CHESAPEAKE AND DELAWARE CANAL
PEARCE CREEK CONFINED DISPOSAL FACILITY

2017 Discharge Monitoring Plan

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers Philadelphia District (USACE) has the mission and authority under the Rivers and Harbors Act to maintain navigation channels in the interest of safe navigation for both large ocean-going and smaller vessels in compliance with authorized channel dimensions. The Federal navigation project Inland Waterway from Delaware River to Chesapeake Bay, DE and MD requires a dredging management program to ensure that there is sufficient capacity for placement of material dredged during channel maintenance operations. Since 1829, the Chesapeake and Delaware Canal (C&D Canal) has allowed vessels to travel west to the Port of Baltimore from the Delaware River rather than south in the Delaware River and Bay to the Atlantic Ocean coast of Delaware, Maryland, and Virginia to the mouth of the Chesapeake Bay and from there, north up the Chesapeake Bay to the Port of Baltimore, a savings of over 300 miles (Figure 1). Currently, the C&D Canal and approach channels carry approximately 40 percent of shipping traffic in and out of the Port of Baltimore.

To maintain navigability, the C&D Canal Southern and Northern Approach Channels in the upper Chesapeake Bay are periodically dredged and the material has been placed in either upland dredged material confined disposal facilities (CDFs) or up until 2012, placed overboard in aquatic sites in the upper Chesapeake Bay (Pooles Island Open Water Placement Sites). The state of Maryland closed the use of all overboard placement sites near Pooles Island in 2012. The Pearce Creek CDF is the preferred option for its available capacity and proximity to the Chesapeake Bay approach channels. Alternative locations such as Court House Point (7 miles to the northeast) or Poplar Island (50 miles to the south) would incur higher dredging, transport, and placement costs than the use of the Pearce Creek CDF. The USACE maintains the channel at an authorized depth of 35 feet with two feet of advanced maintenance, for a total depth of 37 feet at mean low water (MLW).

The USACE acquired 996 acres of land (the Pearce Creek CDF property) in 1937 when the C&D Canal was deepened. Perimeter soil dikes were constructed on an area approximately 260 acres. A sluice gate was constructed for the purpose of allowing water to be released from the containment area to Pearce Creek in a controlled manner during dredged material placement operations. A second sluice was constructed near the mouth of Pearce Creek, which limited the discharge water from Pearce Creek to the Elk River and created Pearce Creek Lake. Dredged material was placed in the CDF in 1937 and 1938, and then again beginning in the 1960s, until the last placement in 1993. The existing soil dikes were raised to their current elevation in 1989 (35-45 feet relative to the North American Vertical Datum of 1988). It is estimated that 4.0 million cubic yards (mcy) of dredged material have been placed in the CDF.

2.0 OBJECTIVE

The objective of this document is to provide the surface water quality monitoring plan to be implemented during operation of the Pearce Creek CDF during the 2017 C&D Canal project maintenance dredging cycle. This plan fulfills the requirements of the 19 December 2014 Water Quality Certificate (14-WQC-02) provided by the Maryland Department of the Environment (MDE).

