UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

REGION 3

STATEMENT OF BASIS

Former Millennium Specialty Chemicals
St. Helena Manufacturing Facility
Baltimore, Maryland

EPA ID NO. MDD003093507

Prepared by

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List of Acronyms

AR	Administrative Record
AVS	Acid volatile sulfide
bgs	Below ground surface
CAO	Corrective Action Objective
CMA	Corrective Measures Alternatives
COC	Contaminant of Concern
COPEC	Contaminant of Potential Ecological Concern
DMT	Dundalk Marine Terminal
EDR	Environmental Data Resources, Inc.
EPA	Environmental Protection Agency
EPL	Erosion protection layer
ESA	Environmental Site Assessment

Facility	St. Helena Manufacturing Facility
Final Decision	Final Decision and Response to Comments
FMC	Food Chain Model
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
IC	Institutional Control
LECT	Lyondell Environmental Custodial Trust
Millennium	Millennium Specialty Chemicals
mg/kg	Milligram per kilogram
RCRA	Resource Conservation and Recovery Act
RME	Reasonable maximum exposures
RML	Residual management layer
RFI	RCRA Facility Investigation
SB	Statement of Basis
SEM	Simultaneously extracted metals
SLERA	Screening Level Ecological Risk Assessment
SU	Standard unit
TAL	Target Analyte List
TOC	Total Organic Carbon
UCL	Upper Confidence Level

Section 1: Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for Colgate Creek sediments in the vicinity of the former Millennium Specialty Chemicals' (Millennium) St. Helena Manufacturing Facility (Facility), located at 2701 Broening Highway in Baltimore, Maryland. EPA issued a Final Decision and Response to Comments (Final Decision) in 2019 in which it selected a Final Remedy for soils and groundwater at the Facility. That Final Remedy consists of installation of an engineered cover/cap over exposed soil, creek bank stabilization, stormwater system upgrade, monitored natural attenuation of groundwater, and land and groundwater use controls.

EPA's proposed remedy in this SB consists of dredging and placing a subaqueous cap in a 1.31-acre "Cap Area" as depicted in **Figure 1** and dredging and backfilling a 0.05-acre "Hot Spot Area" as depicted in **Figure 1**. Both Areas have been contaminated by the release of hazardous waste from the Facility. This SB highlights key information relied upon by EPA in proposing its remedy.

The Facility is subject to EPA's Corrective Action Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. §§ 6901 et seq. The Corrective Action Program requires that owners and/or operators of facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their property.

EPA is providing a thirty (30) day public comment period on EPA's proposed remedy described in this SB. EPA will evaluate comments received after the public comment period has ended and may modify its proposed remedy based on such comments. If the final remedy is substantially unchanged from the one proposed, EPA will issue a Final Decision and inform all persons who submitted written comments or requested notice of EPA's final determination. If the final remedy is significantly different from the one proposed, EPA will issue a public notice explaining the new remedy and will reopen the comment period. EPA will respond in writing to all relevant comments received during the comment period.

Information on the Corrective Action program and the Government Performance and Results Act Environmental Indicator Determinations for the Facility can be found by navigating to https://www.epa.gov/hwcorrectiveactioncleanups/epa-rcra-id-mdd003093507.

EPA has compiled an Administrative Record (AR) containing all documents, including data and quality assurance information, upon which EPA's proposed remedy is based. See Section 11, Public Participation, below, for information on how you may review the AR.

Section 2: Facility Background

The approximately 18-acre Facility is located at 2701 Broening Highway in the City of Baltimore, Maryland (**Figure 1**). The Facility is flanked by Norfolk Southern Corporation railroad tracks, Edgewater Street, and Ralls Avenue along the northeast property boundary; a vacant lot and Ralls Avenue to the southeast; Broening Highway and Colgate Creek to the southwest; and Tnemec, a manufacturer of paints and protective coatings, to the northwest (**Figure 2**). The nearby surrounding area is primarily

occupied by industrial facilities including the Dundalk Marine Terminal (DMT) to the southwest across Broening Highway; Point Breeze Industrial Park to the west, beyond Colgate Creek; and Techalloy, a manufacturer of stainless steel, nickel alloy, and low-alloy products to the north across the Norfolk Southern railroad tracks and Edgewater Street. A residential community and community park are also located approximately 100 feet northeast of the Facility.

The Facility was first developed in 1914 by the General Smelting Company of Pennsylvania according to a 2006 Phase I Environmental Site Assessment Report prepared by Arcadis G&M, Inc. Manufacturing operations at the Facility prior to 1921 are largely undocumented. Based on information in the 2006 Phase I ESA Report, zinc lithopone was likely the principal manufactured product prior to 1921. From 1920 to 1933, Glidden Chemicals and Pigments Co. produced zinc lithopone, cadmium lithopone, and titanium dioxide. From 1933 to 1946, American Zirconium Corp. (a joint venture of Glidden & Metal and Thermit Corp.) produced titanium- and zirconium-based pigments, as well as zinc lithopone and cadmium lithopone. From 1946 to 1967, Glidden Chemicals and Pigments Co. produced cadmium-based pigments and until 1958, also produced titanium-based pigments and zinc lithopone. Starting in 1967, Millenium Chemicals (subsidiary of Hanson Trust PLC/Cristal Chemical Co./Lyondell Chemical Company; formerly Glidden Co., subsidiary of SCM Corp/Hanson Trust PLC/ICI PLC)[1] produced amorphous silica dioxide (SiO_2) at the Facility. Amorphous silica gel production included the use of sulfuric acid and sodium silicate. Soda ash, a chemical commonly used to raise the pH of aqueous solutions, was used in wastewater treatment. The plant was shut down in 2007, and in 2008, the plant was decommissioned and all structures demolished. Between 2008 and 2010, approximately 10.7 acres of the Facility were subdivided and leased to various entities for the staging and transfer of semi-trailers and cargo containers going to and from the DMT, or as vehicle storage areas.

The Facility is currently owned by the Lyondell Environmental Custodial Trust (LECT), which was created to take ownership of contaminated properties, including the Facility, once owned by the bankrupt Lyondell Chemical Company. On March 31, 2010, the United States Bankruptcy Court for the Southern District of New York entered an order in Case No. 09-10023 styled *In re: Lyondell Chemical Company, et al* (the "Court Order"), and established the Trust to own and remediate, and convey, if possible, certain land that was formerly owned by the Lyondell Chemical Company, including the Facility.

Following establishment of the Trust in 2010, the leases of the Facility property were terminated, and there are no occupants or business conducted at the Site. All former structures were demolished in 2008 and numerous building foundations and slabs, paved driving surfaces, and areas of building demolition debris are present in the southern portion of the Facility. In other areas, the ground surface is unpaved. Areas of historical fill were identified along the western portion of the Facility running from the north end of the Facility to Broening Highway (North and West Fill Areas) during the RCRA Facility Investigation (RFI). Other notable surface features at the Site include a rail spur along the northeastern boundary of the property.

[1] In the early 1980's, Glidden was involved in a series of transactions and mergers involving firms listed parenthetically, in chronological order. At some point thereafter, ownership of the site transferred from Glidden to Millennium Chemicals Inc. under a mutual parent company.

Section 3: Conceptual Site Model

Geology

The Facility is located within the Coastal Plain physiographic province, generally characterized by a thickening eastward wedge of mostly unconsolidated Triassic to Quaternary sediments. The area in the immediate vicinity of the Facility is underlain by unconsolidated marine sediments of the Cretaceous-aged Potomac Group, composed of the Patapsco, Patuxent, and Arundel formations, in stratigraphic order from youngest (uppermost) to oldest (lowermost).

The Patapsco formation consists primarily of clay interbedded with lenses of coarse sand. The Patuxent formation consists primarily of medium- to coarse-grained quartz sand interbedded with lenses of gravel and silty clay. The Arundel formation is also known as the Arundel Clay and is up to 125 feet thick.

Based on an Environmental Data Resources, Inc. (EDR) regulatory database report included with the 2006 Phase I Environmental Site Assessment (ESA) Report, regional soils are classified as the Othello series, which is primarily a silt-loam with moderately slow infiltration rates. According to the United States Department of Agriculture Natural Resources Conservation Service Soil Survey database, the Facility is classified as urban land with 0% to 15% slopes. The surrounding area soils are classified as the Beltsville-Urban land complex, which is a moderately-well drained loam with moderately high infiltration rates, and the Leonardtown-Urban land complex, which is a poorly drained silt loam with moderately high infiltration rates.

Hydrogeology

The Patapsco formation is a shallow unconfined aquifer, which consists of interbedded sand, silt, and clay. Groundwater within the Patapsco formation is typically brackish and is not utilized as a source of groundwater for human consumption or for industrial purposes. The Patapsco Formation is underlain by the Arundel confining layer, which is characterized by red to reddish-yellow dense clay with thin silt lenses. Soil borings installed during the Phase II investigation north of the Site showed this unit to be approximately 60 to 80 feet thick.

Shallow groundwater was encountered at depths of approximately 2.5 to 12 feet below ground surface (bgs), and the depths to water in the deep wells ranged from approximately 9.5 to 16 feet bgs. Shallow groundwater in the vicinity of and across the Site generally flows to the west, toward Colgate Creek. Deep groundwater also appears to flow toward Colgate Creek across most of the Facility and its immediate vicinity.

The Facility and surrounding area properties are serviced by public water supply provided by the City of Baltimore. Based on information provided by EDR, no private water supply wells were identified within a one-mile radius of the Facility.

Hydrology

Topography at the Facility is generally characterized by a gentle slope to the west-southwest. Surface elevations range from approximately 0 to 25 feet above mean sea level with the highest elevations along the railroad tracks at the southeast corner of the Facility, and the lowest elevations along Colgate

Creek at the western Facility boundary. As such, storm water falling on paved or low-permeability unpaved portions of the Facility generally flows overland to the west and southwest toward Colgate Creek. Storm drains located within the southern (the area of former operations) and southwestern portions of the Facility, and a concrete trench drain in the central portion of the Facility (near the former recovery plant) collect storm water which then discharges to Colgate Creek via several outfalls.

Section 4: Summary of Environmental Investigations

The following section describes the results of sediment data collected during the RFI in 2013 and 2016 and supplemental data collected in 2020. Sediment results from the 2013 investigation are shown in **Table 1**, surface water results are shown in **Tables 2** and **3**, and porewater results are included in **Tables 4** and **5**. Sediment results from the 2016 investigation are shown in **Table 6** and sediment results from the 2020 investigation are shown in **Tables 7** and **8**. **Figures 3** through **7** show arsenic, cadmium, chromium, lead, and zinc concentrations in sediment.

The Trust performed investigations of Colgate Creek sediments in the vicinity of the Facility during two phases of the RFI, completed in November 2013 and September 2016, respectively. These investigations revealed the sediments to be clayey sand with abundant gravel and large debris including concrete sections, logs, and crab pots within 20 feet of the banks, and very soft clay and silt with organic matter in the central portions of the Creek. Colgate Creek sediments were also noted to have an average pH of 7.76 standard units (SU) and the majority of sample locations exhibited a petroleum sheen on the Colgate Creek surface following sediment disturbance.

In November 2013, the Trust collected sediment samples from nine locations associated with former storm water or process water outfalls at the Facility, as well as an additional three sampling locations upstream of the Facility. The Trust completed shallow sediment sampling with a petit ponar sampler or hand-deployed piston corer with acetate liner. Shallow sediment samples were analyzed for Target Analyte List (TAL) metals (plus titanium), sulfide, water content, total organic carbon (TOC), acid volatile sulfide (AVS) and simultaneously extracted metals (SEM). Sediment pH was also field measured in the vicinity of each sample location.

Additionally, the Trust collected surface water samples from ten locations (US02 and CC01- CC09) and pore water samples were collected from nine locations (US02 and CC01-CC08).

In September 2016, subsurface sediment cores were collected at 23 locations using Vibracore technology and were analyzed for TAL metals (plus titanium), water content, TOC, and pH.

Between these two events, the Trust collected a total of 54 sediment samples at 35 locations in Colgate Creek adjacent to the Facility in the vicinity of historical outfalls, and upgradient from the Facility. Results indicated the presence of metals which exceeded preliminary screening levels. Preliminary screening levels were derived from EPA Region 3 Marine Sediment Screening Benchmarks where applicable or EPA Region 3 Freshwater Screening Benchmarks where Marine Benchmarks did not exist for a specific analyte. Metals exceeding these benchmarks included antimony, arsenic, cadmium, total chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver and zinc. One sample (SC-M-D) was taken downstream of the Broening Highway bridge and results from this location also exceeded preliminary screening levels for the same metals except for manganese.

Statement of Basis

Toxicity testing was also completed in 2017 at five locations (CC07, SC-M-D, SC-M-U, SC-S-T1 and SC-S-T2).

In November 2020, the Trust collected sediment samples at 22 locations in Colgate Creek to fill data gaps in existing sediment data, supplement historical data collected previously, and provide baseline data to support a Corrective Measure Study Report. Sediment samples were collected with a piston corer to a depth of six feet or until refusal. The Trust completed upstream sampling in a depositional area approximately 1,000 feet upstream of the Facility and collected a single transect immediately upstream of the Facility to determine existing sediment conditions as well as to compare sediment concentrations in these upstream locations with sediment concentrations adjacent to the Facility. The Trust also collected sediment samples approximately 50 and 100 feet west of previous sample locations SC-S-T1, SC-M-T1, and SC-S-T2 which had elevated metals concentrations, to determine remedial boundaries. Two sampling transects were completed between the southern Facility property line and the northern terminus of the dredged navigation channel in Colgate Creek, and two additional sediment locations were collected upstream and downstream of sediment location SC-M-D. All samples were analyzed for TAL metals and geotechnical data was collected to support a subsequent corrective measures design.

Combined with historical data, the subsurface data indicate arsenic concentrations are generally highest in the 2-4-foot interval with several locations adjacent to the former plant exceeding 1,000 milligrams per kilogram (mg/kg). The highest arsenic concentration at 2-4 feet was observed at historical downgradient location SC-M-D (7,920 mg/kg). Concentrations of cadmium in sediments were generally similar to those of arsenic, with the highest concentrations primarily in the 2-4-foot interval and the highest concentration overall found at historical downgradient location SC-M-D.

Lead concentrations in sediments in the vicinity of the Facility were shown to be generally increasing with depth, with maximum concentrations in the 4-6-foot interval from historical samples and in the 2-4-foot interval from the 2020 samples. Downgradient lead concentrations around hotspot location SC-M-D reach a maximum value (22,800 mg/kg) in the 2-4-foot interval, with decreasing concentrations at depths greater than 4 feet.

The sediment investigation performed in 2020 provided supplemental information upstream, downstream, adjacent to the Facility, and alongside historical sediment investigations. Analytical data from the 2020 investigation proved generally consistent with data collected as part of the 2013 and 2016 investigations. An area of elevated metals concentrations (particularly lead, cadmium, and arsenic) was confirmed adjacent to the Facility, approximately within the boundaries of locations CC10, SC-S-T1, SC-S-T2 and SC-M-T2 (this area has been designated as the “Cap Area”). Another hotspot of elevated concentrations was confirmed around historical sample location SC-M-D (this area has been designated as the “Hot Spot Area”).

Section 5: Human Health Risk Assessment

A baseline human health risk assessment (HHRA) was conducted to determine whether corrective measures are needed to address concentrations that pose a potentially unacceptable risk from reasonable maximum exposures (RME) under current and reasonably expected future land use at and

around the Facility. The risk assessment results for exposure to Facility-related contaminants of concern (COCs) in sediment are summarized below for the following receptors with sediment exposure: Off-Site maintenance workers, recreational receptors, and the fisherman/crabber. The maximum concentrations of COCs within sediment in the supplemental sediment dataset, collected in November 2020, are lower than the maximum concentrations of the RFI sediment dataset, and no additional areas of elevated metals were identified in sediment with the supplemental investigation. Therefore, the human health sediment risk assessment based on RFI data was used to conservatively assess risks associated with exposure to COCs in sediment for remedial decision-making.

Off-Site Maintenance Workers: This receptor was assumed to have the potential to contact sediments in the outfall area within Colgate Creek and in the accessible shore areas of the Facility. This receptor's exposure duration was assumed to be 10 years, and the exposure frequency of contacting sediments within and immediately adjacent to stormwater outfalls was 1 day per month (12 days per year), and the exposure frequency of contacting accessible shoreline sediments was 2 times per year (based on the assumed infrequent maintenance activity of removing debris from this area). The HHRA conservatively calculated cancer risks and a hazard index (HI) for individual sediment samples. The cumulative cancer risk for maintenance worker exposure to outfall and accessible shoreline sediment concentrations did not exceed EPA's risk range of 10^{-6} to 10^{-4}, or MDE's risk target of 10^{-5} for any location. Arsenic was the carcinogenic COC for which these cancer risks were based. The maintenance worker HI for sediment exposure did not exceed EPA's acceptable target of 1 for any outfall area or accessible shoreline area sediment. Therefore, no corrective measures are necessary to protect this receptor from unacceptable risks from contacting outfall or accessible shoreline sediments.

Recreational Receptor: The recreational receptor's exposure to sediments was evaluated for direct contact while wading (near-shore sediments) and while on the accessible shoreline adjacent to the former plant (accessible shoreline sediments). This receptor was assumed to be an adolescent (age 6-16 years old) with an exposure duration of 10 years who wades 2 days per week during the months of May through October (that is, 52 days per year). The HHRA conservatively calculated cancer risks and HIs for individual sediment samples, as well as for exposure-weighted mean concentrations of chemicals of potential concern in the near-shore sediment samples and accessible shoreline sediment samples. All sample locations yielded cumulative cancer risks for recreational direct contact with sediments that are within EPA's risk range of 10^{-6} to 10^{-4}. The RME cumulative cancer risk based on an exposure-weighted mean did not exceed EPA's risk range of 10^{-6} to 10^{-4}. Arsenic was the carcinogenic COC for which these cancer risks were based. The noncancer HI for sediment exposure of this receptor did not exceed EPA's acceptable target of 1 for individual samples or exposure weighted averaged concentrations.

There was one sample (SC-S-T2) that exceeded the lead sediment screening level of 5,100 mg/kg for this receptor (based on EPA's adult lead model). The exposure weighted mean concentration of lead for this receptor was lower than the lead screening level.

Based on cumulative cancer risks, noncancer HIs, and receptor-specific lead risk assessment, no corrective measures are necessary to protect this receptor for direct contact of near-shore and accessible shoreline sediments.

Statement of Basis

Fisherman/Crabber: The fisherman/crabber was evaluated for two exposure pathways associated with sediment in the near-shore and accessible shoreline sediments of Colgate Creek. These are the direct contact with sediment and ingestion of locally harvested crab that had accumulated COPCs from sediment. The fisherman/crabber was assumed to be a local adult with an exposure duration of 26 years who fishes or crabs in Colgate Creek adjacent to the Facility on a weekly basis (that is, 52 days per year). The HHRA presented risk calculations both for individual sediment samples, and for exposure-weighted mean concentrations of the near-shore sediment samples and the accessible shoreline sediment samples. For direct contact exposure to the accessible shoreline sediments by the fisherman/crabber, all sediment samples in the near-shore and accessible shoreline areas yielded cumulative cancer risks within EPA's risk range of 10^{-6} to 10^{-4}. Arsenic was the carcinogenic COC for which these cancer risks were based. The noncancer HIs were lower than 1 for both individual sample concentrations and exposure-weighted concentrations. Therefore, no corrective measures are necessary to protect this receptor for direct contact of accessible shoreline sediments.

The HHRA identified only one potentially unacceptable human health risk with COCs in sediment. This was for ingestion of modeled concentrations of arsenic in crabs exposed to arsenic in accessible shoreline sediments. Cumulative risks associated with three RFI samples (SC-ST1, SC-S-T2, and SC-M-T1) exceeded MDE's risk target of 10^{-5}, but not EPA's risk range. Arsenic sediment risk-based concentrations associated with specific cancer risk levels can be calculated for the local crab ingestion pathway. Based on the RFI risk results, a 10^{-5} risk-based arsenic sediment concentration for ingestion of crab exposed to these sediments is 335 mg/kg. Four RFI sediment samples exceed this risk-based arsenic sediment concentration (SC-S-T2, SC-M-T1, SC-S-T1, and CC06).

There were two samples (SC-S-T2 and SC-M-T1) that exceeded the lead sediment screening level of 4,183 mg/kg for this receptor.

As indicated above, elevated levels of arsenic and lead are present in sediment that can contribute to potentially unacceptable risks for the ingestion of crab pathway for the fisherman/crabber receptor. Therefore, corrective measure response actions include capping, a combination of sediment removal and capping, or in-situ treatment to address elevated levels of arsenic and lead in sediment that contribute to potentially unacceptable risks for the ingestion of crab pathway for the fisherman/crabber receptor.

Section 6: Ecological Risk Assessment

A screening level ecological risk assessment (SLERA) was conducted in July 2017. The SLERA consisted of Steps 1, 2, and 3a of the EPA ecological risk assessment process. The SLERA included an evaluation of surface water, surface sediment, and sediment pore water within Colgate Creek. Therefore, the selected receptors evaluated in the SLERA included benthic invertebrates, fish, and aquatic-feeding wildlife.

