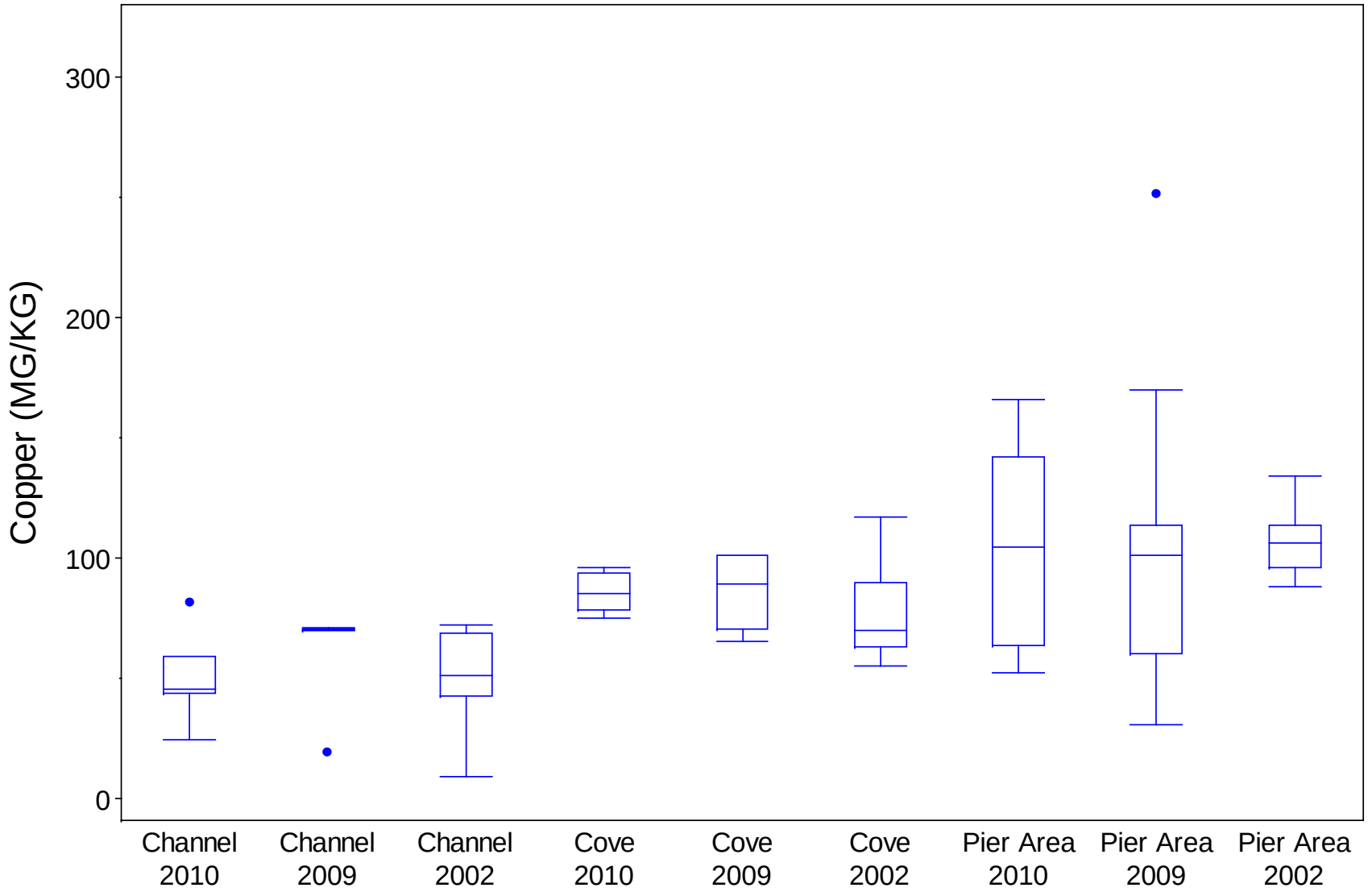


Figure D-8f. Box and Whisker Plots for Chemical Concentrations in Surface Sediment – Copper

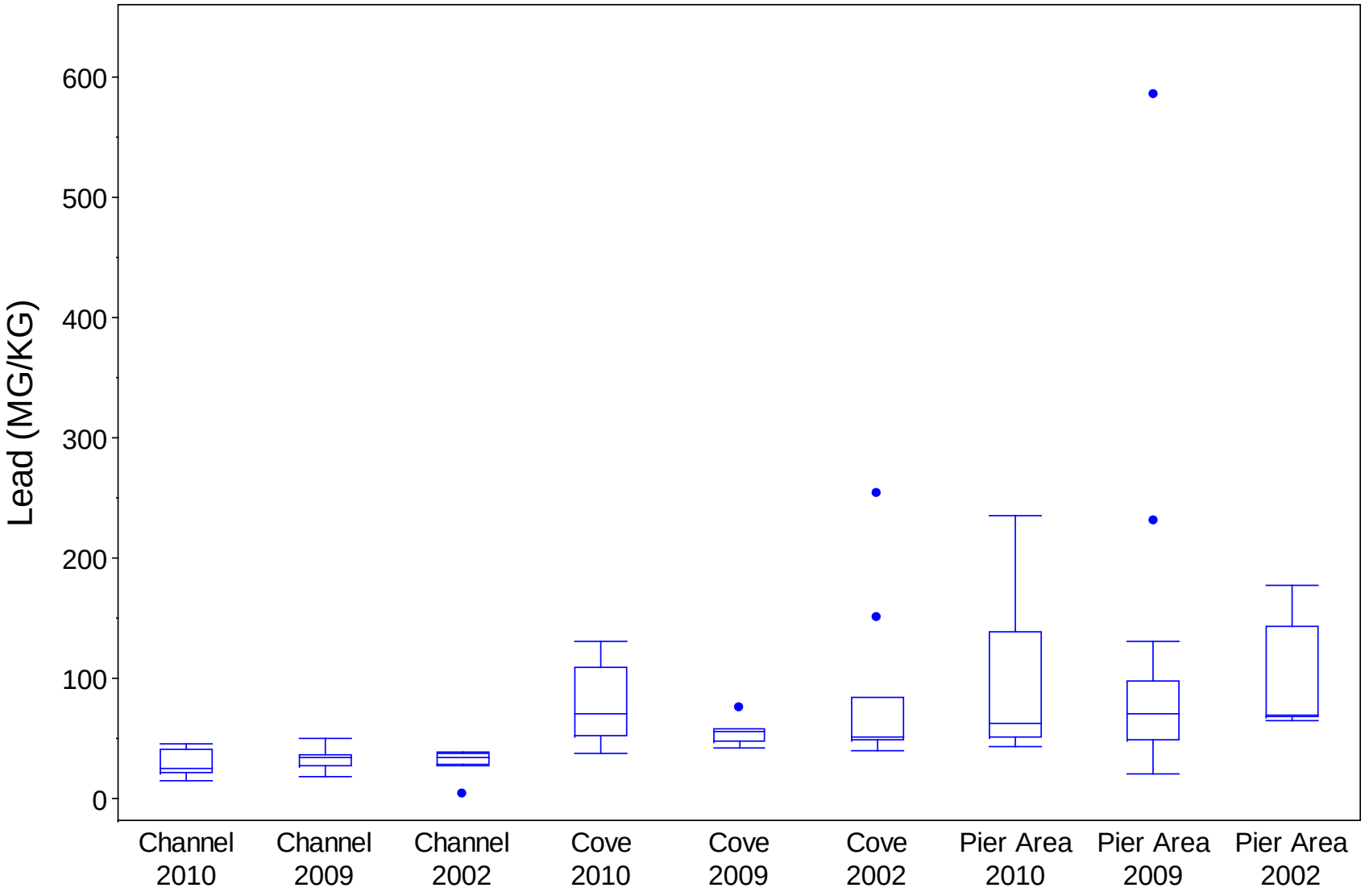


Figure D-8g. Box and Whisker Plots for Chemical Concentrations in Surface Sediment - Lead

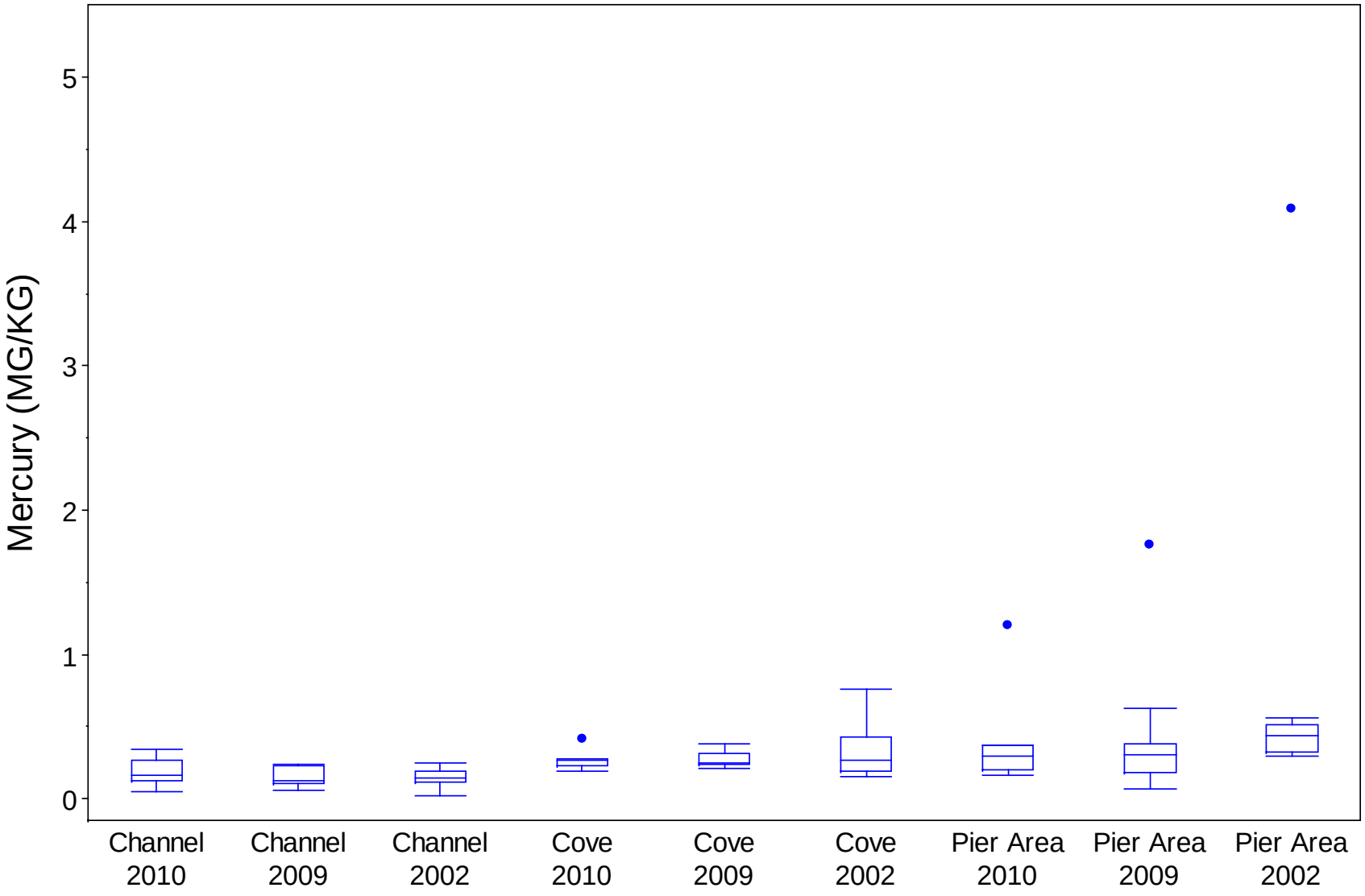


Figure D-8h. Box and Whisker Plots for Chemical Concentrations in Surface Sediment - Mercury

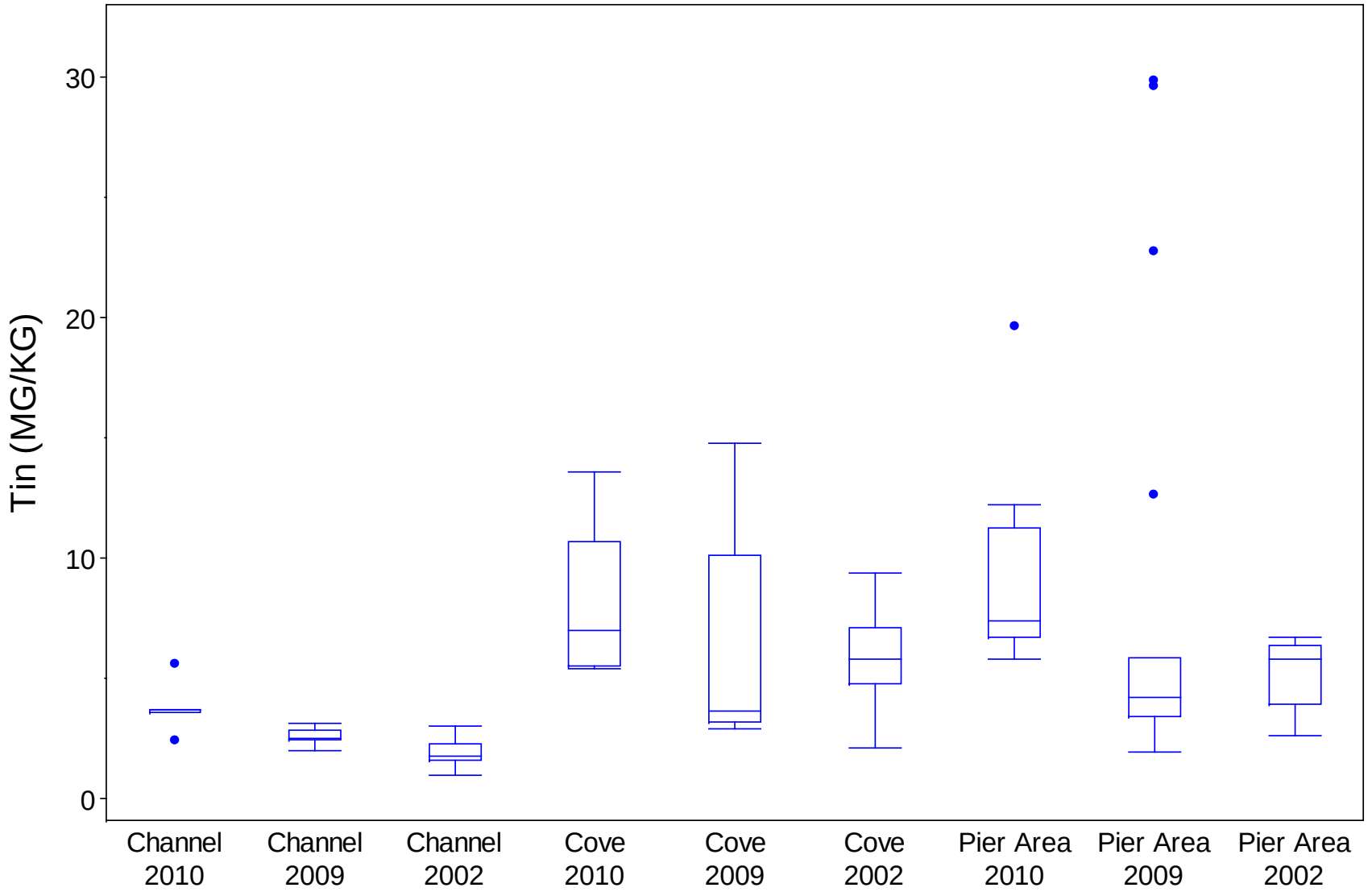


Figure D-8i. Box and Whisker Plots for Chemical Concentrations in Surface Sediment - Tin

