

# Site Conceptual Cleanup Plan Draft

## Former RG Steel Facility



Prepared for:

**Sparrows Point LLC**  
**1430 Sparrows Point Boulevard**  
**Sparrows Point Maryland 21219**

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## **1 INTRODUCTION**

### **1.1 General Information**

This Site Conceptual Cleanup Plan (SCCP) was prepared by EnviroAnalytics Group on behalf of Sparrows Point LLC, the Seller (and current owner) of the approximately 3,100-acres of land on the historically industrial Sparrows Point Site (Site or Facility).

### **1.2 Purpose and Objective**

The SCCP is intended to provide concepts for remediation, closure and pathway exclusion of applicable areas for the Site as may be defined in a Prospective Purchaser Agreement with the US EPA Region III (EPA) (Conceptual Cleanup Plan) and an Administrative Order on Consent and Covenant Not To Sue with the State of Maryland (MDE) as contemplated between HRP Sparrows Point, LLC (HRP) as the prospective purchaser (Purchaser) and the respective agencies. Summaries are included of past and current Site conditions and for prior environmental investigations including the identification of significant environmental conditions.

Guidance for future remediation work at the Site is outlined, including;

- 1) remaining obligations and corrective actions for the Site required under the Multi-Media Consent Decree between the EPA, MDE and Bethlehem Steel Corporation, which was entered in 1997 in the U.S. District Court for the District of Maryland, Case Nos. JFM-97-558 and JFM-97-559, as qualified by the RG Steel/SPLLC Sale Order and the Prospective Purchaser Agreement and,
- 2) obligations for parcels of land that are intended to be removed from the definition of Facility or Site under the Consent Decree and transferred to and subject to the process for obtaining closure (including financial assurance and public comment) in the contemplated Administrative Order on Consent to be entered into between the State and HRP.

The SCCP also outlines the objectives, approach, and methods to complete remediation and achieve 'closure' of environmental obligations of the Site as provided in Article 5 of the Purchase and Sale Agreement executed by and between Sparrows Point, LLC and HRP Sparrows Point, LLC on December 14, 2013, specifically including;

- A general investigation and remediation plan for the completion of Seller's Environmental Obligations (the "Seller Remediation Plan"); and,
- The types, scope and nature of environmental controls and restrictions (including the geographical footprint thereof) which are mutually acceptable to both Seller and Purchaser.

### **1.3 Background Information**

The Sparrows Point Site is located in Baltimore County, Maryland at the southeast corner of the Baltimore metropolitan area, approximately nine miles from the downtown area. The Site encompasses approximately 3,100 acres located on a peninsula situated on the Patapsco River near its confluence with the Chesapeake Bay physically positioned in the mouth of the heavily industrialized and urbanized Baltimore Harbor / Patapsco River region. A land connection to the northeast links the peninsula with the adjacent community of Edgemere.

From the late 1800s until 2012, the Site was used for the production and manufacturing of steel. Iron and steel production operations and processes at the Site included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, Sparrows Point was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steelmaking operations at the Facility ceased in fall 2012, and plans for the Site include demolition and redevelopment over the next several years.

The original topography of the peninsula was flat with elevations not exceeding 15 feet North American Vertical Datum 1988 (NAVD88). The peninsula has been drastically altered since the inception of the steel manufacturing activities. Creeks have been filled in and new land has been added to various areas of the Site by building up near-shore areas of the river.

Potential sources of releases to the environment from the Site were identified in a final RCRA Facility Assessment Phase II Report (RFA Report) prepared for EPA by A.T. Kearney dated August 12, 1993. The RFA Report provided an updated report for the Facility from an initial draft RFA Report prepared by PRC Environmental Management on April 12, 1988.

On October 10, 1997, the United States Environmental Protection (USEPA) and the Maryland Department of the Environment (MDE) filed a multimedia Consent Decree through the U.S District Court for the Court of Maryland seeking relief from alleged endangerment to public health, welfare, or the environment from contamination at and around the Sparrows Point Facility in Sparrows Point, Maryland. Pursuant to the requirements of the 1997 Consent Decree, Site-Wide Investigation activities and associated environmental assessments have been performed at the site focused on characterizing the nature and extent of releases to on-site areas of the Facility. Work has been completed to implement an investigation and screening process to evaluate potential source areas of releases to the environment and define if further action (or no further action) is necessary. Major submittals completed to date as part of the Site-Wide Investigation include:

- Description of Current Conditions, January 1998 (Rust 1998);
- Site-Wide Investigation Work Plan – Groundwater Study, June 2000 (CH2M Hill 2000);
- Site-Wide Investigation Groundwater Study Report, July 2001 (CH2M Hill 2001);
- Site-Wide Investigation Release Site Characterization Study, June 2002 (CH2M Hill 2002a);

- Site-Wide Investigation: Report of Nature & Extent of Releases to Groundwater From the Special Study Areas, International Steel Group, ISG Sparrows Point, Inc. Facility, Sparrows Point, Maryland, January 2005 (URS 2005a), revised 2007;
- CA725 Facility Investigation and Human Health Risk Evaluation (HHRE) Findings, ISG Sparrows Point, June 2005 (URS 2005b);
- Ecological Risk Assessment Strategy Document; ISG Sparrows Point Facility (URS 2006a);
- Final Ecological Risk Assessment Work Plan for On-Site Areas (URS 2007).
- Screening Level Ecological Risk Assessment For On-Site Areas Final (April 2009, URS)
- Supplemental Report County Lands Parcel 1B Ponds Final ( May 2009, URS)
- Final Baseline Ecological Risk Assessment for On-Site Areas (BERA) Report (URS, October 7, 2011)

#### **1.4 SCCP Organization**

Section 2 of the SCCP presents information on the Facility setting, Section 3 presents information on the Site use and history, Section 4 presents environmental information associated with assessment and investigation work and operation of interim measures, Section 5 presents conceptual cleanup and response plans and Section 6 presents the compliance plan for the solid waste landfills.

Specific information is presented including a general approach for response actions to support renewal of the Site, approach for closure of regulatory obligations for the Site and area-specific response actions that are anticipated to satisfy identified environmental conditions. The SCCP addresses recognized environmental conditions identified during the all appropriate inquiry process undertaken by Weaver Boos Consultants on behalf of the Purchaser to the extent practicable based on currently available information. The compliance plan for the landfills includes actions to be undertaken to provide operational compliance, closure and post-closure care for the two on-site landfills.

## **2 FACILITY SETTING**

### **2.1 Location and Surrounding Land Use**

The Sparrows Point Site is located in Baltimore County, Maryland at the southeast corner of the Baltimore metropolitan area. The Site is approximately 3100 acres and occupies all of a peninsula bounded to the west by Bear Creek; to the south by the Patapsco River; and to the east by Jones Creek, Old Road Bay, and residential areas of the City of Edgemere. The Site is also bounded to the north by the Sparrows Point Country Club.

Zoning maps indicate that the Sparrows Point Site is zoned Manufacturing Heavy - Industrial, Major (MH-IM). Surrounding property zoning classifications include the following: Manufacturing Light (ML), Resource Conservation (RC), Density Residential (DR), Business Roadside (BR), Business Major (BM), Business Local (BL), and Residential Office (RO). The Sparrows Point Country Club is located north of the Sparrows Point Site on the other side of the Peninsula Expressway. Light industrial and commercial properties are located northeast of the Site and northwest of the Site on the other side of Bear Creek. Residential areas of Edgemere and Fort Howard are located northeast of the Site and east of the Site on the other side of Jones Creek and Old Road Bay. Residential areas of Dundalk are located northwest of the Site on the other side of Bear Creek.

### **2.2 Physiography, Topography and Surface Drainage**

The Baltimore area is situated within the Atlantic Slope physiographic region which is further subdivided into the Piedmont Plateau and Coastal Plain provinces. The Sparrows Point Site is wholly located in the Coastal Plain Province. The Coastal Plain is the relatively low part of the Atlantic Slope and is bounded on the east by the edge of the Continental Shelf in the Atlantic Ocean and on the west by the Piedmont Plateau.

The topographic development of the Atlantic Slope region is directly related to the regional geology. Topographic elevations in the Coastal Plain are generally less than 300 feet above mean sea level (msl). The Coastal Plain is underlain by relatively soft, generally unindurated, easily eroded sediments of the Cretaceous, Tertiary, and Quaternary Systems. These Coastal Plain sediments are underlain by the crystalline Pre-Cambrian and early Paleozoic rocks which extend from the Piedmont Plateau.

The Sparrows Point Site is bordered by water on three sides with land connection predominantly to the north and northeast. The peninsula is bounded to the east by Old Road Bay and Jones Creek; to the south by the Patapsco River; and to the west by Bear Creek, all of which directly or indirectly drain to the Chesapeake Bay located southeast of the Site.

The current ground surface at the Sparrows Point Site is relatively flat. All major topographic features (such as buildings, landfills, and material stockpiles) are manmade. Throughout most of the peninsula, the elevation of the ground surface is between 0 and 20 feet mean sea level (msl). The average elevation is about 15 feet msl. In the southern portion of the Site, there are several



man-made landforms (raw and byproduct material stockpiles) that exceed 20 feet msl in elevation. Greys Landfill, located near the northwestern corner of the property, is approximately 110 feet msl in elevation at its highest point.

Surface water runoff is diverted and collected by a network of culverts, underground pipes, and drainage ditches within the Site. The stormwater is then discharged to Bear Creek, Jones Creek/Old Road Bay, and the Patapsco River. Prior to 1970, much of the stormwater from the northern part of the Site was discharged to Humphrey Creek and subsequently to Bear Creek. Between 1950 and 1970, the Tin Mill Canal was constructed within portions of Humphrey Creek which continued to receive stormwater from the northern part of the Site. Since about 1970, stormwater runoff from the northern part of the Site has discharged to the Tin Mill Canal, and then conveyed to the Humphrey Creek Wastewater Treatment Plant (HCWWTP) for treatment.

### **2.3 Fill Placement**

Slag, a byproduct of iron- and steel-making, has been used as an on-site fill material since operations began at the Sparrows Point Facility. Prior evaluations have been completed to assess the extent of made land activities for the Site. A land plat, dated August 1916 and January 1917 was used as the basis for this land reclamation evaluation. In January 1917, the Site consisted of approximately 2166 acres of land. Humphrey Creek was a northeast trending embayment in the northern portion of the Site. It drained to Bear Creek and was reported to have contained fresh water. A tributary to Humphrey Creek called Blockhouse Cove extended well into the central part of the Site from the southern side of Humphrey Creek. Greys Creek, an embayment oriented east-southeast, was present to the north of Humphrey Creek. The Town of Sparrows Point was present in the south central portion of the Site.

By April 1938, steel manufacturing operations were well established, particularly on the eastern side of Sparrows Point. Blockhouse Cove had been completely reclaimed, and a bridge partially dammed the opening to Bear Creek. A significant portion of the southern end of the Site had been reclaimed. A small amount of land along the southern edge of the Site was reclaimed between the late 1930's and the late 1950's. The northeast end of Humphrey Creek, two small tributaries to Jones Creek, and some land north of the current Shipyard were also reclaimed by that time. By 1971, all of Humphrey Creek estuary had been reclaimed, and the Tin Mill Canal had been constructed within the slag fill. In addition, Greys Creek and an additional area along the southern boundary of the Site had been completely reclaimed. Currently, the surveyed acreage of the Site is 3100 acres.

### **2.4 Regional Geology**

The general geologic stratigraphy of the Baltimore area includes crystalline Pre-Cambrian and early Paleozoic basement rocks that are unconformably overlain by the Patuxent Formation which is conformably overlain by the Arundel Formation. The Arundel Formation is unconformably overlain by the Patapsco Formation which represents the uppermost Cretaceous

sediments. Pleistocene sediments unconformably overlie the Cretaceous sediments. In places, recent deposits of natural and anthropogenic origin overlie the Pleistocene sediments.

In general, the Coastal Plain sediments thicken to the southeast and comprise a wedge-shaped mass lapping over the east-sloping crystalline-rock floor.

The Patuxent Formation is the lowermost unit of the Potomac Group. The Patuxent sediments consist primarily of quartzose gravel and sand interbedded with silty clay lenses. The thickness ranges from 50 to 250 feet.

The Arundel Formation, or Arundel Clay, is the middle unit of the Potomac Group. In the Baltimore area it is a red to red-yellow, dense, plastic clay with thin lenses of silt. The composition of the clay is predominantly kaolinite and illite. The Arundel Clay ranges in thickness from 25 to 200 feet and thickens to the east and south.

The Patapsco Formation is the upper-most unit in the Potomac Group. In the Baltimore area, the Patapsco is comprised of interbedded sands, silts, and clays, and its thickness ranges from 0 to 200 feet.

Quaternary sediments of Pleistocene age are present directly above the Cretaceous sediments of the Potomac Group at thicknesses from 0 to 150 feet. The sand, gravel, and clay that comprise the Pleistocene sediments are divided into two generalized formations: upland deposits and lowland deposits.

## **2.5 Regional Hydrogeology**

Aquifers in the Patuxent and Patapsco Formations are the primary groundwater sources in the Baltimore area. Local water supplies can be produced from the Talbot (i.e., Pleistocene) Formation. In areas close to estuaries, water supply wells in any of these formations are susceptible to chloride contamination.

### **2.5.1 Patuxent Aquifer**

The aquifer in the Patuxent Formation is a significant source of groundwater for the Baltimore area. Both current and historic discharge from the Patuxent aquifer is primarily through water-well withdrawals. Historic use of the Patuxent aquifer dates back to the 1850's. Elevated chloride concentrations caused by saltwater encroachment have been documented in the Patuxent aquifer since the 1930's.