The SLERA evaluated risks to the selected receptors from surface water and pore water samples collected in 2013, and from sediment samples collected in 2013 and 2016 (no surface water or pore water samples were collected in 2016). For the initial screening step and selection of preliminary constituents of potential ecological concern (COPECs), constituents in surface water and pore water

were compared to MDE Toxic Substance Water Quality Criteria for Surface Water or EPA Region 3 Marine Surface Water Screening Benchmarks for Ecological Risk Assessment. For constituents detected in sediment, USEPA Region 3 Marine Sediment Screening Benchmarks for Ecological Risk Assessment were used. For constituents that did not have marine sediment screening benchmarks, EPA Region 3 Freshwater Sediment Screening Benchmarks for Ecological Risk Assessment were used.

Maximum constituents in each media were compared to the screening levels for selecting preliminary COPECs as part of Step 2 of the SLERA process. Based on this initial screening, several metals were identified as preliminary COPECs for surface water, porewater, and sediment.

The next part of the screening process included the Step 3a refinement. This included using a weight-of-evidence approach to determine which COPECs and locations warrant further study, if any. After the Step 3a refinement step, the following constituents were retained as COPECs:

- Surface water: No constituents were retained as COPECs.
- Sediment and Porewater: Cadmium, copper, lead, nickel, silver, and zinc required further evaluation for benthic invertebrates. Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc required further evaluation for aquatic-feeding wildlife because they are bioaccumulative metals.

Two lines of evidence were used in the SLERA to further evaluate potential risks to benthic invertebrates including: 1) Evaluation of AVS and SEM in conjunction with TOC, and 2) whole sediment toxicity testing. The AVS-SEM evaluation indicated that toxicity is unlikely for mixtures of cadmium, copper, lead, nickel, silver, and zinc in sediment at all sampling locations except CC03-SD.2, CC04-SD.1, CC04-SD.2, CC04B, CC05-SD.2, CC05-SD.3, and SC-S-T2.

Ten-day static bioassays were conducted with the amphipod *Leptocheirus plumulosus* on sediment samples collected from five locations in 2016 (SC-S-T2, SC-M-D, SC-M-U, CC07, and SC-S-T1). Benthic invertebrate toxicity test results for the five sediment sampling locations ranged from 0% to 96% mean survival. The benthic toxicity test data is adequate to demonstrate that reductions in the very elevated sediment metals concentrations are necessary to protect the benthic environment.

For wildlife, several metals were identified as preliminary COPECs that have the potential to bioaccumulate. These constituents were evaluated for aquatic-feeding wildlife in the SLERA by comparing modeled dietary intake of COPECs by representative avian and mammalian species to doses reported in the literature as thresholds for adverse effects on survival or reproduction. The following receptors were included in the food web modeling: Mallards, Raccoons, Great Blue Heron, and River Otter.

Food chain models (FCM) were used to calculate a dose for each receptor which was then divided by a toxicity reference value to calculate a hazard quotient (HQ). For the initial screening step (using maximum chemical concentrations in the sediment), only the HQs calculated for raccoon exposure to arsenic and mallard and raccoon exposure to selenium exceeded 1. For the Step 3a refinement, the FCM was recalculated using the mean and a 95 percent upper confidence level (UCL) of the mean concentrations to provide a method to evaluate more realistic exposure scenarios. After utilizing the mean and 95 percent UCL concentrations, all HQs were less than or equal to 1.

Statement of Basis

As indicated above, toxicity to benthic invertebrates was identified at the nearshore sediment locations SC-S-T1 and SC-S-T2 within the proposed Cap Area. The recommended corrective measures resulting from the HHRA scenarios would address the sediment at SC-S-T1 and SC-S-T2 either by capping or a combination of sediment removal and capping, so these areas would no longer be exposed. Other areas with elevated levels of metals in sediment would similarly be removed/capped to eliminate exposure of benthic invertebrates to current metals concentrations (i.e., at location SC-M-D within the Hot Spot Area).

Section 7: Corrective Action Objectives

EPA's Corrective Action Objectives (CAOs) are as follows:

The primary CAO developed for the sediments in Colgate Creek is to reduce, to the extent practicable, risks to benthic macroinvertebrates by isolating, treating, or removing bioavailable sediments with concentrations of COCs. Arsenic, cadmium, lead, and zinc were selected as COCs for sediment, based on the likelihood of the Facility's previous operations serving as a source of these metals, as well as the magnitude of exceedance of these sediment metals concentrations compared to sediment Probable Effects Concentrations (PECs) found in *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald 2000). While it is understood that chromium is also a likely COC, there are other nearby contributing sources of chromium to the Creek sediments that eliminate chromium as a COC of the Facility. However, most of the sediment locations with the highest chromium concentrations are located within the Cap and Hot Spot Areas.

The secondary CAO is to reduce, to the extent practicable, human health risks associated with exposure to COCs through the ingestion of fish/crab pathway by isolating, treating, or removing sediments with elevated concentrations of arsenic and lead.

Section 8: Corrective Measures Alternatives

Two areas of concern, the Cap Area and the Hot Spot Area (**Figure 1**), were identified based on elevated concentrations of COCs in sediment exceeding a hazard quotient of 10 as compared to the MacDonald PECs, as well as supporting toxicity test data (**Table 9**). These areas bound sediments containing elevated metals concentrations (particularly lead, cadmium, zinc, and arsenic) adjacent to and downstream of the Facility. The Cap Area, which is approximately 1.31-acres, includes locations CC008, CC009, SC-S-T1, CC011, SC-M-T1, CC012, CC013, SC-S-T2, and SC-M-T2. The Hot Spot Area, which is approximately 0.05-acres, includes a downstream hotspot of elevated COC concentrations near the Port Access Bridge. The Hot Spot area includes location SC-M-D.

The following corrective measures were evaluated for the Cap and Hot Spot Areas:

- No Action
- Dredging, Subaqueous Cap, and Institutional Controls
- Dredging with Off-Site Disposal

Each of the identified corrective measure response actions considered for the Cap and Hot Spot Areas were qualitatively evaluated and screened based on expected effectiveness, implementability, and

order-of-magnitude costs. Based on this evaluation, all the above response actions, except select types of in-situ treatment, on-site, and off-site disposal, were retained for development of alternatives.

Corrective Measures Alternatives (CMAs) are developed by combining retained corrective measure response actions and associated process options applicable to site specific features and conditions. The CMAs focused on containment (capping) and removal (dredging) as the primary active response actions as these measures are known to be effective and would not require pre-design treatability studies. These approaches would be supplemented by passive measures such as institutional controls (ICs) as necessary to achieve CAOs. Each of the CMAs evaluated are detailed below:

Alternative 1 - No Action: This alternative provides a baseline against which to compare the other alternatives. If the other identified alternatives do not offer substantial benefits in the protection of human health and the environment, the No Action alternative may be considered a feasible approach. This alternative leaves the contamination in the Cap and Hot Spots Area in their current state and all current and potential future risks associated with the contaminated sediments would remain.

Alternative 2 – Dredging, Subaqueous Cap, and Institutional Controls

Under Alternative 2, dredging followed by installation of a conventional sediment cap would be used to contain contaminated sediments, creating a clean surface suitable for reestablishing aquatic biota. The cap would be of sufficient thickness and particle size gradation to ensure isolation of impacted sediments and would be able to withstand erosional forces. Dredging would remove sediment to a depth of approximately 2 feet before placement of a conventional subaqueous cap to maintain the current stream channel elevations. ICs would be required to protect the integrity of the cap.

Dredging would occur as follows: i) mechanical dredging would be utilized for removal of sediment; ii) dredged sediment would be placed on a barge where the dewatering process will begin; iii) dredged sediment would be transferred to a dewatering pad for final dewatering; and iv) dewatered sediment would be transported to a disposal facility. Management of the water collected over the dewatering pad, and some degree of treatment in an onsite water treatment system, will be required before disposal.

Alternative 3 – Corrective Action Areas Removal: This alternative would dredge contaminated sediments to a depth of 6 feet which is anticipated to remove contaminated sediments containing concentrations of risk driver COCs that are elevated above EPA Region 3 Marine and Freshwater Sediment Screening Benchmarks. Within the Cap Area, approximately 4 feet, 8 inches of clean backfill and a residual management layer (RML) of 12 inches would be placed over dredged areas to sequester contaminant residuals from the aquatic environment and provide an ecologically suitable substrate for re-establishment of the benthic habitat. The final thickness of the RML would be determined during design. An erosion protection layer (EPL) of 4 inches would be placed over the RML to prevent erosion and scour. The Hot Spot Area would be fully backfilled with clean material. Additionally, scour protection rock would be added to provide erosion protection around the bridge piers. Dredged sediment would be handled the same as described in Alternative 2.

Section 9: Evaluation of Corrective Measures Alternatives

This section provides a description of the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance. The criteria are applied in two phases. In the first phase, EPA evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria.

Threshold Criteria	Evaluation for Cap Area	Evaluation for Hot Spot Area
1) Protect human health and the environment	Alternative 1 – No Action The no action alternative would not protect human health and the environment. Alternative 1 was retained for comparison purposes and will not be discussed further. Alternative 2 – Dredging, Subaqueous Cap, and ICs Human health and the environment would be protected by reducing the exposure pathway through removal and physical isolation of contaminants in sediment under a subaqueous cap. Alternative 3 – Dredging with Off-Site Disposal Human health and the environment would be protected by eliminating the exposure pathway to ecological receptors through removal of contaminants in sediment.	Alternative 1 – No Action The no action alternative would not protect human health and the environment. Alternative 1 was retained for comparison purposes and will not be discussed further. Alternative 2 – Dredging, Subaqueous Cap, and ICs Human health and the environment would be protected by reducing the exposure pathway through removal and physical isolation of contaminants in sediment under a subaqueous cap. Alternative 3 – Dredging with Off-Site Disposal Human health and the environment would be protected by eliminating the exposure pathway to ecological receptors through removal of contaminants in sediment.
2) Achieve media cleanup objectives	Alternative 2 – Dredging, Subaqueous Cap and ICs The CAOs would be met after the construction of the subaqueous cap and implementation of ICs to protect the integrity of the cap. Alternative 3 – Dredging with Off-Site Disposal The CAOs would be met once the dredging is completed, and the Cap	Alternative 2 – Dredging, Subaqueous Cap and ICs The CAOs would be met after the construction of the subaqueous cap and implementation of ICs to protect the integrity of the cap. Alternative 3 – Dredging with Off-Site Disposal The CAOs would be met once the dredging is completed, and the Hot

	Area is backfilled.	Spot Area is backfilled.
3) Remediating the Source of Releases	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 would not completely remove all elevated metals concentrations, but it would reduce the contaminant levels, provide a clean surface suitable for reestablishing aquatic biota, and physically isolate the remaining contaminants in sediment. <u>Alternative 3 – Dredging with Off-Site Disposal</u> The source areas of elevated metals concentrations would be eliminated because dredging would remove contaminants in sediment that are above the relevant EPA benchmarks.	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 would not completely remove all elevated metals concentrations, but it would reduce the contaminant levels, provide a clean surface suitable for reestablishing aquatic biota, and physically isolate the remaining contaminants in sediment. <u>Alternative 3 – Dredging with Off-Site Disposal</u> The source areas of elevated metals concentrations would be eliminated because dredging would remove contaminants in sediment that are above the relevant EPA benchmarks.
Balancing Criteria	**Evaluation**	
1) Long-term effectiveness	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 is effective in the long-term. The majority of the contamination would be removed. Any residual contamination would be capped with the placement of a sand layer and EPL. ICs would protect the integrity of the cap. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternate 3 would achieve long-term effectiveness through removal of the contamination. Any residual contamination would be managed with the placement of 4 feet, 8 inches of clean backfill and a 12-inch RML.	<u>Alternative 2 – Dredging, Subaqueous Cap and ICs</u> Alternative 2 is effective in the long-term. The majority of the contamination would be removed. Any residual contamination would be capped with the placement of a sand layer and EPL. ICs would protect the integrity of the cap. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternate 3 would achieve long-term effectiveness through removal of the contamination. Any residual contamination would be managed with the placement of clean backfill.
2) Reduction of	<u>Alternative 2 – Dredging,</u>	<u>Alternative 2 – Dredging, Subaqueous</u>

toxicity, mobility, or volume of the Hazardous Constituents	<u>Subaqueous Cap, and ICs</u> Toxicity, mobility, and volume of waste would be reduced by the removal and appropriate disposal of the metals-contaminated sediments. The amount of sediments removed would be less than the amount removed by Alternative 3, but the mobility and toxicity would also be reduced by the installation of the subaqueous cap. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Toxicity, mobility, and volume of waste would be reduced by the removal and appropriate disposal of the metals-contaminated sediments.	<u>Cap, and ICs</u> Toxicity, mobility, and volume of waste would be reduced by the removal and appropriate disposal of the metals-contaminated sediments. Additionally, mobility and toxicity will also be reduced by the installation of the subaqueous cap. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Toxicity, mobility, and volume of waste would be reduced by the removal and appropriate disposal of the metals-contaminated sediments.
3) Short-term effectiveness	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 could pose short-term impacts to the environment and community, but the impacts will be minimized by implementing environmental controls. These controls could include use of turbidity curtains to limit impacts to the surrounding surface water quality, and noise, air quality, and odor controls. These mitigation measures would be evaluated during design. The construction duration is estimated to be 90 days. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternative 3 could pose short-term impacts to the environment and community, but the impacts will be minimized by implementing environmental controls. These	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 could pose short-term impacts to the environment and community, but the impacts will be minimized by implementing environmental controls. These controls could include use of turbidity curtains to limit impacts to the surrounding surface water quality, and noise, air quality, and odor controls. These mitigation measures would be evaluated during design. The construction duration is estimated to be 90 days. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternative 3 could pose short-term impacts to the environment and community, but the impacts will be minimized by implementing environmental controls. These

	controls could include use of turbidity curtains to limit impacts to the surrounding surface water quality, and noise, air quality, and odor controls. Construction duration is estimated to be 135 days.	controls could include use of turbidity curtains to limit impacts to the surrounding surface water quality,y and noise, air quality, and odor controls. Construction duration is estimated to be 135 days.
4) Implementability	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> The technologies associated with the handling, transportation, and off-site disposal of dredged sediment are all considered technically feasible and proven technologies that have been implemented nationwide. Resources for the removal and capping technology are readily available in the local area from multiple vendors. The implementability of a waterway use restriction would be further explored with the applicable authorities during corrective measure design. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternative 3 has potential difficulties due to the large volume of contaminated sediments to be removed. Technologies associated with the handling, transportation, and off -site disposal of dredged sediment are all considered technically feasible and proven technologies that have been implemented nationwide. Resources for the removal technology are readily available from multiple vendors in the local area.	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> The technologies associated with the handling, transportation, and off-site disposal of dredged sediment are all considered technically feasible and proven technologies that have been implemented nationwide. Resources for the removal and capping technology are readily available in the local area from multiple vendors. The implementability of a waterway use restriction would be further explored with the applicable authorities during corrective measure design. <u>Alternative 3 – Dredging with Off-Site Disposal</u> Alternative 3 has potential difficulties due to the large volume of contaminated sediments to be removed. Technologies associated with the handling, transportation, and off -site disposal of dredged sediment are all considered technically feasible and proven technologies that have been implemented nationwide. Resources for the removal technology are readily available from multiple vendors in the local area.
5) Cost	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 was estimated at a capital cost of approximately $3.9M.	<u>Alternative 2 – Dredging, Subaqueous Cap, and ICs</u> Alternative 2 was estimated at a capital cost of approximately $2.7M.

	Alternative 3 – Dredging with Off-Site Disposal Alternative 3 was estimated at a capital cost of approximately $9.1M.	Alternative 3 – Dredging with Off-Site Disposal Alternative 3 was estimated at a capital cost of approximately $4.8M.
6) Community Acceptance	EPA will evaluate community acceptance based on comments received during the public comment period and will address any comments in the Final Decision.	EPA will evaluate community acceptance based on comments received during the public comment period and will address any comments in the Final Decision.
7) State/Support Agency Acceptance	State involvement has been solicited throughout the RCRA corrective action process and MDE concurred with the chosen proposed remedy.	State involvement has been solicited throughout the RCRA corrective action process and MDE concurred with the chosen proposed remedy.

Section 9: Proposed Remedy

Based on the evaluation criteria, EPA has determined Alternative 2 for the Cap Area and Alternative 3 for the Hot Spot Area meet the threshold criteria and provide the best balance of tradeoffs with respect to the evaluation criteria. Both alternatives protect human health and the environment.

While Alternative 3 would remove more contaminated sediments from Colgate Creek, Alternative 3 has the higher cost due to the cost of dredging and amount of sediment disposed. Given the costs and extent of contamination, EPA has determined that Alternative 2 is the most cost effective for the Cap Area and Alternative 3 is the most cost effective for the Hor Spot Area.

Alternative 2 would contain risk-driver COCs in the Cap Area adjacent to the Facility property through dredging/capping. Conventional subaqueous sediment capping consisting of an approximately 2 feet thick cap of clean material would be placed over the 1.31-acre area with contaminated sediments in the Cap Area (**Figure 8**), creating a clean surface suitable for reestablishing aquatic biota. The final cap thickness will be determined during corrective measure implementation design based on evaluation of various factors including bioturbation, consolidation, erosion, operational considerations (such as propeller scour), and chemical isolation. Approximately 2 feet of sediments (**Figure 9**), the same thickness as the cap thickness, would be removed before cap placement to maintain the current stream channel elevations. The cap material is assumed to consist of clean sand and a gravel EPL (**Figure 12**). The thickness of the EPL was estimated based on the water depths and flows of Colgate Creek. The final thickness and particle size of the cap material and the EPL would be determined during the design phase based on isolation modeling and the 100-year storm flow, respectively. The ICs for this alternative would restrict activity within the waterway that could result in the release of residual contamination from beneath the cap or otherwise expose the capped materials to the environment (e.g., no dredging or anchoring).

Alternative 3 includes removal of sediment from the 0.05-acre Hot Spot Area (**Figure 10**) to a depth of

6 feet from the hot spot of elevated concentrations around historical sample location SC-M-D, where the highest concentrations of metal exceedances were detected in the 2-4-foot interval, with decreasing concentrations at sample depths greater than 4 feet (**Figure 11**). The Hot Spot Area would be backfilled with clean sand and scour protection (**Figure 12**). The scour protection rock would be sized during final design.

Section 10: Financial Assurance

On March 31, 2010, the United States Bankruptcy Court for the Southern District of New York entered an order in Case No. 09-10023 styled *In re: Lyondell Chemical Company, et al* (the "Court Order"), and established the Trust to own and remediate, and convey, if possible, certain land that was formerly owned by the Lyondell Chemical Company. Funding to address the Facility was established at $10 million.

Funds from the Trust would be used to finance the proposed remedy, which is estimated at approximately $6.6 million.

Section 11: Public Participation

The public may participate in the remedy selection process by reviewing this SB and documents contained in the AR for the Facility and providing comments. The AR contains all information considered by EPA when proposing this remedy. The AR documents are available for public review at the location below:

U.S. EPA Region 3
4 Penn Center
1600 JFK Boulevard
Philadelphia, PA 19103
Contact: Christine Kimak (3LD11)
Phone: 215-814-2798
Fax: (215) 814-3113
Email: kimak.christine@epa.gov

The public comment period will last thirty (30) calendar days from the date that the notice is published in a local newspaper. You may submit comments by mail, fax, or e-mail to Christine Kimak. EPA will hold a public meeting to discuss this proposed remedy upon request. If you would like to request a public meeting, please contact Christine Kimak.

EPA will respond to all relevant comments received during the comment period. If EPA determines that new information warrants a modification to the proposed remedy, EPA will modify the proposed remedy or select an alternative based on the new information and/or public comments. In the Final Decision, EPA will announce the selection of its final remedy, respond to all relevant comments received, and explain the rationale for any changes to the proposed remedy. All persons who comment on this proposed remedy will receive a copy of the Final Decision. Others may obtain a copy by contacting Christine Kimak at the address listed above. The Final Decision will also be made publicly available on EPA's website for the Facility.

Statement of Basis

Section 12: Signature

DAVID CAMPBELL Digitally signed by DAVID CAMPBELL
Date: 2026.05.15 10:17:18 -04'00'

_____

David Campbell, Director
Land, Chemicals, and Redevelopment Division
US EPA Region 3

Section 13: Index to Administrative Record

Arcadis. 2006. 2006 Phase I ESA Report. Former Millennium Specialty Chemicals, St Helena Facility, Baltimore, Maryland.

Ramboll. 2017. RCRA Facility Investigation Report. Former Millennium Specialty Chemicals, St Helena Manufacturing Facility, Baltimore, Maryland.

Ramboll. 2018. RCRA Corrective Measures Study Report for Soil and Groundwater. Former Millennium Specialty Chemicals, St Helena Manufacturing Facility, Baltimore, Maryland.

Tetra Tech. 2020. Corrective Measures Implementation Work Plan. Former Millennium Manufacturing Facility. Baltimore, Maryland.

Tetra Tech. 2021. St. Helena Facility Colgate Creek Sediment Investigation. Baltimore, Maryland.

USEPA. 2010. Final Administrative Order on Consent, In the Matter of: Lyondell Environmental Custodial Trust, St. Helena Manufacturing Facility, 2701 Broening Highway, Baltimore MD 21222, EPA I.D. No. MD D003093507 [Docket No. RCRA-03-2010-0309 CA].