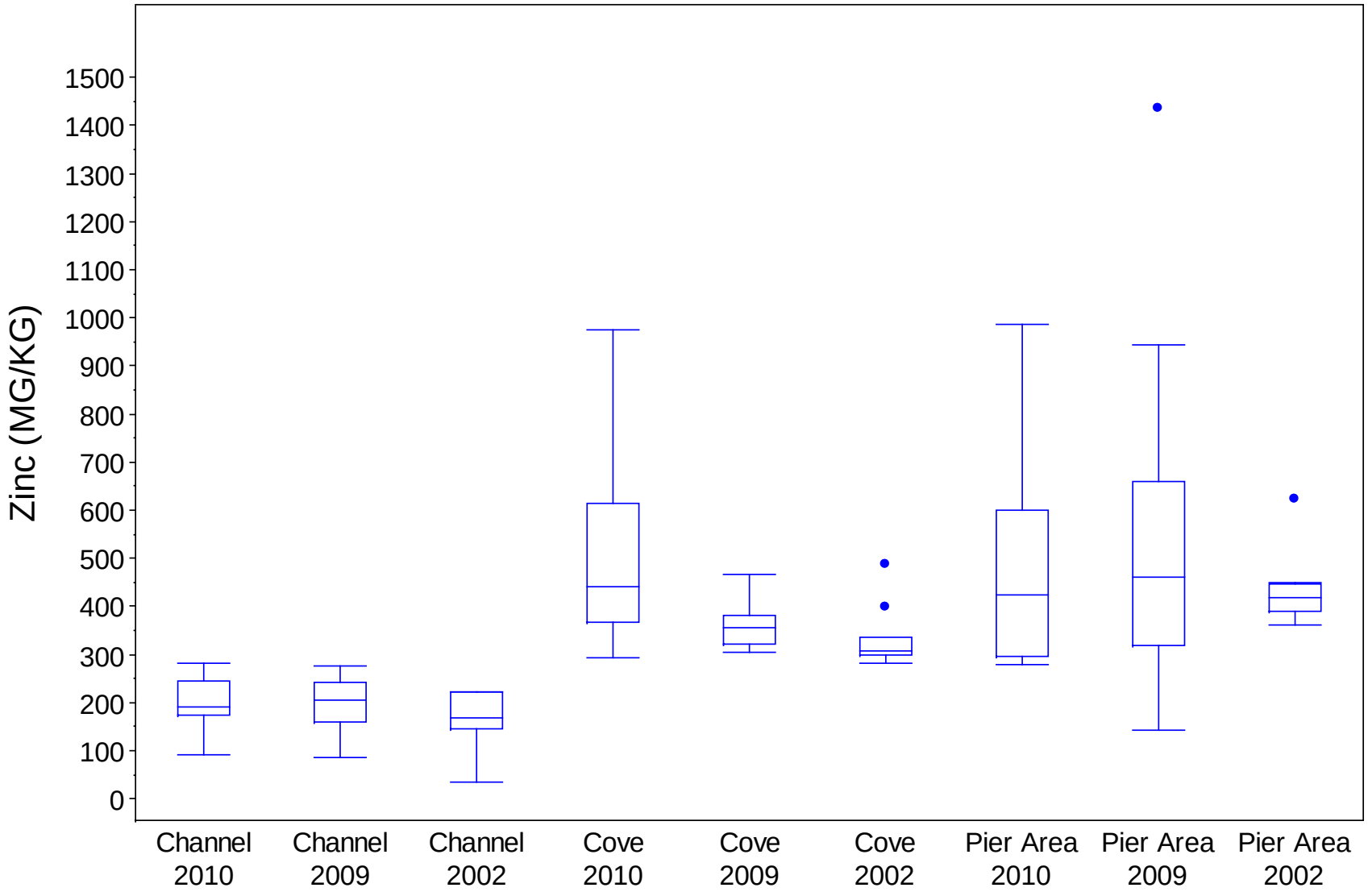


Figure D-8j. Box and Whisker Plots for Chemical Concentrations in Surface Sediment - Zinc

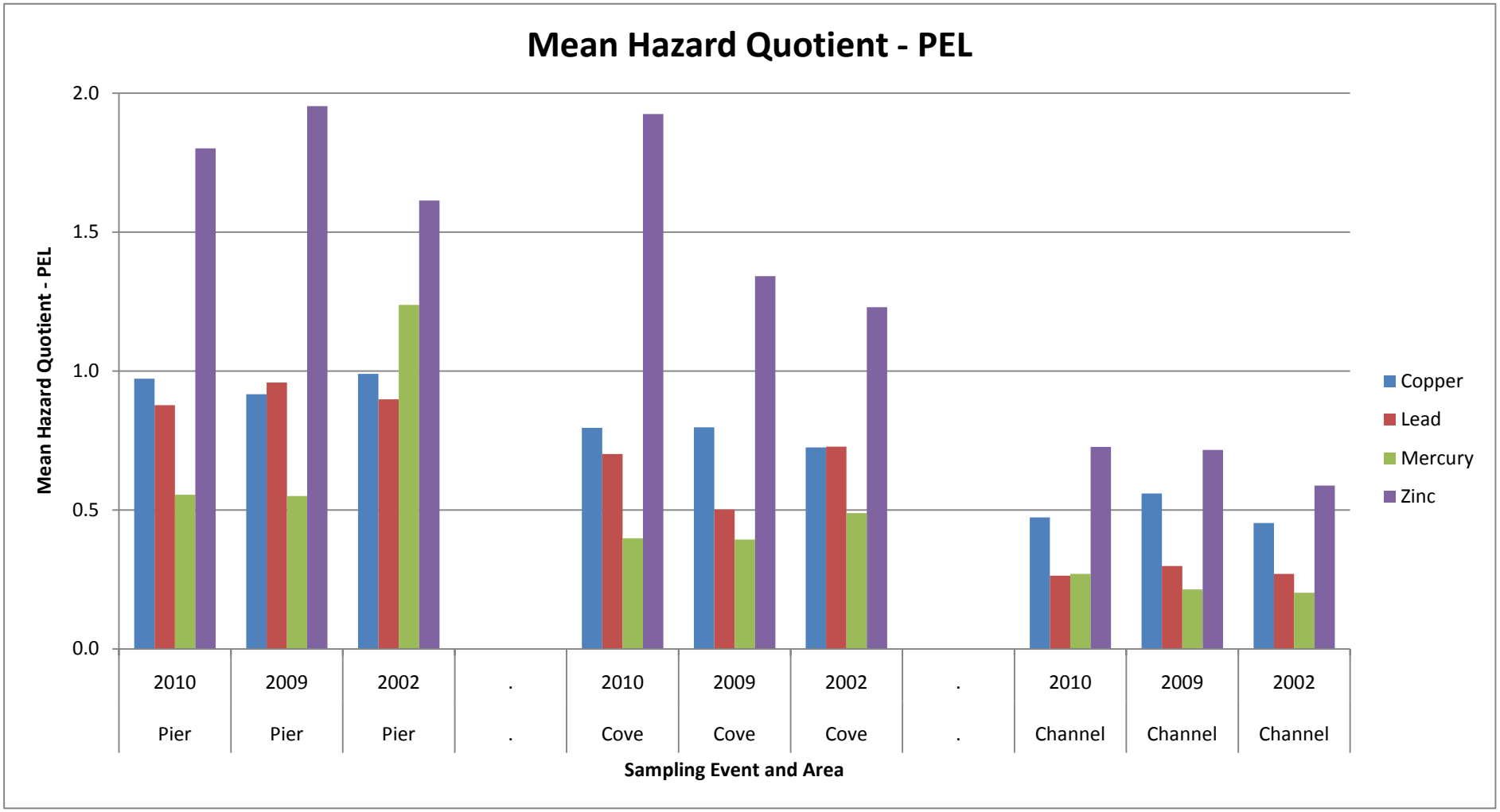


Figure D-9a. PEL-Based Hazard Quotients for Surface Sediment Concentrations by Area and Year

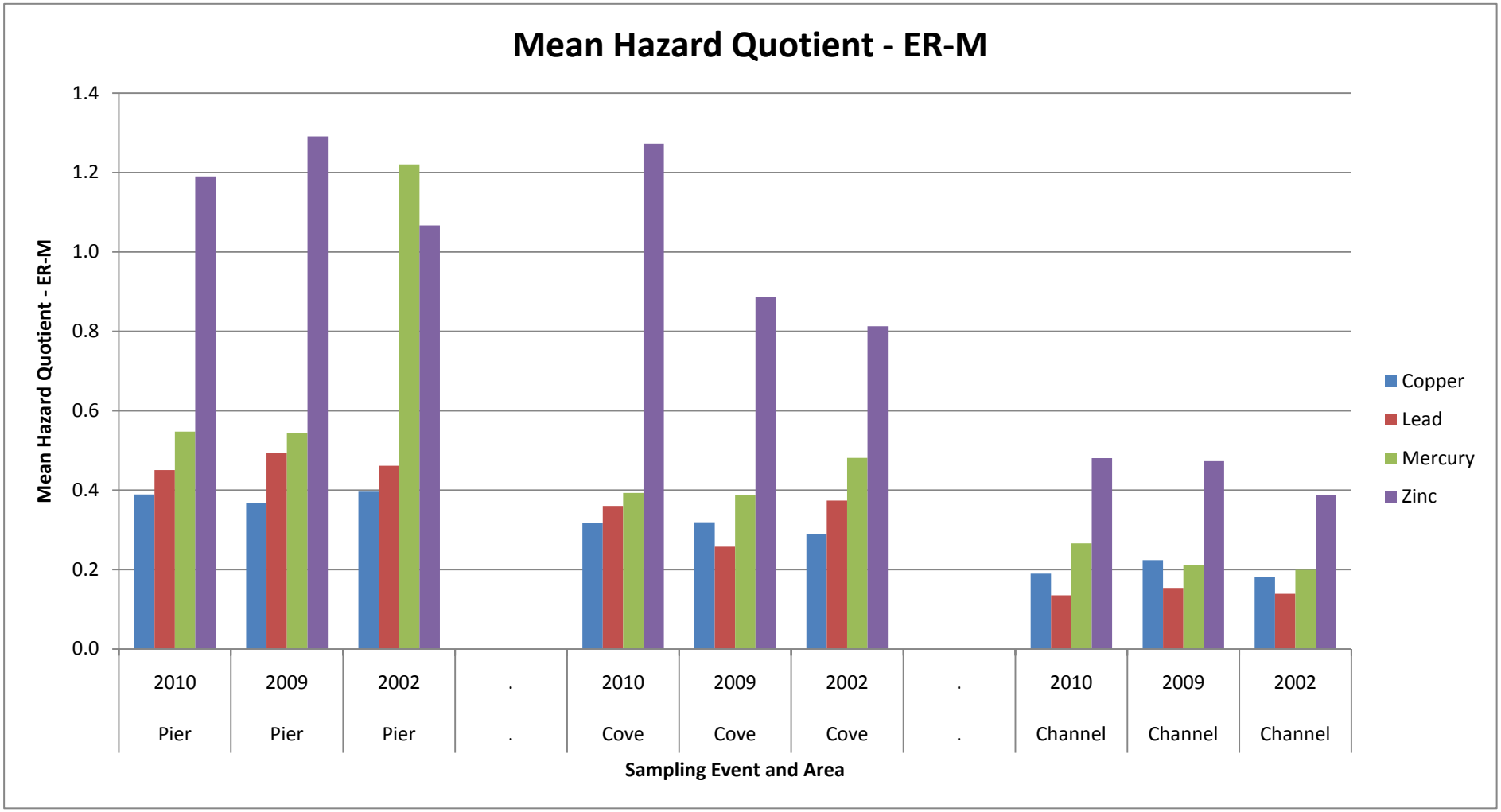


Figure D-9b. ER-M Based Hazard Quotients for Surface Sediment Concentrations by Area and Year