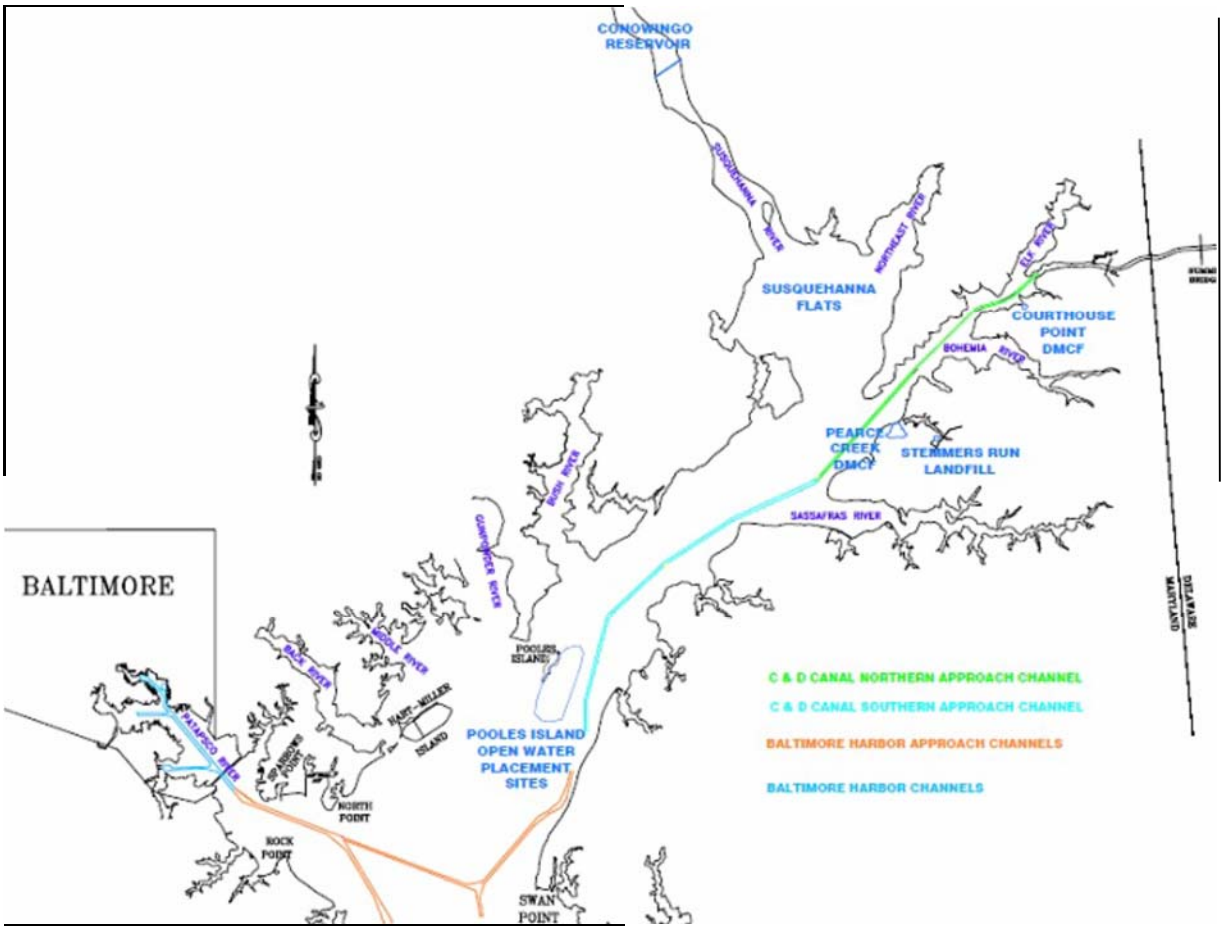

Figure 1: Navigation Channels Between the Port of Baltimore and the C&D Canal.

3.0 PEARCE CREEK CDF LOCATION

The Pearce Creek CDF is located in Cecil County, Maryland (see Figure 2) on the eastern bank of the Chesapeake Bay near the confluence of the Elk River and the Chesapeake Bay. The site is located on Pond Neck approximately 7 miles west of Cecilton, Maryland. Several small communities border the CDF, including West View Shores, Bay View Estates, and Crystal Beach (Figure 3). Development of the West View Shores community occurred mainly after World War II in the 1940s and 1950s.

The development of Bay View Estates, which borders the study area to the southwest, occurred later and at a slower pace than the community of West View Shores.