Section 14: Attachments

Table 1 – Summary of Sediment Analytical Results for Metals - 2013
Table 2 – Summary of Surface Water Field Parameters
Table 3 – Summary of Surface Water Analytical Results
Table 4 – Summary of Pore Water Field Parameters
Table 5 – Summary of Pore Water Analytical Results
Table 6 – Summary of Sediment Analytical Results for Metals - 2016
Table 7 – Colgate Creek Surface Sediment Analytical Data, Former St. Helena Facility – November 2020
Table 8 – Colgate Creek Subsurface Sediment Analytical Data, Former St. Helena Facility – November 2020
Table 9 – Sediment Screening Table, Former St. Helena Facility

Figure 1 – Vicinity Map & Aerial Photo with Sediment Corrective Measures Limits
Figure 2 – Upland Site Layout/Surrounding Properties
Figure 3 – Summary of Arsenic Concentrations in Sediment
Figure 4 – Summary of Cadmium Concentrations in Sediment
Figure 5 – Summary of Chromium Concentrations in Sediment
Figure 6 – Summary of Lead Concentrations in Sediment
Figure 7 – Summary of Zinc Concentrations in Sediment
Figure 8 – Conceptual Dredge Limits in Cap Area
Figure 9 – Conceptual Cap Area Dredge Cross Section
Figure 10 – Conceptual Dredge Limits in Hot Spot Area
Figure 11 – Conceptual Hot Spot Area Dredge Cross Section
Figure 12 – Proposed Typical Cross Sections

Statement of Basis

Tables

Table 1
Summary of Sediment Analytical Results for Metals - 2013
Colgate Creek
Baltimore, Maryland

Location	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	US01	US02	US03	CC01		CC02			CC03			
Sample Name			CCUS1-SD-112113	CCUS2-SD-112113	CCUS3-SD-112113	CC01-SD-112113	CCDUP01-SD-112113	CC02-SD.1-112113	CC02-SD.2-112113	CC02-SD.3-112213	CC03-SD.1-112213	CC03-20160810	CC03-SD.2-112213	CC03-SD.3-112213
Sample Date			11/21/2013	11/21/2013	11/21/2013	11/21/2013	11/21/2013	11/21/2013	11/21/2013	11/22/2013	11/22/2013	8/10/2016	11/22/2013	11/22/2013
Sample Depth Interval (ft bgs)			0-1	0-1	0-1	0-1		0-1	0-1	0-1	0-1	0-1	0-1	0-1
Notes							Field Duplicate							
AVS/ SEM (umoles/g)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Acid Volatile Sulfide	NS	NS	10.8	64.9	63.7	28.3	13.5	86.0	176	102	19.7	16.5	96.1	78.4
Cadmium	NS	NS	0.012663	0.048842	0.150996	0.139736	0.072555	3.39116	2.31693	1.58236	0.679038	0.361714	1.35801	1.14318
Copper	NS	NS	0.542276	2.74317	7.85077	1.08801	0.632364	1.21811	1.27963	2.62476	1.87756	0.803089	13.1022	1.69811
Lead	NS	NS	0.320919	2.07506	1.93559	0.831240	0.510835	12.6096	9.13827	7.35082	2.05272	0.67555	210.532	1.7387
Nickel	NS	NS	0.125215	0.336905	0.485044	0.369959	0.160287	0.582068	0.716404	0.494230	0.332811	0.332709	1.02848	1.46753
Zinc	NS	NS	2.37702	7.77656	15.1721	6.74294	3.48146	60.3261	59.1644	25.8452	13.1717	11.3331	72.6798	33.5262
SEM/AVS Ratio	NS	NS	0.312787	0.200008	0.401798	0.324095	0.359815	0.908454	0.412589	0.371543	0.919481	0.818553	3.10823	0.504767
Metals (mg/kg)														
Aluminum	NS	NS	3,130	8,930	16,300	9,180	8,780	4,660	5,920	4,230	3,230	NA	6,700	8,310
Antimony [1]	2	2	1.08	**8.9**	**6.18**	**38.1**	**40.8**	**69.1**	**121**	**95.8**	**63.6**	NA	**42.6**	**21.7**
Arsenic	7.24	9.8	5.03	**14.3**	**25.8**	**29**	**20.2**	**166**	**256**	**189**	**41.1**	NA	**46.2**	**62**
Barium	NS	NS	59	365	563	990	1,330	366	494	569	823	NA	550	603
Beryllium	NS	NS	0.492	2.61	5.93	2.24	1.95	0.786	0.698	0.706	0.382	NA	0.546	0.44
Cadmium	0.68	0.99	**1.51**	**11**	**30.3**	**16.7**	**13.6**	**221**	**354**	**192**	**93.8**	NA	**158**	**152**
Calcium	NS	NS	18,100	14,900	20,100	26,600	101,000	6,520	8,340	4,110	5,520	NA	14,500	25,200
Chromium (total)	52.3	43.4	31.3	**124**	**203**	**643**	**443**	**339**	**650**	**885**	**508**	NA	**1,720**	**2,430**
Chromium (VI)	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt [1]	50	50	10	35.1	**61.6**	19.2	12.6	18.4	20.8	25.3	16.6	NA	37.8	40.6
Copper	18.7	31.6	**86.5**	**776**	**2,430**	**165**	**112**	**478**	**424**	**402**	**234**	NA	**191**	**160**
Iron [1]	20,000	20,000	6,360	15,700	**35,300**	**32,500**	**22,700**	15,600	18,000	19,300	16,900	NA	**26,700**	**28,600**
Lead	30.2	35.8	**82.1**	**662**	**695**	**218**	**190**	**1,690**	**2,360**	**1,380**	**265**	NA	**310**	**310**
Magnesium	NS	NS	7,110	7,960	13,300	9,940	12,100	4,120	4,540	4,770	4,490	NA	8,260	9,050
Manganese [1]	460	460	151	260	**462**	316	372	123	187	153	219	NA	359	**485**
Mercury	0.13	0.18	0.115	**1.82**	**2.4**	**0.381**	**0.323**	**1.63**	**2.68**	**1.28**	**0.39**	NA	**0.713**	**0.491**
Nickel	15.9	22.7	**16.5**	**70.5**	**136**	**37.4**	**24.5**	**29.2**	**44.6**	**55.3**	**37.4**	NA	**99.1**	**121**
Potassium	NS	NS	398	1,030	2,060	597	749	414	456	303	235	NA	298	253
Selenium [1]	2	2	0.854	**4.12**	**8.14**	**3.3**	**4.61**	**49.6**	**68.7**	**43.5**	**21.2**	NA	**39.2**	**31.7**
Silver	0.73	1	0.25	**1.74**	**1.47**	0.698	0.57	**0.901**	**1.77**	**1.04**	**0.953**	NA	0.462	0.333
Sodium	NS	NS	1,360	2,800	5,560	1,370	1,440	1,500	1,820	1,190	987	NA	1,260	1,050
Thallium	NS	NS	0.207	0.457 U	0.757 U	0.154	0.254	0.763	1.08	0.904	0.635	NA	0.242	0.222
Titanium	NS	NS	199	1,450	670	455	614	714	1,160	886	373	NA	572	662
Vanadium	NS	NS	14.4	74.9	94.7	67.9	49	49.3	108	90.4	62.7	NA	178	229
Zinc	124	121	**173**	**674**	**1,710**	**621**	**372**	**2,540**	**3,560**	**2,310**	**1,260**	NA	**1,800**	**2,220**
Other Parameters														
Sulfides (mg/kg) [1]	130	130	**720**	**1,200**	**1,400**	**2,000**	**680**	**2,300**	**3,700**	**680**	**1,300**	**1,100**	**3,100**	**2,600**
Total Organic Carbon (%)	NS	NS	4.45 / 3.50	5.23 / 5.64	8.86 / 8.48	5.48 / 4.83	2.75 / 2.21	4.30 / 6.83	2.66 / 3.33	3.16 / 3.91	8.92 / 7.17	1.66	3.44 / 3.24	6.08 / 6.61
Water Content (%)	NS	NS	23.4	40.5	63.3	27.5	24.7	28.0	35.3	25.0	18.4	NA	24.8	19.6
pH (s.u.)	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.1	NA	NA

Notes:

BOLD - Bold concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region 3 marine sediment screening benchmark (July, 2006).

UNDERLINED - Underlined concentrations indicate constituents exceed the United States Environmental Protection Agency (USEPA) Region 3 freshwater sediment screening benchmark (August, 2006).

J - Estimated value due to either a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL.

U - Constituent was not detected in the associated method blank at a concentration that may have contributed to the sample result.

K - Indicates the reported value may be biased high.

L - Indicates the reported value may be biased low.

NS - Not standard; no numeric criterion has been established by MDE or USEPA.

NA - Sample was not analyzed for this analyte.

Q - Lab qualifier

ft bgs - feet below ground surface

µmoles/g micromoles per gram

mg/kg milligrams per kilogram

s.u. standard units

[1] - Currently no marine sediment benchmark screening value is available. Value taken from USEPA Region 3's Freshwater Sediment Screening Benchmark table per USEPA guidelines.

Table 1
Summary of Sediment Analytical Results for Metals - 2013
Colgate Creek
Baltimore, Maryland

Location	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	CC04						CC05			CC06			
Sample Name			CC04-SD.1-112213	CC04A-20160810	CC04-SD.2-112213	CC04B-20160810	CC04B-20160810-FD	CC04-SD.3-112213	CC05-SD.1-112113	CC05-SD.2-112113	CC05-SD.3-112113	CC06-SD.1-112213	CCDUP02-SD-112213	CC06-SD.2-112213	CC06-SD.3-112213
Sample Date			11/22/2013	8/10/2016	11/22/2013	8/10/2016	8/10/2016	11/22/2013	11/21/2013	11/21/2013	11/21/2013	11/22/2013	11/22/2013	11/22/2013	11/22/2013
Sample Depth Interval (ft bgs)			0-1	0-1		0-1		0-1	0-1	0-1	0-1		0-1	0-1	0-1
Notes							Field Duplicate								
AVS/ SEM (umoles/g)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Acid Volatile Sulfide	NS	NS	37.7	13.9	40.7	25.5	6.26	45.7	33.4	8.35	9.71	1120	1010	943	90.7
Cadmium	NS	NS	0.694897	0.314989	0.897082	0.529942	0.487003	0.694059	0.705028	0.333608	3.61908	22.6343	19.7751	6.58001	1.34255
Copper	NS	NS	3.98727	0.559001	1.09729	1.2003	0.883636	0.837886	0.615019	0.414474	2.83749	0.06834 U	6.8805	2.43673	1.02785
Lead	NS	NS	5.21844	0.63221	1.72359	1.10301	0.710569	1.52821	1.35847	0.331053	2.38703	17.3272	31.1479	13.9695	2.33949
Nickel	NS	NS	1.19417	0.370094	0.663896	0.885319	0.710569	0.743218	0.838826	1.46882	3.07170	0.276678	0.389486	0.335744	0.747785
Zinc	NS	NS	31.7808	9.67142	53.1960	11.6973	14.0424	27.6102	20.3601	11.5976	25.4441	525.226	331.308	468.218	40.9052
SEM/AVS Ratio	NS	NS	1.13728	0.830771	1.41469	0.604543	2.67721	0.687387	0.714893	1.69441	3.84752	0.504909	0.385454	0.521251	0.511167
Metals (mg/kg)															
Aluminum	NS	NS	8,670	NA	7,180	NA	NA	6,130	7,190	10,000	12,000	2,160	4,470	4,890	5,620
Antimony [1]	2	2	**12.5**	NA	**8.39**	NA	NA	**13.1**	**3.24**	1.69	**2.87**	**60.8**	**66.4**	**24.5**	**14**
Arsenic	7.24	9.8	**58**	NA	**75.6**	NA	NA	**65.8**	**73.2**	**36.6**	**42.5**	**1.640**	**435**	**173**	**60.5**
Barium	NS	NS	790	NA	1,300	NA	NA	1,080	1,320	1,070	9,920	177	163	208	395
Beryllium	NS	NS	0.381	NA	0.291	NA	NA	0.243	0.416	0.413	0.525	0.373	0.576	0.648	0.772
Cadmium	0.68	0.99	**104**	NA	**174**	NA	NA	**420**	**176**	**50.2**	**230**	**3,640**	**2,050**	**699**	**154**
Calcium	NS	NS	25,500	NA	5,200	NA	NA	14,600	24,300	26,900	35,900	3,170	4,150	3,630	25,300
Chromium (total)	52.3	43.4	**2,470**	NA	**1,690**	NA	NA	**1,530**	**1,650**	**2,540**	**2,820**	**195**	**297**	**354**	**1,100**
Chromium (VI)	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt [1]	50	50	41.7	NA	37.5	NA	NA	27.1	32.7	47.3	48	14.8	23.8	19.2	32.5
Copper	18.7	31.6	**171**	NA	**158**	NA	NA	**121**	**211**	**58.7**	**108**	**2,030**	**1,460**	**666**	**168**
Iron [1]	20,000	20,000	**30,500**	NA	**34,100**	NA	NA	**25,000**	**25,700**	**31,000**	**35,700**	19,400	**30,200**	**21,700**	**20,000**
Lead	30.2	35.8	**212**	NA	**362**	NA	NA	**329**	**817**	**142**	**236**	**1,140**	**1,240**	**563**	**289**
Magnesium	NS	NS	10,300	NA	6,870	NA	NA	6,630	11,900	15,700	13,000	1,660	2,160	4,730	9,560
Manganese [1]	460	460	**699**	NA	**926**	NA	NA	**534**	**570**	**552**	**1,020**	410	326	332	359
Mercury	0.13	0.18	**0.486**	NA	**0.4**	NA	NA	**0.492**	**0.216**	**0.168**	**1.1**	**2.93**	**4.15**	**2.28**	**1.56**
Nickel	15.9	22.7	**123**	NA	**119**	NA	NA	**88.8**	**95.6**	**144**	**138**	**21.5**	**35.7**	**51.6**	**66.7**
Potassium	NS	NS	267	NA	188	NA	NA	262	278	316	590	283	315	485	520
Selenium [1]	2	2	**47**	NA	**26**	NA	NA	**30.6**	**26.1**	**8.2**	**39.1**	**590**	**338**	**67.1**	**35.2**
Silver	0.73	1	0.659	NA	0.249	NA	NA	0.231	0.29	0.16	0.309	**4.68**	**6.63**	**2.74**	0.402
Sodium	NS	NS	914	NA	1,190	NA	NA	1,250	1,040	1,390	1,120	1,410	1,010	1,420	1,420
Thallium	NS	NS	0.193	NA	0.284	NA	NA	0.177	0.337	0.184	0.314	6.64	3.29	1.52	0.631
Titanium	NS	NS	659	NA	494	NA	NA	510	465	580	691	2,420	3,040	1,220	655
Vanadium	NS	NS	255	NA	192	NA	NA	161	149	234	255	84.1	74.1	53.4	86.2
Zinc	124	121	**1,480**	NA	**5,100**	NA	NA	**2,820**	**2,320**	**1,060**	**1,290**	**43,400**	**21,800**	**25,700**	**2,960**
Other Parameters															
Sulfides (mg/kg) [1]	130	130	**1,200**	**700**	**820**	**1,100**	**1,100**	**350**	**1,100**	**150**	**350**	**22,000**	**21,000**	**12,000**	**4,100**
Total Organic Carbon (%)	NS	NS	1.84 / 3.19	2.78	1.86 / 1.54	1.65	1.78	1.03 / 1.18	2.51 / 2.68	2.80 / 2.05	5.41 / 4.06	4.59 / 4.43	5.45 / 5.28	3.05 / 1.70	9.16 / 7.73
Water Content (%)	NS	NS	17.9	NA	23.0	NA	NA	17.4	16.8	15.7	13.6	39.4	40.9	36.7	28.9
pH (s.u.)	NS	NS	NA	8.2	NA	8.2	8.1	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

BOLD - Bold concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region 3 marine sediment screening benchmark (July, 2006).

UNDERLINED - Underlined concentrations indicate constituents exceed the United States Environmental Protection Agency (USEPA) Region 3 freshwater sediment screening benchmark (August, 2006).

J - Estimated value due to either a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL.

U - Constituent was not detected in the associated method blank at a concentration that may have contributed to the sample result.

K - Indicates the reported value may be biased high.

L - Indicates the reported value may be biased low.

NS - Not standard; no numeric criterion has been established by MDE or USEPA.

NA - Sample was not analyzed for this analyte.

Q - Lab qualifier

ft bgs - feet below ground surface

µmoles/g micromoles per gram

mg/kg milligrams per kilogram

s.u. standard units

[1] - Currently no marine sediment benchmark screening value is available. Value taken from USEPA Region 3's Freshwater Sediment Screening Benchmark table per USEPA guidelines.

Table 2
Summary of Surface Water Field Parameters
Former Millennium Specialty Chemicals St. Helena Manufacturing Facility
Baltimore, Maryland

Sample Location	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)	Salinity (ppt)
US02	17.2*	198	8.89	15.3	12.94	13.3	11.9
CC01	22.96*	81	8.43	14.6	10.35	9.8	12.1
CC02	22.96*	81	8.43	14.6	10.35	9.8	12.1
CC03	13.18*	173	8.14	16.4	9.52	7.3	14.1
CC04	13.86*	27	8.31	15.4	10.31	15.6	12.8
CC05	16.58*	180	8.21	17.1	10.02	5.7	14.5
CC06	18.85*	180	8.89	13.9	13.44	14.3	10.6
CC07	18.25*	152	8.78	14.3	11.78	14.1	11.4
CC08	13.56*	99	8.44	6.82	6.68	5	5.9
CC09	3.21	-140	8.97	6.43	15.79	21.1	4.3

Notes:

* - A number of dissolved oxygen (DO) measurements measured in the field appear to have been supersaturated, possibly indicating a faulty DO meter. Measured DO concentrations can be artificially inflated by multiple physical factors, including salinity, pressure, and temperature.

mg/L - milligrams per liter.

mV - millivolts.

SU - standard pH units.

mS/cm - millisiemens per centimeter.

°C - degrees Celsius.

NTU - nephelometric turbidity units.

ppt - parts per thousand.

Table 3
Summary of Surface Water Analytical Results
Colgate Creek
Baltimore, Maryland

Location	MDE SW Ambient Water Quality Criteria CV	EPA Region 3 Marine Screening Benchmarks for Surface Water	US02	CC01	CC02	CC03	CC04	CC05		CC06	CC07	CC08	CC09
Sample Name [3]			CCVS2-SW-111813	CC01-SW-111913	CC02-SW-111913	CC03-SW-111913	CC04-SW-111913	CCDUP01-SW-111913	CC05-SW-111913	CC06-SW-111813	CC07-SW-111813	CC08-SW-111913	CC09-SW-111913
Sample Date			11/18/2013	11/19/2013	11/19/2013	11/19/2013	11/19/2013	11/19/2013	11/19/2013	11/18/2013	11/18/2013	11/19/2013	11/19/2013
Notes								Field Duplicate					
Dissolved Metals (µg/L) [3]			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum[1]	NS	87	100 U	100 U	80 J	70 J	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Antimony	NS	500	5 U	1.4 BJ	3.7	2.6	2.5 BJ	2.6 BJ	2.3	2.8 BJ	5 U	5 U	5 U
Arsenic[2]	36	12.5	16.4	15.5	15.2	18.2	17.2	19.3	16.2	13.5	19.4	20.2	6
Barium[1]	NS	4	42.9	42.3	44	44.4	41.6	42.2	42.5	46.2	43.1	1,120	5 U
Beryllium[1]	NS	0.66	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cadmium[2]	8.8	0.12	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Calcium[1]	NS	116,000	117,000	116,000	126,000	130,000	130,000	133,000	132,000	111,000	115,000	79,900	47,500
Chromium (total)	NS	57.5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cobalt[1]	NS	23	0.5 J	0.6 J	0.6 J	0.6 J	0.5 J	0.5 J	0.5 J	0.5 J	0.4 J	1 J	0.2 J
Copper	3.1	3.1	**57.3**	**51.8**	**33.7**	**57.1**	**57.7**	**51.8**	**65.3**	**46.2**	**50.9**	**11.8**	1.8 J
Iron[1]	NS	300	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Lead	8.1	8.1	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Magnesium[1]	NS	82,000	341,000	331,000	372,000	386,000	386,000	389,000	393,000	321,000	341,000	132,000	27,900
Manganese[1]	NS	120	13.6	31.7	27.7	27	23.8	24.8	23.5	22.4	7.2	391	132
Mercury[2]	0.94	0.016	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	8.2	8.2	6	5.7	5.9	7	7.8	5.9	5.8	6.8	6.5	**10.4**	7.6
Potassium[1]	NS	53,000	125,000	120,000	104,000	110,000	145,000	145,000	124,000	113,000	126,000	262,000	12,400
Selenium	71	71	49	46	44	51	51	60	48	39	60	24	20
Silver	NS	0.23	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Sodium[1]	NS	680,000	292,000	275,000	2,800,000	2,910,000	316,000	321,000	332,000	261,000	316,000	307,000	239,000
Thallium	NS	21.3	5 U	5 U	1 U	1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Titanium	NS	NS	50 U	50 U	50 U	0.8 BJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Vanadium[1]	NS	20	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Zinc	81	81	25 U	25 U	8 J	21 J	6 BJ	25 U	25 U	25 U	25 U	6 BJ	25 U
Total Metals (µg/L)													
Aluminum[1]	NS	87	690	410	210	80 J	90 J	80 J	70 J	80 J	280	100 U	100 U
Antimony	NS	500	1.7 BJ	11.3	5.9	3 J	3.1 J	3.4 J	2.9	3.1 J	1.7 BJ	5 U	5 U
Arsenic[2]	36	12.5	19	16.2	20.1	18.1	17.3	18.3	18	17.2	20.2	29.9	7.9
Barium[1]	NS	4	80.8	123	183	58.4	58.6	53.5	54.4	70.7	226	897	5 U
Beryllium[1]	NS	0.66	0.1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cadmium[2]	8.8	0.12	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1.4 J	**9.3**
Calcium[1]	NS	116,000	116,000	117,000	126,000	125,000	129,000	133,000	135,000	109,000	121,000	75,500	50,900
Chromium (total)	NS	57.5	6 J	5 BJ	4 BJ	10 U	10 U	10 U	10 U	2 BJ	6 J	2 BJ	10 U
Chromium VI	50	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt[1]	NS	23	1.3 J	1.1 J	1 J	0.7 J	0.6 J	0.6 J	0.6 J	0.7 J	0.8 J	1.3 J	0.3 J
Copper	3.1	3.1	**72.4**	**62.4**	**72.2**	**35.7**	**62.4**	**43.3**	**66.6**	**49.5**	**60.5**	**11.9**	**4.8 J**
Iron[1]	NS	300	1,300	1,030	510	240	250	220	190	220	600	140	60 J
Lead	8.1	8.1	**12.1**	**10.8**	**9.4**	2 J	2 J	1.6 J	1.4 J	1.8 J	7.6	5 U	5 U
Magnesium[1]	NS	82,000	339,000	335,000	369,000	370,000	386,000	393,000	396,000	311,000	356,000	124,000	49,400
Manganese[1]	NS	120	39.8	52	47.3	33.3	34.6	34.9	34.4	37.4	28.2	424	136
Mercury[2]	0.94	0.016	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.46
Nickel	8.2	8.2	7.4	6.6	7.1	7.3	**8.2**	6.7	5.7	**8.4**	7.4	**10.7**	8
Potassium[1]	NS	53,000	127,000	128,000	138,000	138,000	138,000	112,000	136,000	105,000	132,000	237,000	19,000
Selenium	71	71	56	46	59	52	51	55	51	50	59	25	21
Silver	NS	0.23	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Sodium[1]	NS	680,000	290,000	330,000	318,000	272,000	311,000	322,000	287,000	259,000	283,000	236,000	590,000
Thallium	NS	21.3	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Titanium	NS	NS	67	172	78	19 J	17 J	16 J	14 J	12 J	74	50 U	50 U
Vanadium[1]	NS	20	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Zinc	81	81	34	25	22 J	26	11 BJ	15 J	12 J	8 BJ	25	**574**	**302**