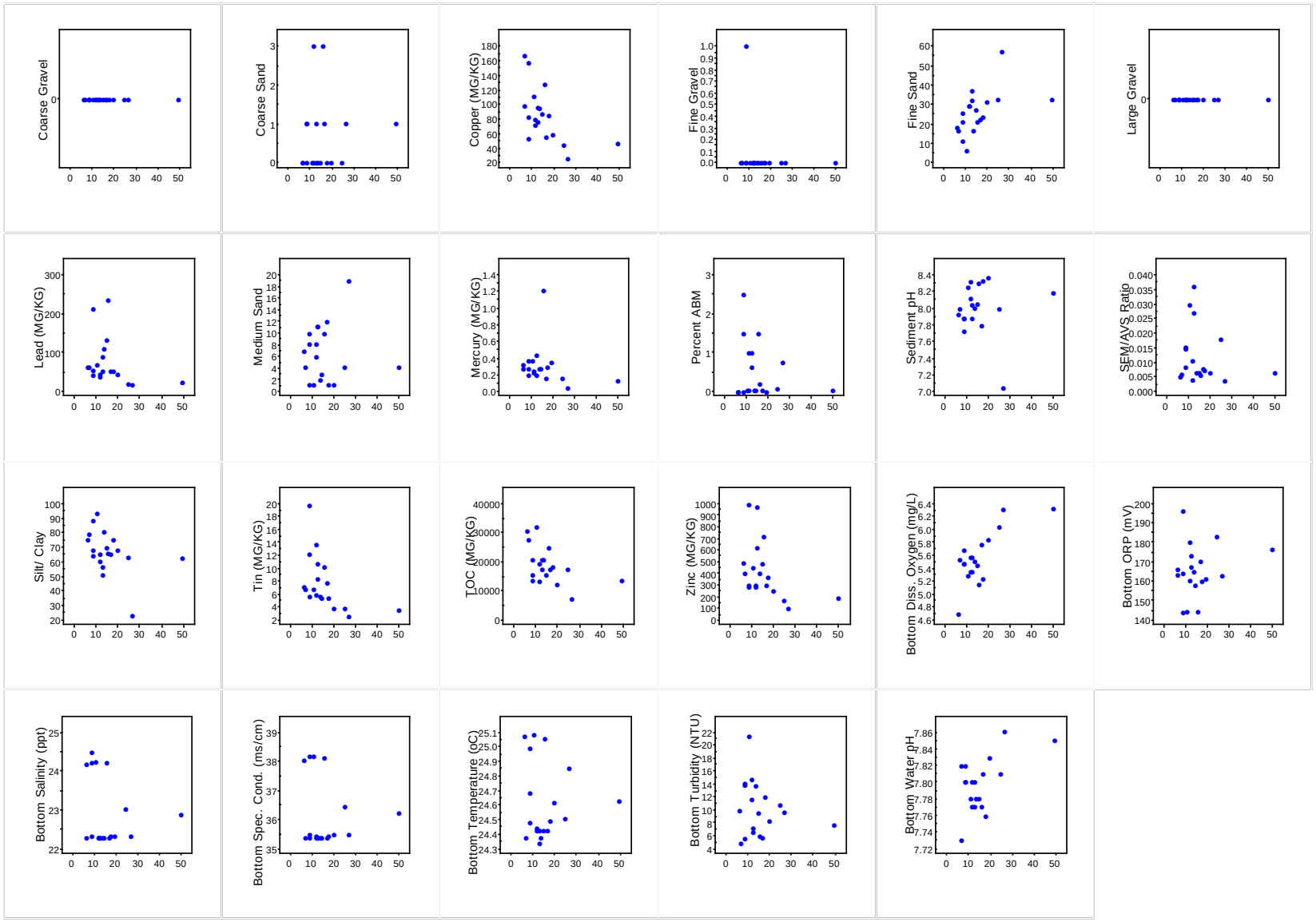


Figure D-10a. Number of Taxa (Taxa Richness) Scatter Plots – 2010 Data

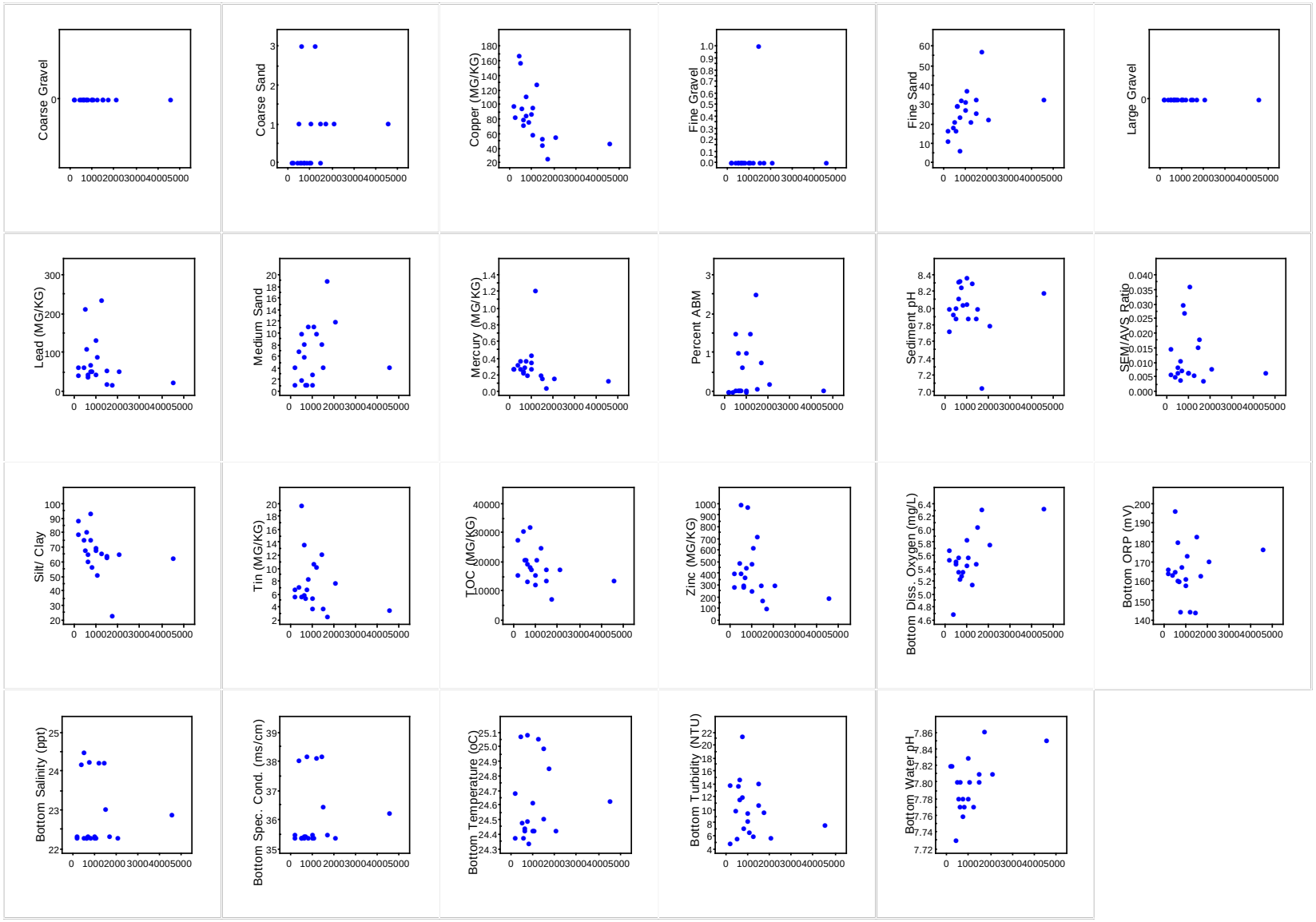


Figure D-10b. Total Density Scatter Plots – 2010 Data

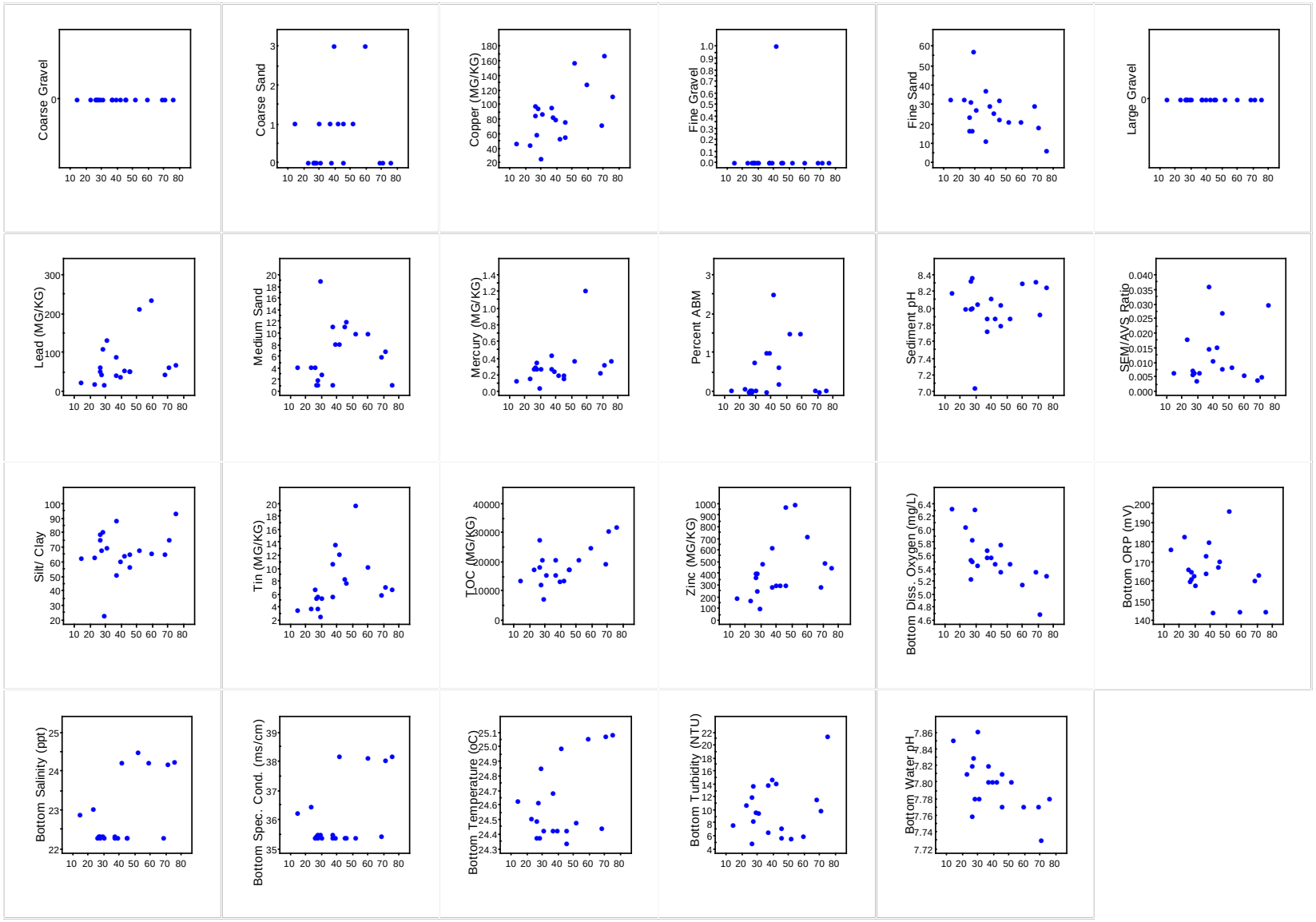


Figure D-10c. Percent Contribution of Dominant Taxon Scatter Plots – 2010 Data

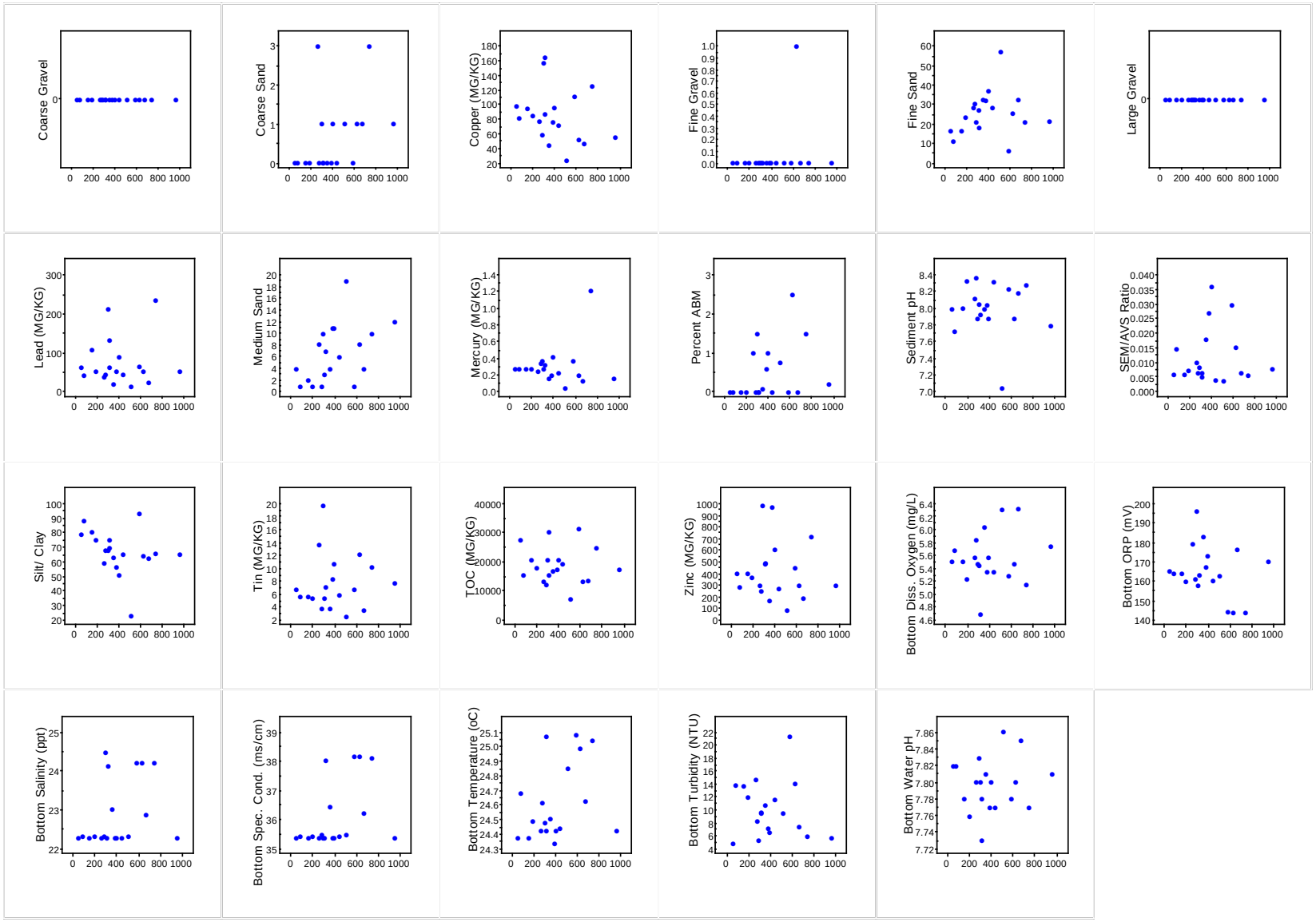


Figure D-10d. Density of Dominant Taxon Scatter Plots – 2010 Data

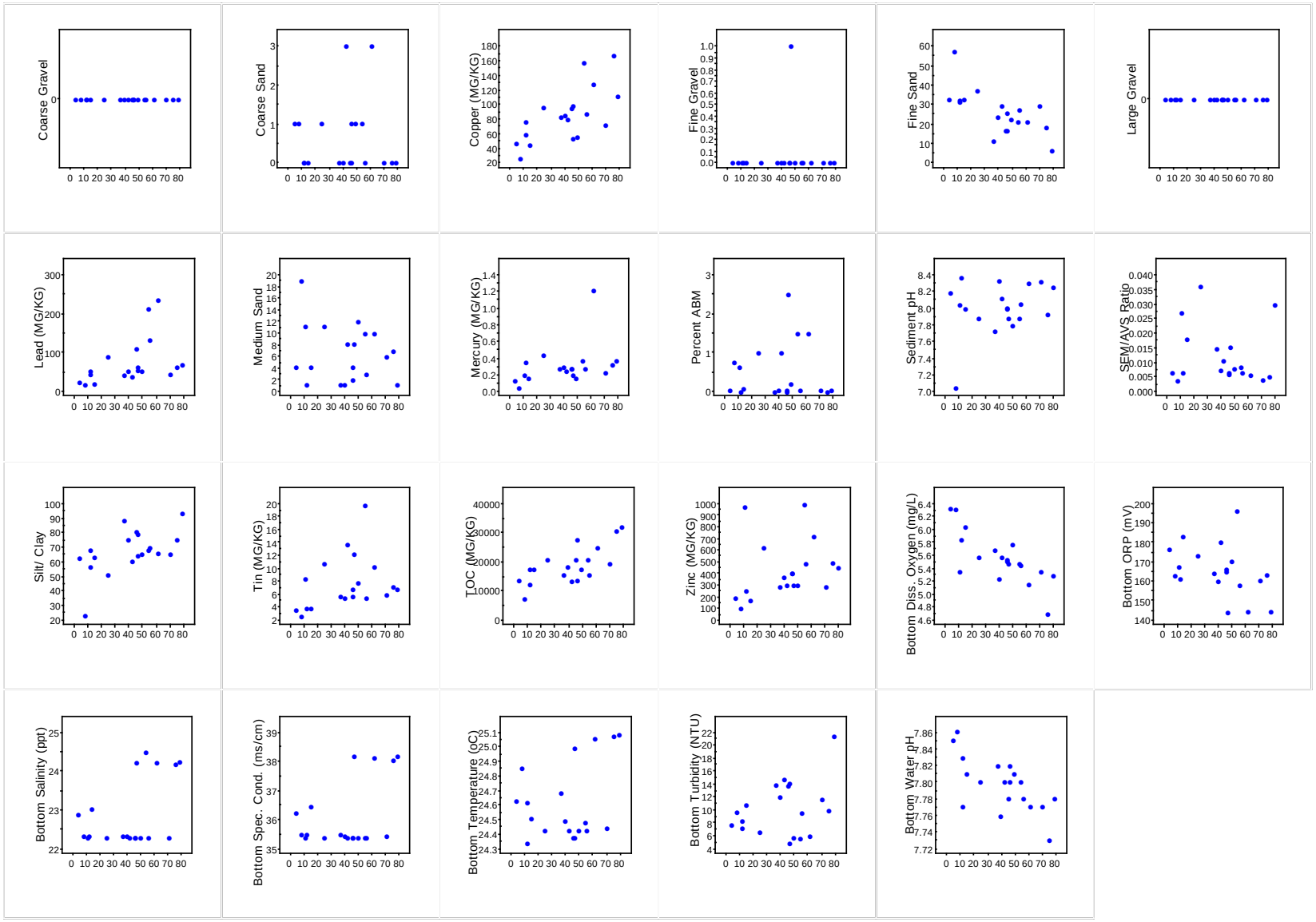


Figure D-10e. Percent Spionid Polychaetes Scatter Plots – 2010 Data

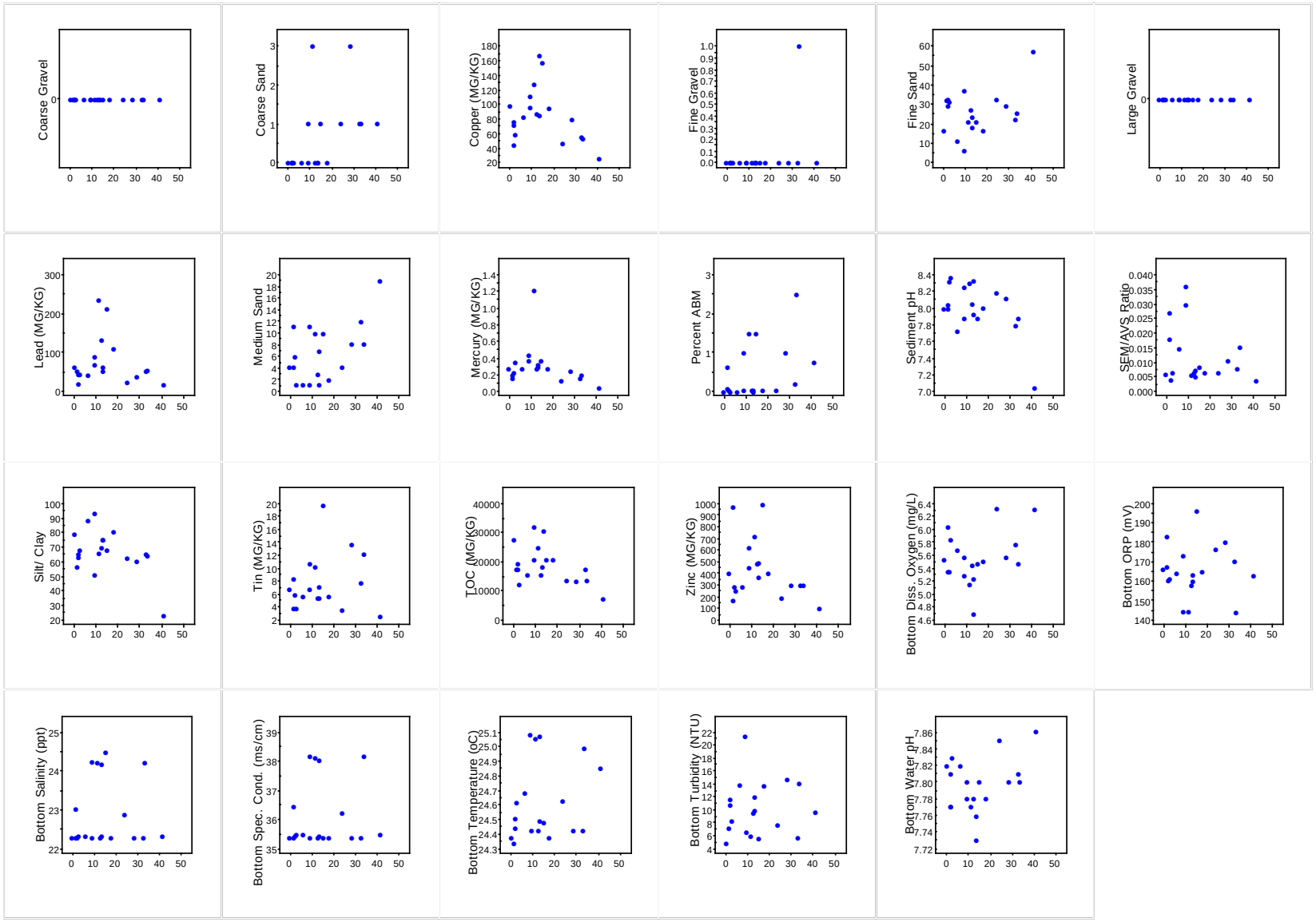


Figure D-10f. Percent Mediomastus and Capitella Polychaetes Scatter Plots – 2010 Data