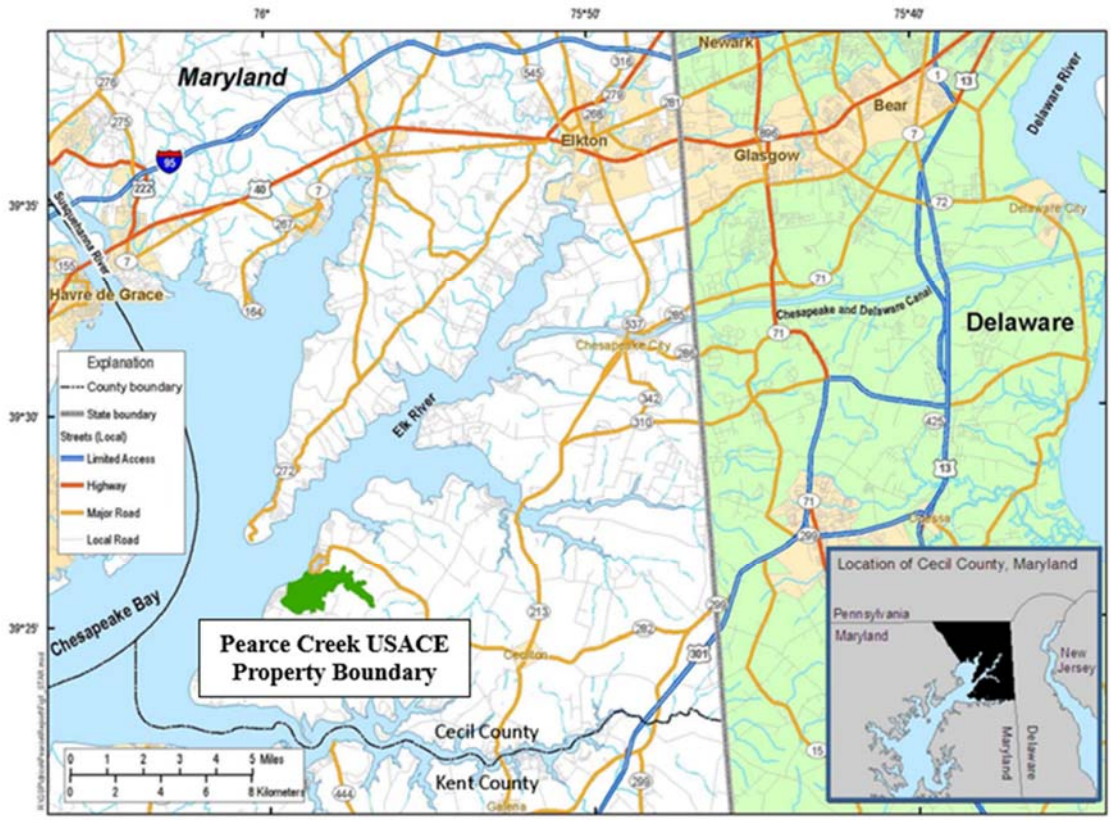

Figure 2: Location of the US Army Corps of Engineers Property Boundary Pearce Creek Facility in Cecil County, Maryland.

Figure 3: Pearce Creek Facility and Vicinity, Cecil County, Maryland.

4.0 PEARCE CREEK CDF SITE PREPARATION

To prepare the Pearce Creek CDF, perimeter earthen dikes were re-established and graded, and an impermeable liner was installed to eliminate the hydrogeologic connection of dredged materials placed within the site and underlying groundwater.

5.0 DISCHARGE MONITORING PLAN

5.1 Scope of Work

This plan is for the evaluation of maintenance dredging activities within the Chesapeake and Delaware Canal Federal Navigation Project. The task is an evaluation of the chemical quality of water flowing out of the Pearce Creek confined dredged material containment facility (CDF) during operation. Samples will be collected concurrent with maintenance dredging operations within the approach channel to the Chesapeake and Delaware Canal. Dredging is projected to begin in October 2017, and will last approximately two months (60 days). One sample will be collected per week for a total of nine weeks.

Sampling will include water and associated suspended solids discharging from the site (effluent). Samples will be collected and appropriately preserved in the field, and

delivered to a laboratory for various chemical analyses. All samples will be analyzed for TAL inorganics, mercury, total suspended solids, pH, dissolved oxygen, dissolved phosphate, ortho-phosphate, total phosphorous, total dissolved phosphorous, nitrate/nitrite, ammonia, total Kjeldahl nitrogen, and sulfate. In addition, the volume of water being discharged from the CDF will be measured. Daily water samples will also be collected to determine the concentration of total suspended solids associated with discharges.

Table 2 provides a list of the number of samples to be analyzed for each parameter. The contractor will prepare a report that documents the sampling procedures, sample preparation techniques, laboratory methods, QA/QC, and test results including data analysis.

5.2 Sample Collection

Effluent: A total of nine effluent samples will be collected over the discharge period (approximately one sample per week). Grab effluent samples will be collected on individual sample days (one sample per week). Samples will be collected at the Pearce Creek CDF weir during the period of discharge. These grab samples will be analyzed for TAL inorganics (both total and dissolved), total mercury, total suspended solids, pH, dissolved oxygen, dissolved phosphate, ortho-phosphate, total phosphorous, total dissolved phosphorous, nitrate/nitrite, ammonia, total Kjeldahl nitrogen, and sulfate.

Effluent samples will be collected from water that has overflowed the containment area into the sluice box. Storage and preservation procedures for water samples will follow *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (New Jersey Department of Environmental Protection, 1997). The specified holding times for water samples will be adhered to. All water sample containers will be acid-rinsed (10% nitric acid) for metal analysis.

Rinseate Blank: One rinseate blank will be created during the period of sample collection. The rinseate blank will be created by rinsing the water sample collection device with laboratory grade water and collecting that water for laboratory analysis. This blank will represent any contamination associated with the water sample collection device. The blank will be analyzed for TAL inorganics (both total and dissolved), total mercury, pH, dissolved phosphate, ortho-phosphate, total phosphorous, total dissolved phosphorous, nitrate/nitrite, ammonia, total Kjeldahl nitrogen, and sulfate.