Notes:
BOLD - Bold concentrations indicate constituents that exceed the Maryland Department of the Environment (MDE) surface water (SW) ambient water quality criteria chronic value (CV) per Code of Maryland Regulations (COMAR) Section 26.08.02.03-2 (April 28, 2014 (41:8 Md. R. 474)).
UNDERLINED - Underlined concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region III Marine Screening Benchmarks (July, 2006).
J - Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL.
U - Constituent was not detected at the method detection limit shown.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
NS - No standard; no numeric criterion has been established by MDE or USEPA.
NA - Not analyzed.
Q - Lab qualifier
µg/L - micrograms per liter
[1] - For analytes where no marine value is available, value from US EPA Region III's Freshwater Screening Benchmark table (July, 2006) is used.
[2] - All USEPA Marine Screening Benchmark values are expressed in terms of dissolved analyte in the water column except for those indicated with 2 which are expressed in terms of total concentration.
[3] - Sample names were the same for dissolved analytes, however "Dissolved" was added to the end of the sample name.

Table 4
Summary of Pore Water Field Parameters
Former Millennium Specialty Chemicals St. Helena Manufacturing Facility
Baltimore, Maryland

Sample Location	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)	Salinity (ppt)
US02	11.8*	-216	7.45	16.5	9.61	4.1	14.1
CC01	11.52	-95	7.19	7.16	8.47	4.4	5.9
CC02	11.71	-126	7.57	16.8	7.87	3.9	15.1
CC03	11.76	-93	7.67	15	6.59	3	13.9
CC04	10.55	-132	7.68	17.3	8.53	8.5	15.3
CC05	13.34*	-44	7.97	16.6	8.84	6.9	14.5
CC06	14.39*	-165	7.94	16	9.38	17.5	13.7
CC07	9.89	-147	7.21	15.4	12.36	3.6	12.2
CC08	10.67	-113	8.37	10.5	12.29	16	8

Notes:

* -A number of dissolved oxygen (DO) measurements measured in the field appear to have been supersaturated, possibly indicating a faulty DO meter. Measured DO concentrations can be artificially inflated by multiple physical factors, including salinity, pressure, and temperature.

mg/L - milligrams per liter.

mV - millivolts.

SU - standard pH units.

mS/cm - millisiemens per centimeter.

°C - degrees Celsius.

NTU - nephelometric turbidity units.

ppt - parts per thousand.

Table 5
Summary of Pore Water Analytical Results
Colgate Creek
Baltimore, Maryland

Location	MDE SW Ambient Water Quality Criteria CV	EPA Region 3 Marine Screening Benchmarks for Surface Water	US02	CC01	CC02	CC03	CC04	CC05	CC06		CC07	CC08
Sample Name			CCUS2-PW-112013	CC01-PW-112013	CC02-PW-112013	CC03-PW-112013	CC04-PW-112013	CC05-PW-112013	CC06-PW-112013	CCDUP01-PW-112013	CC07-PW-112013	CC08-PW-112013
Sample Date			11/20/2013	11/20/2013	11/20/2013	11/20/2013	11120/13 09:20	11/20/2013	11/20/2013	11/20/2013	11/20/2013	11/20/2013
Notes										Field Duplicate		
Total Metals (µg/L)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum[1]	NS	87	80 J	40 J	100 U	100 U	130	100 U	150	920	100 U	400
Antimony	NS	500	13 U	4.4 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic[2]	36	12.5	12 J	16.3	**60**	17.2	24.5	17.5	**44.3**	22.8	12.8	33.4
Barium[1]	NS	4	145	78.6	237	72.4	115	87.4	790	2,390	393	553
Beryllium[1]	NS	0.66	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cadmium[2]	8.8	0.12	13 U	5 U	5 U	5 U	5 U	5 U	0.3 J	**43.9**	5 U	**99.1**
Calcium[1]	NS	116,000	158,000	262,000	155,000	181,000	170,000	155,000	159,000	133,000	162,000	109,000
Chromium (total)	NS	57.5	5 J	2 J	6 J	3 J	30	11	7 J	9 J	3 J	7 J
Cobalt[1]	NS	23	0.8 J	1 J	1.2 J	1.1 J	1.1 J	1.4 J	0.6 J	0.8 J	0.7 J	0.9 J
Copper	3.1	3.1	**34**	**19.2**	**28.7**	**39.1**	**37**	**38.6**	**33**	**35**	**27.3**	**32.5**
Iron[1]	NS	300	210 B	17,600	13,000	6,320	7,470	710	310 B	1,720	560	1,770
Lead	8.1	8.1	3 J	3.2 J	2.5 J	2.1 J	6	2.2 J	**13.4**	**100**	5 U	**16.2**
Magnesium[1]	NS	82,000	358,000	251,000	375,000	430,000	410,000	378,000	368,000	292,000	381,000	222,000
Manganese[1]	NS	120	247	814	557	561	293	1,240	2,590	1,890	635	586
Mercury[2]	0.94	0.016	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22	0.2 U	0.44	0.2 U	0.2 U
Nickel	8.2	8.2	5 J	6.8	3.7 J	4.9 J	6	7.8	6.3	6	4.7 J	**8.5**
Potassium[1]	NS	53,000	118,000	65,600	123,000	141,000	133,000	147,000	129,000	108,000	131,000	82,600
Selenium	71	71	37	27	34	46	44	48	45	37	38	22
Silver	NS	0.23	13 U	5 U	0.8 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Sodium[1]	NS	680,000	2,670,000	1,530,000	2,660,000	3,080,000	3,360,000	3,070,000	2,720,000	2,220,000	2,870,000	1,780,000
Thallium	NS	21.3	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.5 J
Titanium	NS	NS	6 J	32 J	9 J	3 J	20 J	2 J	19 J	930	50 U	24 J
Vanadium[1]	NS	20	25 U	10 U	10 U	10 U	3 J	10 U	10 U	8 J	10 U	3 J
Zinc	81	81	21 J	11.3 J	12 J	10 J	31	24 J	**114**	**1,630**	6 J	**2,110**

Notes:
BOLD - Bold concentrations indicate constituents that exceed the Maryland Department of the Environment (MDE) surface water (SW) ambient water quality criteria chronic value (CV) per Code of Maryland Regulations (COMAR) Section 26.08.02.03-2 (April 28, 2014 (41:8 Md. R. 474)).
UNDERLINED - Underlined concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region III Marine Screening Benchmarks (July, 2006).
J - Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL.
U - Constituent was not detected at the method detection limit shown.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
NS - No standard; no numeric criterion has been established by MDE or USEPA.
Q - Lab qualifier
µg/L - micrograms per liter
[1] - For analytes where no marine value is available, value from US EPA Region III's Freshwater Screening Benchmark table (July, 2006) is used.
[2] - All USEPA Marine Screening Benchmark values are expressed in terms of dissolved analyte in the water column except for those indicated with 2 which are expressed in terms of total concentration.

Table 6
Summary of Sediment Analytical Results for Metals - 2016
Colgate Creek
Baltimore, Maryland

Location	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	CC07			CC07		CC08	CC10	CC11	CC12		CC13	CC14
Sample Name			CC07-SD.1-112113	CC07-SD.2-112113	CC07-SD.3-112113	CC07 (0-0.5)	CC07 (0-0.5)-FD	CC08-SD-112513	CC10-20160810	CC11-20160810	CC12-20160810	CC12-20160810-FD	CC13-20160810	CC14-20160810
Sample Date			11/21/2013	11/21/2013	11/21/2013	8/10/2016	8/10/2016	11/25/2013	8/10/2016	8/10/2016	8/10/2016	8/10/2016	8/10/2016	8/10/2016
Sample Depth Interval (ft bgs)			0-1	0-1	0-1	0-0.5	0-0.5	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Notes							Field Duplicate					Field Duplicate		
AVS/ SEM (umoles/g)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Acid Volatile Sulfide	NS	NS	274	410	284	106	191	154	NA	NA	NA	NA	NA	NA
Cadmium	NS	NS	1.66244	1.90339	1.50731	1.00292	0.832698	2.60215	NA	NA	NA	NA	NA	NA
Copper	NS	NS	8.69969	3.21772	7.61076	1.73878	2.21475	1.66295	NA	NA	NA	NA	NA	NA
Lead	NS	NS	4.82256	5.85261	4.82622	1.75817	1.45182	2.99398	NA	NA	NA	NA	NA	NA
Nickel	NS	NS	0.710332	0.689085	0.676719	0.296089	0.261758	0.483589	NA	NA	NA	NA	NA	NA
Zinc	NS	NS	43.9293	48.3245	36.0577	25.236	21.9847	88.7676	NA	NA	NA	NA	NA	NA
SEM/AVS Ratio	NS	NS	0.218337	0.146310	0.178446	0.283321	0.14003	0.626690	NA	NA	NA	NA	NA	NA
Metals (mg/kg)														
Aluminum	NS	NS	13,200	13,200	13,200	9,090	8,840	4,620	5,240	3,910	3,620	3,420	5,940	7,050
Antimony [1]	2	2	**42.6**	**64.4**	**48.3**	**73.6**	**65.7**	**5.12**	**2.69 J**	**3.45 J**	**2.66**	**2.22 J**	**2.6 J**	**4.3 J**
Arsenic	7.24	9.8	**81.1**	**97.1**	**78.2**	**35.4**	**47.8**	**106**	**21.6**	**22.2**	**13.7**	**13.1**	**16.8**	**49.1**
Barium	NS	NS	578	510	604	773	589	835	1,280	1,620	1,680	1,990	2,430	4,120
Beryllium	NS	NS	3.39	3.02	3.18	1.64	1.56	0.417	0.393	0.291	0.24	0.164	0.97	0.353
Cadmium	0.68	0.99	**256**	**267**	**241**	**95**	**115 J**	**268**	**26.4 J**	**22.5 J**	**15.7 J**	**12.5 J**	**20 J**	**138 J**
Calcium	NS	NS	11,600	11,700	32,800	10,100	8,500	33,600	21,800	19,500	17,500	20,200	32,600	26,200
Chromium (total)	52.3	43.4	**643**	**624**	**526**	**347**	**375**	**524**	**976 J**	**760 J**	**526 J**	**793 J**	**1,040 J**	**1,350 J**
Chromium (VI)	NS	NS	NA	NA	NA	NA	NA	NA	0.24 J	0.98 U	0.24 J	0.99 U	0.95 U	1.2 U
Cobalt [1]	50	50	46.4	37.4	39	25	23.3	12.4	16.9	14.3	11.8	13.4	19.9	24.4
Copper	18.7	31.6	**1,550**	**1,660**	**1,680**	**574**	**601**	**240**	**23.8**	**29.4**	**42.9**	**32.8**	**55.7**	**67.1**
Iron [1]	20,000	20,000	**36,100**	**37,100**	**35,600**	**24,200**	**24,100**	17,200	14,600	14,800	14,000	12,200	19,600	**24,800**
Lead	30.2	35.8	**899**	**1,070**	**962**	**410**	**402 J**	**522**	**171 J**	**97 J**	**42.5 J**	**39 J**	**76.9 J**	**152 J**
Magnesium	NS	NS	10,200	9,110	9,860	9,000	8,430	13,500	13,700	12,200	11,500	11,800	18,900	14,700
Manganese [1]	460	460	**491**	457	**555**	307	313	**697**	364	375	292	248	424	**538**
Mercury	0.13	0.18	**2.29**	**2.02**	**1.92**	**1.49**	**1.29**	**0.288**	0.093	**0.144**	0.073	0.056	0.114	**0.3**
Nickel	15.9	22.7	**97.4**	**95.7**	**94.3**	**45 J**	**42.6**	**46.8**	**57.1 J**	**44.4 J**	**69.3 J**	**54.7 J**	**67.4 J**	**79.6 J**
Potassium	NS	NS	1,800	1,770	1,780	1,510	1,440	391	243	181	250	167 J	254	513
Selenium [1]	2	2	**39.9**	**44.3**	**39.9**	**13.2**	**14.4**	**22.5**	**3.18 J**	**2.23 J**	1.24	1.4 J	1.86 J	**5.71 J**
Silver	0.73	1	**2.29**	**2.27**	**2.07**	**1.21 J**	**0.862 J**	0.428	0.067 J	0.071 J	0.059 J	0.058 J	0.228 J	0.133 J
Sodium	NS	NS	6,340	6,490	7,320	4,700	4,450	1,020	924	691	569	701	763	1,470
Thallium	NS	NS	1.08	0.969	0.87	0.872	0.74	1.8	0.181	0.182	0.135	0.107	0.34	1.29
Titanium	NS	NS	1,140	1,130	1,230	813 K	736 K	381	288 J	269 J	220 J	264 J	351 J	424 J
Vanadium	NS	NS	128	126	124	63.2	64.9	54.8	61.9 J	52 J	39.9 J	59.6 J	78.5 J	102 J
Zinc	124	121	**3,850**	**4,020**	**3,230**	**2,040**	**1,970**	**5,760**	**672 J**	**717 J**	**492 J**	**509 J**	**711 J**	**3,160 J**
Other Parameters														
Sulfides (mg/kg) [1]	130	130	**4.500**	**2.900**	**3.700**	NA	NA	**2.000**	NA	NA	NA	NA	NA	NA
Total Organic Carbon (%)	NS	NS	7.51 / 7.68	7.86 / 7.78	7.56 / 7.49	NA	NA	6.12 / 5.84	NA	NA	NA	NA	NA	NA
Water Content (%)	NS	NS	65.8	64.6	67.2	150	160	30.2	26	22	18	23	19	50
pH (s.u.)	NS	NS	NA	NA	NA	NA	NA	NA	8.2	8.1	8.2	8.2	8.4	7.9

Notes:

BOLD - Bold concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region 3 marine sediment screening benchmark (July, 2006).

UNDERLINED - Underlined concentrations indicate constituents exceed the United States Environmental Protection Agency (USEPA) Region 3 freshwater sediment screening benchmark (August, 2006).

J - Estimated value due to either a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL.

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K - Indicates the reported value may be biased high.

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ft bgs - feet below ground surface

µmoles/g micromoles per gram

mg/kg milligrams per kilogram

s.u. standard units

[1] - Currently no marine sediment benchmark screening value is available. Value taken from USEPA Region 3's Freshwater Sediment Screening Benchmark table per USEPA guidelines.

Table 6
Summary of Sediment Analytical Results for Metals - 2016
Colgate Creek
Baltimore, Maryland

Location	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	SC-M-U			SC-S-T1				SC-S-T2			SC-M-T1			
Sample Name			SC-M-U (0-0.5)	SC-M-U (0-2)	SC-M-U (2-4)	SC-S-T1 (0-0.5)	SC-S-T1 (0-2)	SC-S-T1 (2-4)	SC-S-T1 (4-6)	SC-S-T2 (0-0.5)	SC-S-T2 (0-2)	SC-S-T2 (2-4)	SC-M-T1 (0-2)	SC-M-T1 (2-4)	SC-M-T1 (4-6)	SC-M-T1 (6-8)
Sample Date			8/10/2016	8/9/2016	8/9/2016	8/10/2016	8/9/2016 15:15	8/9/2016 15:20	8/9/2016 15:25	8/10/2016	8/9/2016	8/9/2016	8/9/2016	8/9/2016	8/9/2016	8/9/2016
Sample Depth Interval (ft bgs)			0-0.5	0-2	2-4	0-0.5	0-2	2-4	4-6	0-0.5	0-2	2-4	0-2	2-4	4-6	6-8
Notes																
AVS/ SEM (umoles/g)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Acid Volatile Sulfide	NS	NS	18.9	NA	NA	53.7	NA	NA	NA	89.8	NA	NA	NA	NA	NA	NA
Cadmium	NS	NS	0.00627	NA	NA	0.480653 J	NA	NA	NA	20.9827 J	NA	NA	NA	NA	NA	NA
Copper	NS	NS	0.104964	NA	NA	3.0076	NA	NA	NA	0.03722 J	NA	NA	NA	NA	NA	NA
Lead	NS	NS	0.188027	NA	NA	1.38477	NA	NA	NA	19.02229	NA	NA	NA	NA	NA	NA
Nickel	NS	NS	0.076276 J	NA	NA	0.319167	NA	NA	NA	0.299954	NA	NA	NA	NA	NA	NA
Zinc	NS	NS	1.63768	NA	NA	15.6396	NA	NA	NA	373.668 J	NA	NA	NA	NA	NA	NA
SEM/AVS Ratio	NS	NS	0.106519	NA	NA	0.387929	NA	NA	NA	4.61037	NA	NA	NA	NA	NA	NA
Metals (mg/kg)																
Aluminum	NS	NS	2,110	5,000	7,030	9,290	7,000	11,200	1,250 J	3,600	8,640	7,480	6,020	4,230	1,830	6,140 J
Antimony [1]	2	2	**3.33 J**	**75.2**	**148**	**260 J**	**722**	**839**	**36.8**	**150 J**	**96.8**	**16.2 B**	**404**	**976**	**22.7**	**15.2**
Arsenic	7.24	9.8	2.56	**15.1**	**36.3**	**51.1**	**652**	**88.5**	3.35	**3.070**	**297**	**76.2**	**759**	**121**	**7.5**	**29**
Barium	NS	NS	25.9	571 L	715 L	454	1,980 L	1,530 L	5,410 L	6,240	2,140 L	1,790 L	2,400 L	1,300 L	5,520 L	3,000 L
Beryllium	NS	NS	0.288	0.744	0.707	3.58	0.971	1.42	0.124 J	0.433	0.595	0.546	0.585	0.394	0.079 J	0.329
Cadmium	0.68	0.99	**0.736**	**11.1**	**33.5**	**102 J**	**758**	**526**	**106**	**3.620 J**	**1.690**	**509**	**1.250**	**371**	**101**	**385**
Calcium	NS	NS	10,500	12,300	8,390	6,640	3,390	4,210	1,140 U	4,060	2,560 J	2,220	1,900 J	1,000 U	1,080 U	5,800 U
Chromium (total)	52.3	43.4	16.1	**416**	**454**	**317**	**836**	**1,590**	**78.4**	**258**	**91.7**	**85.5**	**462**	**381**	**91**	**250**
Chromium (VI)	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt [1]	50	50	6.85	15.7	15.2	47.6	19.8	20	3.66	20	19.9	7.69	12.3	6.79	2.91	6.57
Copper	18.7	31.6	**48.3**	**522**	**961**	**1,740**	**1,790**	**1,570**	**909**	**1,710 J**	**1,270**	**457**	**1,560**	**1,110**	**534**	**1,210**
Iron [1]	20,000	20,000	5,040	19,400	**23,700**	**25,000**	**29,800**	**48,600**	4,020	**20,500**	**36,800**	**23,100**	**23,300**	17,600	3,310	13,900
Lead	30.2	35.8	**63.8**	**1,810**	**4,130**	**584**	**3,230**	**1,090**	**746**	**6,760**	**880**	**4,330**	**4,410**	**1,140**	**1,100**	**1,430**
Magnesium	NS	NS	4,790	3,840	2,810	5,540	2,220	2,780	J 1460	3,480	1,640	1,620	2,100	1,180 J	1,630 J	2,980 J
Manganese [1]	460	460	152	392 K	318 K	370	196 K	222 K	60.5 K	450	**942 K**	**538 K**	202 K	63.4 K	27.1 K	93.5 K
Mercury	0.13	0.18	0.067 L	**0.378**	**1.02**	**2.37 L**	**6.03**	**2.73**	**4.19**	**2.52 L**	**7.06**	**2.37**	**10.5**	**5.06**	**9.81**	**5.87**
Nickel	15.9	22.7	11.3 J	**150**	**40**	**83.7**	**81.9**	**98.2**	9.43	**26.8 J**	**27.6**	**17.1**	**45.6**	**17.5**	8.66	**16.4**
Potassium	NS	NS	231	616	815	1,240	838	1,090	376 J	549	593 J	689	778 J	573 J	575 J	1,440 U
Selenium [1]	2	2	0.483	**2.18**	**6.15**	**19.7**	**73.4**	**70.1**	**2.15**	**348**	**80.8**	**6.52**	**84.9**	**45.5**	**4.75**	**25.6**
Silver	0.73	1	0.091 J	**1.62**	**8.49**	**1.12 J**	**3.11**	**2.58**	**0.882**	**6.82 J**	**1.94**	**1.33 J**	**3.62 J**	**3.6**	**1.75**	**2.05**
Sodium	NS	NS	773	2,260 K	2,920 K	3,780	1,910 K	1,460 K	812 J	2,910	938 K	973 K	4,760 K	4,150 K	5,060 K	6,020 K
Thallium	NS	NS	0.062 B	0.148 B	0.541	1.32	1.97	0.776	0.334	15.4	2.78	0.539	3.36	0.886	0.421	1.29
Titanium	NS	NS	145 K	321	1,760	864 K	2,660	1,750	3,540	1,650 K	4,700	94	4,270	2,090	5,420	12,200
Vanadium	NS	NS	8.24	43.8	99.7	76.2	108	149	32.9	70.6	62.5	23.3	119	73.1	95	157
Zinc	124	121	109	**2,430**	**2,180**	**2,200**	**6,930**	**3,210**	**4,610**	**27,600 J**	**23,700**	**39,600**	**12,900**	**2,600**	**3,670**	**7,070**
Other Parameters																
Sulfides (mg/kg) [1]	130	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (%)	NS	NS	1.37 / 1.29	4.27 / 4.15	7.43 / 7.82	6.45 J / 7.28 J	6.17 / 6.36	7.46 / 7.14	4.39 / 4.31	4.08 / 3.89	7.6 / 7.9	3.6 / 4.84	5.35 / 5.32	5.47 / 5.4	4.54 / 4.49	4.57 / 4.67
Water Content (%)	NS	NS	30	42	72	130	210	180	190	57	84	85	130	130	140	170
pH (s.u.)	NS	NS	8.2	8.3	7.6	7.6	7.6	7.9	7.2	8.2	7.6	7.4	7.4	7.4	7.3	7.3

Notes:

BOLD - Bold concentrations indicate constituents that exceed the United States Environmental Protection Agency (USEPA) Region 3 marine sediment screening benchmark (July, 2006).