### **2.5.2 Patapsco Aquifer**

The aquifer in the Patapsco Formation is also a source of groundwater for the Baltimore area. A sand facies in the lower part of the Patapsco Formation is considered the principal source of water in the Patapsco aquifer. Groundwater within the Patapsco Formation is confined at Sparrows Point with the overlying Pleistocene sediments serving as the upper confining bed and the Arundel Formation as the lower confining bed. In some parts of the Baltimore area,

including the Sparrows Point Site, the Patapsco Formation contains a well-defined "middle clay bed" that separates the lower sand facies from the upper part of the formation.

The Patapsco aquifer was used as a source of groundwater prior to 1900 and during the early part of the 20th century. Because the Patapsco aquifer widely subcrops beneath the brackish Patapsco River, elevated chloride concentrations became a major problem in areas near the Patapsco River estuary. By 1945, almost all water production from the Patapsco aquifer had ended due to excessive chloride in the Harbor, Canton, and Dundalk areas. The Sparrows Point Site was the only major user of the Patapsco aquifer in 1945. Water production totaled about 3 Mgal/d; however, by the late 1940's and 1950's, many of the Sparrows Point wells were affected by elevated chlorides as well and were therefore abandoned. As of 1985, there was no major use of the Patapsco aquifer in the immediate vicinity of the Patapsco River estuary.

### **2.5.3 Pleistocene Groundwater**

Although not common, local supplies of groundwater can be developed in the Pleistocene lowland deposits of the Talbot Formation in the Baltimore area. Wide variations have been reported for the transmissivity of water-bearing zones in the Talbot Formation in the Sparrows Point area. Elevated chloride concentrations in the Talbot Formation are wide-spread along the Patapsco River and its estuaries, and salt-water encroachment is a significant factor limiting development of water supplies in the Talbot Formation. Wells completed in the Talbot Formation at Sparrows Point have been abandoned and are not suitable for potable supply.

### **3 FACILITY USE AND HISTORY**

#### **3.1 Overview**

Pennsylvania Steel built the first blast furnace at Sparrows Point in 1887. The first iron was cast in 1889. Bethlehem Steel Corporation (BSC) purchased the Sparrows Point Facility in 1916 and enlarged it by building mills to produce hot rolled sheet, cold rolled sheet, galvanized sheet, tin mill products, and steel plate. During peak production in 1959, the Facility operated 12 coke oven batteries, 10 blast furnaces, and four open hearth furnaces. The coke ovens ceased operations in December 1991 and have been demolished and removed from the Site. The remaining operations at the Site ceased operations in 2012 and the related structures are currently being demolished and removed from the Site. The Site had been continually used for the production of iron and steel from 1887 until 2012; the following sections provide a historical description of Site use.

#### **3.2 Steel Manufacturing Operations**

Steel manufacturing involved the handling of vast amounts of raw materials including coke, iron ore, limestone, and scrap steel, as well as recovering byproducts and managing waste materials. The following operations and/or processes were performed during the manufacturing lifespan at the Sparrows Point Facility:

- Iron and Steel Production
  - Raw Material Handling
  - Coke Production
  - Sinter Production
  - Iron Production
  - Steel Production and Semi-Finished Product Preparation
- Finished Product Preparation
- Coal Chemical Recovery System
  - Coal Chemical Plants
  - Benzene and Litol Plants
  - Hydrogen Cyanide Strippers
  - Desulfurization Plant and Sulfur Recovery
- Other Byproducts Recovery Systems
  - Ammonia Removal Plant
  - Green Pellet Plant Ball Mill

- Palm Oil Recovery
- Slag Processing
- Wastewater Treatment Systems
- Bio-Oxidation Plant
- Blast Furnace/Sinter Plant Water Treatment System
- Basic Oxygen Furnace Water Treatment System
- Chromium High Density Sludge (HDS) Plant
- Tin Mill Canal and Humphrey Creek Wastewater Treatment Plant
- Solid Waste Management
  - Greys Landfill
  - Coke Point Landfill
- Air Pollution Control

The following sections present brief descriptions of these operations and/or processes.

### **3.2.1 Iron and Steel Production**

Iron- and steel-making involves raw material handling, coke production, sinter production, iron production, steel production, semi-finished product preparation, and finished product preparation.

### **3.2.2 Raw Material Handling**

Most of the raw materials used in the production of iron and steel were stockpiled in the ore pier area located in the south-central portion of the Site. The raw materials include iron ore, coke, crushed limestone, quartz gravel, sand, mill scale, and pellet fines.

### **3.2.3 Coke Production**

Coke was produced on Site for use as a fuel in the iron-to-steel making process. A total of 13 coke oven batteries were used between the 1930's and 1991 at which time the coke ovens ceased operations. During the period of active coke production, coal was stored in an area located north of Coke Point Landfill and southwest of the Benzene/Litol Plant.

### **3.2.4 Sinter Production**

Sinter was produced on Site for use as a raw material for iron production. Sinter is an agglomerated and fused mixture of fine-sized materials such as iron ore, coke breeze, fluxstone, mill scale, and flue dust used to charge the blast furnaces. After fusing, the sinter product was

crushed and screened. Undersized sinter fragments were recycled and acceptably sized sinter fragments were air cooled, screened again, and then sent to charge the blast furnaces.

### **3.2.5 Iron Production**

Iron was produced in blast furnaces where iron ore (or iron-bearing pellets), sinter, coke, and limestone were continuously fed into the top of the furnace. Solid materials were ultimately heated by the hot air and fuel injected in the lower section of the furnace and from coke burning. Molten iron forms from the heating and reaction with these gases. The limestone reacts with the ore impurities to form slag, which floats atop the molten iron. The slag was separated and transferred directly to the granulated Slag Plant and then taken to an on-Site processing area. The iron was drawn from the furnace bottom to hot metal cars for transport to the steel making furnaces.

### **3.2.6 Steel Production and Semi-Finished Product Preparation**

Molten iron and ferrous scrap metal were refined by oxidation in the steel-making process. Once refined, alloys were added to the molten iron for the desired grade of steel. Slag was also generated in this process and was taken to the reprocessing area on-site. The steel was continuously cast and semi-finished steel slabs were cut to proper lengths at two strands of the Continuous Caster for further processing at either the Plate Mill or Hot Strip Mill.

### **3.2.7 Finished Product Preparation**

Finished steel was produced in various portions of the Site at the Plate Mill and two Finishing Mills (the Cold Sheet Mill, and the Tin Mill). These mills generate various steel products, all to customer specifications, including hot-rolled sheets and strips, cold-rolled sheets, and flat plates. Some of the products were galvanized, coated with corrosion-resistant alloys (i.e., galvalume or chrome), or tin-plated at the Coating Lines located in the Cold Sheet Mill and the Tin Mill.

Two other mills in the northwestern portion of the Site, the Rod and Wire Mill and the Pipe Mill operated between the 1940's and early 1980's producing rods, wire products, and pipes.

### **3.2.8 Coal Chemical Recovery System**

During the coke production years, the coal chemical recovery system consisted of several individual plants that operated for raw coke gas treatment. These plants were located in the southwest portion of the Site, and included the A and B Coal Chemicals Plants (CCP), the Benzene and Litol Plants, two Hydrogen Cyanide Strippers, and the Desulfurization Plant and Sulfur Recovery. The history and current status of these plants are discussed below.

- Coal Chemical Plants - Raw coke oven gas was initially treated at the A or B CCP. The A CCP (which served coke oven batteries 1-6 and battery A beginning in the 1930's) and B CCP (which served batteries 11 and 12 beginning in the 1950's) both ceased operations in

1991. These plants contained various oil/water separators, scrubbers, saturators, cooling towers, tar decanters, and numerous tanks.

- Benzene and Litol Plants - The Benzene and Litol Plants were distillation and cracking plants used for the purification of light oil into benzene, toluene, and xylene and operated from the late 1940's through 1986. These plants contained numerous tanks, coolers, absorbers, and scrubbers. All plant units have been removed.
- Hydrogen Cyanide Strippers - Two Hydrogen Cyanide Strippers were used for the removal of hydrogen cyanide from gas generated at the A and B CCPs, and from wastewaters generated in the treatment of this gas. One stripper removed the cyanide from the final cooler condensate. The other stripper removed the cyanide from the coke oven gas before distribution of the gas to the plant. All plant units have been removed.
- Desulfurization Plant and Sulfur Recovery - The original Sulfur Recovery Plant operated from the late 1960s through the late 1980s, and it removed about one-third of the sulfur produced from the A and B CCP coke oven gas. This unit was torn down and replaced with a new unit that would have fully desulfurized the gas. The new unit was never operated prior to the shutdown of the coke ovens in 1991.

### **3.2.9 Other Byproducts Recovery Systems**

Byproduct recovery systems that were formerly operated at the Site include the Ammonia Recovery Plant, the Green Pellet Plant, the Ball Mill, Palm Oil Recovery and Slag Reprocessing.

- Ammonia Removal Plant - Excess weak ammonia liquor from the A and B CCP coking operations was temporarily stored in a one-million gallon tank prior to pumping it to the Ammonia Removal Plant. At the Ammonia Removal Plant, the liquor was added to lime slurry and then sent to a clarifier to remove suspended solids. The pre-limer clarifier sludge was beneficially re-used at the Humphrey Creek Wastewater Treatment Plant for pH adjustment. The clarified liquor went to the Bio-Oxidation Plant for phenol treatment.
- Green Pellet Plant - The Green Pellet Plant, located in the open-hearth furnace shop area near the south-central portion of the Site, operated from the early 1970's to approximately 1980. Here, unfired (green) iron ore pellets were manufactured from open hearth and basic oxygen furnace fume dust. The pellets were then charged back into the furnaces. The plant was demolished in 1990.
- Ball Mill - The Ball Mill was located west of the coke ovens. There are no reported startup dates, but the mill ceased operations in the 1980's. Coal tar and material from the tar decanter, which formed from the quenching of coke oven gases, was recovered here and processed to a liquid for beneficial use as fuel at the Pennwood Power Station or at the Open Hearths.
- Palm Oil Recovery - The Palm Oil Recovery (PORI) received and processed waste oils generated throughout the Sparrows Point Facility. PORI operations began around 1950. Waste oil was received by an oil/water separator and discharged to a holding tank.

Wastewaters were then piped to an earthen lagoon where the waste oil is skimmed and recovered. Wastewaters were discharged to the Tin Mill Canal, and further treated at the HCWWTP.

- Slag Reprocessing - Slag generated at the Blast Furnace and the BOF was processed on Site. At the Blast Furnace, hot slag is dumped in holding bins and sprayed with water to cool and solidify the material. Molten slag from the BOF was tapped from the steel-making vessel into containers (thimbles) for transport to the slag-processing Facility where it was dumped and sprayed with water. Cooled, solidified slag was dug from the Blast Furnace slag bins or from piles at the slag Facility and separated by crushing and screening into various sizes suitable for sale. Some of the BOF slag was recycled to the iron-making operation.

### **3.2.10 Wastewater Treatment Systems**

The generation of a variety of wastewaters, waste pickling liquors, and other aqueous wastes was part of the routine procedures for steel making and steel processing. Some of the more important plants/systems that were located on-site are briefly discussed below.

- Bio-Oxidation Plant - Most of the wastewater treated at the Bio-Oxidation Plant came from the Ammonia Removal Plant, the Benzene and Litol Plants, and from the A CCP Hydrogen Cyanide Stripper. The treatment system consisted of various tanks, skimmers, oil/water separators, mixing chambers, aeration basins, and thickeners.
- Blast Furnace/Sinter Plant Water Treatment System - The Blast Furnace/Sinter Plant Water Treatment System processed water from the Sinter Plant scrubbers and treats slurry from the Blast Furnace recycled water system for soluble zinc and cyanide. The treatment system consisted of a thickener, a belt press filter, and two spent pickle liquor tanks. Dewatered sludge (non-hazardous) was disposed in Greys Landfill and water was discharged through NPDES permitted outfall 101.
- BOF Water Treatment System - The BOF gas cleaning water treatment system was a recycle system that treated water from four (4) BOF scrubbers used to remove suspended particulates from BOF process gas generated during the production of steel. The treatment system consisted of various tanks and settling equipment. Solids were removed and disposed at Greys Landfill. Excess water (blowdown) was sent to the HCWWTP for final discharge through NPDES outfall 014.
- Chromium High Density Sludge (HDS) Plant - In 1987 the Chromium High Density Sludge (HDS) was installed to process chromium-bearing wastewater generated during chromium plating and passivating operations at the Tin Mill. The wastewater treatment system includes several tanks (i.e., reduction, neutralization, and flocculation), pH adjustment, thickening, and filtering of solids. Sludge from the treatment process is sent off-site for proper disposal. Treated wastewater is sent to the Humphrey Creek Wastewater Treatment Plant (HCWWTP). This plant is not scheduled for demolition.



- Tin Mill Canal and Humphrey Creek Wastewater Treatment Plant - The Tin Mill Canal (TMC) is a man-made canal constructed in slag fill and located in the northern half of the Site. The TMC primarily serves as a conveyance for industrial wastewater discharged from several Site facilities. The canal also receives stormwater runoff. The TMC is approximately 7300 feet long, 30 to 50 feet wide, and averages approximately 15 feet in depth below surface grade. Wastewater flows generally east to west toward the Humphrey Creek Waste Water Treatment Plant (HCWWTP). The eastern portion of the TMC began operating in the early 1950's. The western (remaining) portions of the canal and HCWWTP were completed and began operating in approximately 1969. Treated wastewaters discharge through NPDES outfall 014 to Bear Creek. The HCWWTP was reconfigured and improved by incorporating the ACTIFLO® microsand ballasted clarification process in 2004. The TMC and HCWWTP are still in use.

### **3.2.11 Solid Waste Management**

Solid wastes have been disposed of and managed primarily at two areas within the Sparrows Point Site: Greys Landfill and Coke Point Landfill.