An automatic sampler will be used to collect daily composite samples (60 samples) of water discharging from the weir for determining total suspended solids concentrations. The sampler will be programmed to collect water at six-hour intervals, over a 24-hour period.

Weir Discharge: The volume of water discharging from the Pearce Creek CDF weir will be measured over the entire discharge period. The Pearce Creek CDF has two pipes discharging water above the water line. An Isco 2110 Flow Meter or something similar

will be used to measure discharge volume through the pipes.

5.3 Sample Analysis

Water samples will be analyzed for the various parameters as discussed above. Laboratory methods are as follows: TAL inorganics (both total and dissolved) (SW846-6020), total mercury (USEPA method 1631E), total suspended solids (USEPA method 160.2), pH (meter reading at time of sample collection), dissolved oxygen (meter reading at time of sample collection), dissolved phosphate (SM18 4500-PE), ortho-phosphate (MCAWW 300.A), total phosphorous (Low Level USEPA method 365.1), total dissolved phosphorous (SM18 4500-PE), nitrate/nitrite (MCAWW 353.2), ammonia (MCAWW 350.1), total Kjeldahl nitrogen (MCAWN 351.2), and sulfate (USEPA method 375.4, 375.3).

5.4 Quality Assurance and Quality Control

The laboratory conducting the analyses will be registered and accredited in the State of Maryland or by the National Environmental Laboratory Accreditation Program (NELAP). Laboratory analytical instrument calibration and inspection will be conducted daily. All excess water will be appropriately labeled, preserved and stored for a period of 60 days subsequent to the sampling period. All procedures required will conform to a viable analytical quality assurance/quality control program.

5.5 Data Analysis

Data will be analyzed using Code of Maryland Regulations (COMAR) Title 26 subtitle 08 Water Pollution 26.08.02.03-2 Numerical Criteria for Toxic Substances in Surface Waters. Freshwater surface water quality criteria for protection of human health and aquatic life will be used to determine if the disposal operation meets applicable standards.

The average hardness of the water will be calculated from all weir samples collected during the discharge period. This average hardness value will be used to calculate the applicable aquatic life criteria for several of the divalent metals.

Hardness values will be calculated using the following equation:

Hardness, mg equivalent CACO3/L = 2.497 [Ca, mg/L] + 4.118 [Mg, mg/L]

6.0 REPORTING REQUIREMENTS AND FREQUENCY

All data will be provided to the Maryland Department of the Environment, Water Management Administration Attn: Mr. Elder A. Ghigiarelli, Jr. as it becomes available from the laboratory. A complete report containing all data and field methodologies will be provided approximately two months after the dredging

operation has ceased.

Table 1: C&D Canal Project Sediment Sample Parameter Specific Laboratory Methods.

Parameter	Analytical Method	Preparation Method
Inorganics		
Inorganics by ICP-MS	SW846 6020A	3005A/3010A/3050B
Mercury, Low Level Mercury, CVA Fluorescence	EPA 1631E	EPA 1631E
Cyanide, Total	SW846 9014	SW846 9010C
Organics		
Volatile Organics GCMS	SW846 8260C	SW846 1311 5030C
Organochlorine Pesticides	SW846 8081B LOW	SW846 3541/3640A
Semivolatile Organics GCMS	SW846 8270D	SW846 3541
PCB Aroclors	SW846 8082A	SW846 3541/3665A
PCB Congeners	EPA 1668	EPA 1668
Dioxins/Furans	EPA 1613B	EPA 1613B
Miscellaneous		
Total Organic Carbon	Lloyd Kahn Method	Lloyd Kahn Method
Grain Size	ASTM D 2487/D422/D4318	ASTM D 2487/D422/D4318

Table 2: C&D Canal Maintenance Dredging Project, Pearce Creek CDF Water Quality Monitoring, Sample Summary and Chemical Analyses.

Parameter	Analytical Method	Number of Effluent Samples	QA/QC Samples
TAL Inorganics (Total and Dissolved)	SW846-6020	18	2
Mercury	USEPA 1631E	9	1
Dissolved Phosphate	SM18 4500-PE	9	1
Nitrate/Nitrite	MCAWW 353.2	9	1
Sulfate	USEPA 375.4, 375.3	9	1
Ortho-phosphate	MCAWW 300.A	9	1
Total Phosphorous	Low Level USEPA 365.1	9	1
Total Dissolved Phosphorous	SM18 4500-PE	9	1
Total Kjeldahl Nitrogen	MCAWN 351.2	9	1
Ammonia	MCAWW 350.1	9	1
pH	Meter Reading	9	
Dissolved Oxygen	Meter Reading	9	
Total Suspended Solids	USEPA 160.2	69	