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ft bgs - feet below ground surface

µmoles/g micromoles per gram

mg/kg milligrams per kilogram

s.u. standard units

[1] - Currently no marine sediment benchmark screening value is available. Value taken from USEPA Region 3's Freshwater Sediment Screening Benchmark table per USEPA guidelines.

Table 6
Summary of Sediment Analytical Results for Metals - 2016
Colgate Creek
Baltimore, Maryland

Location	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	SC-M-T2			SC-01-T		SC-M-D				
Sample Name			SC-M-T2 (0-2)	SC-M-T2 (2-4)	SC-M-T2 (4-6)	SC-01-T (0-2)	SC-01-T (2-4)	SC-M-D (0-0.5)	SC-M-D (0-2)	SC-M-D (2-4)	SC-M-D (4-6)	SC-M-D (4-6) FD
Sample Date			8/9/2016	8/9/2016	8/9/2016	8/9/2016	8/9/2016	8/10/2016	8/10/2016	8/10/2016	8/10/2016	8/10/2016
Sample Depth Interval (ft bgs)			0-2	2-4	4-6	0-2	2-4	0-0.5	0-2	2-4	4-6	
Notes												Field Duplicate
AVS/ SEM (umoles/g)			Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Acid Volatile Sulfide	NS	NS	NA	NA	NA	NA	NA	180	NA	NA	NA	NA
Cadmium	NS	NS	NA	NA	NA	NA	NA	0.922918	NA	NA	NA	NA
Copper	NS	NS	NA	NA	NA	NA	NA	3.12195	NA	NA	NA	NA
Lead	NS	NS	NA	NA	NA	NA	NA	2.36757	NA	NA	NA	NA
Nickel	NS	NS	NA	NA	NA	NA	NA	0.41954	NA	NA	NA	NA
Zinc	NS	NS	NA	NA	NA	NA	NA	23.9763	NA	NA	NA	NA
SEM/AVS Ratio	NS	NS	NA	NA	NA	NA	NA	0.171157	NA	NA	NA	NA
Metals (mg/kg)												
Aluminum	NS	NS	11,600	7,030	2,820	5,110	5,790	8,740	10,200	2,140	6,050	5,260
Antimony [1]	2	2	**191**	**356**	**96.9**	**354**	**364**	**6.800**	**253**	**676**	**43.7 J**	**93.2 J**
Arsenic	7.24	9.8	**72.9**	**505**	**280**	**82.8**	**242**	**103**	**212**	**7.920**	**97**	**110**
Barium	NS	NS	881 L	2,080 L	1,840 L	786 L	2,790 L	705	1,350 L	3,470 L	3,100 J	4,740 J
Beryllium	NS	NS	2.58	0.829	0.197 J	0.457	0.397	1.95	1.16	0.189 J	0.366	0.29
Cadmium	0.68	0.99	**152**	**664**	**1,230**	**104**	**135**	**137 J**	**974**	**7,500**	**575**	**694**
Calcium	NS	NS	5,310	3,600	1,040 J	2,120 J	2,720 J	6,160	4,310	1,780 J	1,440 J	1,380 J
Chromium (total)	52.3	43.4	**359**	**789**	**103**	**374**	**333**	**477**	**1,520**	**80.2**	**260**	**266**
Chromium (VI)	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt [1]	50	50	25.9	16.6	5.09	10.2	7.86	30	24.6	8.98	7.56	7.57
Copper	18.7	31.6	**1,670**	**1,440**	**1,430**	**581**	**659**	**937**	**1,520**	**3,040**	**1,490**	**1,510**
Iron [1]	20,000	20,000	**32,400**	**28,000**	6,980	17,000	**21,000**	**23,100**	**42,400**	13,500	19,900	18,200
Lead	30.2	35.8	**1,070**	**3,030**	**5,900**	**877**	**1,180**	**558 J**	**1,270**	**22,800**	**3,820 J**	**5,320 J**
Magnesium	NS	NS	5,710	2,600	1,650	1,970	2,710	6,520	4,620	1,440	2,720	2,570
Manganese [1]	460	460	293 K	230 K	86 K	116	102	323	285 K	143 K	110 K	97.1 K
Mercury	0.13	0.18	**1.7**	**5.16**	**22.9**	**3.19**	**5.97**	**1.8 L**	**14.2**	**27.3**	**10.1 J**	**25.7 J**
Nickel	15.9	22.7	**68.3**	**86.8**	12.2	**48.6**	**25.7**	**53.9**	**78.2**	11.4	**17.4**	**16**
Potassium	NS	NS	1,650	933	580 J	802 J	848 J	1,260	1,120	316 J	919 J	838 J
Selenium [1]	2	2	**27.2**	**60.8**	**51.2**	**17.9**	**29**	**23.8**	**202**	**305**	**42.3**	**37.9**
Silver	0.73	1	**1.55**	**3.21**	**3.32 J**	**1.94**	**2.22**	**1.26 J**	**2**	**2.95 J**	**2.58 J**	**2.99 J**
Sodium	NS	NS	6,170 K	5,010 K	4,220 K	3,760 K	5,730 K	3,420	6,060 K	3,580 K	5,840 K	5,870 K
Thallium	NS	NS	0.779 J	1.7	3.58	0.435	0.749	0.774	1.29	24.2	2.16	2.38
Titanium	NS	NS	1,010	2,430	5,770	3,010	15,900	1,040	2,200	6,010	18,000	16,700
Vanadium	NS	NS	101	113	82.8	112	426	83.4	192	86.4	210	202
Zinc	124	121	**2,510**	**5,810**	**13,500**	**1,750**	**2,450**	**2,170**	**4,850**	**29,800**	**14,900**	**16,200**
Other Parameters												
Sulfides (mg/kg) [1]	130	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (%)	NS	NS	6 / 6.14	7.33 / 7.28	4.89 / 4.91	5.55 / 5.06	4.73 / 5.33	6.64 / 6.72	9.53 / 8.72	3.88 / 3.99	5.4 / 5.58	4.78 / 4.37
Water Content (%)	NS	NS	200	200	130	130	180	140	200	150	170	160
pH (s.u.)	NS	NS	7.7	7.6	7.8	7.4	7.3	8.3	8	7.2	7.6	7.6

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NS - Not standard; no numeric criterion has been established by MDE or USEPA.

NA - Sample was not analyzed for this analyte.

Q - Lab qualifier

ft bgs - feet below ground surface

µmoles/g micromoles per gram

mg/kg milligrams per kilogram

s.u. standard units

[1] - Currently no marine sediment benchmark screening value is available. Value taken from USEPA Region 3's Freshwater Sediment Screening Benchmark table per USEPA guidelines.

TABLE 7

COLGATE CREEK SURFACE SEDIMENT ANALYTICAL DATA

FORMER ST. HELENA FACILITY - NOVEMBER 2020

Baltimore, Maryland

Analyte	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	Colgate Creek Surface (0-6") Sediment Analytical Data																				
			CC001	CC002	CC003	CC004	CC005	CC006	CC007	CC008	CC009	CC010	CC011	CC012	CC013	CC014	CC015	CC016	CC017	CC018	CC019	CC020	CC021	CC022
Metals (mg/kg)																								
Aluminum	NS	NS	5,300	7,100	5,000	8,900	9,700	5,600	9,300	9,900	8,300	10,000	10,000	8,500	5,400	8,200	8,000	6,700	5,500	9,300	7,200	9,500	8,400	8,800
Antimony	2	2	**4**	**33**	**3.7**	**11**	**11**	**15**	**47**	**44**	**57**	**18**	**45**	**33**	**35**	**16**	**14**	**68**	**11**	**44**	**12**	2	**7.6**	**29**
Arsenic	7.24	9.8	5.5	**17**	4.7	**17**	**12**	**8.2**	**24**	**130**	**33**	**21**	**210**	**31**	**54**	**30**	**28**	**220**	**21**	**78**	**33**	**12**	**30**	**110**
Barium	NS	NS	120	930	110	1,400	820	1,100	2,400	1,000	1,200	1,800	560	2,600	160	1,800	2,100	670	1,500	300	2,100	570	1,800	3,300
Beryllium	NS	NS	1.2	1.3	0.75	2.5	1.3	1	2	3.4	2.2	1.7	2.3	1.8	0.99	1.4	1.5	1.8	0.95	1.5	1.1	0.55	0.85	1.3
Cadmium	0.68	0.99	**3.4**	**14**	**2.3**	**22**	**14**	**15**	**32**	**63**	**71**	**35**	**98**	**96**	**200**	**30**	**37**	**130**	**29**	**510**	**110**	**6**	**25**	**52**
Calcium	NS	NS	16,000	7,700	17,000	13,000	16,000	6,400	14,000	6,800	7,900	11,000	5,600	9,900	8,800	12,000	7,800	27,000	8,700	11,000	11,000	42,000	4,600	8,700
Chromium	52.3	43.4	**94**	**270**	**62**	**120**	**97**	**72**	**180**	**180**	**190**	**150**	**280**	**270**	**430**	**160**	**190**	**320**	**190**	**1,500**	**1,900**	**1,400**	**150**	**180**
Cobalt	50	50	15	22	8.9	30	15	8.3	25	35	22	20	26.0	22	21	20	19	19	14	39	39	23	12	17
Copper	18.7	31.6	**230**	**620**	**98**	**800**	**290**	**210**	**470**	**1,400**	**780**	**540**	**1,300**	**500**	**290**	**2,800**	**670**	**820**	**360**	**550**	**160**	**35**	**160**	**480**
Iron	20,000	20,000	12,000	**21,000**	13,000	**22,000**	**22,000**	19,000	**25,000**	**23,000**	**21,000**	**25,000**	**25,000**	**23,000**	16,000	**23,000**	20,000	**24,000**	15,000	**32,000**	**28,000**	**25,000**	**22,000**	**23,000**
Lead	30.2	35.8	**130**	**1500**	**160**	**450**	**280**	**180**	**300**	**560**	**490**	**410**	**910**	**420**	**530**	**330**	**310**	**870**	**200**	**600**	**210**	**41**	**170**	**440**
Magnesium	NS	NS	8,700	4,000	9,500	9,800	11,000	5,600	9,900	5,800	6,600	9,200	5,000	8,600	5,400	9,100	6,600	4,200	5,600	9,300	11,000	9,200	4,700	6,300
Manganese	460	460	150	250	150	240	210	120	250	260	230	260	220	260	200	270	250	230	200	300	260	**480**	290	290
Mercury	0.13	0.18	**0.37**	**0.54**	0.11	**1.4**	**0.54**	**0.73**	**0.77**	**2.3**	**1.3**	**1.1**	**1.6**	**1.1**	**1**	**0.68**	**0.88**	**1.9**	**0.47**	**4.4**	**0.43**	0.086	**0.39**	**1.3**
Nickel	15.9	22.7	**32**	**61**	**23**	**44**	**33**	**20**	**47**	**54**	**38**	**38**	**60**	**42**	**39**	**38**	**31**	**47**	**25**	**92**	**92**	**60**	**23**	**34**
Potassium	NS	NS	790	1,100	810	1,500	1,600	910	1,500	1,500	1,400	1,600	1,400	1,400	710	1,300	1,200	980	870	900	530	930	1,300	1,400
Selenium	2	2	1.3	**2.7**	1	**3.7**	**2.5**	**2.8**	**4.5**	**10**	**8.7**	**5.9**	**14**	**11**	**34**	**6.8**	**6**	**31**	**4.2**	**100**	**7.3**	**13**	**4.6**	**11**
Silver	0.73	1	0.6	**1.2**	0.44	0.73	0.63	0.41	**0.77**	**1.1**	**0.99**	**0.88**	**1.5**	**0.89**	**0.81**	**0.86**	**0.76**	**1.6**	0.52	**1.3**	0.42	0.12	0.48	**0.96**
Sodium	NS	NS	2,300	3,300	2,600	5,100	5,000	4,500	6,200	4,700	4,800	4,900	4,100	6,200	2,500	4,700	3,500	3,800	3,100	3,200	1,800	3,000	5,100	5,400
Thallium	NS	NS	0.13	0.24	0.097	0.42	0.3	0.18	0.44	0.6	0.59	0.46	0.61	0.65	0.63	0.48	0.41	0.62	0.32	0.91	0.53	0.16	0.3	0.5
Vanadium	NS	NS	26	47	24	45	47	33	58	62	58	54	70	62	56	57	52	98	46	160	140	110	56	82
Zinc	124	121	**350**	**1,500**	**290**	**990**	**830**	**490**	**960**	**1,400**	**1,300**	**1,100**	**1,800**	**1,600**	**2,100**	**870**	**880**	**1,500**	**630**	**3,100**	**3,800**	**200**	**530**	**1,000**

NOTES:

Bold = Concentrations Exceed United State Environmental Protection Agency (USEPA) Region 3 Marine Sediment Screening Benchmark

Underlined = Concentrations Exceed United State Environmental Protection Agency (USEPA) Region 3 Freshwater Sediment Screening Benchmark

NS = No Standard; no numeric criterion has been established by USEPA.

TABLE 8

COLGATE CREEK SUBSURFACE SEDIMENT ANALYTICAL DATA

FORMER ST. HELENA FACILITY - NOVEMBER 2020

Baltimore, Maryland

Analyte	USEPA Region 3 Marine Sediment Screening Benchmark	USEPA Region 3 Freshwater Sediment Screening Benchmark	Colgate Creek Sediment Sample Location and Depth (in Inches)																						
			CC008 (0-6)	CC008 (25-29)	CC009 (0-6)	CC009 (23-32)	CC010 (0-6)	CC010 (29-39)	CC011 (0-6)	CC011 (23-33)	CC012 (0-6)	CC012 (25-30)	CC013 (0-6)	CC013 (28-38)	CC015 (0-6)	CC015 (22-27)	CC015 (49-59)	CC016 (0-6)	CC016 (26-29)	CC016 (50-55)	CC017 (0-6)	CC017 (27-37)	CC017 (48-53)	CC018 (0-6)	CC018 (23-33)	CC018 (45-52)
Metals (mg/kg)																									
Aluminum	NS	NS	9,900	11,000	8,300	6,500	10,000	3,700	10,000	3,200	8,500	8,400	5,400	2,300	5,400	8,100	14,000	8,000	8,300	11,000	6,700	6,300	9,100	9,300	5300	9000
Antimony	2	2	**44**	**230**	**57**	**210**	**18**	**830**	**45**	**670**	**33**	**230**	**35**	**120**	**14**	**330**	**180**	**68**	**480**	**11**	**11**	**310**	**17**	**44**	**150**	**14**
Arsenic	7.24	9.8	**130**	**150**	**33**	**1000**	**21**	**26**	**210**	**25**	**31**	**210**	**54**	**2500**	**28**	**1200**	**67**	**220**	**330**	**1100**	**21**	**1400**	**120**	**78**	**450**	**110**
Barium	NS	NS	1,000	290	1,200	2,400	1,800	9,700	560	16,000	2,600	4,100	160	210	2,100	3,600	6,700	670	4,500	1	1,500	2,700	5,700	300	690	1,100
Beryllium	NS	NS	3.4	1.9	2.2	0.54	1.7	0.21	2.3	0.15	1.8	1.5	0.99	0.34	1.5	0.86	1.1	1.8	ND	0.99	0.95	ND	ND	1.5	ND	1
Cadmium	0.68	0.99	**63**	**490**	**71**	**660**	**35**	**50**	**98**	**40**	**96**	**360**	**200**	**3200**	**37**	**420**	**230**	**130**	**370**	**8.9**	**29**	**480**	**400**	**510**	**1200**	**580**
Calcium	NS	NS	6,800	4,000	7,900	4,000	11,000	1,900	5,600	2,600	9,900	5,500	8,800	10,000	7,800	4,500	2,900	27,000	3,900	760	8,700	3,600	4,100	11,000	8,700	3,800
Chromium	52.3	43.4	**180**	**1,100**	**190**	**310**	**150**	**73**	**280**	**55**	**270**	**650**	**430**	46	**190**	**340**	**110**	**320**	**510**	42	**190**	**360**	**480**	**1,500**	**190**	**270**
Cobalt	50	50	35	18	22	11	20	3	26.0	2.9	22	19	21	8.9	19	13	12	19	8.4	9.8	14	14	9.8	39	12	12
Copper	18.7	31.6	**1,400**	**2,000**	**780**	**1,400**	**540**	**390**	**1,300**	**500**	**500**	**1,200**	**290**	**2,000**	**670**	**1,100**	**630**	**820**	**770**	**42**	**360**	**910**	**1,500**	**550**	**1,900**	**1,000**
Iron	20,000	20,000	**23,000**	**41,000**	**21,000**	17,000	**25,000**	2,000	**25,000**	2,600	**23,000**	**28,000**	16,000	10,000	20,000	**32,000**	20,000	**24,000**	**25,000**	12,000	15,000	18,000	**28,000**	**32,000**	17,000	**22,000**
Lead	30.2	35.8	**560**	**1300**	**490**	**5500**	**410**	**550**	**910**	**540**	**420**	**1800**	**530**	**6300**	**310**	**2800**	**1300**	**870**	**1800**	**52**	**200**	**2400**	**1600**	**600**	**7400**	**2200**
Magnesium	NS	NS	5,800	2,100	6,600	1,600	9,200	600	5,000	780	8,600	3,200	5,400	840	6,600	3,000	3,200	4,200	2,600	2,100	5,600	2,200	3,700	9,300	1,800	2,100
Manganese	460	460	260	160	230	170	260	16	220	28	260	210	200	180	250	210	290	230	160	160	200	110	110	300	150	120
Mercury	0.13	0.18	**2.3**	**6**	**1.3**	**9.4**	**1.1**	**1.6**	**1.6**	**1.8**	**1.1**	**3.9**	**1**	**6.5**	**0.88**	**5.2**	**1.8**	**1.9**	**12**	**0.14**	**0.47**	**4.4**	**2.9**	**4.4**	**8.9**	**2.3**
Nickel	15.9	22.7	**54**	**59**	**38**	**31**	**38**	9.7	**60**	7.6	**42**	**73**	**39**	13	**31**	**56**	**24**	**47**	**23**	**21**	**25**	**40**	**21**	**92**	**26**	**26**
Potassium	NS	NS	1,500	990	1,400	810	1,600	690	1,400	750	1,400	1,100	710	440	1,200	1,200	1,700	980	970	1,200	870	860	1,200	900	820	1,000
Selenium	2	2	**10**	**65**	**8.7**	**98**	**5.9**	**9.6**	**14**	**8.4**	**11**	**58**	**34**	**300**	**6**	**59**	**25**	**31**	**110**	1.3	**4.2**	**59**	**55**	**100**	**130**	**33**
Silver	0.73	1	**1.1**	**3.5**	**0.99**	**6.6**	**0.88**	**3.2**	**1.5**	**3**	**0.89**	**2.9**	**0.81**	**6.9**	**0.76**	**4.6**	**2.4**	**1.6**	**4**	0.087	0.52	**3.9**	**2.6**	**1.3**	**9.9**	**2.6**
Sodium	NS	NS	4,700	3,000	4,800	3,000	4,900	4,000	4,100	4,100	6,200	4,800	2,500	2,600	3,500	5,100	4,700	3,800	4,900	2,400	3,100	4,200	7,700	3,200	4,800	2,900
Thallium	NS	NS	0.6	0.97	0.59	3.2	0.46	0.31	0.61	0.21	0.65	1.4	0.63	5.7	0.41	1.8	0.91	0.62	0.87	0.23	0.32	1.6	2.2	0.91	4.1	1.6
Vanadium	NS	NS	62	150	58	130	54	130	70	87	62	130	56	79	52	170	94	98	550	39	46	230	310	160	170	69
Zinc	124	121	**1,400**	**2,200**	**1,300**	**10,000**	**1,100**	**240**	**1,800**	**220**	**1,600**	**3,700**	**2,100**	**32,000**	**880**	**3,300**	**3,300**	**1,500**	**1,700**	**290**	**630**	**3,500**	**8,800**	**3,100**	**24,000**	**9,500**

NOTES:

Bold = Concentrations Exceed United State Environmental Protection Agency (USEPA) Region 3 Marine Sediment Screening Benchmark

Underlined = Concentrations Exceed United State Environmental Protection Agency (USEPA) Region 3 Freshwater Sediment Screening Benchmark

NS = No Standard; no numeric criterion has been established by USEPA.