- Greys Landfill - Greys Landfill is located at the northwestern portion of the Sparrows Point property. The landfill is situated adjacent to Interstate Route 695 that provides a boundary to the south of the landfill and Peninsula Highway that is north of the landfill. The existing landfill area is approximately 40 acres in size and is characterized by waste deposits and graded side slopes developed during many years of waste and miscellaneous slag filling operations. Current surface elevations of the waste materials generally range from 90 to 110 feet in elevation. Filling operations in this area began in approximately 1970 as determined by aerial photograph records. The landfill is in use today. In the northeast corner of Greys Landfill is the Tar Decanter Cell, also known as the Closed CHS Cell. This unit is a 1.5-acre RCRA-regulated disposal cell that received various coal tar sludge, slag, dusts, filter cakes, and miscellaneous debris. The unit was closed and capped in 1983 under a closure plan submitted to MOE in April 1983 and approved in August 1983.
- Coke Point Landfill - Coke Point Landfill is a solid waste disposal area located within the boundary limits of the Sparrows Point Site located at the southwestern edge of the Facility adjacent to the Patapsco River. The potential landfill area defined by horizontal boundary limit is approximately 46 acres. Approximately 25 to 30 acres have been used historically for waste disposal. The landfill currently exhibits irregular side slopes and vertical topographic elevations ranging up to approximately 70 feet. The area is characterized by surface materials of slag and miscellaneous fill that were placed during filling operations to provide made land at Coke Point. The area apparently received discarded materials during that time; but there is no clear starting date for the operation. Since 1971 until 2012, the area had been used as a landfill and waste disposal area. The

landfill received a variety of non-hazardous waste that generally included foundry dust, waste sand, slag, refractories, and various other dusts.

## **4 SITE ASSESSMENTS, INVESTIGATIONS AND INTERIM MEASURES**

The property operated for many years solely as an integrated iron and steel complex. Environmental obligations exist as a result of this operation, chiefly related to the investigation and cleanup of former waste disposal locations. Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) that are potential sources of releases to the environment at the Site were initially identified as part of the RCRA Facility Assessment process completed by EPA in the 1980's and further refined during Visual Site Inspections conducted in 1991 as described in the Final RFA Report (Kearney, 1993). A total of 203 SWMUs and 28 AOCs were identified; descriptions for 41 of the SWMUs and 26 of the AOCs were provided in the report. More recently, the property has been the subject of a Phase I Environmental Site Assessment (Weaver Boos, 2014) undertaken in support the all appropriate inquiry and due diligence process of its prospective Purchaser.

### **4.1 Site-Wide Investigation Work**

The former owner, Bethlehem Steel, agreed with the EPA and MDE to a comprehensive multimedia Consent Decree. The Consent Decree requires site wide investigation and associated corrective action for the property and compliance, closure and post closure care matters associated with two on-site landfills (Greys Landfill and the Coke Point Landfill). The initial effort for the planning of site wide investigation tasks associated with the Consent Decree provided a description of the current conditions of the Site. This work included the development of the *Description of Current Conditions Report*, (DCCR) Rust 1998.

Screening analyses of the SWMUs, AOCs and non-RFA areas were completed in the DCCR to define further investigation requirements and associated chemicals of potential interest (COPs) for SWMUs and AOCs requiring further investigation and to screen out SWMUs and AOCs that were not observed to be releasing and requiring no further action. This analysis included review and analysis of the RFA Report, environmental files of Bethlehem Steel Corporation (including correspondence, analytical data summaries, permit information, site investigation reports, closure reports, monitoring/sampling reports and remediation reports) and on-site inspections. A total of 74 SWMUs and 10 AOCs remained for further consideration after completion of the screening analysis in the DCCR. In addition, 5 non-RFA areas were identified that required further investigation. An inventory of SWMUs, AOCs and other non-RFA areas of the Site identified and described in the DCCR and associated results of the screening analysis is presented in Table 1.

Subsequent investigations have focused on five "Special Study Areas" of the Site that encompass the significant majority of the SWMUs, AOCs and non-RFA areas identified as requiring further investigation. The special study areas include Coke Point Landfill, former Coke Oven Area, Tin Mill Canal/Finishing Mills Area, Humphrey Impoundment and Greys Landfill. Table 1 identifies the relationship between the special study areas and associated SWMUs, AOCs and non-RFA areas. Investigations have also been completed to assess on-site ecological risk on a

site-wide basis. Work has been completed including characterization of release areas, groundwater nature and extent investigations, human health risk evaluation, and screening and baseline ecological risk assessments. Data and results associated with the site-wide investigative work contained within these reports are summarized in the following sections:

- Site-Wide Investigation Release Site Characterization Study, June 2002 (CH2M Hill 2002a);
- Site-Wide Investigation: Report of Nature & Extent of Releases to Groundwater From the Special Study Areas, International Steel Group, ISG Sparrows Point, Inc. Facility, Sparrows Point, Maryland, January 2005 (URS 2005a), revised 2007;
- CA725 Facility Investigation and Human Health Risk Evaluation (HHRE) Findings, ISG Sparrows Point, June 2005 (URS 2005b);
- Ecological Risk Assessment Strategy Document; ISG Sparrows Point Facility (URS 2006a);
- Final Ecological Risk Assessment Work Plan for On-Site Areas (URS 2007).
- Screening Level Ecological Risk Assessment For On-Site Areas Final (April 2009, URS)
- Supplemental Report County Lands Parcel 1B Ponds Final ( May 2009, URS)
- Final Baseline Ecological Risk Assessment for On-Site Areas (BERA) Report (URS, October 7, 2011)

More recently, Weaver Boos Consultants, LLC (Weaver Boos) performed a Phase I Environmental Site Assessment (Phase I) on behalf of the Purchaser's counsel in general compliance with the scope and limitations of American Society for Testing Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-13). The purpose of this Phase I is to identify and report, to the extent feasible, recognized environmental conditions with respect to the Property. ASTM E 1527-13 defines a recognized environmental condition as:

*The presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions.*

Based upon the assessments completed thus far, the Phase I revealed evidence of recognized environmental conditions and historical recognized environmental conditions in connection with the Site.

## **4.2 Descriptions of Site Areas**

### **4.2.1 Coke Point Area**

The Coke Point Area is approximately 300 acres in size located on the southwest portion of the Site. The area is a man-made peninsula comprised of slag from the ground surface to

approximately 15-30 feet below grade where the native sediments (silts, sands and clays) are then encountered. This area includes the former Coke Oven Area and Coke Point Landfill special study areas.

The natural groundwater hydraulic gradient is fairly flat, with a radial flow pattern moving towards the shoreline. Groundwater data suggests that an artificial hydraulic gradient is being created by groundwater pumping associated with an off-site shipyard Facility located to the northwest of Coke Point (separate ownership). This pumping appears to directly affect the fate and transport of impacted groundwater in portions of Coke Point, creating artificial groundwater movement in both lateral and vertical downward directions in response to pumping activity.

Analytical results obtained from groundwater samples collected during site investigation activities indicate that VOCs and SVOCs (predominately benzene and naphthalene) have impacted the shallow and intermediate groundwater zone at the Coke Point Area. Groundwater plumes containing dissolved VOCs and to a certain extent SVOCs exist in the slag fill in an unconfined groundwater zone occurring roughly 5 to 15 feet below the ground surface and an intermediate native material groundwater zone occurring 20 to 40 feet below the ground surface. Non aqueous phase liquid (NAPL) source areas containing benzene and naphthalene respectively are present in two distinct locations as shown on Figure 1. The benzene NAPL source area encompasses approximately 54,500 ft<sup>2</sup>; the naphthalene source area is approximately 31,300 ft<sup>2</sup>.

The extent of the groundwater plumes for benzene and naphthalene are shown on Figure 1. Areas in excess of 10 mg/L for benzene and 1 mg/L for naphthalene are shown which roughly approximate 1% of the respective solubility limits. The areal extent of the VOC and SVOC groundwater impacts is confined to the Coke Point fill portion of the Sparrows Point peninsula and has not migrated to the area north of the Coke Oven area. The maximum VOC concentrations (predominately benzene) are located at the northwest portion of the Coke Oven SSA. Groundwater with elevated COPI VOCs has migrated towards the southwest and northwest of the Coke Oven SSA and is present at the shoreline. The SVOC concentrations (predominately naphthalene) are more evenly distributed, and the maximum concentrations are located on the eastern half of the Coke Oven SSA. The nature of the plumes is further described as follows:

#### Dissolved Benzene Plumes:

- Shallow Depth (~ 5-20 ft. bgs)

The northwest quadrant of Coke Point contains a plume greater than 10 mg/L currently encompassing ~ 2,450,072 ft<sup>2</sup> (56 acres)

The central southern portion of the Point contains a relatively small plume greater than 10 mg/L currently encompassing ~ 67,800 ft<sup>2</sup> (1.6 acres)

The northeastern quadrant contains two small benzene plumes greater than 10 mg/L

- The northeast corner, currently encompassing ~75,000 ft<sup>2</sup>

- The central eastern area, currently encompassing ~75,000 ft<sup>2</sup>
- Intermediate Depth (~30-45 ft. bgs)

The northwest quadrant of Coke Point contains a plume greater than 10 mg/L currently encompassing ~1,820,200 ft<sup>2</sup> (42 acres)

Dissolved Naphthalene Plume:

- Shallow Depth (~5-15 ft. bgs)

Upper mid-eastern portion of Coke Point, plume greater than 1 mg/L currently encompassing ~ 2,586,500 ft<sup>2</sup> (59 acres)

Based on monitoring data, there is no indication that significant concentrations of VOCs or SVOCs are present deeper than 75 feet below the ground surface. VOC and the SVOC concentrations decrease to below their respective reporting limits or exhibit a significant decreasing trend toward the laboratory reporting limits in all samples collected from the lower groundwater zone piezometers.

A sporadic presence of metals, including arsenic, lead and vanadium, was detected in the shallow and intermediate groundwater zones. The total metal concentrations show a general decrease throughout Coke Point in the intermediate and lower groundwater zones as native materials are encountered. The measured concentrations in the lower zone are all within the low µg/L ranges. The presence of metals in groundwater in this area at these concentrations may be related to baseline levels of metals that are present in the fill and natural soils at the Facility and not associated with historic site activities.

#### **4.2.2 Tin Mill Canal/Finishing Mills Area**

The Tin Mill Canal/Finishing Mills Area includes the Tin Mill Canal (TMC) and adjacent finishing mills area that included operations for steel plating and coating operations as shown on Figure 2. The TMC is constructed of slag materials and is approximately 7300 feet long and 30-50 feet wide at the bottom. The finishing mill area is approximately 200 acres of mill structures that discharged contact wastewaters and stormwater through sewer pipe systems to the TMC. The finishing mills are shut down and in the process of being razed and are no longer a source of contact wastewater discharges to the TMC. This work will eliminate potential future sewer discharges from the finishing mills that would be of concern.

The canal has been used historically for the conveyance of both stormwater and wastewater to a central wastewater treatment plant (HCWWTP) prior to discharge to surface water through a NPDES permitted discharge outfall. Materials that contain metals and oil/grease have been deposited in the Tin Mill Canal over time from process sewer discharges associated with the steel finishing operations. These materials are located within the entire length and width of the canal and affect water currently being controlled and discharged through the canal. The canal still receives and controls stormwater runoff from the Site; the HCWWTP remains operational to

treat stormwater runoff prior to discharge. Hydrogeologic studies have shown that the canal also controls and receives groundwater inflow from Site areas adjacent to the canal.

Impacts to groundwater at the Tin Mill Canal/Finishing Mill area are generally confined to areas adjacent to the canal and do not show impacts in piezometers located along the eastern or western shoreline downgradient from these areas. Analytical results obtained from samples collected during site investigation activities indicate that impact to the groundwater by VOCs and SVOCs are generally confined to the area adjacent to the Tin Mill Canal within the shallow and intermediate groundwater zones. Investigations did not identify issues in the groundwater surrounding the finishing mills that were of significant concern.

### **4.2.3 Humphrey Impoundment**

Humphrey Impoundment is located in the northwest portion of the Site along the northern side of the downstream section of the Tin Mill Canal (Figure 2). The area was originally open water that was closed off when the canal construction was completed around 1970. The impoundment was subsequently filled with various materials that included in part non-hazardous wastes until the mid-1980s. The area is now predominantly characterized by dense surface vegetation (Phragmites reed beds). Existing habitat is not conducive to large wildlife populations and this characteristic is likely to be considered in assessing the potential need for corrective action.

Specific areas of the impoundment were used for the storage/placement of TMC dredge materials in areas historically noted as containment areas or TMC impoundments. The containment areas/impoundments have been identified as previously located on the southern edge of Humphrey Impoundment. Collectively these areas are approximately 4 acres in size (Figure 2).

Analytical results obtained from samples collected during site investigation and ecological risk assessment activities for the Humphrey Impoundment indicate limited potential for off-site groundwater impacts and low to negligible risk to on-site ecological receptors. Impacts to groundwater by the VOCs and SVOCs are confined to the area adjacent to the Tin Mill Canal within the shallow and intermediate groundwater zones. Concentrations of VOCs and SVOCs along the shoreline west of Humphrey Impoundment were below or approaching their respective laboratory reporting limits in the shallow intermediate and lower groundwater zones.

A limited presence of metals including lead, vanadium, thallium and chromium are present in the shallow and intermediate groundwater associated with the Humphrey Impoundment. Diffuse metals are also present in the shallow surface materials. The chromium, lead, thallium and vanadium concentrations in groundwater decrease with depth to the lower zone. The presence of metals detected in the lower groundwater zones in this area may be related to baseline levels of metals that are present in the natural soils at the Facility and not associated with Site activities.