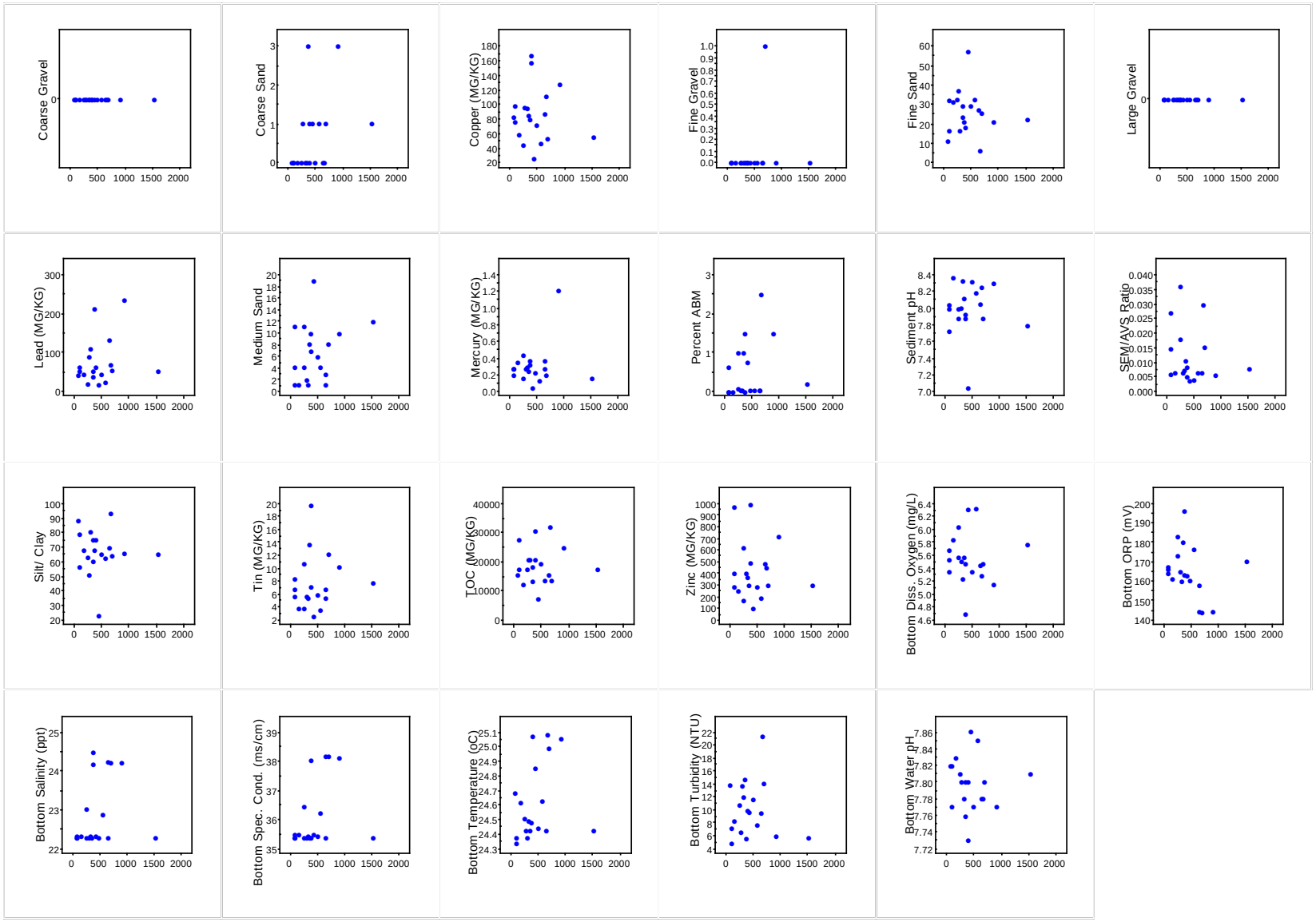


Figure D-10g. Density of Pollution Tolerant Organisms Scatter Plots – 2010 Data

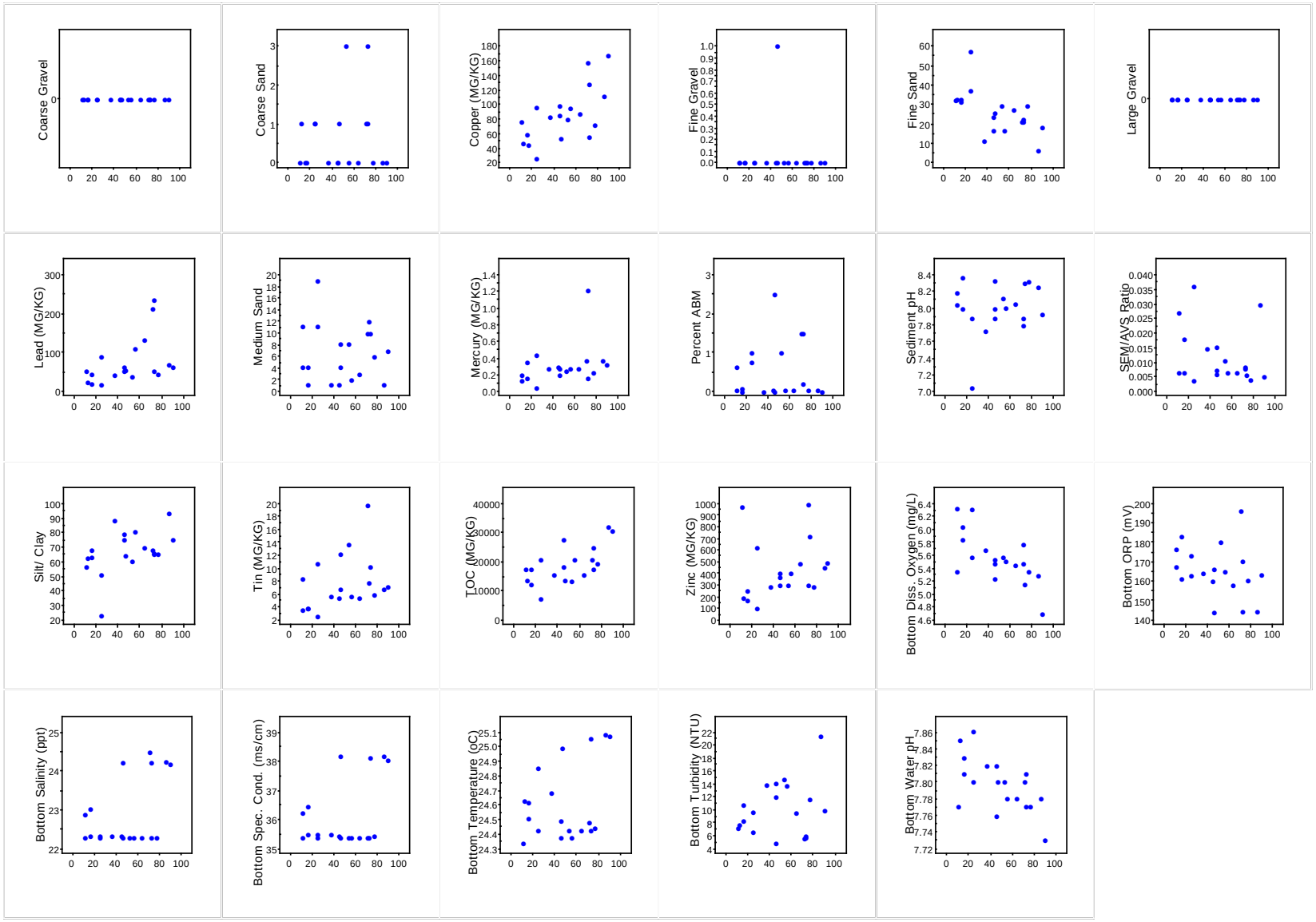


Figure D-10h. Percent Pollution Tolerant Organisms Scatter Plots – 2010 Data

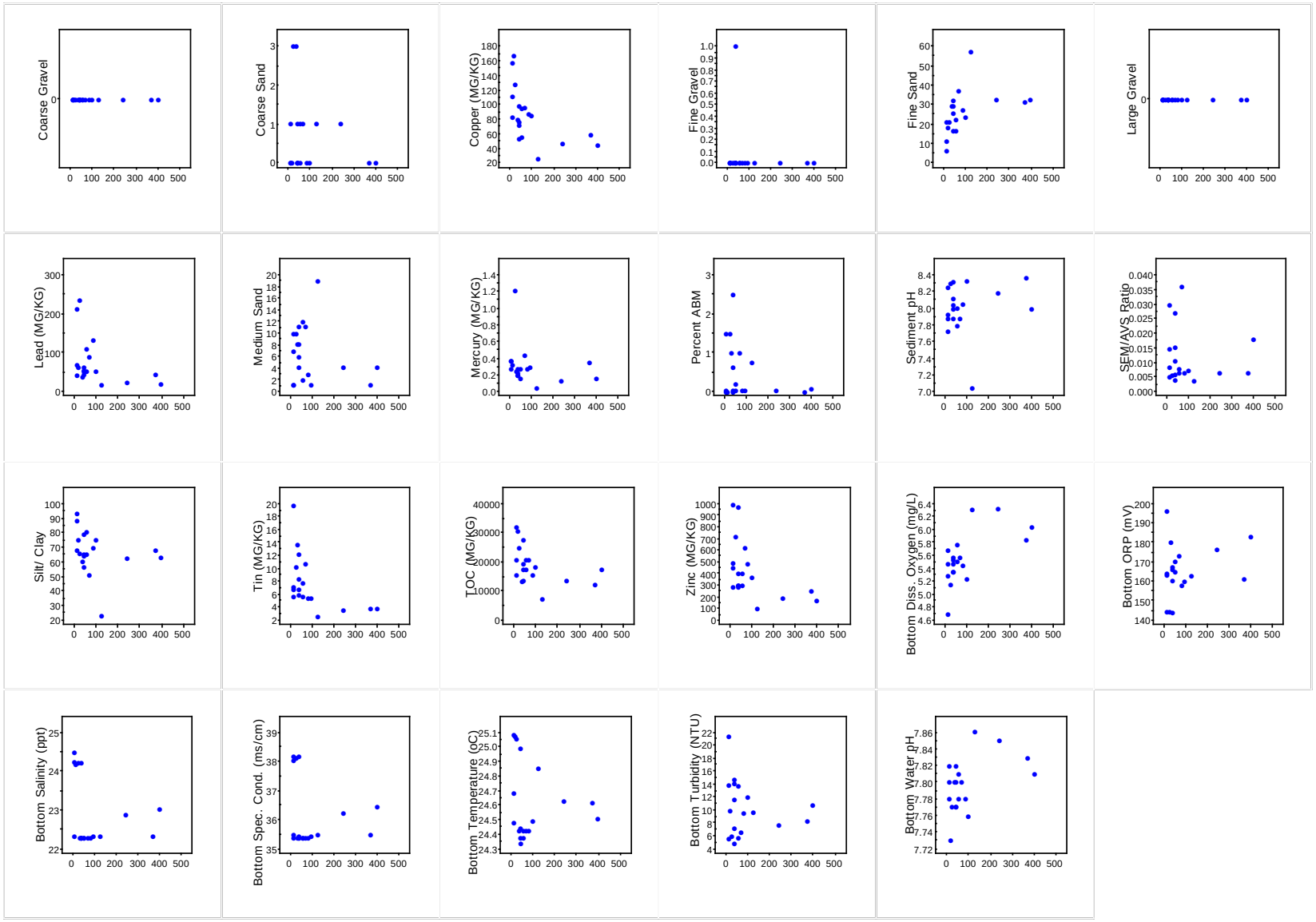


Figure D-10i. Density of Pollution Sensitive Organisms Scatter Plots – 2010 Data