Surface sediment results from select samples from Table 1 are repeated on Table 2.

TABLE 9
SEDIMENT SCREENING TABLE
FORMER ST. HELENA FACILITY
Baltimore, Maryland

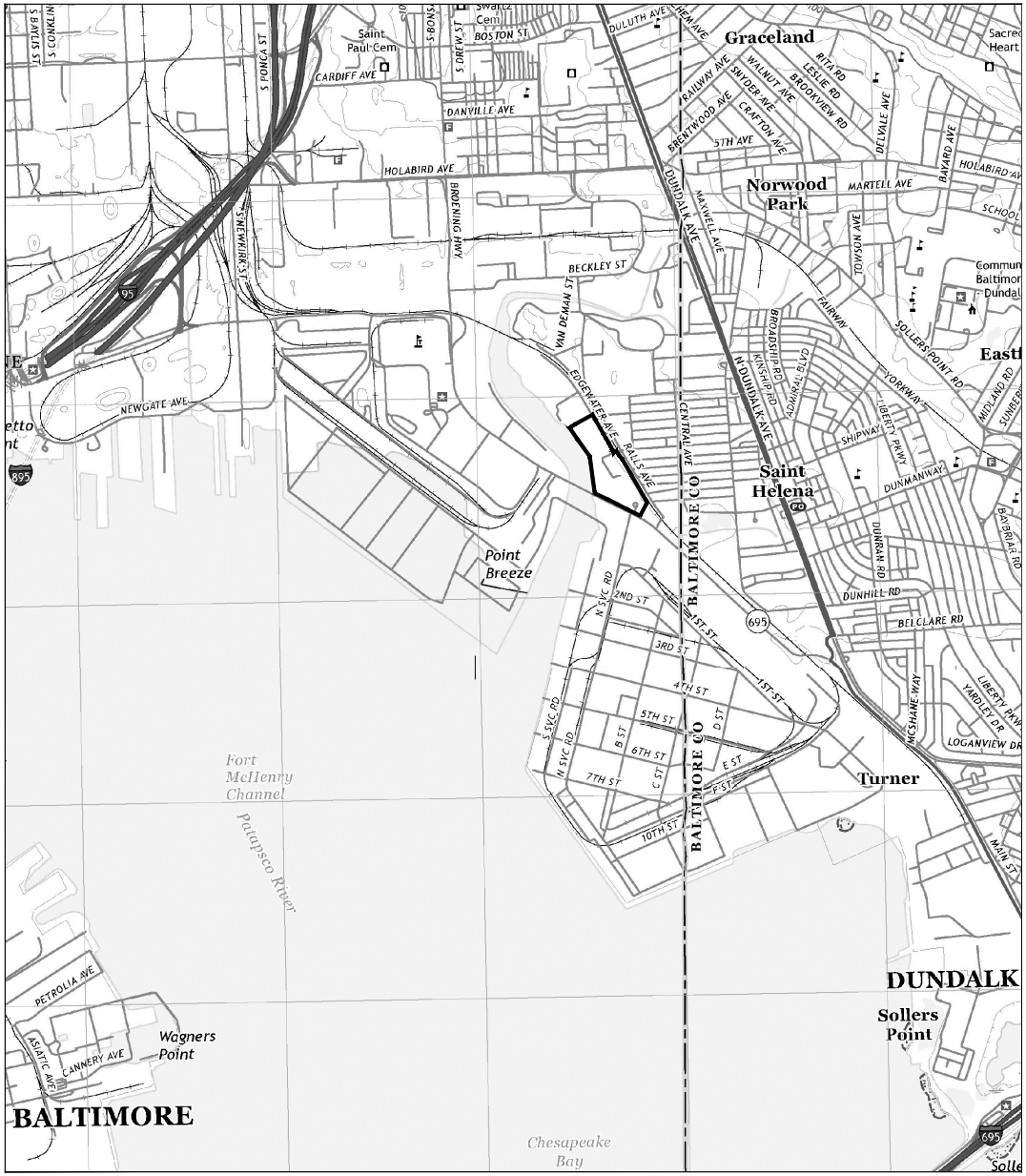
Analyte	McDonald, et al., (2000) Probable Effects Concentrations	Colgate Creek Surface (0-6") Sediment Analytical Data [1]																											
		SC-M-T1 (0-24")	SC-M-T2 (0-24")	SC-S-T1	SC-S-T2	SC-M-D	SC-M-D (24-48")	CC01	CC02	CC03	CC04	CC05	CC06	CC07	CC08	CC09	CC10	CC11	CC12	CC13	CC14	CC15	CC16	CC17	CC18	CC19	CC20	CC21	CC22
Metals (mg/kg)																													
Arsenic	33	759	72.9	51.1	3070	103	7920	5.5	17	4.7	17	12	8.2	24	130	33	21	210	31	54	30	28	220	21	78	33	12	30	110
Cadmium	4.98	1250	152	102	3620	137	7500	3.4	14	2.3	22	14	15	32	63	71	35	98	96	200	30	37	130	29	510	110	6	25	52
Chromium	111	462	359	317	258	477	80.2	94	270	62	120	97	72	180	180	190	150	280	270	430	160	190	320	190	1,500	1,900	1,400	150	180
Lead	128	4410	1070	584	6760	558	22800	130	1500	160	450	280	180	300	560	490	410	910	420	530	330	310	870	200	600	210	41	170	440
Zinc	459	12900	2510	2200	27600	2170	29800	350	1,500	290	990	830	490	960	1,400	1,300	1,100	1,800	1,600	2,100	870	880	1,500	630	3,100	3,800	200	530	1,000

NOTES:

1 - Depths that are not 0 to 6 inches are noted in parentheses under the sample number.

Hazard Quotients																													
Analyte	McDonald, et al., (2000) Probable Effects Concentrations	Colgate Creek Surface (0-6") Sediment Analytical Data [1]																											
		SC-M-T1 (0-24")	SC-M-T2 (0-24")	SC-S-T1	SC-S-T2	SC-M-D	SC-M-D (24-48")	CC01	CC02	CC03	CC04	CC05	CC06	CC07	CC08	CC09	CC10	CC11	CC12	CC13	CC14	CC15	CC16	CC17	CC18	CC19	CC20	CC21	CC22
Metals																													
Arsenic	33	23.0	2.2	1.5	93	3.1	240	0.2	0.5	0.1	0.5	0.4	0.2	0.7	3.9	1.0	0.6	6.4	0.9	1.6	0.9	0.8	6.7	0.6	2.4	1.0	0.4	0.9	3.3
Cadmium	4.98	251	31	20	727	28	1506	0.7	2.8	0.5	4.4	2.8	3.0	6.4	12.7	14.3	7.0	19.7	19.3	40.2	6.0	7.4	26.1	5.8	102.4	22.1	1.2	5.0	10.4
Chromium	111	4.2	3.2	2.9	2.3	4.3	0.7	0.8	2.4	0.6	1.1	0.9	0.6	1.6	1.6	1.7	1.4	2.5	2.4	3.9	1.4	1.7	2.9	1.7	13.5	17.1	12.6	1.4	1.6
Lead	128	34.5	8.4	4.6	52.8	4.4	178	1.0	11.7	1.3	3.5	2.2	1.4	2.3	4.4	3.8	3.2	7.1	3.3	4.1	2.6	2.4	6.8	1.6	4.7	1.6	0.3	1.3	3.4
Zinc	459	28.1	5.5	4.8	60.1	4.7	64.9	0.8	3.3	0.6	2.2	1.8	1.1	2.1	3.1	2.8	2.4	3.9	3.5	4.6	1.9	1.9	3.3	1.4	6.8	8.3	0.4	1.2	2.2

Figures



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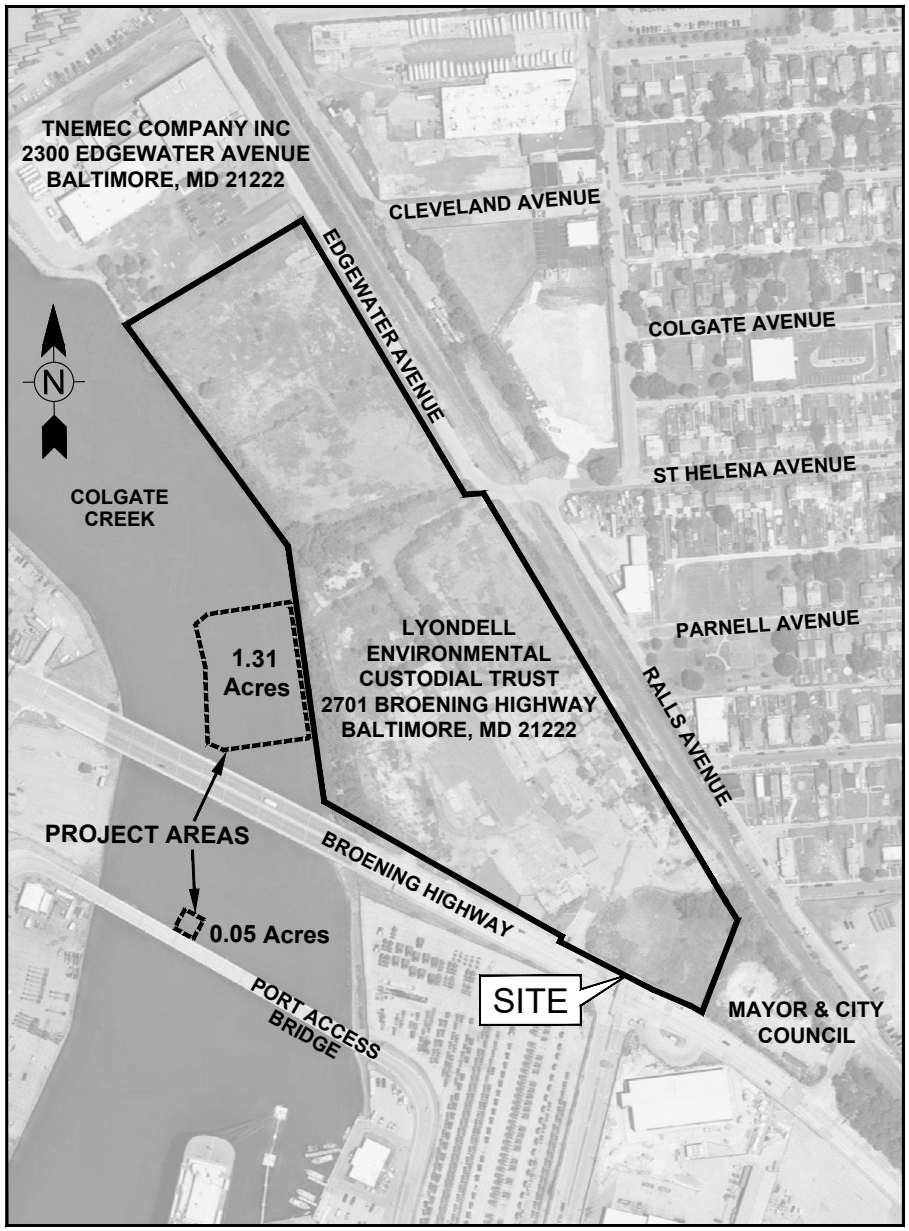


Scale: 1"=400'

Vicinity Map & Aerial Photo with Sediment Corrective Measures Limits

Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**

Applicant Name: **Lyondell Environmental Custodial Trust**

35 East Wacker Drive, Suite 690, Chicago, Illinois 60601

Figure 1

Date: 09/09/25

TETRA TECH

LEGEND

- Colgate Creek Shoreline
- Approximate Facility Boundary

0 200 400

SCALE IN FEET

TITLE: UPLAND SITE LAYOUT / SURROUNDING PROPERTIES

LOCATION: St. Helena Manufacturing Facility
Baltimore, Maryland

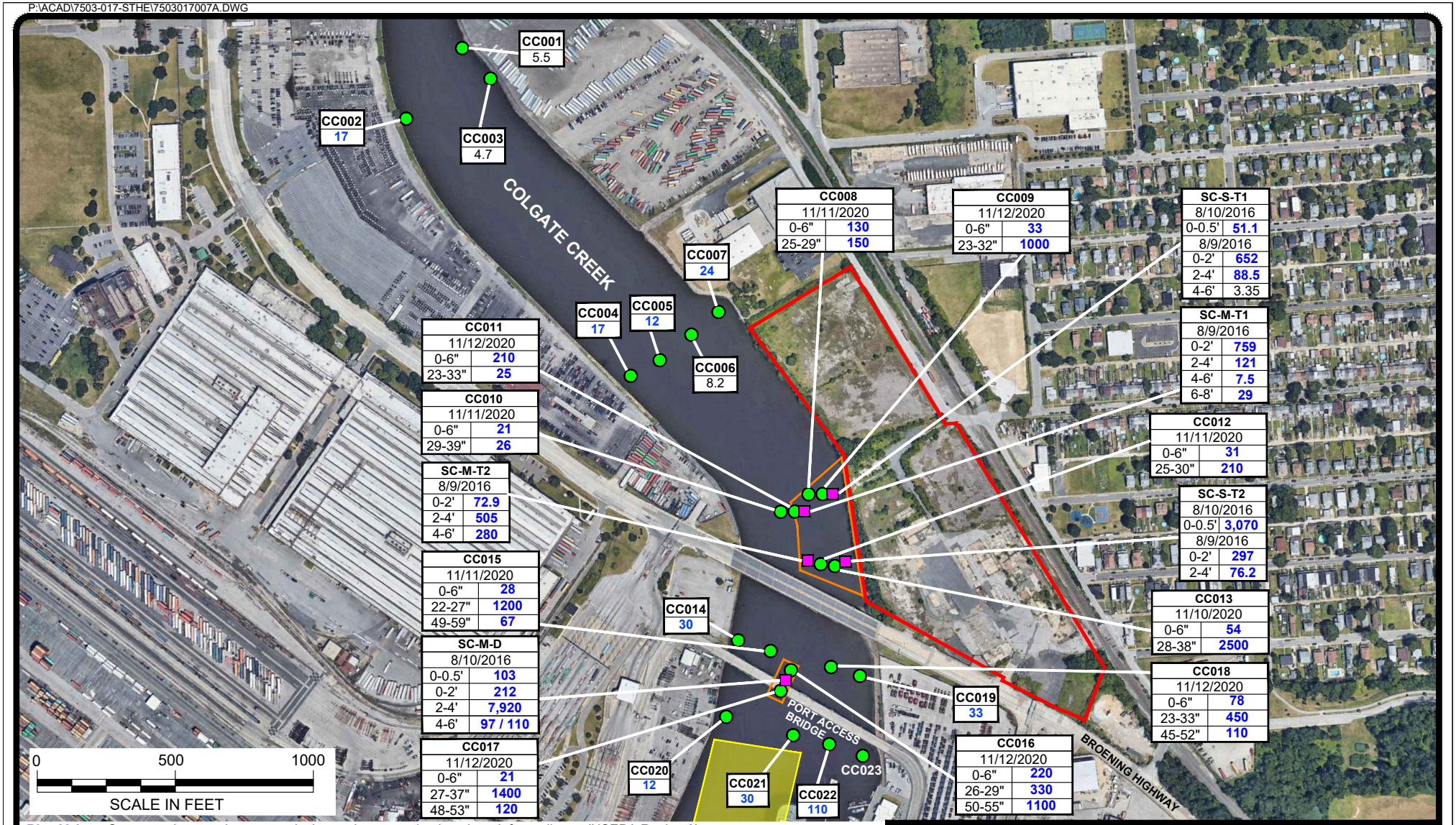
TETRA TECH

APPROVED	SNP
DRAFTED	CMP
PROJECT#	117-7503017
DATE	10/16/23

FIGURE 2

P:\ACAD\7503-016-STHEV\7503016061A.DWG

P:\ACAD\7503-017-STHE\7503017007A.DWG



Blue Value: Concentration equals or exceeds the marine screening benchmark for sediment (USEPA Region 3).
Black Value: Concentration is below the marine screening benchmark for sediment (USEPA Region 3).

LEGEND

- SITE BOUNDARY
- APPROXIMATE LOCATION OF DREDGED CHANNEL
- PROPOSED SEDIMENT SAMPLE LOCATION
- HISTORICAL BORING LOCATION
- ACTUAL LIMITS WILL BE DEFINED AS PART OF THE CMI WORKPLAN

CC008	← SAMPLE ID
130	← CONCENTRATION VALUE

All values reported as milligram per kilogram (mg/kg)

SC-M-T1	
8/9/2016	
0-2'	759
2-4'	121
4-6'	7.5
6-8'	29

2016 RFI SEDIMENT SAMPLE RESULTS FOR DEPTHS SHOWN

N

TITLE: SUMMARY OF ARSENIC CONCENTRATIONS IN SEDIMENT

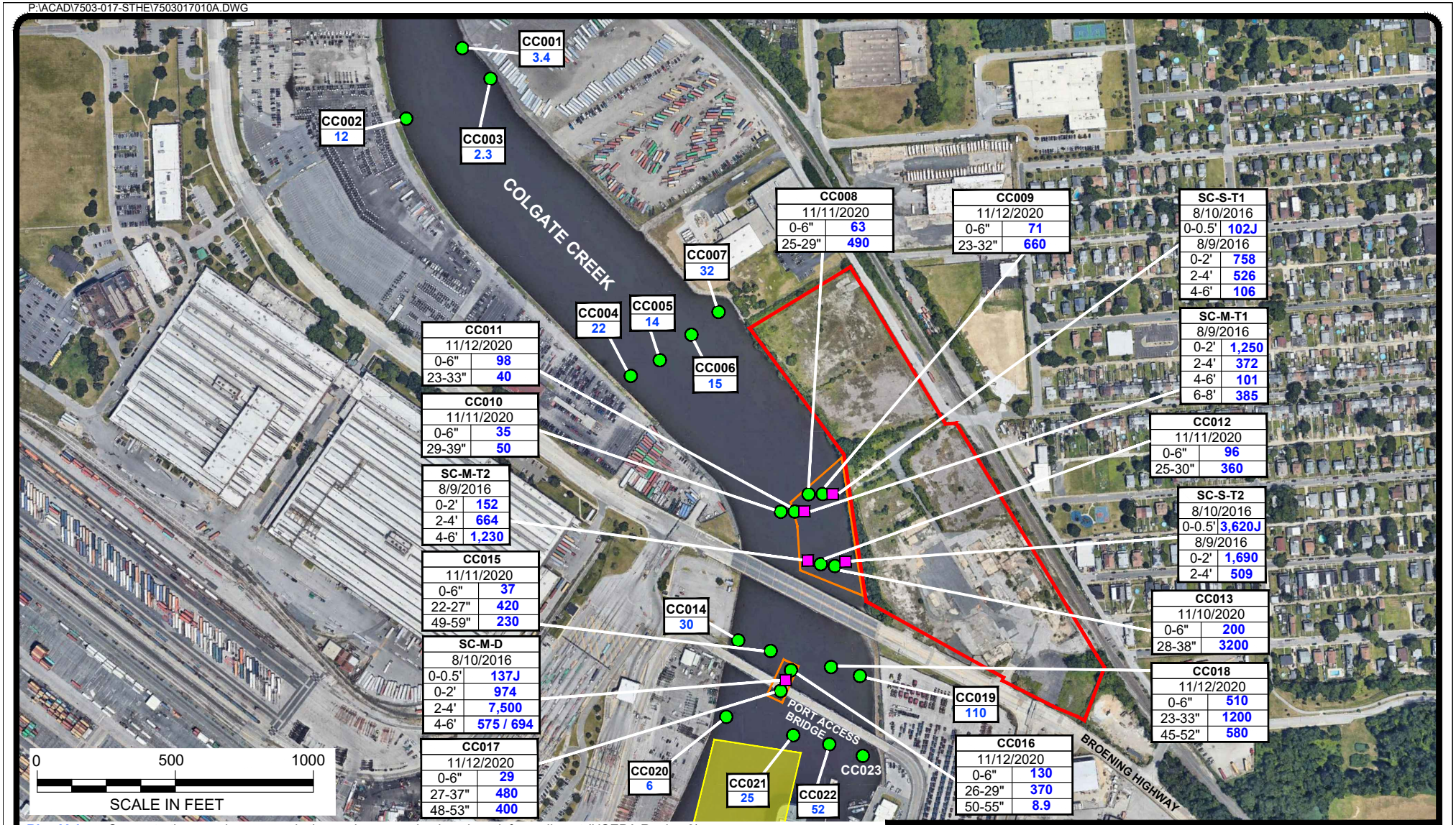
LOCATION: St. Helena Manufacturing Facility
Baltimore, Maryland

TETRA TECH

APPROVED	SC
DRAFTED	CP
PROJECT#	117-7503017
DATE	07/03/23

FIGURE 3

P:\ACAD\7503-017-STHE\7503017010A.DWG



Blue Value: Concentration equals or exceeds the marine screening benchmark for sediment (USEPA Region 3).
Black Value: Concentration is below the marine screening benchmark for sediment (USEPA Region 3).