#### 4.2.4 Greys Landfill Area

The Greys Landfill Area includes the area occupied by Greys Landfill and areas to the north and east of Greys Landfill bounded by the Peninsula Expressway that include approximately 80 acres (area identified as County Lands Parcel 1A, Figure 3). These areas have been shown to have impacts from historical waste management practices. Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) are present in surface soil, subsurface soil and in groundwater. Analytical results obtained from samples collected during site investigation activities indicate that impact to the groundwater by VOCs and SVOCs is confined to the shallow groundwater zone near the northern portion of the Greys Landfill. Concentrations of VOC and SVOC analytes in the shallow zone show a decreasing horizontal trend away from the source area and have been defined to be below or approaching laboratory limits in all directions. In vertical extent, VOC and SVOC analytes in the intermediate groundwater zone were not detected or were detected at values approaching the laboratory limits. A limited presence of metals including arsenic and thallium are present in the shallow and intermediate groundwater. These analytes appear to be confined to the area along the northern border of the Greys Landfill. The measured concentrations are within low µg/L ranges.

#### 4.3 Interim Measures

##### 4.3.1 Rod and Wire Mill Area

Interim Measures are currently underway at the former Rod and Wire Mill Area as described below and shown on Figure 4:

- Institutional controls for soils have been established to provide a “Restricted Work Area” to control the exposure of on-site workers to soils in the Former Sludge Bin Storage Area.
- A groundwater monitoring network has been installed including the use of 31 wells for monitoring the performance of the groundwater pump and treat system. This monitoring network is used to collect water level and groundwater quality data.
- A groundwater pump and treat system is operated and maintained consisting of two intermediate depth zone recovery wells (RW10-PZM020 and RW15-PZM020) that operate at a rate of between 5.0 and 12.0 gallons per minute (gpm). The expected normal operating rate for the treatment plant was set at a combined rate of 8.0 to 12.0 gpm with a maximum design flow of 25 gpm. Recovered groundwater is transported via a pipeline to the Humphreys Creek Wastewater Treatment Plant (HCWWTP) for subsequent treatment and discharge in accordance with the NPDES permit requirements for the Facility.
- Average cadmium and zinc concentrations measured in the groundwater recovery wells in 2012:  
RW10  
Cd = 12 ppm (~142 lbs for the year mass recovered)



Zn = 470 ppm (~5,805 lbs for the year mass recovered)

RW15

Cd = 3.3 ppm (~41 lbs for the year mass recovered)

Zn = 51 ppm (~637 lbs for the year mass recovered)

#### **4.3.2 Coke Oven Area**

Interim measures (IMs) have been developed to address identified environmental conditions at the Coke Oven Area (COA). Six IM "Cells" have been identified at the COA as described below and shown on Figure 1:

- Cell 1: Prototype Air-Sparge/Soil Vapor Extraction (AS/SVE) System in the Former Benzol Processing Area
- Cell 2: AS/SVE and Groundwater Extraction System in Former Coal Storage Area
- Cell 3: AS/SVE System in "Cove" Area
- Cell 4: In-Situ Anaerobic Bio-treatment Area in Coal Tar Area
- Cell 5: Groundwater Extraction at the Turning Basin Area
- Cell 6: LNAPL Recovery at the Former Benzol Processing Area

As of December 31, 2013, Cells 1, 3, and 6 are operational. Design work was completed on the IM remediation systems for Cell 2 and Cell 5 and submitted for approval on August 6, 2013. Approval for both systems was received from EPA on September 10, 2013. As part of this approval, the bio-treatment process at Cell 4 has been discontinued and a combined Cell4/Cell5 remediation design has been approved. Further details of the IM systems are as follows:

##### **4.3.2.1 Cell 1: Prototype AS/SVE System in the Former Benzol Processing Area**

Cell 1 consists of an AS/SVE system coupled with vapor destruction via an electric catalytic oxidation (CATOX) unit. In total, Cell 1 has destroyed approximately 11,903 pounds of recovered hydrocarbons since operational startup in August 2010. A decreasing total volatile organic compound (VOC) concentration trend is documented at the groundwater wells monitored for system performance in this location.

##### **4.3.2.2 Cell 2: AS/SVE and Groundwater System in Former Coal Storage Area**

Design work was completed in 2013 on the IM remediation systems for Cell 2 and submitted for approval on August 6, 2013. Approval for the Cell 2 system was received from EPA on September 10, 2013. The Cell 2 system includes: 1) groundwater extraction from selected wells installed into the semi-confined intermediate sand unit below the slag groundwater zone, 2) treatment of that recovered groundwater, 3) re-injection of the treated groundwater, and 4) AS/SVE in the slag groundwater zone. The intermediate groundwater sand unit ranges from approximately 20 feet below ground surface to approximately 40 to 45 feet below ground surface. The remediation design for this zone is to operate a pump and treat groundwater system that utilizes a low profile air stripper and a CATOX unit to destroy all VOC vapors generated

prior to exhausting to the atmosphere. The remediation design for the shallow groundwater zone is to operate an AS/SVE system, recover stripped VOCs, and destroy those captured VOCs in a CATOX unit prior to the air stream being released to the atmosphere.

#### **4.3.2.3 Cell 3: AS/SVE System in the “Cove” Area**

Cell 3 consists of an AS/SVE system coupled with vapor destruction via an electric CATOX unit. In total, Cell 3 has destroyed approximately 1,352.4 pounds of recovered hydrocarbons since system startup on June 24, 2011. Since system startup, a generally decreasing VOC concentration trend in groundwater is documented for some of the monitoring wells. The trends for these monitoring wells will continue to be monitored and assessed during system operation in future months.

#### **4.3.2.4 Cell 4: In-Situ Anaerobic Bio-treatment Area**

The in-situ anaerobic bio-treatment system at Cell 4 has been discontinued as of the end of third quarter 2013. The treatment area at Cell 4 has been incorporated into the design of Cell 5, which will be installed in the first quarter 2014.

#### **4.3.2.5 Cell 4/5: Groundwater Extraction at the Turning Basin Area**

Design work was completed in 2013 on the IM remediation systems for Cell 4/5 and submitted for approval on August 6, 2013. Approval for the Cell 4/5 system was received from EPA on September 10, 2013. The Cell 4/5 system includes a remediation design that addresses a shallow groundwater contamination source area (Cell 4) and the area between the source and the shoreline (Cell 5) at the Turning Basin area. The remediation system involves using high vacuum extraction points from which both soil vapor and groundwater will be recovered and sent through a low profile air stripper in an effort to promote the volatilization of naphthalene and other dissolved volatile organic compounds (VOCs). All recovered soil vapor and generated off-gas would be sent through VGAC vessels prior to being discharged to the atmosphere. The treated groundwater would be sent to re-injection trenches located up-gradient of the plume. In addition to providing a “flushing” effect across the source area, the introduction of treated water will eventually help alter the water chemistry inside the source area to a point where bio-augmentation efforts may be a viable in-situ treatment option in the future.

#### **4.3.2.6 Cell 6: LNAPL Extraction at the Former Benzol Processing Area**

The Cell 6 LNAPL monitoring and recovery system operated during 2013. An estimated 1971 gallons (14,450 pounds) of LNAPL were recovered during 2013, bringing the total recovered LNAPL to 10,346 gallons (75,802 pounds) as of December 31, 2013. The existing LNAPL recovery systems will be operated in 2014 with periodic adjustments to the pumps and other components to maximize product recovery.

## **5 CONCEPTUAL CLEANUP AND RESPONSE PLAN**

### **5.1 General Approach**

This section presents conceptual cleanup and response actions that are anticipated to support the renewal of the Sparrows Point Site with redevelopment comprised solely of commercial/industrial activity. The Site has been previously used for steel manufacturing further regulated as a single parcel by a 1997 Consent Decree that covers the entire Site. Efforts will be completed to return the entire Site to “market ready” conditions and to complete response actions for select areas of the Site in an effort to return these areas to productive use.

Site-wide institutional and legal controls will be established and integrated within the response actions. These controls are anticipated to include, but will not necessarily be limited to, the following:

- Deed restriction for commercial/industrial site use only, no portion of the Site will be used for agricultural, recreational or residential purposes
- Deed restriction on groundwater use, no subsurface water or groundwater will be extracted from aquifers for any purpose
- Development and implementation of soil/materials management plans for remedial and redevelopment activities
- Where necessary, restriction on development/reuse or use of vapor intrusion control technologies for occupied buildings

### **5.2 Closure Approach**

Significant environmental work has been conducted by former owner/operators under the Consent Decree and the data reveals that the majority of the Site is not subject to future remedial efforts under the Consent Decree. Regulatory obligations for remediation, closure and pathway exclusion of applicable areas of the Site that will also support market ready redevelopment are currently being clarified with the EPA and the MDE. These obligations have been defined as *market ready closure*. It is contemplated that approximately 2400 acres of the Site will be removed from the jurisdiction of the Consent Decree and be transferred to and subject to the process for obtaining closure (including financial assurance and public comment) for parcels in the Administrative Order on Consent entered into between the State and HRP. As such, separate remediation plans will be developed based upon the concepts outlined in this SCCP that will be intended to address regulatory obligations remaining under the Consent Decree and Prospective Purchaser Agreement (Special Study Areas) and regulatory obligations for areas of the Site removed from the Consent Decree (State Administrative Order Areas) to obtain a market ready closure.

The contemplated Special Study Areas and State Administrative Order Areas are shown on Figure 5 and described further as follows:

- **Special Study Areas** - Areas of Facility that include SWMUs and AOCs listed in EPA's August 12, 1993 RFA and as further clarified in the DCCR, including recognized environmental conditions identified in the Phase I report. Regulatory obligations and closure will be conducted in accordance with the terms of the Consent Decree. The Special Study Areas include work associated with site-wide groundwater closure obligations;
  
- **State Administrative Order Areas** - Areas of the Facility that include nominal SWMUs or AOCs listed in EPA's August 12, 1993 RCRA Facility Assessment (RFA) as further clarified in the DCCR, and may include recognized environmental conditions identified as part of the Phase I process. This area is proposed to be removed from the definition of Facility or Site under the Consent Decree and regulatory obligations and closure will be conducted in accordance with the contemplated Administrative Order on Consent to be entered into between the State and HRP. It is understood, however, that although market ready closure will be achieved through the Administrative Order on Consent, a final closure must occur through EPA's RCRA Statement of Basis process, through which a Certificate of Completeness will be issued.

Area specific conceptual cleanup actions will be implemented to complete the closure process required by the Consent Decree and the Prospective Purchaser Agreement and to complete a closure process that will be defined in the State Administrative Order. Corrective measures studies will be completed for areas that require response actions in accordance with the Consent Decree. The corrective measures study will define current conditions, completed remedial measures, and remaining environmental efforts such as monitoring and reporting for the Site such that closure approvals can be obtained for these areas. The State Administrative Order is anticipated to provide the framework for completion of response actions in general conformance with the Maryland Voluntary Cleanup Program (VCP).

### **5.3 Area-Specific Conceptual Cleanup Actions**

An inventory of SWMUs, AOCs and other non-RFA areas of the Site identified and described in the DCCR is presented in Table 1. Further analysis and segregation of this inventory by geographical location, previous operations and likelihood of further remediation required is shown in Table 2. Analysis is provided to define the likelihood of further remediation (or likelihood for no further action) and the associated rationale for further remediation (no further action). Recognized environmental conditions identified in the Phase I will also be considered and incorporated as appropriate. An outline of the conceptual cleanup plans including the information provided to the MDE and EPA on April 7, 2014 is shown on Table 3 and further described as follows.

### 5.3.1 Special Study Areas

Environmental Investigation Work Plans (EIWPs) will be developed for the Special Study Areas that will define the path forward for environmental investigations, remediation, pathway exclusion and closure. As necessary and appropriate, the EIWPs will be specifically integrated with proposed development plans for parcels within the Special Study Areas. Approval from the Agencies will be required to initiate work for the EIWP. This effort will include interactions with the Agencies including presentation of the proposed environmental work and the proposed site development plan.

Cleanup actions designed to address defined remedial objectives may be implemented as interim measures that would then be subject to monitoring and institutional controls identified as part of a subsequent corrective measures study and the associated corrective measures implementation. The conceptual cleanup actions planned for Special Study Areas are further described as follows:

#### 5.3.1.1 Coke Point Area

Contaminants of concern include dissolved benzene, naphthalene, and non-aqueous phase liquid (NAPL). The primary exposure pathway for the Coke Point Area, which includes the COA and Coke Point Landfill, is the release of groundwater to surface water of the Patapsco River. Off-site migration of benzene through groundwater within the shallow or intermediate aquifers is also of concern. The natural groundwater hydraulic grade is fairly flat, with a radial flow pattern moving towards the shoreline. Potential risks may be present for this exposure pathway from direct toxicity of chemicals to benthic organisms, accumulation in foodwebs, surface water aquatic life and human health. Corrective actions will mitigate this exposure and utilize groundwater compliance concentrations derived from risk assessment work to be completed based in part on surface WQS for VOCs and SVOCs. Remediation criteria also include the removal of NAPL sources to mitigate continuing groundwater sources of contamination and actions to mitigate the potential for migration of contaminated groundwater to offsite areas as follows:

##### Groundwater

- Remove NAPL sources to mitigate ongoing contribution to groundwater contamination
- Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
- Mitigate potential off-site migration of contaminated groundwater

##### Soil Vapor

- Prevent migration of soil vapor for occupied structures

Response actions for the Coke Point Area are anticipated to include: in-situ source area removal and treatment, mitigation of migration to adjoining surface water above acceptable

concentration(s), and mitigation of potential off-site migration. These actions will initially include the implementation or continued operations of currently approved interim measures as previously and recently agreed by the Seller. Additional response action(s) that might be found necessary to meet the remediation criteria or to allow for the termination of currently approved remediation measures will be undertaken in accordance with an EIWP subject to the approval of the Agencies. The EIWP will include details regarding necessary plans, investigative studies, or risk assessments to assist in developing the remediation objectives, compliance requirements, and define future monitoring obligations.