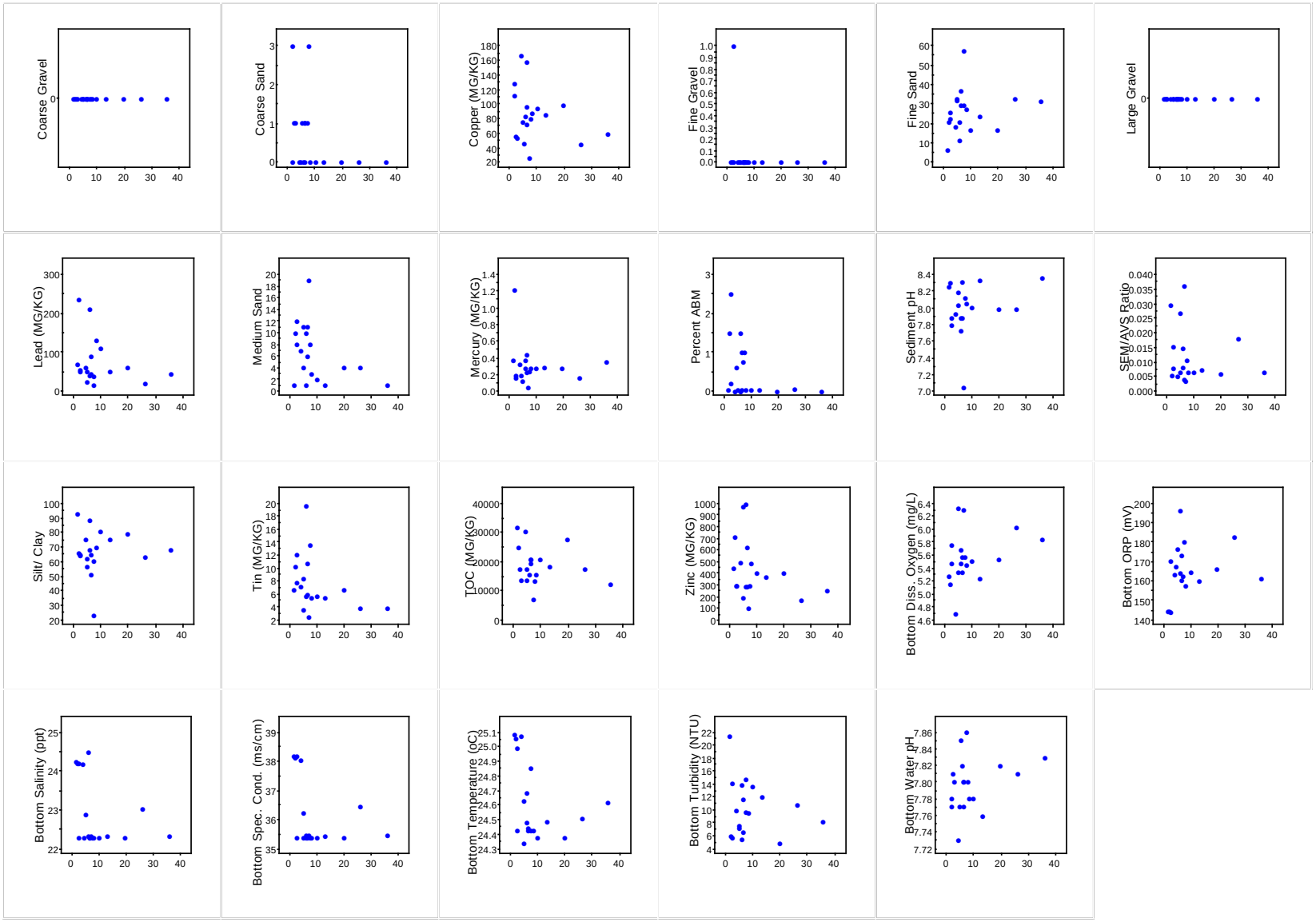


Figure D-10j. Percent Pollution Sensitive Organisms Scatter Plots – 2010 Data

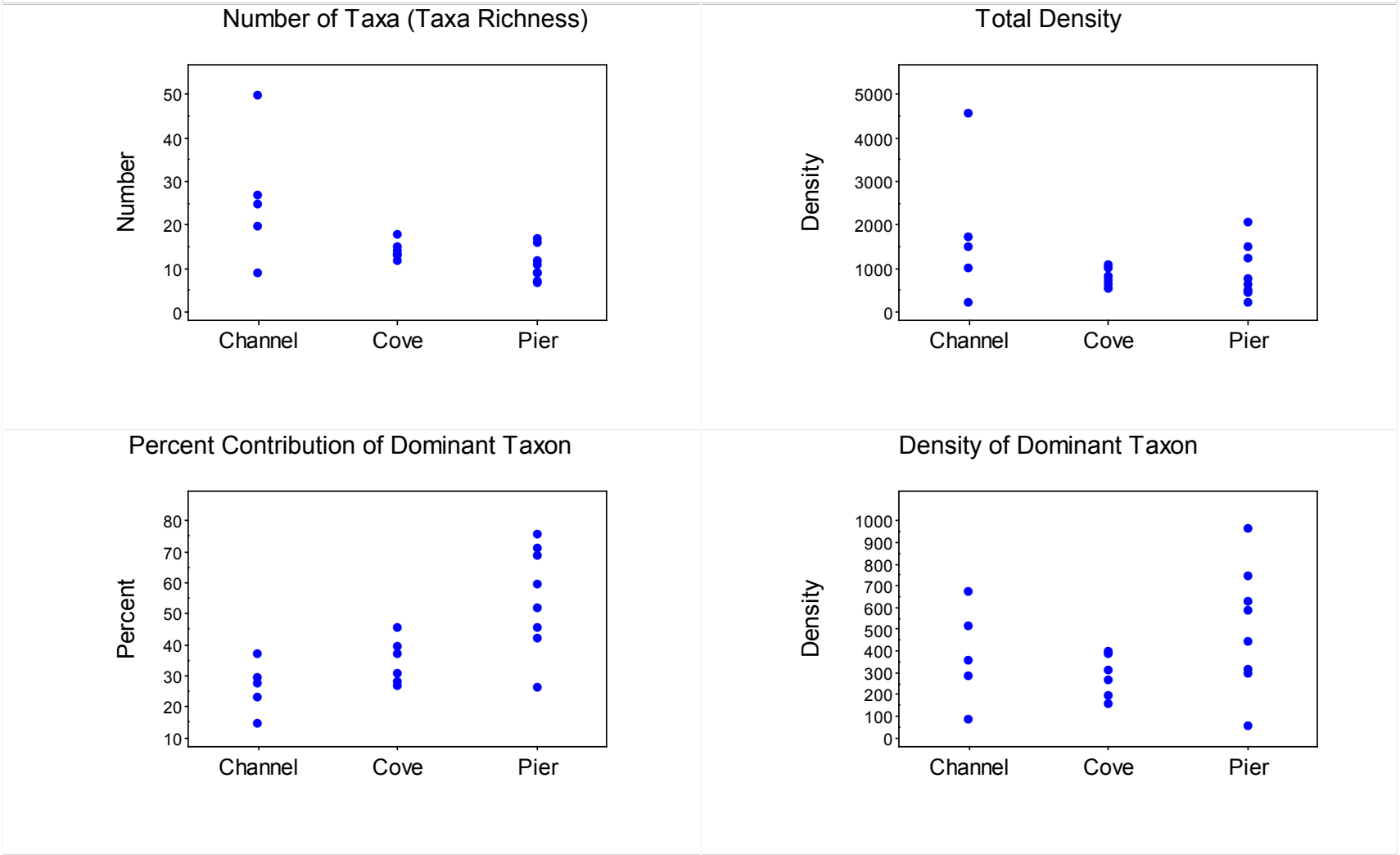


Figure D-11a. Scatter Plots for Benthic Invertebrate Metrics by Area – 2010 Data

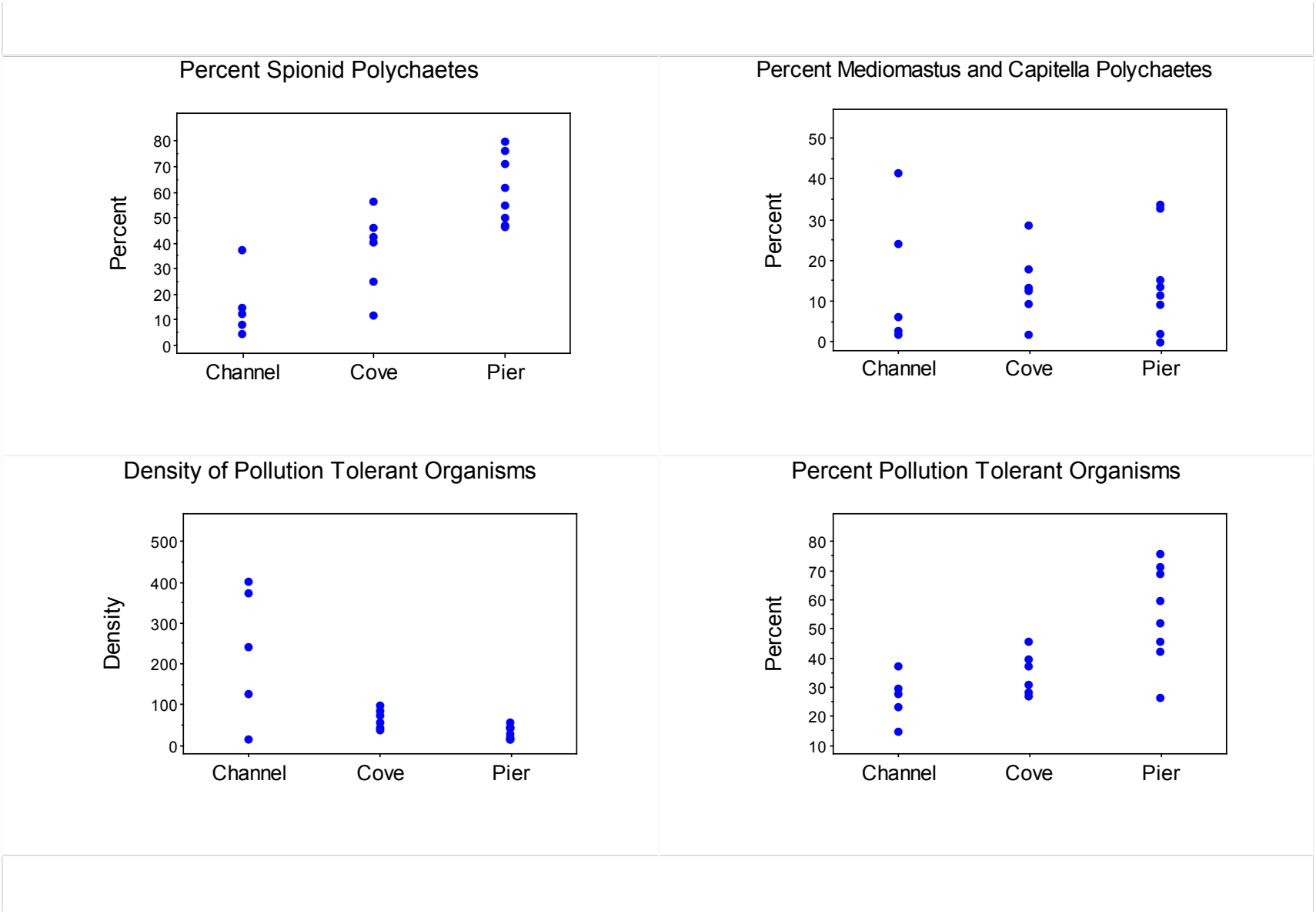
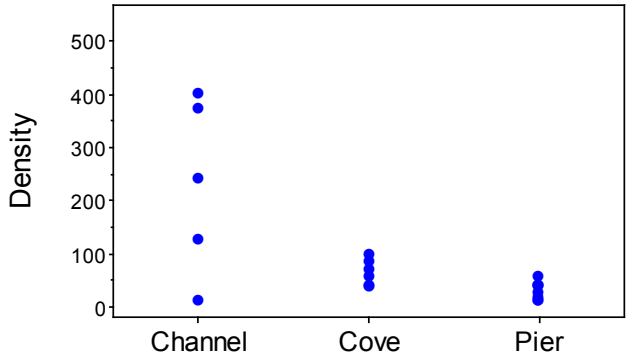