LEGEND

- SITE BOUNDARY
- APPROXIMATE LOCATION OF DREDGED CHANNEL
- PROPOSED SEDIMENT SAMPLE LOCATION
- HISTORICAL BORING LOCATION
- ACTUAL LIMITS WILL BE DEFINED AS PART OF THE CMI WORKPLAN

CC008
63

← SAMPLE ID
← CONCENTRATION VALUE
All values reported as milligram per kilogram (mg/kg)

SC-M-T1	
8/9/2016	
0-2'	1,250
2-4'	372
4-6'	101
6-8'	385

2016 RFI SEDIMENT SAMPLE RESULTS FOR DEPTHS SHOWN

N

TITLE: SUMMARY OF CADMIUM CONCENTRATIONS IN SEDIMENT

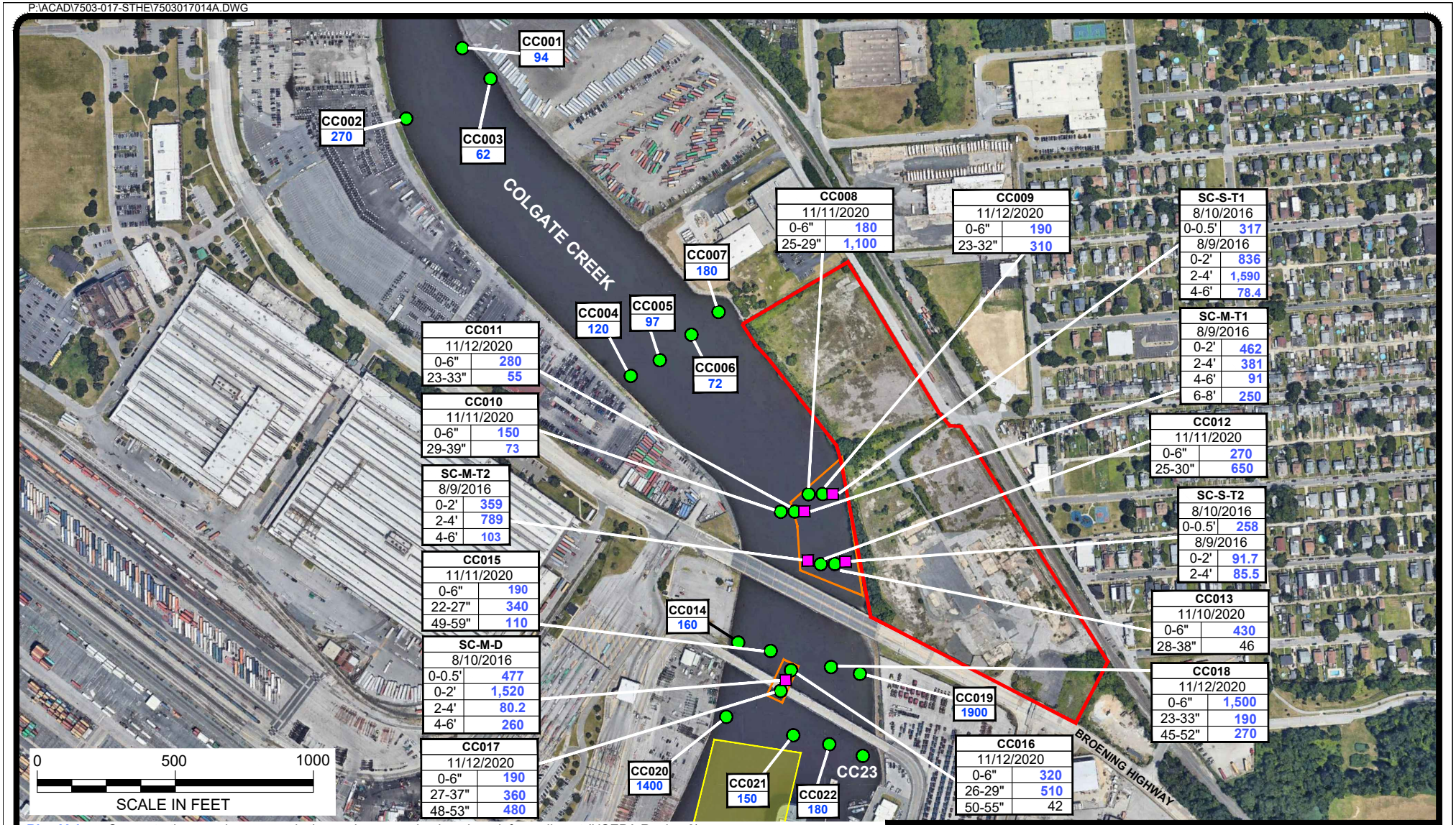
LOCATION: St. Helena Manufacturing Facility
Baltomore, Maryland

TETRA TECH

APPROVED	SC
DRAFTED	CP
PROJECT#	117-7503016
DATE	07/03/23

FIGURE 4

P:\ACAD\7503-017-STHE\7503017014A.DWG



Blue Value: Concentration equals or exceeds the marine screening benchmark for sediment (USEPA Region 3).
Black Value: Concentration is below the marine screening benchmark for sediment (USEPA Region 3).

LEGEND

- SITE BOUNDARY
- APPROXIMATE LOCATION OF DREDGED CHANNEL
- PROPOSED SEDIMENT SAMPLE LOCATION
- HISTORICAL BORING LOCATION
- ACTUAL LIMITS WILL BE DEFINED AS PART OF THE CMI WORKPLAN

CC008
63

SAMPLE ID
CONCENTRATION VALUE
All values reported as milligram per kilogram (mg/kg)

SC-M-T1	
8/9/2016	
0-2'	1,250
2-4'	372
4-6'	101
6-8'	385

2016 RFI SEDIMENT SAMPLE RESULTS FOR DEPTHS SHOWN

N

TITLE: SUMMARY OF CHROMIUM CONCENTRATIONS IN SEDIMENT

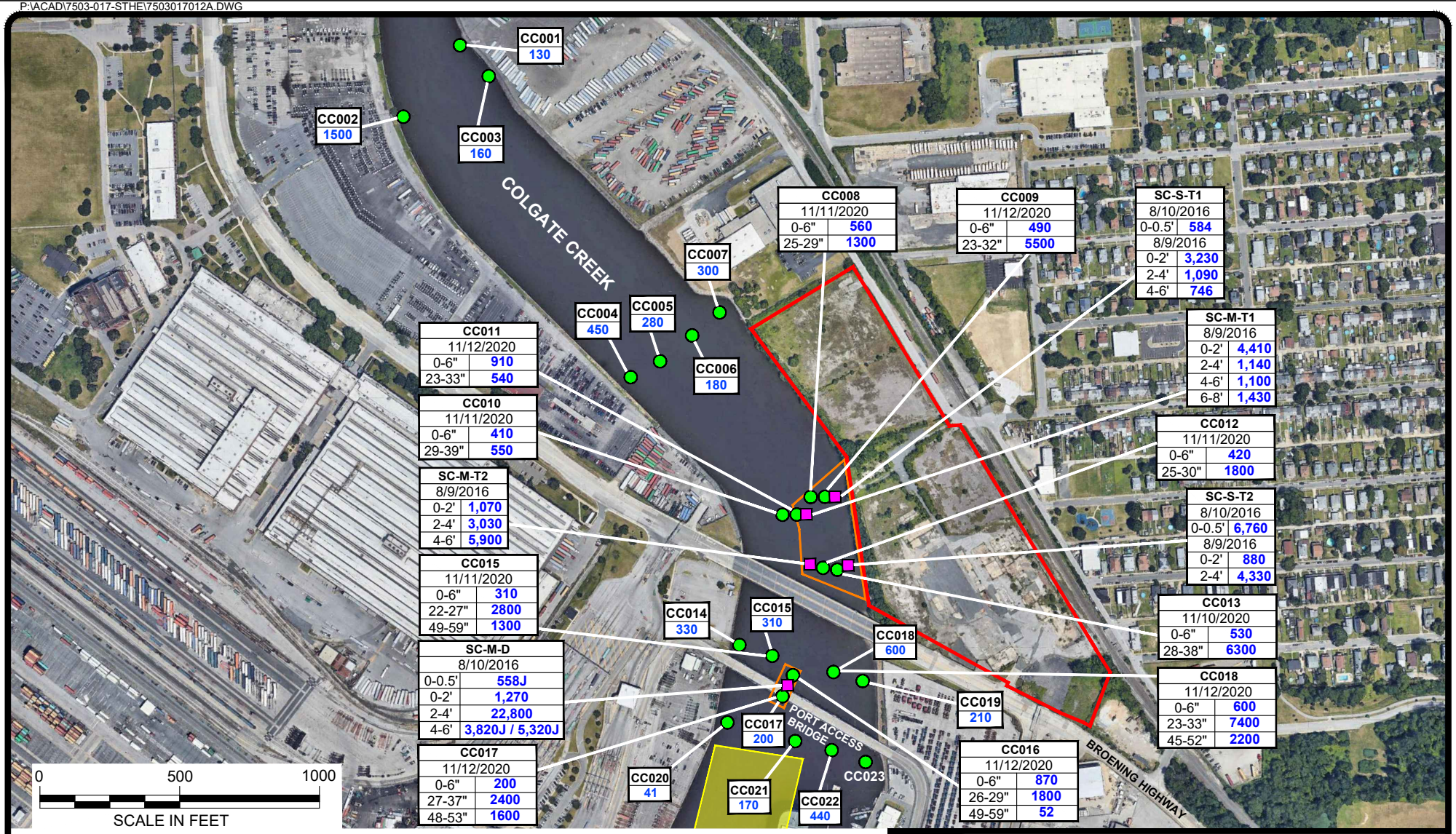
LOCATION: St. Helena Manufacturing Facility
Baltimore, Maryland

TETRA TECH

APPROVED	SC
DRAFTED	CP
PROJECT#	117-7503017
DATE	07/03/23

FIGURE 5

P:\ACAD\7503-017-STHE\7503017012A.DWG



Blue Value: Concentration equals or exceeds the marine screening benchmark for sediment (USEPA Region 3).
Black Value: Concentration is below the marine screening benchmark for sediment (USEPA Region 3).

LEGEND

- SITE BOUNDARY
- APPROXIMATE LOCATION OF DREDGED CHANNEL
- PROPOSED SEDIMENT SAMPLE LOCATION
- HISTORICAL BORING LOCATION
- ACTUAL LIMITS WILL BE DEFINED AS PART OF THE CMI WORKPLAN

CC008 / 560 ← SAMPLE ID / CONCENTRATION VALUE

All values reported as milligram per kilogram (mg/kg)

SC-M-T1 / 8/9/2016 / 0-2' 4,410 / 2-4' 1,140 / 4-6' 1,100 / 6-8' 1,430

2016 RFI SEDIMENT SAMPLE RESULTS FOR DEPTHS SHOWN

N

TITLE: SUMMARY OF LEAD CONCENTRATIONS IN SEDIMENT

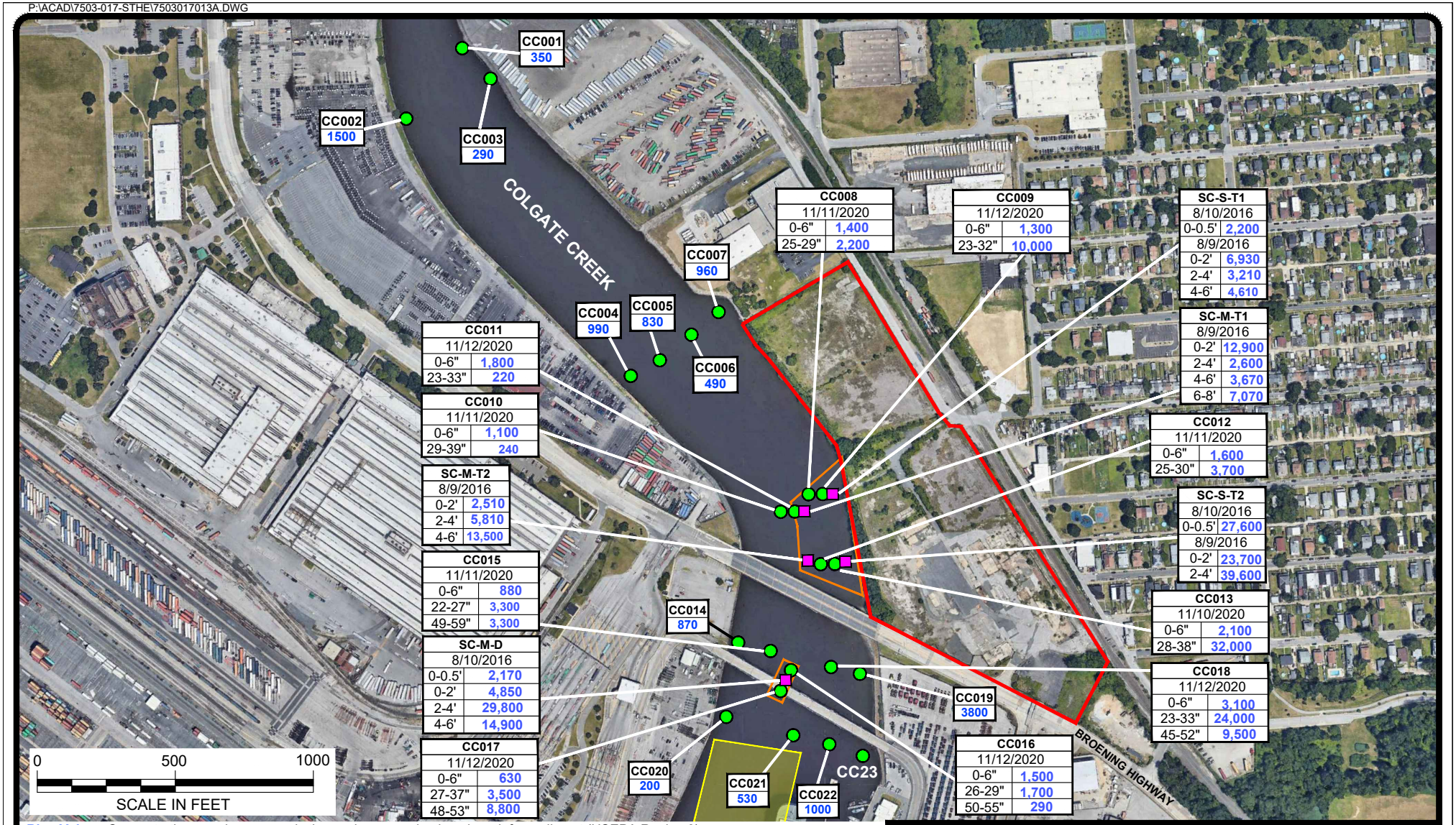
LOCATION: St. Helena Manufacturing Facility
Baltimore, Maryland

TETRA TECH

APPROVED	SC
DRAFTED	CP
PROJECT#	117-7503017
DATE	07/03/23

FIGURE 6

P:\ACAD\7503-017-STHE\7503017013A.DWG



Blue Value: Concentration equals or exceeds the marine screening benchmark for sediment (USEPA Region 3).
Black Value: Concentration is below the marine screening benchmark for sediment (USEPA Region 3).

LEGEND

- SITE BOUNDARY
- APPROXIMATE LOCATION OF DREDGED CHANNEL
- PROPOSED SEDIMENT SAMPLE LOCATION
- HISTORICAL BORING LOCATION
- ACTUAL LIMITS WILL BE DEFINED AS PART OF THE CMI WORKPLAN

CC008 ← SAMPLE ID
63 ← CONCENTRATION VALUE
All values reported as milligram per kilogram (mg/kg)

SC-M-T1
8/9/2016
0-2' 1,250
2-4' 372
4-6' 101
6-8' 385

2016 RFI SEDIMENT SAMPLE RESULTS FOR DEPTHS SHOWN

N

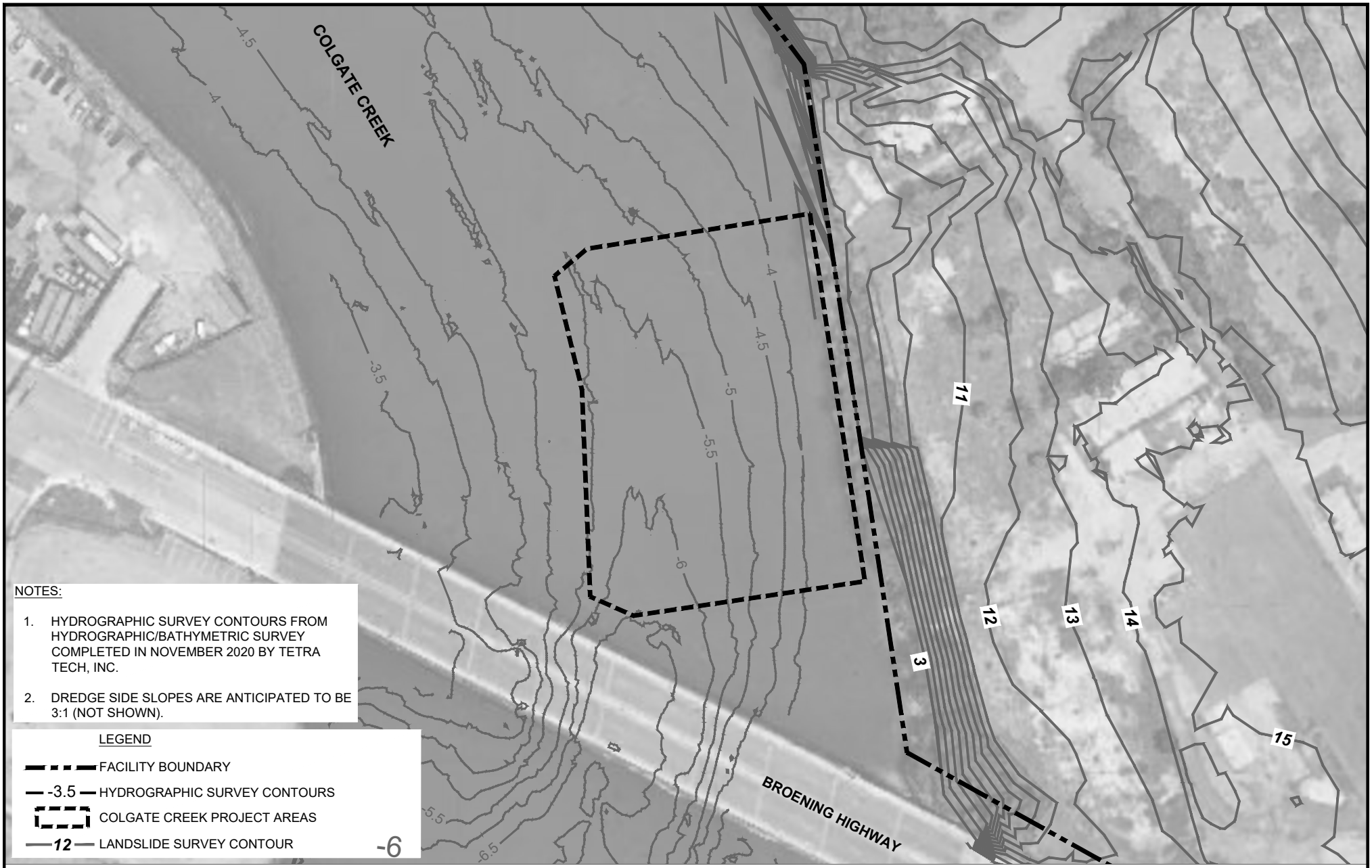
TITLE: SUMMARY OF ZINC CONCENTRATIONS IN SEDIMENT

LOCATION: St. Helena Manufacturing Facility
Baltimore, Maryland

TETRA TECH

APPROVED	SC
DRAFTED	CP
PROJECT#	117-7503017
DATE	07/03/23

FIGURE 7



Conceptual Dredge Limits in Cap Area

Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**

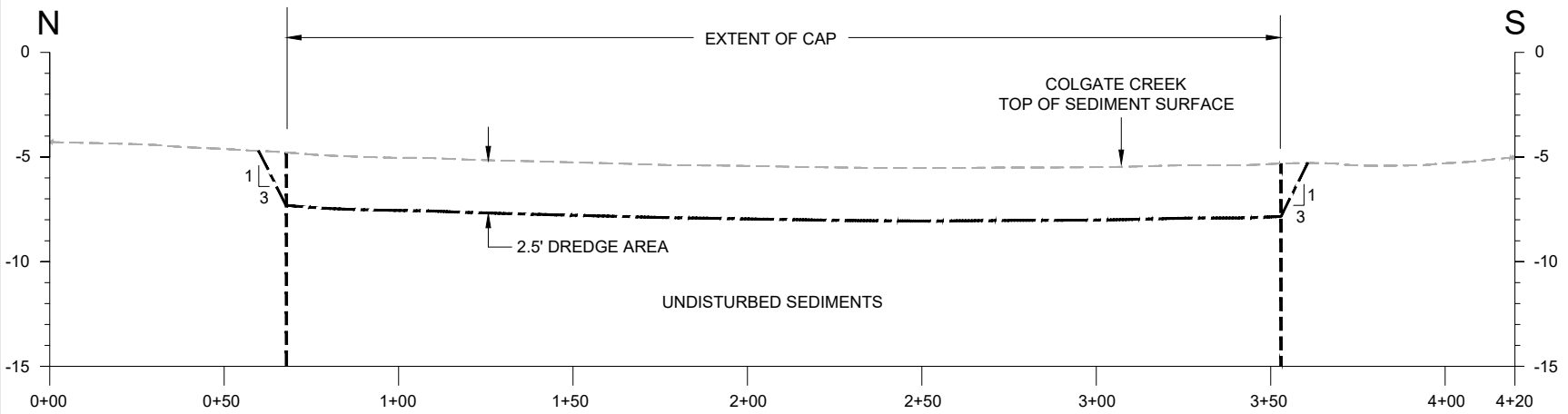
Applicant Name: **Lyondell Environmental Custodial Trust**