Elements of the EIWP for the Coke Point Area are anticipated to include delineation of contaminated areas through additional surface and subsurface investigations; evaluation of in-situ treatability parameters such as grain size and design hydrogeochemical data including pH and other aspects; groundwater flow modeling including fate and transport analysis; and ecological and human health risk assessments to assist in the development of remedial compliance requirements. A numerical model will be developed using the U.S. Geological Survey's SEAWAT, or equivalent, to evaluate groundwater flow and solute transport under current and future conditions. SEAWAT is a computer program capable of simulating three-dimensional, variable-density groundwater flow and solute transport and is well suited for applications involving coastal discharge conditions. The model will be used to simulate mass transport over time to predict the extent of contaminant discharge along the peninsula's boundary and to evaluate the influence of remediation measures. Biodegradation and attenuation will be considered and incorporated into the solute transport model, if appropriate. The output of the model will be used to estimate chemical concentrations associated with groundwater discharge in sediments, sediment pore water and in the surface water column in the near-shore area surrounding the Coke Point Area. It is anticipated that groundwater simulation(s) will be preceded by an early coordination meeting with the Agencies to provide input on key considerations such as:

1. Simulation Objective(s)
2. Scope and extent – horizontal and vertical
3. Data Collection – existing and new
4. Data Evaluation – existing and new
5. Hydraulic Properties of the System
6. Boundary Conditions
7. Initial Conditions
8. Transient or Steady-State
9. Code Selection and Implementation
10. Calibration

11. Execution and Presentation

12. Evaluation of Uncertainty

Key aspects of the groundwater simulation such as those listed above will be listed in the EIWP for review and approval by the agency following resolution of comments that may be received.

Supplemental human health and ecological risk assessments will be conducted to evaluate potential exposures on-site and in the near-shore areas where groundwater discharges. The on-site evaluation will assess risks to workers under current and future conditions. The off-site evaluation will focus on ecological and human health risks associated with the discharge of chemicals from groundwater to nearshore areas. The risk assessments will follow EPA guidance for human health and ecological risk assessment. Measured data for Site materials will be used to assess risks to future workers at the Site. Model-predicted concentrations of chemicals in sediment, sediment pore water, and the surface water column will be used as exposure concentrations in the risk assessment for the off-site nearshore areas. The results of the risk assessment will be used to refine necessary corrective measures and define compliance concentrations for non-point groundwater discharges. The results of the risk assessment will be used to refine necessary corrective measures and define compliance concentrations for non-point groundwater discharges based in part on surface water quality standards for VOCs and SVOCs including benzene (0.51 mg/L) and others to be determined. It is anticipated that risk assessment(s) will be preceded by an early coordination meeting with the Agencies to provide input on key considerations such as:

1. Applicable Guidance and Framework
2. Data Collection – existing and new
3. Data Evaluation – existing and new
4. Exposure Assessment – exposure assumptions
5. Toxicity Assessment – hierarchy of information sources
6. Risk Characterization – methods, individual substances, aggregate risks

Key aspects of risk assessment(s) such as those listed above will be listed in the EIWP for review and approval by the agency following resolution of comments that may be received.

Figure 1 presents a schematic plan for the Coke Point Area. Details of response actions anticipated for Coke Point are as follows:

5.3.1.1.1 NAPL Benzene Source Area (Cell 6)

Mechanical/physical recovery methods are planned to remove LNAPL occurring within the benzene NAPL source area. This will initially be provided by continued operation of the approved Cell 6 Interim Measure. The impacted area is estimated at 54,500 square feet based on the physical occurrence of LNAPL measured in monitoring wells from data taken in 2013.

Additional information will be provided to address the agency's concern that a separate area of LNAPL may be present as expressed on April 7, 2014. The existing recovery system will be expanded to address additional LNAPL-affected areas (if any) and include recovery trenches and additional fluid withdrawal systems to recover LNAPL that can be physically removed from the subsurface. A secondary in-situ polishing effort will then be implemented for this area that will likely involve the use of chemical additives such as oxidants to further mitigate the ongoing presence of LNAPL source materials. It is proposed that LNAPL recovery be terminated at a specific recovery Facility such as a recovery well when its rate of recovery during normal operation declines to less than two (2) gallons per month.

#### 5.3.1.1.2 NAPL Naphthalene Source Area (Cell 4/5)

Mechanical/physical recovery methods are planned to remove NAPL occurring within the naphthalene NAPL source area. This will be provided initially by implementation of the recently approved Interim Measure design for this area. The impacted area is estimated at 31,000 square feet based on the physical occurrence of NAPL measured in monitoring wells from data taken in 2013. The recently approved Interim Measure system will be implemented, operated, and possibly expanded to include extraction with localized surfactant application to recover NAPL that can be physically removed from the subsurface. A secondary in-situ polishing effort will then be proposed for this area that will likely involve the use of chemical additives such as oxidants to further mitigate the ongoing presence of NAPL source materials.

It is anticipated that upgrades of approved Interim Measures such as this will be preceded by an early coordination meeting with the Agencies to provide input on key considerations such as:

1. Remedial Objectives
2. Data Collection and Evaluation
3. Bench Studies or Pilot Studies
4. Design Methodology

Key aspects of proposed upgrade(s) or change(s) such as those listed above will be listed in the EIWP for review and approval by the agency following resolution of comments that may be received.

#### 5.3.1.1.3 Dissolved Groundwater Plumes (Cell 2)

Groundwater extraction, ex-situ treatment, reinjection, and AS/SVE is planned in this area. These elements will initially be provided by implementation of the recently approved Interim Measure design for this area. Later, a subsurface low permeability barrier is proposed to be installed along the northwest shoreline of Coke Point within which groundwater flow is being artificially influenced by off-site pumping. The barrier is anticipated to be constructed using slurry wall techniques approximately 2100 feet long and keyed into a silty clay horizon that occurs at a depth of 60 feet below the ground surface. Flow-through treatment is also being



considered. Recognizing the agency's April 7, 2014 comment regarding the use of flow barriers, design of such a barrier will consider the results of groundwater simulation studies as earlier discussed in Section 5.3.1.1. Several alignment locations are possible parallel to the shoreline as shown on Figure 1. The subsurface barrier will be designed to reduce the hydraulic gradient imposed by the offsite pumping activity and prevent offsite migration of the dissolved plume in the unconfined groundwater zone in the slag and the intermediate groundwater zone.

Flow barrier design(s), if used, or other remediation efforts will be preceded by an early coordination meeting with the Agencies to provide input on key considerations such as:

1. Objectives
2. Material of construction
3. Method(s) of construction
4. Proposed permeability
5. Long-term compatibility
6. Data needs
7. Design methods
8. Testing and construction QA/QC
9. Long-term performance monitoring

#### 5.3.1.1.4 Dissolved Groundwater Plumes (Cell 3)

Initial response action in this area will include continued operation and maintenance of the approved Interim Measure. Expanded corrective measures are anticipated to be proposed in the Cell 3 shoreline location to mitigate groundwater discharges from this shoreline area for which the design will be finalized subsequent to groundwater modeling and risk assessment work to be completed as part of the EIWP. Corrective actions are planned that will double or triple the size of the treatment area of the current Air Sparge/Soil Vapor Extraction system in this area.

#### 5.3.1.1.5 Dissolved Groundwater Plumes (Cell 4/5)

The Cell 4/5 treatment system will be operated to mitigate shoreline impacts on the eastern side of Coke Point. Further investigation is anticipated outside and to the northeast of the remediation system at Cell 4/5 subsequent to startup of the system to define shoreline impacts, if any. In-situ treatment may be implemented in this area and will likely be a chemical oxidation application. The agency's comment relative to in-situ treatment under elevated pH conditions will be addressed as part of the bench or pilot study process as earlier discussed.

This area will be subject to post-remediation obligations including the completion of a Corrective Measure Study that is expected to define implementation requirements for institutional controls and groundwater monitoring. Institutional controls may include the

requirement for vapor mitigation systems for occupied buildings in certain areas. Closure tasks for this area may include future groundwater monitoring requirements to confirm the adequacy of the remedial measures. Timeframe for completion of this work is estimated at 24 to 36 months as shown on Table 3.

### **5.3.1.2 Tin Mill Canal/Finishing Mills Area**

Contaminants of concern in this area include metals, organics, or oil & grease affecting the sediment and banks of the Tin Mill Canal (TMC), and thus potentially the stormwater that continues to be conveyed by the TMC. Remediation will focus on the mitigation of future exposure pathways from contaminated sediment, impacts to stormwater conveyed by the canal, and elimination of contaminants from the aggregate TMC discharge requiring treatment at the HCWWTP as follows:

#### Sediment

- Prevent potential future direct exposure to contaminated sediments located within Tin Mill Canal

#### Surface Water

- Mitigate impacts to stormwater conveyed by Tin Mill Canal and eliminate need for ongoing treatment of stormwater at the HCWWTP

Figure 2 presents a schematic plan for the Tin Mill Canal/Finishing Mill Area. Response actions being considered for the Tin Mill Canal/Finishing Mills Area are anticipated to include either removal and disposal of impacted sediments associated with the canal or isolation techniques with sediments remaining in place and the subsequent installation of acceptable isolation and channel stabilization materials. An EIWP will be necessary to support this work which will be submitted for approval by the Agencies. The EIWP will include details regarding necessary plans and investigative studies to define the area and volume of sediments to be removed, provide waste characterization of the materials for proper disposal and complete the channel stabilization design. Early coordination and agency input on considerations specific to this area will be solicited as discussed earlier.

Response actions being considered are further described as follows:

- Dredging and removal of sediment from the TMC – estimated amount to be removed - 7300' x 40' x 5' (the 5' being the thickness of sediment to be removed) = ~54,000 cu yds of material
- Disposal will require TCLP waste determinations
- Non-hazardous materials are planned to be acceptable for disposal at Greys Landfill
- Isolation of the sediments by covering the sediments with an engineered barrier that will allow the sediments to remain in-situ and mitigate future exposure of stormwater conveyed through the TMC;

This area will be subject to post-remediation obligations including the completion of a Corrective Measure Study that is expected to define implementation requirements for institutional controls and groundwater monitoring. Closure tasks for this area may include future NPDES surface water discharge requirements. Surface water discharge modeling may be appropriate and will necessarily be integrated with site development plans. Continuing stormwater discharges from the TMC will need to meet current and potential future surface water quality criteria associated with NPDES discharge permits for the Site to eliminate the need for ongoing treatment at HCWWTP. These criteria are anticipated to be focused on surface water quality standards for metals such as, but not limited to, copper (0.0061 mg/L), nickel (0.0082 mg/L) and zinc (0.081 mg/L). The quality of shallow groundwater discharging to the TMC is a consideration as commented by the agency on April 7, 2014 and will be specifically addressed in the EIWP. Timeframe for completion of this work is estimated at 18 to 24 months as shown on Table 3. Completion is anticipated to be documented in the Corrective Measures Implementation report.

### **5.3.1.3 Rod and Wire Mill Area**

Contaminants of concern include primarily cadmium and zinc affecting surface soil, subsurface soil, and groundwater. The primary exposure pathways for the Rod and Wire Mill area include potential exposure to surface soil and the potential discharge of groundwater to surface water of Bear Creek. Groundwater, when the pump and treat system is not operating, has been shown to flow west-southwesterly across the impacted areas towards Bear Creek adjacent to the former Rod and Wire Mill. Potential risks may be present for this exposure pathway from direct toxicity of dissolved metals to benthic organisms, accumulation in foodwebs, surface water aquatic life and human health. Response actions will be implemented to mitigate this exposure and utilize groundwater compliance concentrations derived from risk assessment work to be completed based in part on surface water quality standards (WQS) for cadmium and zinc. Corrective actions will be completed to mitigate impacts and eliminate the requirement to operate and maintain existing interim measures (i.e. the pump and treat system). Remediation will focus on the mitigation of future exposure pathways from contaminated soil and groundwater as follows:

#### Soil

- Prevent potential future direct exposure to contaminated surface soil
- Mitigate future leaching to groundwater

#### Groundwater

- Mitigate potential for non-point source discharge of groundwater above acceptable risk-based concentrations and eliminate need for ongoing interim measure currently consisting of pumping and treatment of groundwater in this area

Response actions for the former Rod and Wire Mill Area are anticipated as follows:

- Removal of contaminated surface soils and installation of clean fill;
- In-situ soil stabilization if technically viable and necessary for the selected mitigation approach; and,
- Potential installation of a passive downgradient groundwater treatment system.

An EIWP will be necessary to support this work which will be submitted for approval by the Agencies. The EIWP will include details regarding necessary plans, investigative studies, and risk assessments to assist in developing the remediation objectives, compliance requirements, and future monitoring obligations. The agency's comments relative to the implementation of in-situ stabilization on April 7, 2014 will also be addressed.

Site investigation and design work will include delineation of contaminated areas through additional surface and subsurface investigations, evaluation of in-situ treatability parameters such as grain size and design geochemical data, groundwater flow modeling including fate and transport analysis, and ecological and human health risk assessments to assist in the development of remedial compliance requirements. A numerical model based on the U.S. Geological Survey's SEAWAT, or equivalent, is anticipated to evaluate groundwater flow and solute transport under current and future conditions. The model is anticipated to simulate mass transport over time to predict the extent of contaminant discharge along the peninsula's boundary and to evaluate the influence of remediation measures. Biodegradation and attenuation will be considered and incorporated into the solute transport model, if appropriate. The output of the model is anticipated to estimate chemical concentrations associated with groundwater discharge in sediments, sediment pore water and in the surface water column in the near-shore area surrounding the former Rod and Wire Mill area. Early coordination and agency input on considerations such as bench or pilot studies and groundwater flow simulation will be solicited as previously discussed.