Figure D-11a. Scatter Plots for Benthic Invertebrate Metrics by Area – 2010 Data



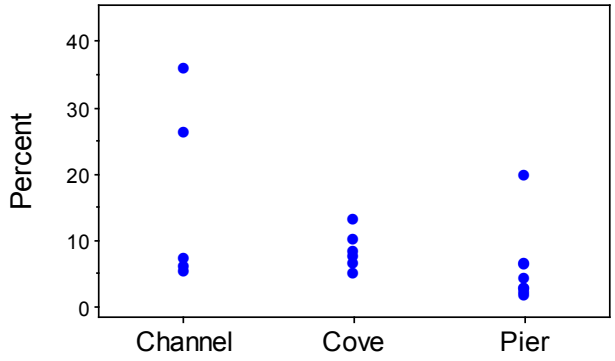


Figure D-11a. Scatter Plots for Benthic Invertebrate Metrics by Area – 2010 Data

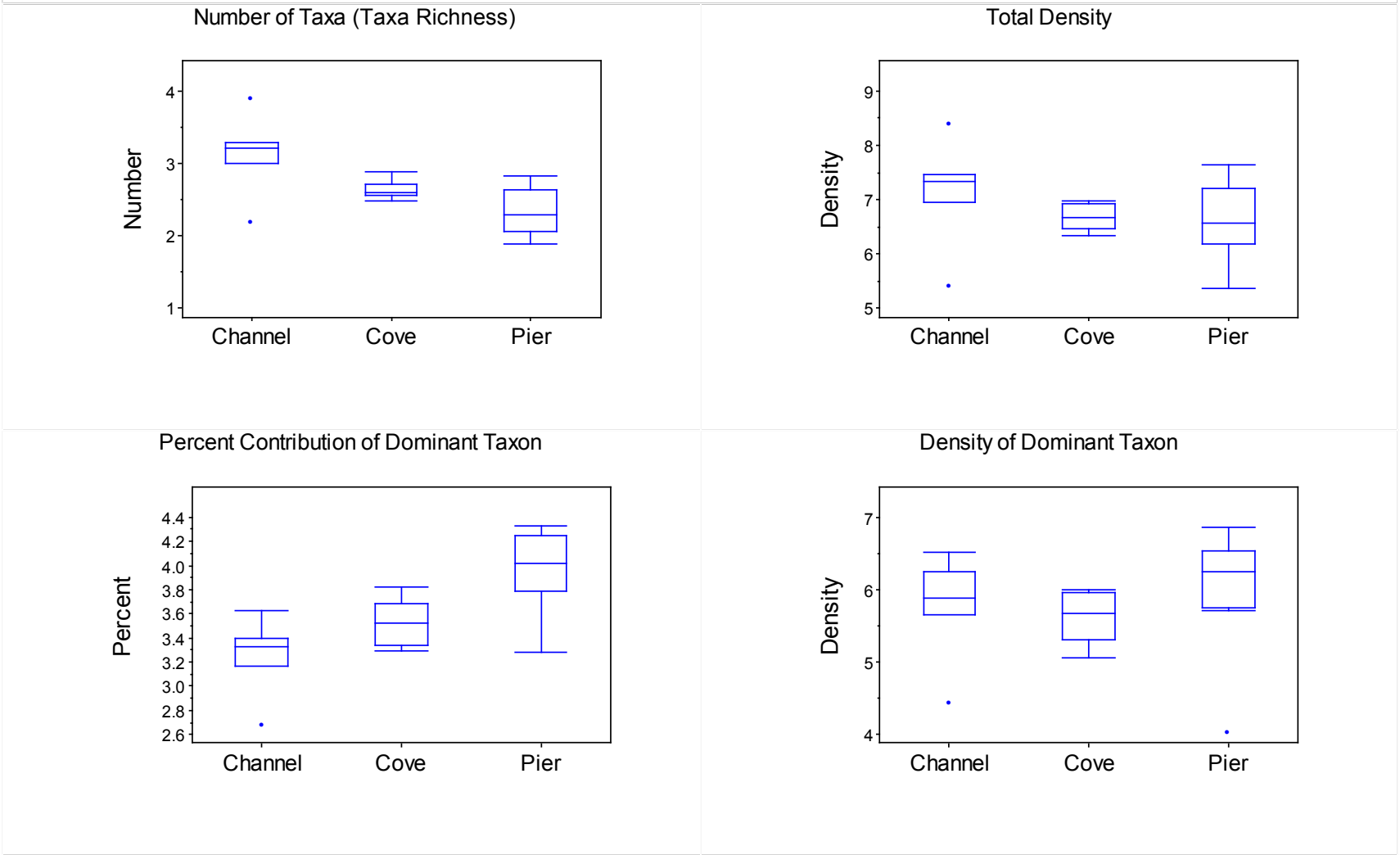


Figure D-11b. Box and Whisker Plots for Benthic Invertebrate Metrics by Area – 2010 Data

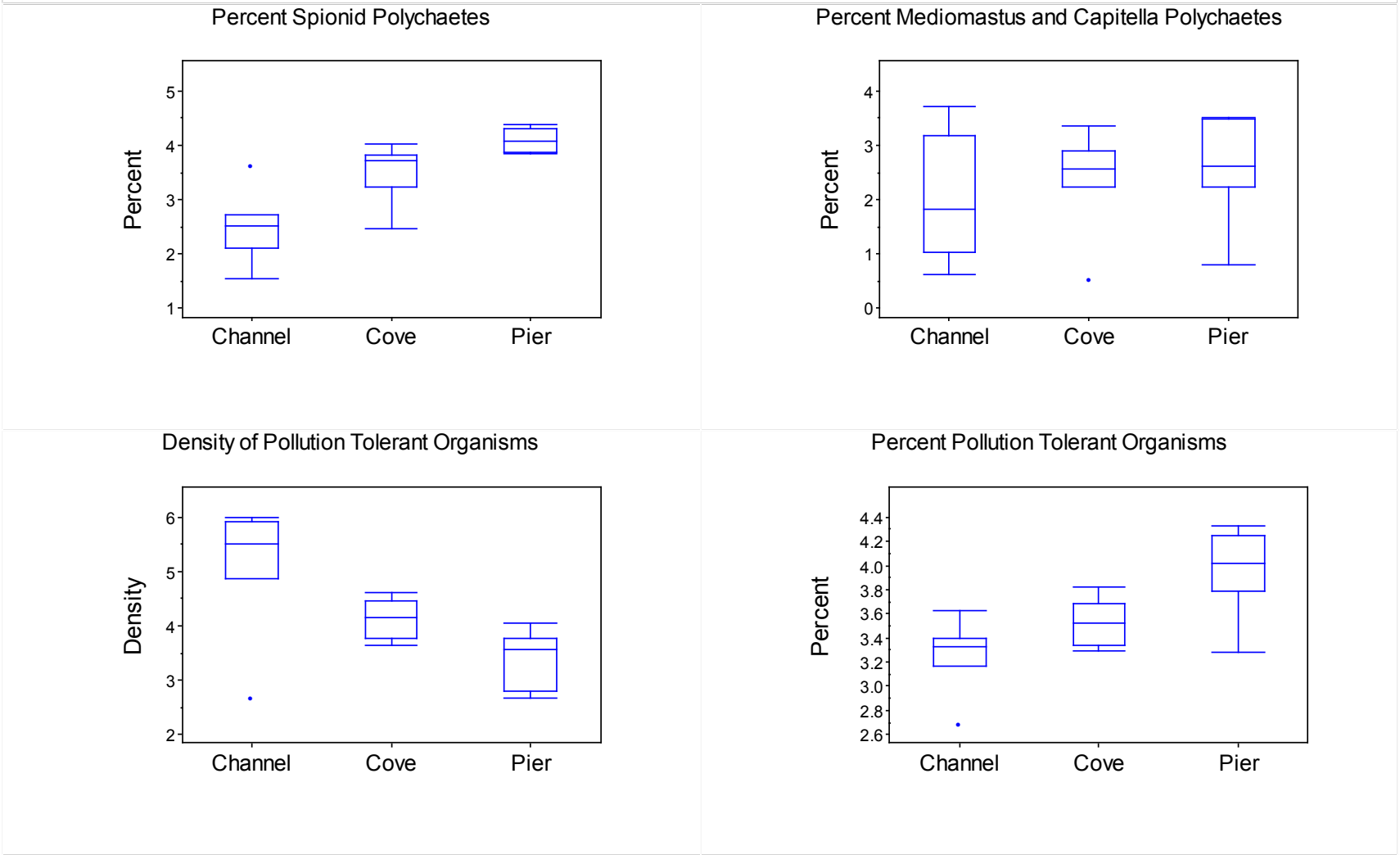
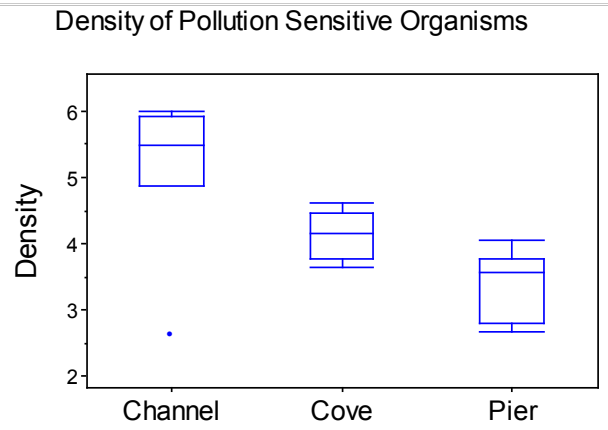


Figure D-11b. Box and Whisker Plots for Benthic Invertebrate Metrics by Area – 2010 Data



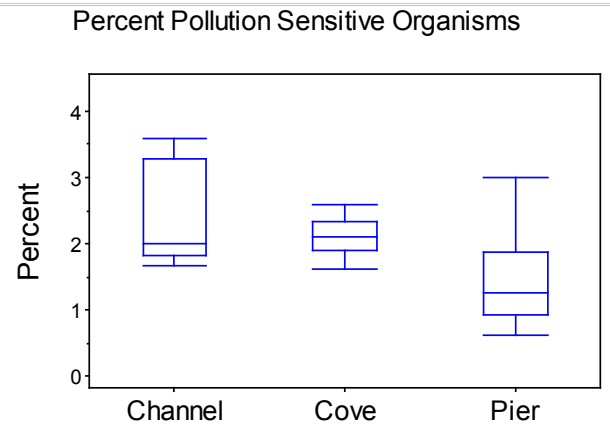


Figure D-11b. Box and Whisker Plots for Benthic Invertebrate Metrics by Area – 2010 Data