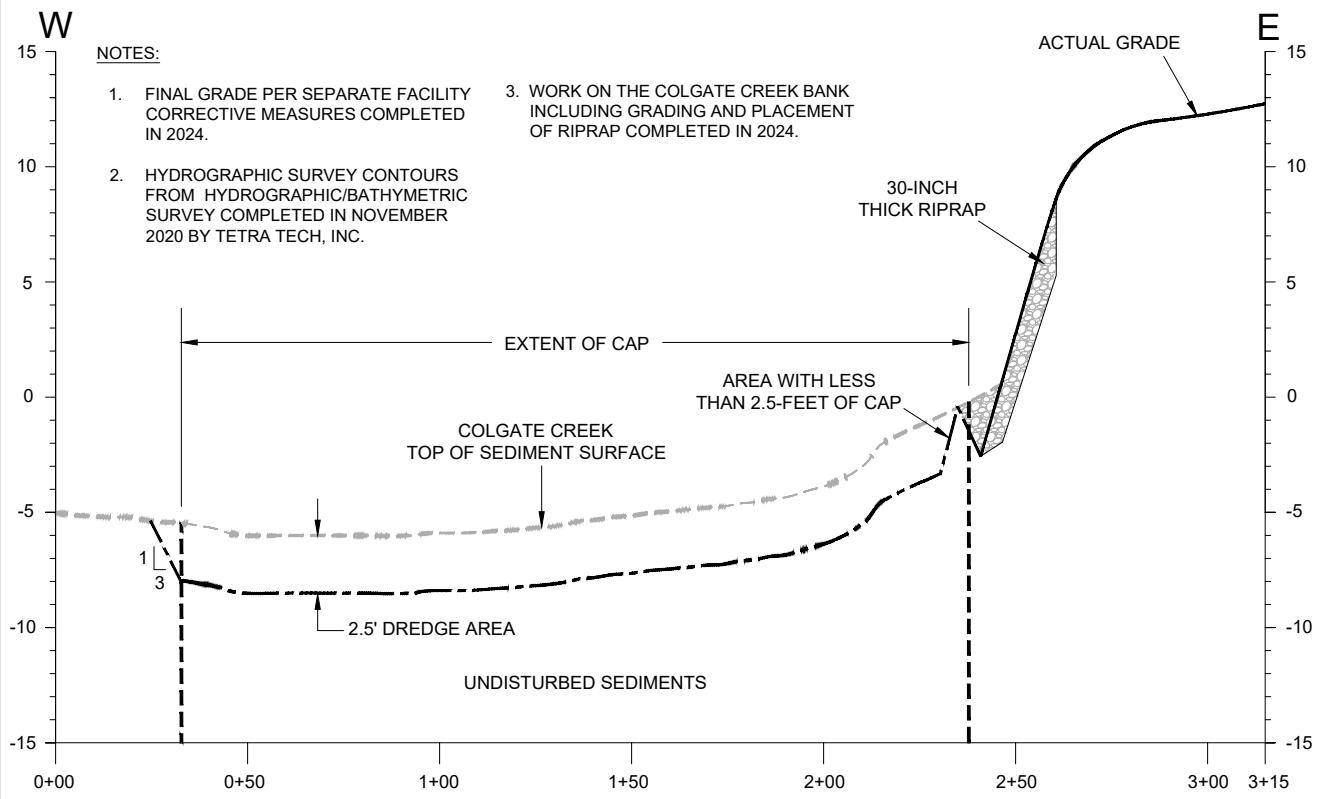
35 East Wacker Drive, Suite 690, Chicago, Illinois 60601

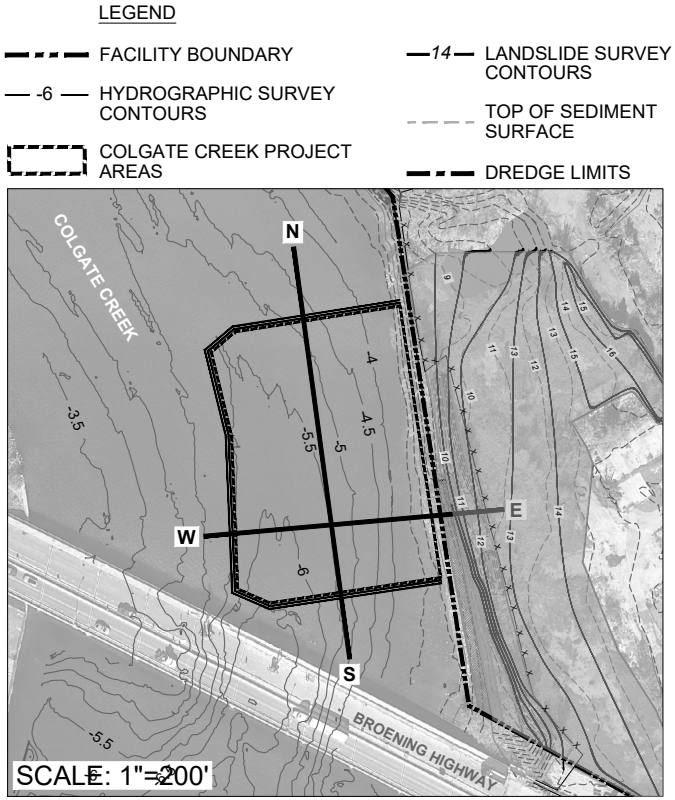
Figure 8

Date: 09/09/25

TETRA TECH







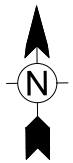
Conceptual Cap Area Dredge Cross Section

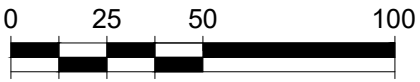
Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**

Applicant Name: **Lyondell Environmental Custodial Trust**

35 East Wacker Drive, Suite 690, Chicago, Illinois 60601





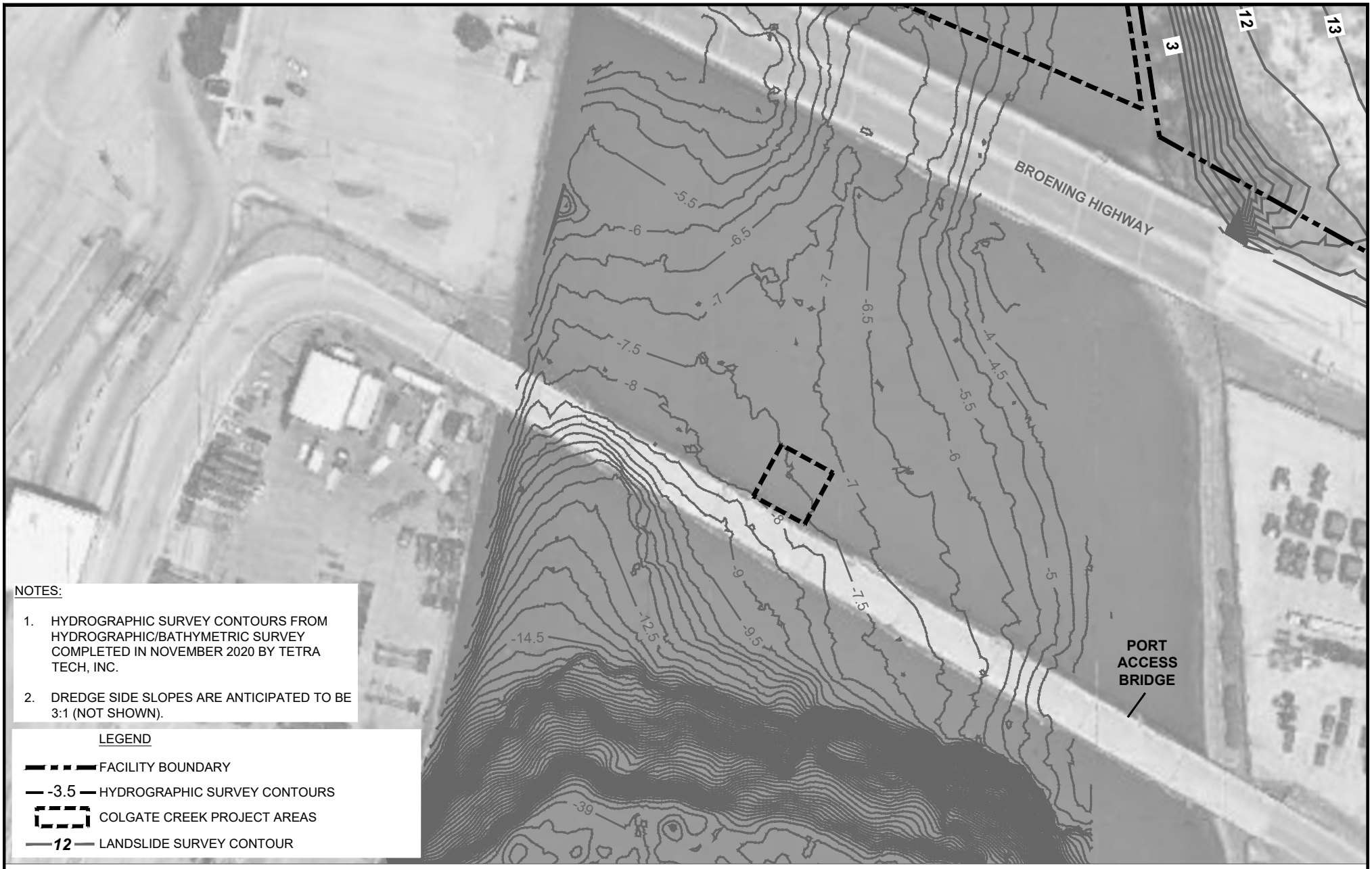
SCALE: 1:50

VERTICAL EXAGGERATION 6X

Figure 9

Date: 09/09/25

TETRA TECH



Conceptual Dredge Limits in Hot Spot Area

Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**

Applicant Name: **Lyondell Environmental Custodial Trust**

35 East Wacker Drive, Suite 690, Chicago, Illinois 60601

N

0 50 100 200

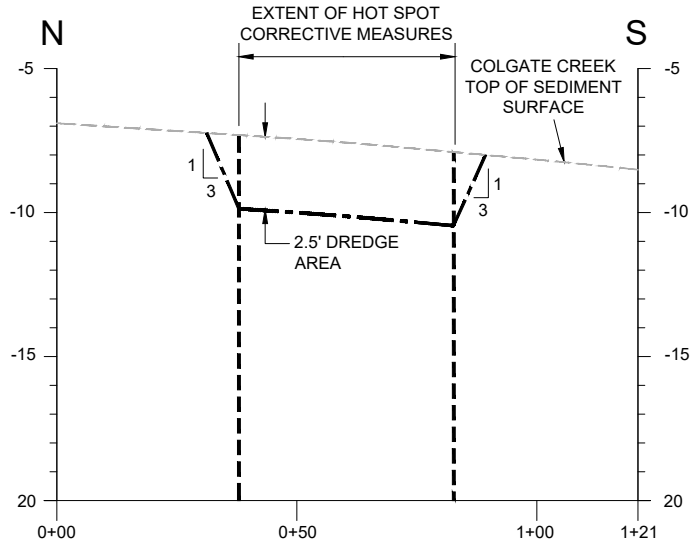
SCALE: 1:100

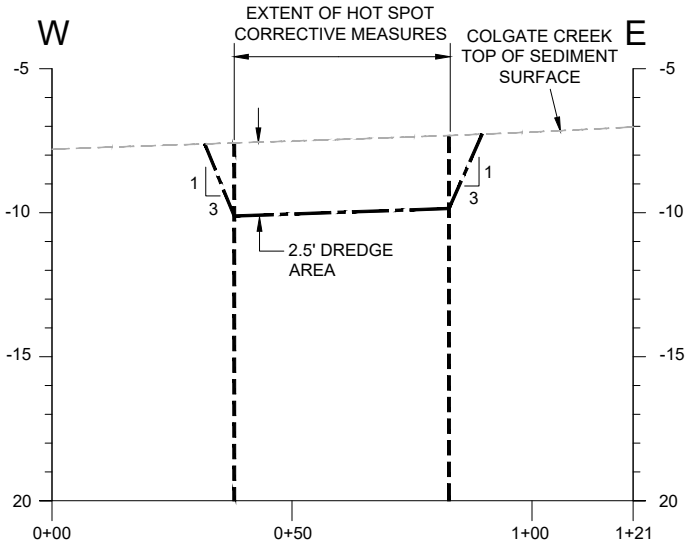
CONTOUR INTERVAL = 0.5 FT

Figure 10

Date: 09/09/25

TETRA TECH



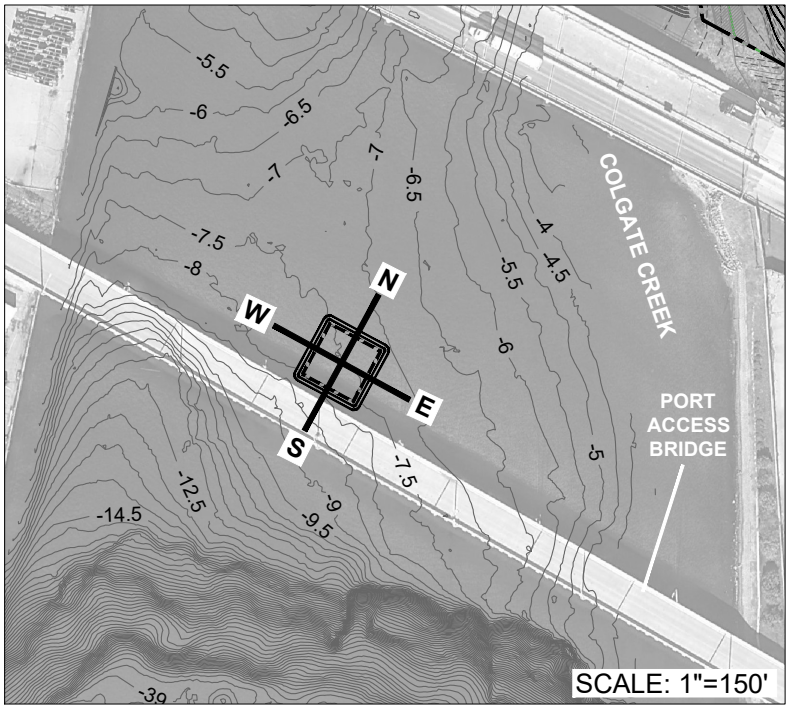


NOTE:

HYDROGRAPHIC SURVEY CONTOURS FROM HYDROGRAPHIC/BATHYMETRIC SURVEY COMPLETED IN NOVEMBER 2020 BY TETRA TECH, INC.

LEGEND

- FACILITY BOUNDARY
- -6 — HYDROGRAPHIC SURVEY CONTOURS
- COLGATE CREEK PROJECT AREAS
- —14— LANDSLIDE SURVEY CONTOURS
- TOP OF SEDIMENT SURFACE
- DREDGE LIMITS



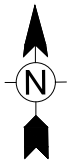
Conceptual Hot Spot Area Dredge Cross Section

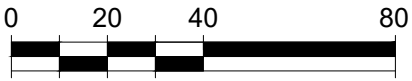
Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**

Applicant Name: **Lyondell Environmental Custodial Trust**

35 East Wacker Drive, Suite 690, Chicago, Illinois 60601





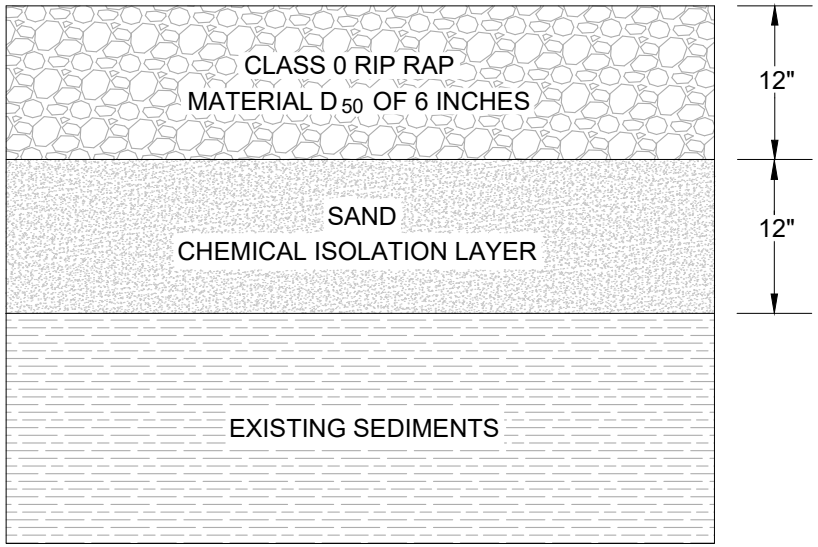
SCALE: 1:40
VERTICAL EXAGGERATION 6X

Figure 11

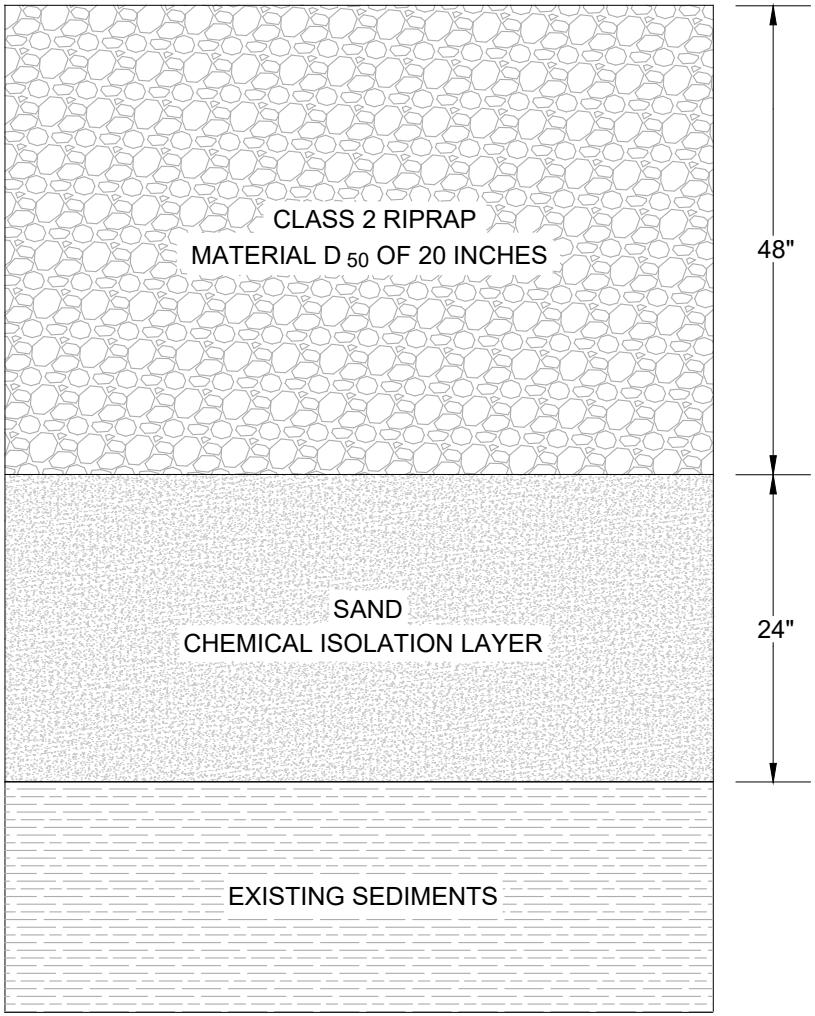
Date: 09/09/25

TETRA TECH

CAP AREA



HOT SPOT AREA



Proposed Typical Cross Sections
Project: **Sediment Dredging and Cap Placement**

Proposed Project for: **Lyondell Environmental Custodial Trust - St. Helena Facility - Baltimore, Maryland**
Applicant Name: **Lyondell Environmental Custodial Trust**
35 East Wacker Drive, Suite 690, Chicago, Illinois 60601

Figure 12
Date: 09/09/25

TETRA TECH