Supplemental human health and ecological risk assessments are anticipated to be conducted to evaluate potential exposures on-site and in the near-shore areas where groundwater discharges. The on-site evaluation will assess risks to workers under current and future conditions. The off-site evaluation will focus on ecological and human health risks associated with the discharge of chemicals from groundwater to near-shore areas. The risk assessments will follow EPA guidance for human health and ecological risk assessment to be agreed in advance. Measured data for Site materials will be used to assess risks to future workers at the Site. Model-predicted concentrations of chemicals in sediment, sediment pore water, and the surface water column will be used as exposure concentrations in the risk assessment for the off-site near-shore areas. The results of the risk assessment will be used to refine necessary corrective measures and define compliance concentrations for non-point groundwater discharges. This work will be focused on mitigating the potential for groundwater discharges to Bear Creek containing cadmium and zinc that exceed acceptable risk based concentrations based in part on surface water quality standards for cadmium (0.008 mg/L) and zinc (0.0081 mg/L). Early coordination and agency input on

considerations specific to risk assessment implementation will be solicited as previously discussed.

Figure 4 presents a schematic plan for the Rod and Wire Mill Area. In-situ soil stabilization is under consideration for areas associated with the former sludge bin storage area and the east pond. In addition to consideration of the in-situ treatment process, it is anticipated that contaminated surface soils from depths of less than 3 feet at the former sludge bin storage will be removed and replaced with clean fill. Once soil remediation is complete, an area of approximately 3 acres will be protected with an engineered barrier, possibly comprised of a clean soil cover or approved equivalent.

An in-situ continuous permeable reactive barrier (PRB) or funnel and gate PRB system using BOF slag or zero valent iron (ZVI) material is under consideration to be installed downgradient and in parallel with the shoreline to mitigate the potential for non-point source discharge of groundwater above acceptable risk-based concentrations. Reactive media selection and PRB design are to be based on pilot testing and/or small-scale bench studies. These remedial options are included as a contingency to be finalized subsequent to groundwater modeling and risk assessment work to be completed as part of the remediation plan. Conceptual downgradient remedial options are also shown in plan view on Figure 4 and further described as follows:

**OPTION #1: Continuous PRB**

- ~ 600 ft long, ~ 3 ft wide, ~ 30 (to 40) ft deep approx. volume: 2,000CY @30' depth
- Comprised of BOF Slag and/or a ZVI material
- ~100 ft long, 3 ft wide, ~30 ft deep grout wall wings on each end, angled to ensure collection of impacted groundwater and force it through the PRB

**OPTION 2: Funnel & Gate PRB System**

- ~ 800 ft long, ~ 3 ft wide, ~ 40 to 50 feet deep
- Funnel sections to be impermeable grout
- Gate sections to be replaceable BOF Slag and/or a ZVI material

**OPTION 3: Contractor-suggested alternative**

This area will be subject to post-remediation obligations including the completion of a Corrective Measure Study that is expected to define implementation requirements for institutional controls and groundwater monitoring. Closure tasks for this area are anticipated to include future groundwater monitoring requirements to confirm the adequacy of the remedial measures. The Corrective Measures Implementation report is anticipated to document completion of this response action. Timeframe for completion of this work is estimated at 12 to 24 months.

#### 5.3.1.4 Greys Landfill Area (County Lands)

Contaminants of concern in this area include VOCs or SVOCs affecting surface soil or groundwater. The primary exposure pathways for the Greys Landfill area are direct exposure to surface soil and the potential release of affected groundwater to surface water of Bear Creek. Groundwater has been shown to flow west-southwesterly across the impacted areas towards Bear Creek adjacent to Greys Landfill. Potential risks may be present for this exposure pathway from direct toxicity of chemicals to benthic organisms, accumulation in foodwebs, surface water aquatic life and human health. Final corrective action will utilize groundwater compliance concentrations derived from risk assessment work to be completed using in part surface water quality standards (WQS) for VOCs and SVOCs. Remediation will also include mitigation of potential future exposure to contaminated media as follows:

##### Soil

- Prevent future direct exposure to contaminated surface soil
- Mitigate future leaching to groundwater

##### Groundwater

- Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations

##### Soil Vapor

- Prevent migration of soil vapor into occupied structures

Response actions for the Greys Landfill area are anticipated to include in-situ source treatment for VOCs and SVOCs involving either chemical and/or biological methods as necessary to mitigate groundwater discharge concerns and placement of cover material. An EIWP will be necessary to support this work which will be submitted for approval by the Agencies. The EIWP will include details regarding necessary plans, investigative studies and risk assessments to assist in developing the remediation objectives, compliance requirements and future monitoring obligations. Site investigation and design work will include delineation of contaminated areas through additional surface and subsurface investigations, evaluation of in-situ treatability parameters such as grain size and design geochemical data, groundwater flow modeling including fate and transport analysis, and ecological and human health risk assessments to assist in the development of remedial compliance requirements to be implemented as previously discussed.

Information is not yet available to define areas requiring in-situ source treatment. Cover material is anticipated to be placed over an area approximately 5 to 10 acres in size to mitigate potential future exposure to surface soil. Work is anticipated to refine data associated with the current conditions of this area and utilize modeling and risk assessment methods to demonstrate compliance.

This area will be subject to post-remediation obligations including the completion of a Corrective Measure Study that is expected to define implementation requirements for institutional controls and groundwater monitoring. Closure tasks for this area may include future groundwater monitoring requirements to confirm the adequacy of the remedial measures. The Corrective Measures Implementation report is anticipated to document completion of this response action. Timeframe for completion of this work is estimated at 12 to 24 months.

### **5.3.1.5 Humphrey Impoundment Area**

Contaminants of concern are anticipated to include metals, organics, or oil & grease affecting surface material or groundwater. Potential exposure pathways and associated requirements for corrective action at the Humphrey Impoundment Area are planned to be evaluated through the preparation of a risk assessment. A Baseline Ecological Risk Assessment has been completed and submitted for the area that concluded low to negligible risk to on-site ecological receptors. Based on this work, response action associated with current ecological conditions is not anticipated to be required. Development for occupied use is not expected in this area which will minimize future exposure pathways. Potential risks may be present from direct toxicity of surface metals to wildlife receptors, accumulation in foodwebs, surface water aquatic life, and human health. Remedial alternatives for Humphrey Impoundment will include an evaluation as to whether the existing vegetative cover (Phragmites) is adequate for the future, or whether a soil or other cover will be needed long-term to mitigate future leaching to groundwater and the potential for non-point source discharge of groundwater above acceptable risk-based concentrations.

Response actions for the Humphrey Impoundment Area are anticipated to include integrated activities associated with completion and approval of a risk assessment for the area and site development plans. Institutional controls are planned to limit future direct contact exposure pathways. An EIWP will be necessary to support this work which will be submitted for approval by the Agencies. The EIWP will include details regarding necessary plans, investigative studies and risk assessments to assist in developing the remediation objectives, compliance requirements and future monitoring obligations as previously discussed.

Exploration, delineation, and possible corrective action for the former TMC containment areas may also be required. These areas are approximately 4 acres in size and located approximately as shown on Figure 2. Information is not yet available to assess the remedial requirements for these areas. Work is planned to refine data associated with the current conditions of the impoundment and investigate the potential presence of conditions requiring response action associated with the former TMC containment areas.

The Humphrey Impoundment Area will be subject to post-remediation obligations including the completion of a Corrective Measure Study that is expected to define implementation requirements for institutional controls and groundwater monitoring. Closure tasks for this area

may include future groundwater monitoring requirements to confirm the adequacy of the remedial measures. Timeframe for completion of this work is estimated at 12 to 18 months.

#### **5.3.1.6 Site Wide Groundwater**

Information will be submitted to the Agencies to evaluate groundwater conditions and potential groundwater impacts on a site-wide basis. The work will include data, assessments, and corrective actions completed for Special Study Areas of the Site as well as sufficient information to assess potential groundwater impacts from areas planned to be removed from the Consent Decree.

The primary exposure pathway of the Site is the release of impacted groundwater to surrounding surface waters. Deed restrictions are planned to be put in place to restrict the extraction of shallow groundwater for any purposes other than remedial activities. Because of several natural and site specific factors such as brackish and other Site related conditions, shallow groundwater is not an actual or reasonably expected source of drinking water. The Sparrows Point peninsula exists downgradient from other land areas and potential users of shallow groundwater. The natural groundwater hydraulic grade of the peninsula is fairly flat, with a radial flow pattern moving towards the shoreline. Potential risks in surface water may be present for this exposure pathway from direct toxicity of chemicals to benthic organisms, accumulation in foodwebs, surface water aquatic life and human health. Corrective actions for specific areas described previously will be designed to mitigate this exposure and utilize groundwater compliance concentrations derived from risk assessment work to be completed based in part on surface water quality standards (WQS).

It is anticipated that the assessment of site-wide groundwater will be preceded by an early coordination meeting with the agencies to provide input on key considerations such as:

1. Applicable Guidance and Framework
2. Groundwater Remedy Decision Framework, point of compliance and cleanup goals
3. Technical impracticability of groundwater restoration
4. Alternate Remedy Selection
5. Data Collection Requirements – Phase I and II Areas and Consent Decree Areas
6. Data Evaluation Requirements

#### **5.3.2 State Administrative Order Area**

Isolated SWMUs, AOCs, and non-RFAs concerns have been identified in State Administrative Order Area including the Hot Mill Area, Primary Rolling Mills Area, Furnace Areas and in general areas of the Site as shown in Table 2. The Phase I also documented the presence of recognized environmental conditions that require further investigation. Work is planned to



refine data associated with the current conditions of these SWMUs, AOCs non-RFA areas and recognized environmental conditions and investigate the potential presence of unacceptable conditions.

Information will be submitted to the Agencies to request certifications for completion of work for a parcel with no further action. Additional investigation, including equivalent updated Phase I and/or focused Phase II investigations will be conducted as required for specific parcels to be developed to provide supporting information to evaluate the potential of environmental impacts. This information will include:

- A specific description of the size and location of the parcel to be removed
- The name of the prospective purchaser/tenant and intended use of parcel (if applicable)
- A summary of the parcel history and current conditions. The summary will include applicable elements of ASTM E 1527-13 Standard Practice for Environmental Site Assessments (Phase I)
- Results of Phase II activities characterizing the parcel and its specific recognized environmental conditions (if any)

Additional data will be submitted specific to SWMUs, AOCs, non-RFA areas, or recognized environmental conditions that have been identified in the parcel. The path forward for certification for completion of work with no further action or remediation and continuing regulation including a defined closure process will be determined based on review of the submitted information.

As discussed with the agencies on April 7, 2014, assessment, further investigation, or response action(s) in the State Administrative Order Area is proposed to be undertaken consistent with the general and technical requirements of the Maryland VCP as set forth at Section 7-506 of the Environment Article of the Maryland Code, as may be supplemented or modified by the Administrative Order on Consent and Covenant Not To Sue. As site wide groundwater will be considered as a Special Study Area, investigations and subsequent response actions, if necessary, are anticipated to be focused on soil conditions of the parcel. Work is planned to refine data associated with the current soil conditions of the parcel and investigate the potential presence of unacceptable conditions. Response actions, if required, will be supported by necessary plans, investigative studies and risk assessments.

Technical and other requirements of the VCP are understood to include but not be limited to the following:

1. Allowable Land Use Controls
2. Environmental Site Assessments
3. Cleanup Criteria Selection
4. No Further Requirements Determination(s)

5. Response Action Plan(s)
6. Issuance of Certificate of Completion
7. Oil Contaminated Sites

The time frame for completing the investigation of parcels within State Administrative Areas is anticipated to reflect the incremental renewal of the overall site and is therefore proposed to allow for flexibility. The eligibility for certifications for completion of work is anticipated to include parcels that demonstrate the absence of recognized environmental conditions that will be sufficiently defined by the Phase I process. Timeframe to complete the request for no further action for these areas is estimated at three to six months.

If MDE determines that development of a response action plan (RAP) is necessary, a proposed RAP will be submitted for approval, including a schedule for implementation and completion of the plan. Following completion of the RAP to the satisfaction of MDE, a No Further Requirements Determination (NFRD) or Certificate of Completion (COC) will be issued. Once initiated for a specific parcel, it is proposed that the investigative and remedial work (if necessary) will generally be completed within 12 to 24 months.

Submittal of specific parcel(s) for consideration under this process will include designation of its planned future use. A NFRD or COC issued for the parcel will be contingent upon its future use. Currently anticipated future use of parcels at the site includes:

- Tier 2B (Commercial Restricted); or,
- Tier 3B (Industrial Restricted).

## **6 COMPLIANCE PLAN FOR SOLID WASTE LANDFILLS**

### **6.1 Compliance Actions**

Actions will be undertaken to provide operational compliance, implement closure in accordance with applicable closure plans developed for the landfills and provide post-closure care requirements for Coke Point and Greys Landfills. Plans are not to operate Coke Point Landfill. Specific objectives include the following:

#### **Coke Point Landfill**

- Complete closure and post-closure care compliance obligations, including the development of closure plans to be approved by the Maryland Department of the Environment (MDE);

#### **Greys Landfill**

- Complete operational, closure and post-closure care compliance obligations, including the completion of closure plans that have been approved by MDE;

### **6.2 Coke Point Landfill**

Coke Point Landfill is not planned to be used including further management of non-hazardous waste materials. Waste materials have not been received at this landfill since the change in ownership from RG Steel Sparrows Point LLC to Sparrows Point LLC. Sparrows Point LLC does not intend to use the Coke Point Landfill Facility to manage waste materials and has also further informed other entities operating at the Sparrows Point Site that waste materials are not to be managed at this landfill.

Coke Point Landfill will continue to be used for slag storage and tenant scrap metal recycling and iron bearing material recovery operations until mid-year 2014. The future use of Coke Point Landfill, including the schedule for closure, will also be contingent upon the ongoing interest by the Maryland Port Administration to acquire the parcel for potential dredged material containment Facility use.

Work will be completed to develop final grading and closure plans for the Facility for submittal to the appropriate regulatory authorities. Once approved, the landfill will be closed in accordance with the closure plan requirements.