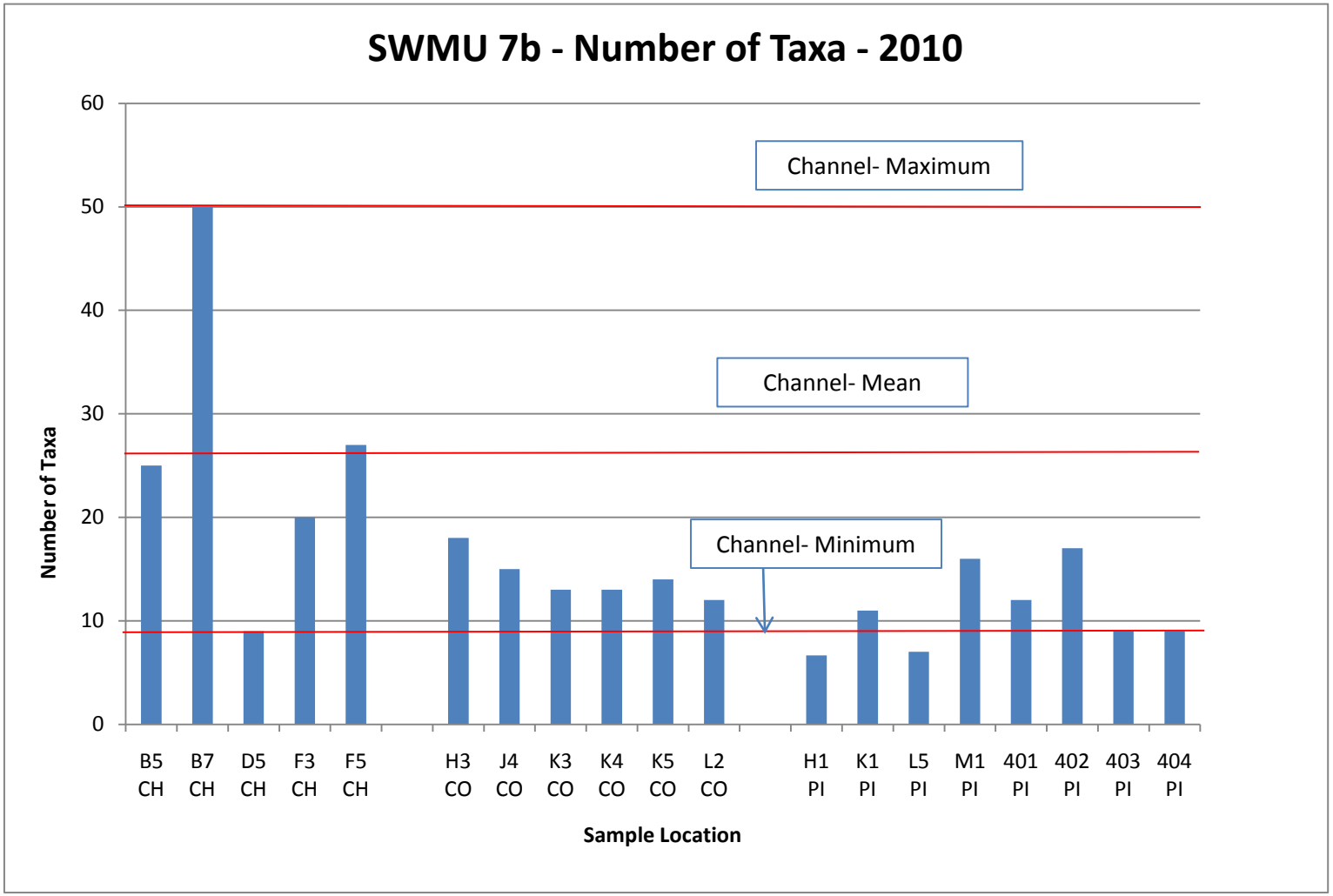


Figure D-12a. Comparison of 2010 Metric Values for the Channel With Cove and Pier Samples - Number of Taxa

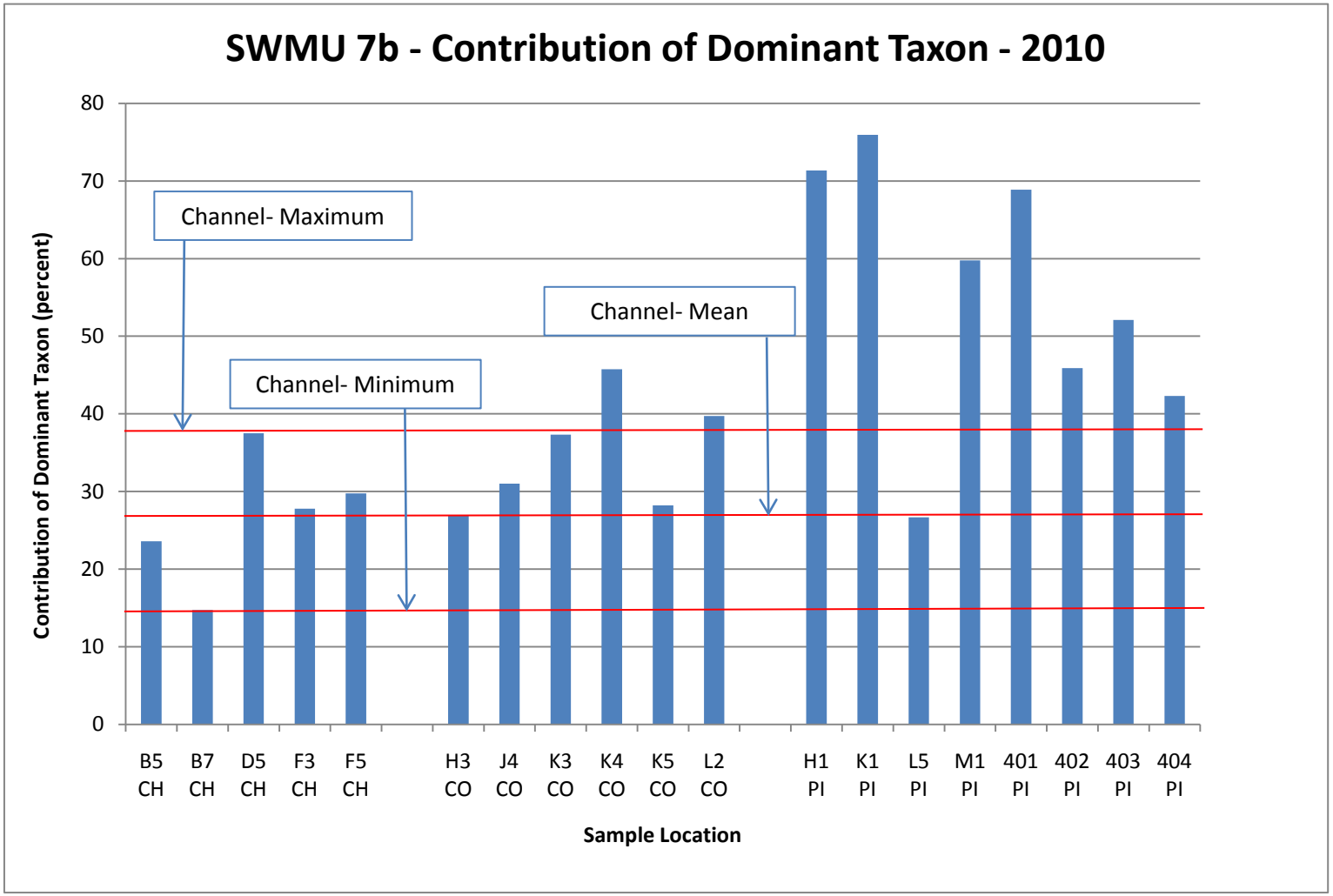


Figure D-12b. Comparison of 2010 Metric Values for the Channel With Cove and Pier Samples - Contribution of Dominant Taxon

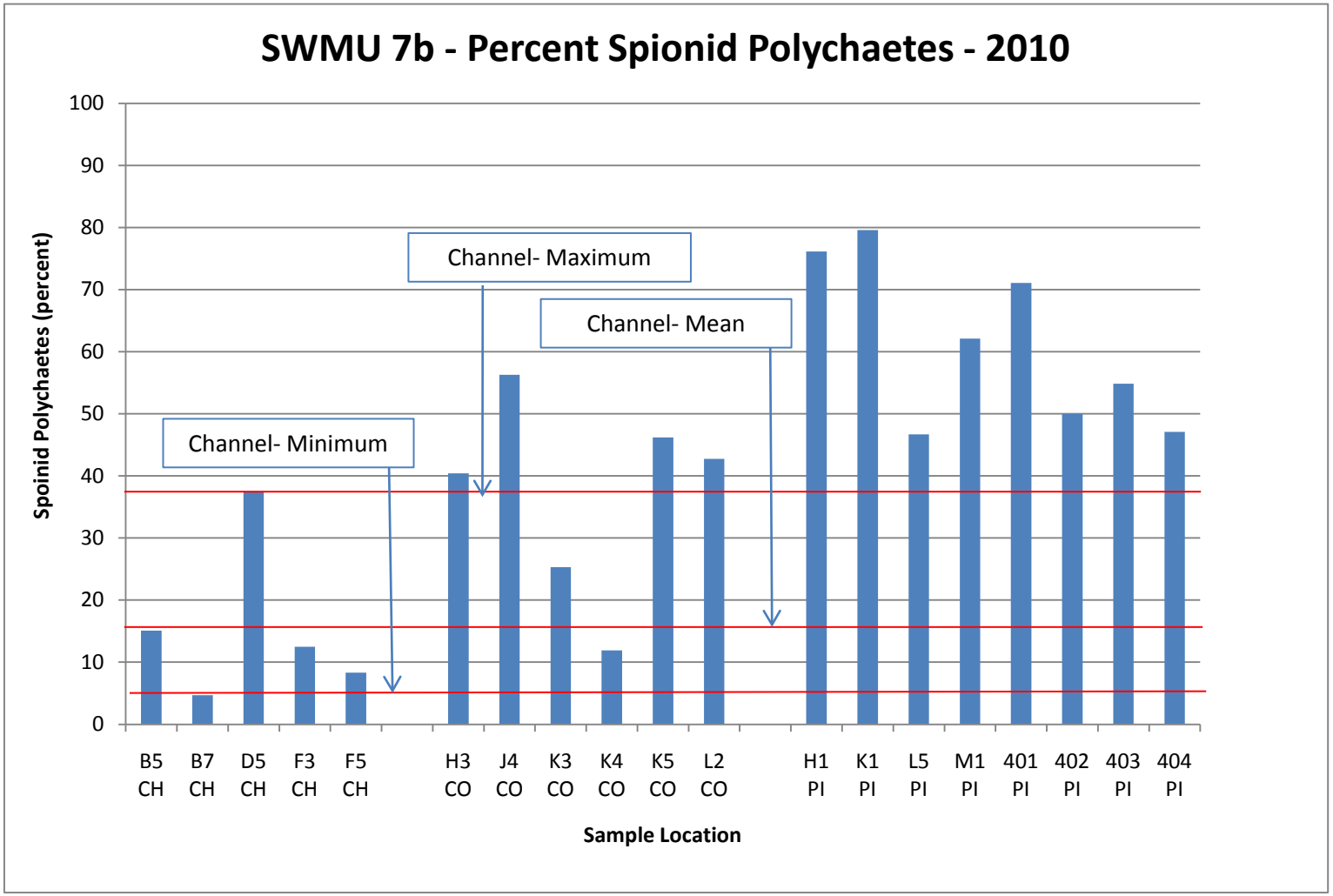


Figure D-12c. Comparison of 2010 Metric Values for the Channel With Cove and Pier Samples - Spionid Polychaetes

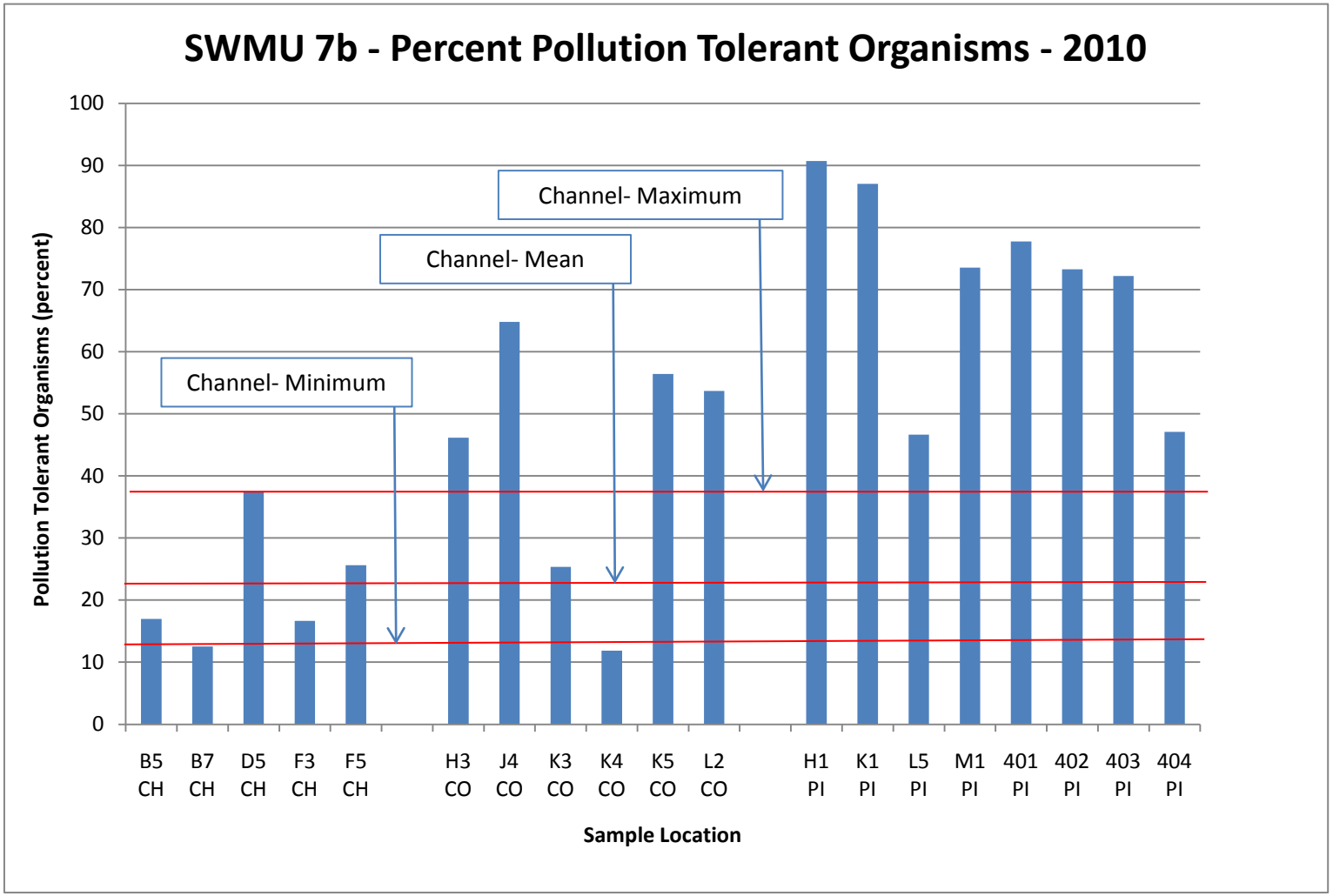


Figure D-12d. Comparison of 2010 Metric Values for the Channel With Cove and Pier Samples - Percent Pollution Tolerant Organisms

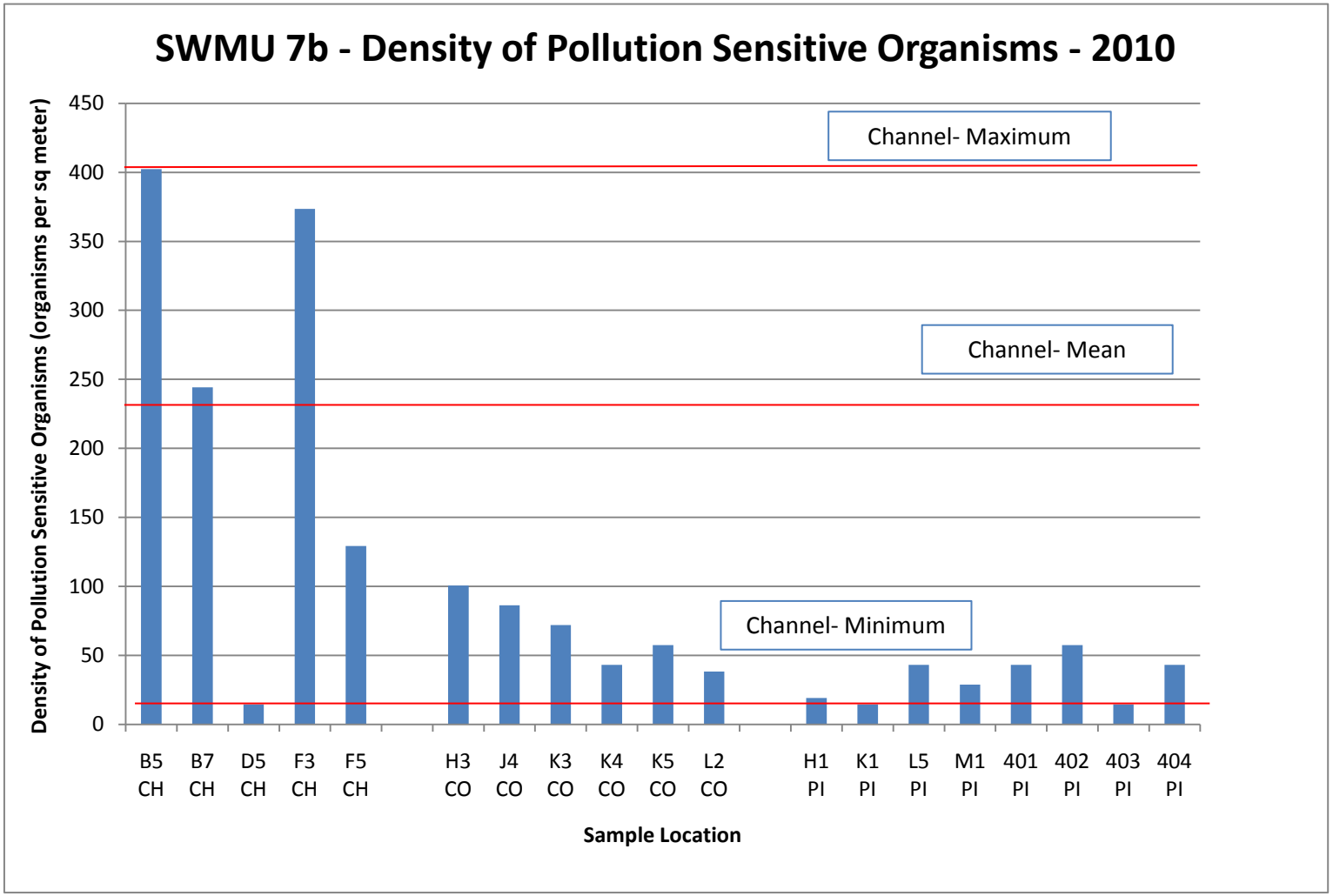


Figure D-12e. Comparison of 2010 Metric Values for the Channel With Cove and Pier Samples - Density of Pollution Sensitive Organisms

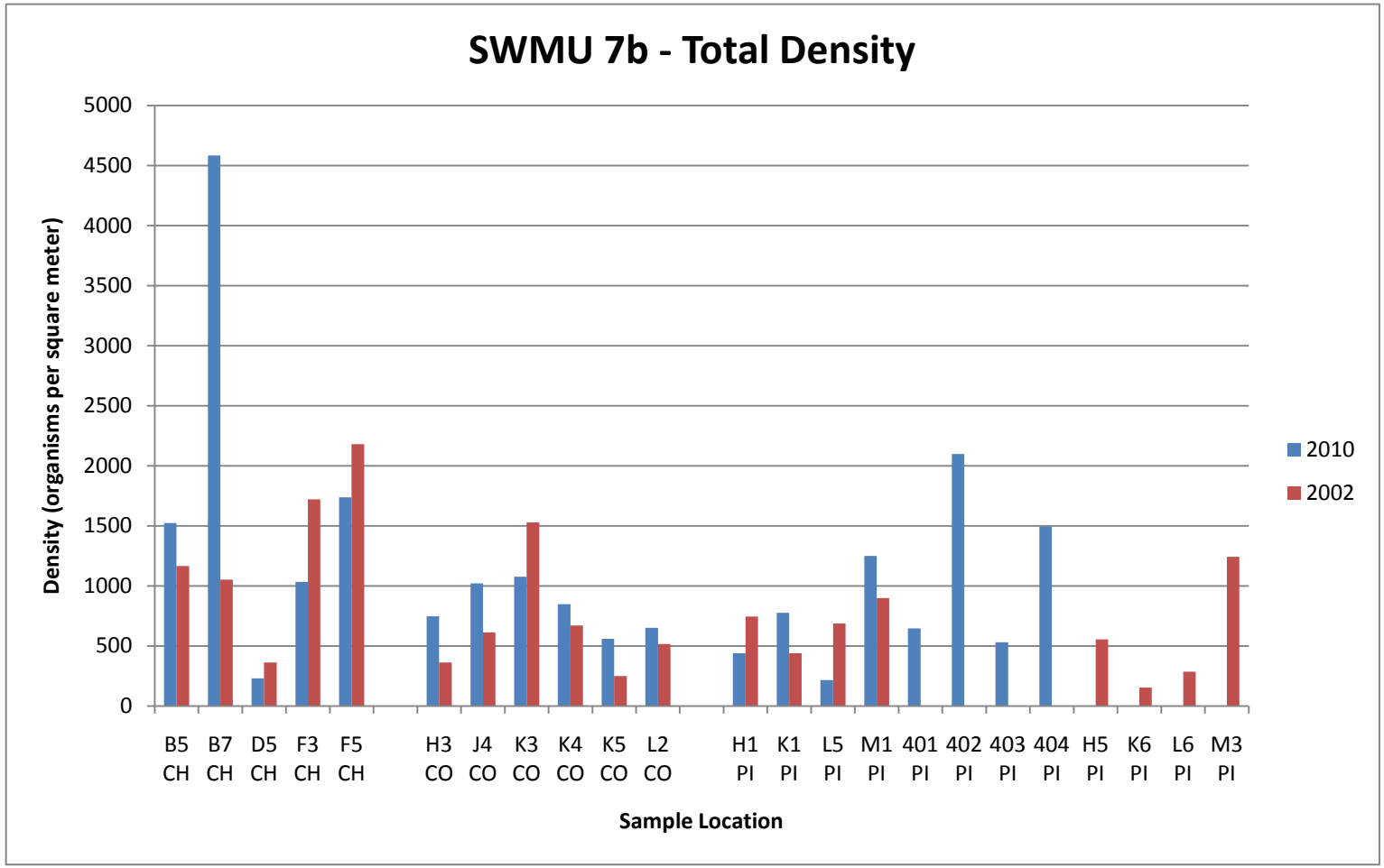


Figure D-13a. Total Density by Area and Year

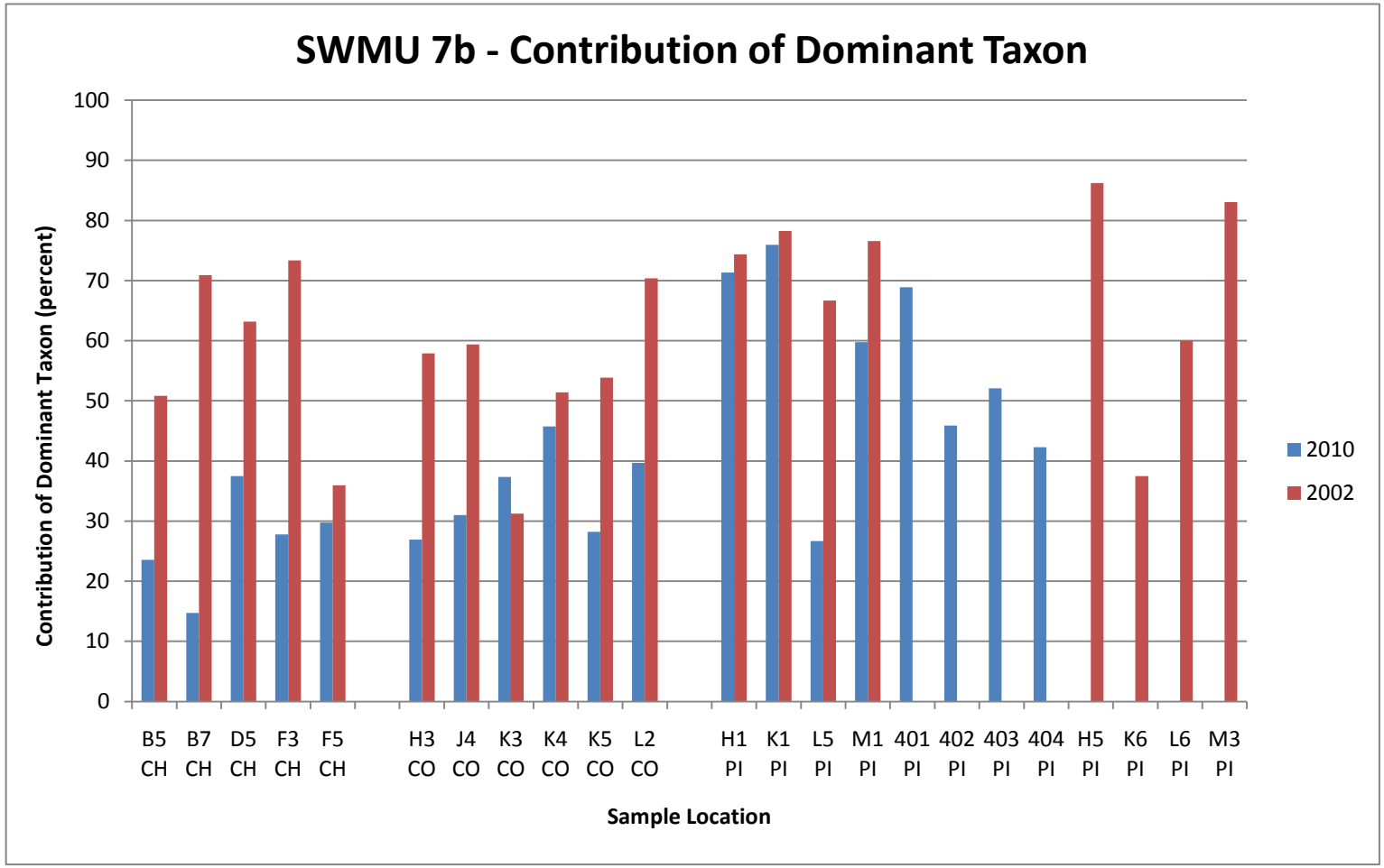


Figure D-13b. Contribution of Dominant Taxon by Area and Year

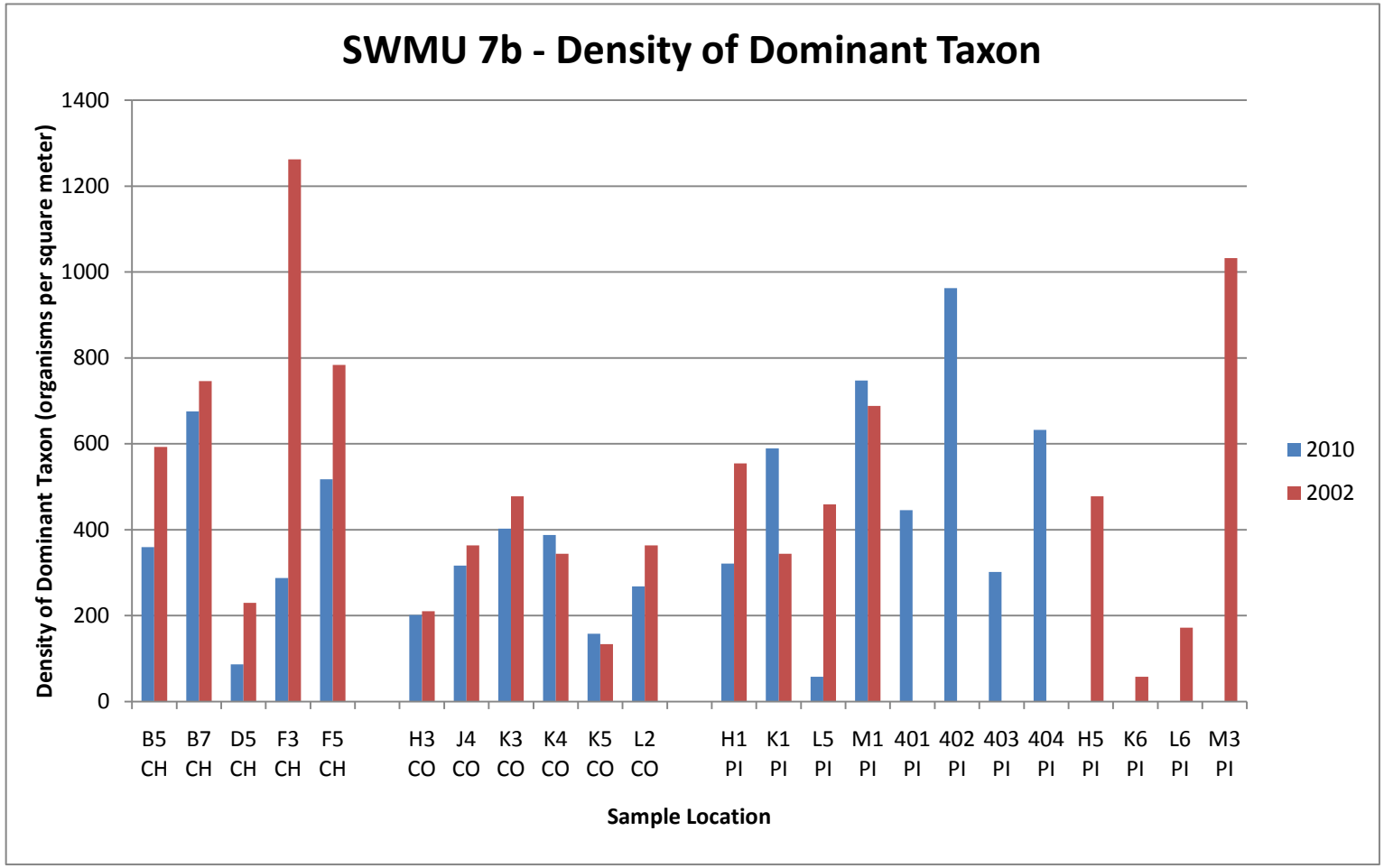


Figure D-13c. Density of Dominant Taxon by Area and Year