The requirements for post-closure care include the following obligations: 1) semi-annual groundwater monitoring, analysis and reporting, 2) semi-annual landfill inspection and reporting, and 3) landfill surface and closure cap maintenance. The post-closure care period has been estimated at ten years.

### **6.3 Greys Landfill**

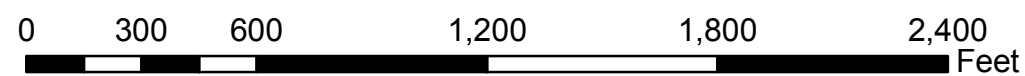
Greys Landfill is planned to be operated for the management of non-hazardous waste materials generated at Sparrows Point associated with the operation of the wastewater treatment plant, demolition activities and response actions until the remaining capacity has been utilized. Greys Landfill has an approved operating and closure plan that defines the closure elevation of the landfill which limits the remaining capacity.

Compliance obligations including semi-annual groundwater monitoring and reporting and operating practices will continue during this time period. Once final elevations are achieved at the landfill, the landfill will be closed in accordance with the approved closure plan requirements.

The requirements for post-closure care include the following obligations: 1) semi-annual groundwater monitoring, analysis and reporting, 2) semi-annual landfill inspection and reporting, and 3) landfill surface and closure cap maintenance. The post-closure care period has been estimated at ten years.



### Coke Point Area



1 inch = 500 feet

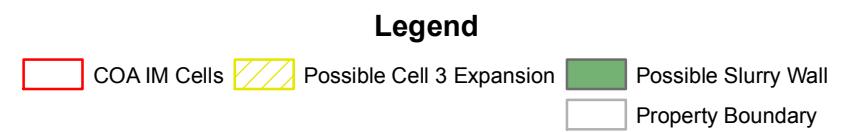


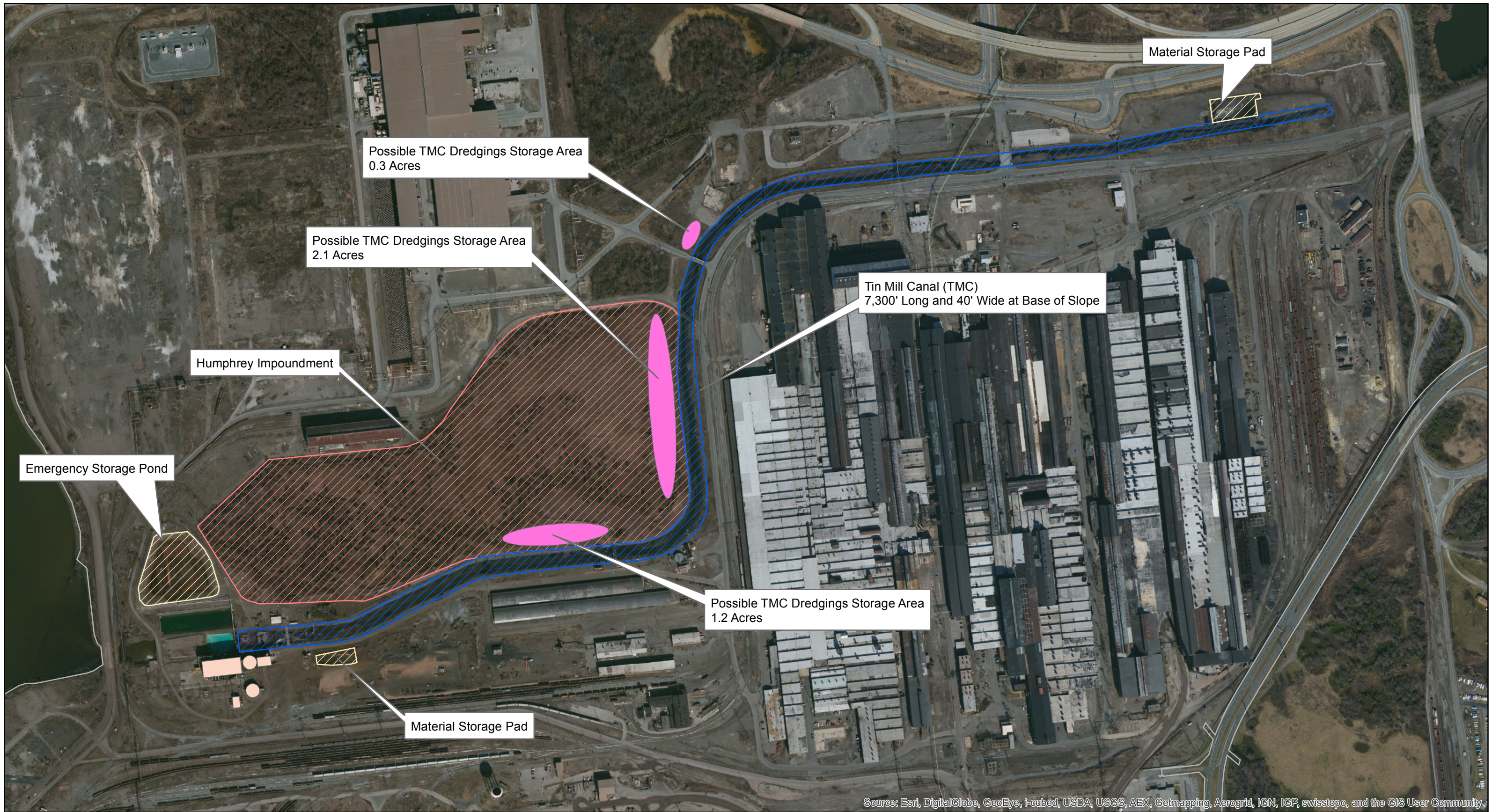
Figure 1

# Former Coke Oven Area Remedial Plan - Intermediate Groundwater Zone



# Former Coke Oven Area Remedial Plan - Shallow Groundwater Zone



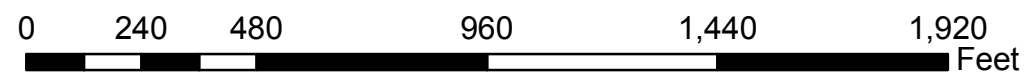


Tin Mill Canal/Finishing Mills and Humphrey Impoundment Areas





### Greys Landfill Area



1 inch = 400 feet

#### Legend




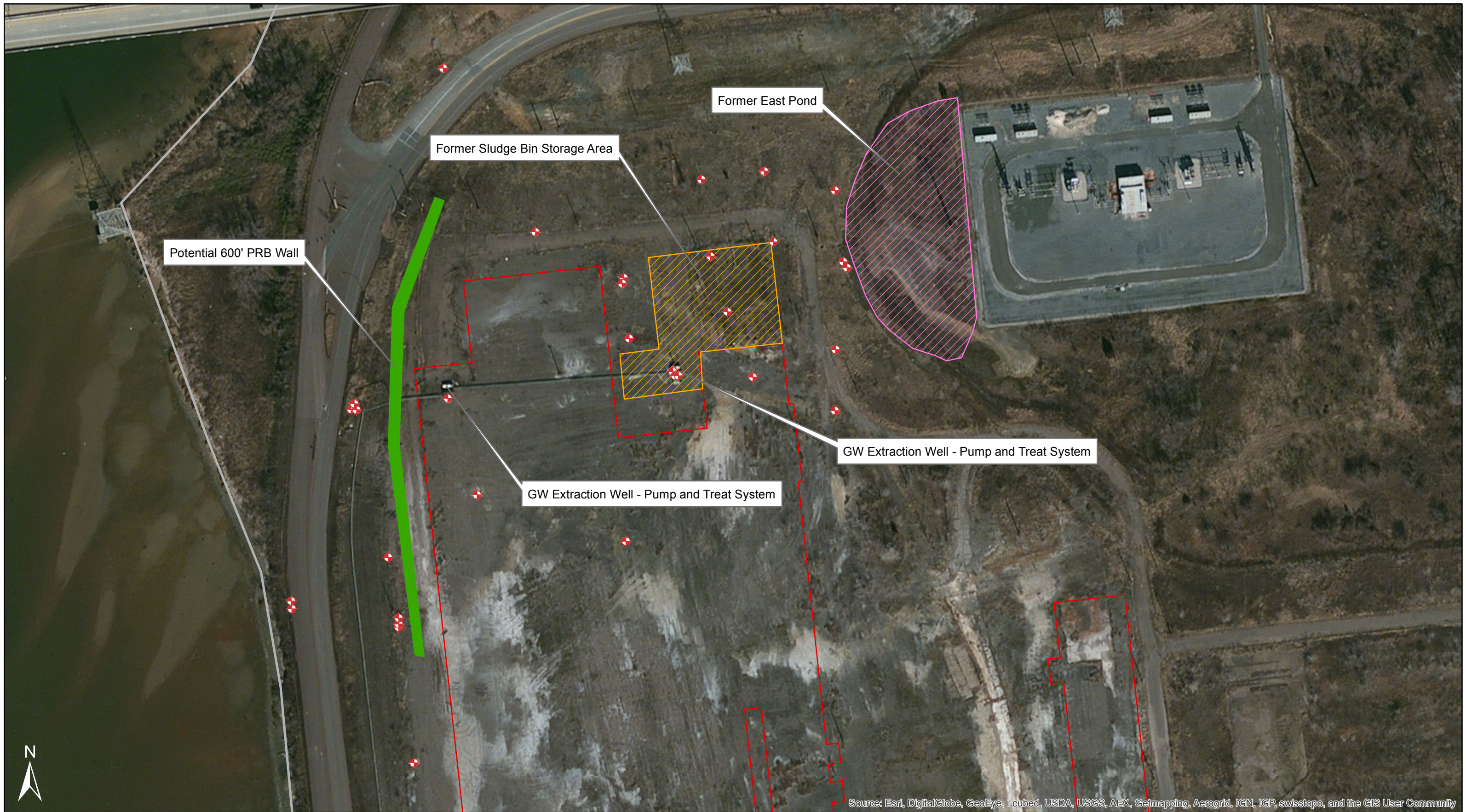
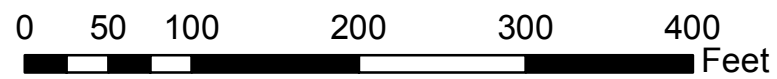
-  County Lands 1A
-  Landfill Boundary
-  Property Boundary

Figure 3



Rod and Wire Mill Area



1 inch = 115 feet

Legend

- + RWM Monitoring Wells
- Former Sludge Bin Storage Area
- Former Building Footprint
- Former East Pond
- PRB Wall
- Property Boundary



### Site Conceptual Cleanup Plan Areas

#### Legend

- Special Study Areas
- Contemplated State Administrative Order Areas
- Property Boundary

0 625 1,250 2,500 3,750 5,000 Feet

1 inch = 1,500 feet

**Table 1**  
**Sparrows Point Remediation Plan**

<b>SWMU/ AOC #</b>	<b>Description</b>	<b>Release Potential Defined by RFA</b>	<b>DCCR Recommended Action</b>	<b>Basis For DCCR Recommendation</b>	<b>Investigation Area (Special Study Area or Outlier Area)</b>
1	Tin Mill Canal	SD	Further Action	Consent Decree "Special Study Area"	Tin Mill Canal/Finishing Mills
2	TMC Discharge Pipes	SD	Further Action	Include in SWMU I Evaluation	Tin Mill Canal/Finishing Mills
3	TMC Oil Skimming Devices	SD	Further Action	Include in SWMU I Evaluation	Tin Mill Canal/Finishing Mills
4	TMC Dredging Containment Areas	SD	Further Action	Undifferentiated with SWMU 6, include in SWMU 1 Evaluation	Humphrey Impoundment
5	TMC Waste Oil Storage Tanks	SD	Further Action	Include in SWMU 1 Investigation	Tin Mill Canal/Finishing Mills
6	TMC Impoundments	SD	Further Action	Undifferentiated with SWMU 4, include in SWMU 1 Evaluation	Humphrey Impoundment
7	Recent TMC Embankment Dredgings	SD	Further Action	Include in SWMU I Evaluation	Tin Mill Canal/Finishing Mills
8	TMC Brill Skimmer Pits	SD	Further Action	Include in SWMU I Evaluation	Tin Mill Canal/Finishing Mills
9	Former TMC Oil Collection Dumpster	SD	Further Action	Include in SWMU I Evaluation	Tin Mill Canal/Finishing Mills
10	HCWWTP Settling Basins	TP	No Further Action	Not observed to be releasing in RFA Report	-----
11	HCWWTP Thickeners	TP	No Further Action	Not observed to be releasing in RFA Report	-----
12	HCWWTP Aerators	TP	No Further Action	Not observed to be releasing in RFA Report	-----
13	HCWWTP Wastewater Chemical Treating Buildings	TP	No Further Action	Not observed to be releasing in RFA Report	-----
14	HCWWTP Spent Pickle Liquor (SPL) Discharge Point	AI	No Further Action	Part of treatment process, discharge is beneficially reused	-----
15	HCWWTP Centrifuges	TP	No Further Action	Not observed to be releasing in RFA Report	-----
16	HCWWTP Sludge Collection Box	TP	No Further Action	Not observed to be releasing in RFA Report	-----
17	HCWWTP Old Alum Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
18	Chrome Recovery Reduction Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
19	Chrome Recovery Neutralization Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
20	Chrome Recovery Flocc Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
21	Chrome Recovery Thickener	TP	No Further Action	Not observed to be releasing in RFA Report	-----
22	Chrome Recovery Sand Filters/Clarifier	TP	No Further Action	Not observed to be releasing in RFA Report	-----
23	Chrome Recovery Rotary Filter Press	TP	No Further Action	Not observed to be releasing in RFA Report	-----
24	Chrome Recovery Sludge Box	TP	No Further Action	Not observed to be releasing in RFA Report	-----
25	Chrome Recovery Piping	TP	No Further Action	Not observed to be releasing in RFA Report	-----
26	Chrome Recovery Filtrate Sump Filtrate Sump	SD	No Further Action	Non-releasing unit, wastes managed within closed treatment system	-----
27	Rod Mill Remediation Area	SD	Continued Operation of IM System	IM groundwater remediation	Rod and Wire Mill Area
28	Northwest Pond	SD	Continued Operation of IM System	IM groundwater remediation	Rod and Wire Mill Area
29	East Pond	SD	Continued Operation of IM System	IM groundwater remediation	Rod and Wire Mill Area
30	Rod Mill Equalization Tanks	SD	Continued Operation of IM System	IM groundwater remediation	Rod and Wire Mill Area
31	Cadmium Treatment Reactor A Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
32	Cadmium Treatment Treatment Alkalization Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
33	Cadmium Treatment Thickener	TP	No Further Action	Not observed to be releasing in RFA Report	-----
34	Cadmium Treatment Sand Filter	TP	No Further Action	Not observed to be releasing in RFA Report	-----
35	Cadmium Treatment Piping	TP	No Further Action	Not observed to be releasing in RFA Report	-----
36	Cadmium Treatment Filter Press	TP	No Further Action	Not observed to be releasing in RFA Report	-----
37	Cadmium Treatment Sludge Collection Box	TP	No Further Action	Not observed to be releasing in RFA Report	-----
38	Cadmium Treatment Trenches	SD	No Further Action	Manages groundwater treatment process overflow, re-enters system	-----
39	Rod Mill Scale Pits	NH	No Further Action	No known releases, managed non-hazardous waste	-----
40	Rod Mill Cleaning House Containment	NR	No Further Action	Not observed to be releasing in RFA Report	-----
41	Rod Mill Former Waste TCE Storage	NR	No Further Action	Not observed to be releasing in RFA Report	-----
42	Rod Mill Former Waste Oil Storage Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
43	Rod Mill Chloroethane Storage Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
44	Rod Mill Cooling Tower	NH	No Further Action	No known releases, managed non-hazardous waste	-----
45	Rod Mill Trenches/Sumps	SD	Further Action	Potential for environmental release	Rod & Wire Mill
46	Pipe Mill Various 55-gallon Drums	I	No Further Action	Not observed to be releasing in RFA Report	-----
47	Pipe Mill Oil/Water Separator	NR	No Further Action	Not observed to be releasing in RFA Report	-----

**Table 1**  
**Sparrows Point Remediation Plan**

<b>SWMU/ AOC #</b>	<b>Description</b>	<b>Release Potential Defined by RFA</b>	<b>DCCR Recommended Action</b>	<b>Basis For DCCR Recommendation</b>	<b>Investigation Area (Special Study Area or Outlier Area)</b>
48	Pipe Mill Former Zinc Ammonium Chloride Sludge Storage Area	SD	No Further Action	Inactive unit, one release with subsequent soil remediation	-----
49	Pipe Mill Trenches/Sumps	SD	Further Action	Focused closure-oriented project	Rod & Wire Mill
50	Billet Prep Waste Oil Storage Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
51	Billet Prep Rinsewater Collection Tanks	I	No Further Action	Not observed to be releasing in RFA Report	-----
52	Billet Prep Baghouse Collectors	NR	No Further Action	Not observed to be releasing in RFA Report	-----
53	Billet Prep Trenches and Blind Sumps	SD	No Further Action	Managed non-hazardous material	-----
54	Coating Lines Blind Sumps	SD	Further Action	Include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
55	Cold Sheet Mill Quencher	I	No Further Action	Not observed to be releasing in RFA Report	-----
56	Cold Sheet Mill Scrubber	I	No Further Action	Not observed to be releasing in RFA Report	-----
57	Cold Sheet Mill Wet Well	I	No Further Action	Not observed to be releasing in RFA Report	-----
58	Cold Sheet Mill Piping	SD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
59	Tandem Mill Trench System	SD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
60	Cold Sheet Mill Empty Drum Storage Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
61	Cold Sheet Mill Waste Oil Staging Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
62	Hot Strip Mill Basins	SD	Further Action	Condition of basins	Hot Strip Mill Area
63	Hot Strip Mill Waste Oil Tank	SD	Further Action	Include in SWMU 62 evaluation	Hot Strip Mill Area
64	Hot Strip Mill Oil Skimmer System	SD	Further Action	Include in SWMU 62 evaluation	Hot Strip Mill Area
65	Hot Strip Mill Cooling Tower	NR	No Further Action	Not observed to be releasing in RFA Report	-----
66	Hot Strip Mill Waste Oil Collection Point	NR	No Further Action	Not observed to be releasing in RFA Report	-----
67	Hot Strip Mill Waste Oil Accumulation Area	I	No Further Action	Not observed to be releasing in RFA Report	-----
68	Hot Strip Mill Pickling Area	I	No Further Action	Not observed to be releasing in RFA Report	-----
69	Hot Strip Mill Satellite Accumulation Area	I	No Further Action	Not observed to be releasing in RFA Report	-----
70	Hot Strip Mill Former SPL Tank Site	NR	No Further Action	Not observed to be releasing in RFA Report	-----
71	PORI Oil/Water Separator	SD	Further Action	Include in SWMU 73 evaluation	Tin Mill Canal/Finishing Mills
72	PORI Holding Tank	SD	Further Action	Include in SWMU 73 evaluation	Tin Mill Canal/Finishing Mills
73	PORI Lagoon	SD	Further Action	Condition of lagoon	Tin Mill Canal/Finishing Mills
74	Green Pellet Plant Thickeners	NR	No Further Action	Not observed to be releasing in RFA Report	-----
75	Scrubbers Open Hearth Furnace #4	NR	No Further Action	Not observed to be releasing in RFA Report	-----
76	Caster Dust Baghouse Storage Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
77	Desulfurizer Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
78	Desulfurizer Collection Dumpsters	NR	No Further Action	Not observed to be releasing in RFA Report	-----
79	Skimmer Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
80	Skimmer Baghouse Collection Dumpsters	NR	No Further Action	Not observed to be releasing in RFA Report	-----
81	Former Open Hearth #3 Site	NR	No Further Action	Not observed to be releasing in RFA Report	-----
82	Former Open Hearth #1 Site	NR	No Further Action	Not observed to be releasing in RFA Report	-----
83	Caster Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
84	Tin Mill Trenches/Sumps	SD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
85	Tin Mill Abatement System	NR	No Further Action	Not observed to be releasing in RFA Report	-----
86	Tin Mill Sump (Acid Monitoring)	SD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
87	Tin Mill Waste Oil Satellite Accumulation Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
88	Halogen Lines Trenches/Sumps	SD	Further Action	Include in SWMU 1 Evaluation	Tin Mill Canal/Finishing Mills
89	Halogen Lines Oil Skimmer	NR	No Further Action	Not observed to be releasing in RFA Report	-----
90	Halogen Lines Waste Pickle Liquor Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
91	Halogen Lines Waste Plating Solution Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
92	Rolling Plate Mill Scale Pit	NH	No Further Action	No known releases, managed non-hazardous waste	-----
93	Greys Landfill	SD	Further Action	Consent Decree "Special Study Area"	Greys Landfill Area
94	Greys Tar Decanter Cell	SD	Further Action	Unit contained within SWMU 93	Greys Landfill Area
95	Greys Trash Transfer Station	NR	No Further Action	Not observed to be releasing in RFA Report	-----

**Table 1**  
**Sparrows Point Remediation Plan**

<b>SWMU/ AOC #</b>	<b>Description</b>	<b>Release Potential Defined by RFA</b>	<b>DCCR Recommended Action</b>	<b>Basis For DCCR Recommendation</b>	<b>Investigation Area (Special Study Area or Outlier Area)</b>
96	Sinter Plant Thickener	NR	No Further Action	Not observed to be releasing in RFA Report	-----
97	Sinter Plant High Density Sludge (HDS) Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
98	Sinter Plant Centrifuge Waste Pile	NR	No Further Action	Not observed to be releasing in RFA Report	-----
99	Sinter Plant Drum Separator	NR	No Further Action	Not observed to be releasing in RFA Report	-----
100	Sinter Plant Lime Grit Box	NR	No Further Action	Not observed to be releasing in RFA Report	-----
101	Sinter Plant SPL Tanks	NR	No Further Action	Not observed to be releasing in RFA Report	-----
102	Battery 12 Trash Collection Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
103	Battery 11 and 12 Quench Pit	NR	No Further Action	Not observed to be releasing in RFA Report	-----
104	Battery A Trash Collection Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
105	Battery A Waste Oil Accumulation	SD	Further Action	Field observation of 1991 VSI	Coke Oven Area
106	Former 1-10 Batteries	NR	No Further Action	Not observed to be releasing in RFA Report	-----
107	Coke Oven Gas Main	NR	No Further Action	Not observed to be releasing in RFA Report	-----
108	Mechanical Shop Waste Oil Accumulation Area	SD	Further Action	Field observation of 1991 VSI	Coke Oven Area
109	AKJ Tar Decanter Batch Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
110	AKJ Tar Decanter Buckets	NR	No Further Action	Not observed to be releasing in RFA Report	-----
111	Battery A Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
112	B CCP Tar Storage Tank Containment Areas	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
113	B CCP Underground Weak Ammonia Pipeline	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
114	B CCP Acid Containment Pad	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
115	B CCP Acid Tanks	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
116	B CCP Ammonia Clarifier Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
117	B CCP Lime Collection Bin	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
118	B CCP Ammonia Stills	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
119	B CCP Ammonia Saturator	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
120	B CCP Acid Surge Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
121	B CCP Wash Oil Coolers (Spiral)	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
122	B CCP Wash Oil Coolers (Shell & Tube)	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
123	B CCP Wash Oil Decanters	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
124	B CCP Wastewater Holding Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
125	B CCP Wash Oil Circulating Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
126	B CCP Scrubbers	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
127	B CCP Waste Oil Bin	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
128	B CCP API Light Oil Separators	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
129	B CCP Muck Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
130	B CCP Million Gallon Weak Ammonia Tank	CV (U)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
131	Bio-Oxidation Plant Wastewater Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
132	Bio-Oxidation Plant 1 MMG Wastewater Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
133	Bio-Oxidation Plant Depurators	NR	No Further Action	Not observed to be releasing in RFA Report	-----
134	Bio-Oxidation Plant Aeration Basins	NR	No Further Action	Not observed to be releasing in RFA Report	-----
135	Bio-Oxidation Plant Clarifiers	NR	No Further Action	Not observed to be releasing in RFA Report	-----
136	A CCP Sulfuric Acid Tank Containment	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
137	A CCP Cyanide Stripper/Stack	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
138	A CCP Oil/Water Separator	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
139	A CCP Former Tar Decanters	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
140	A CCP Acid Saturator Tanks	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
141	A CCP Overflow Skimmer Box	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
142	A CCP Wash Oil Decanters	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
143	A CCP Scrubbers	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
144	A CCP Wastewater Holding Tank	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
145	A CCP Wash Oil Holding Tank	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
146	A CCP Sump	CV (M)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area

**Table 1**  
**Sparrows Point Remediation Plan**

<b>SWMU/ AOC #</b>	<b>Description</b>	<b>Release Potential Defined by RFA</b>	<b>DCCR Recommended Action</b>	<b>Basis For DCCR Recommendation</b>	<b>Investigation Area (Special Study Area or Outlier Area)</b>
147	B/L Oil/Water Separator	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
148	B/L Tank Sludge Staging Area	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
149	B/L Tank Sludge Accumulation Area	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
150	B/L Litol Plant Catalyst Drum Station	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
151	B/L Waste Oil Accumulation Area	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
152	B/L Litol Drum Staging Area	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
153	B/L Benzene Truck Loading Area	CV (L)	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Area
154	H Furnace Dust Catcher	NR	No Further Action	Not observed to be releasing in RFA Report	-----
155	H Furnace Wastewater Thickener	NR	No Further Action	Not observed to be releasing in RFA Report	-----
156	J Furnace Precipitators	NR	No Further Action	Not observed to be releasing in RFA Report	-----
157	J Furnace Gas Washer	NR	No Further Action	Not observed to be releasing in RFA Report	-----
158	J Furnace Scrubber	NR	No Further Action	Not observed to be releasing in RFA Report	-----
159	J Furnace Dust Catcher	NR	No Further Action	Not observed to be releasing in RFA Report	-----
160	Former J Furnace Thickener	RS	No Further Action	Not observed to be releasing in RFA Report	-----
161	A-G & K Former Furnaces	RS	No Further Action	Not observed to be releasing in RFA Report	-----
162	L Furnace Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
163	L Furnace Thickener	TP	No Further Action	Not observed to be releasing in RFA Report	-----
164	L Furnace Gas Scrubbers	TP	No Further Action	Not observed to be releasing in RFA Report	-----
165	L Furnace Slag Piles	NH	No Further Action	No known releases, managed non-hazardous waste	-----
166	RIW Pipeline	TP	No Further Action	Not observed to be releasing in RFA Report	-----
167	RIW Sumps (2)	TP	No Further Action	Not observed to be releasing in RFA Report	-----
168	RIW Holding Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
169	RIW Clarifying Tank	TP	No Further Action	Not observed to be releasing in RFA Report	-----
170	Pilot Plant Slurry Mixing Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
171	Pilot Plant Holding Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
172	Pilot Plant Hydrocyclone	NR	No Further Action	Not observed to be releasing in RFA Report	-----
173	BOF Scrubbers	NR	No Further Action	Not observed to be releasing in RFA Report	-----
174	BOF Thickeners	NR	No Further Action	Not observed to be releasing in RFA Report	-----
175	BOF Sand Collection Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
176	BOF Reclaimed Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
177	BOF Mixing Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
178	BOF Recycle Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
179	BOF Belt Press Station	NR	No Further Action	Not observed to be releasing in RFA Report	-----
180	BOF Reladle Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
181	BOF Separator	NR	No Further Action	Not observed to be releasing in RFA Report	-----
182	Former Tar Tanks at Fuel Station	NR	No Further Action	Not observed to be releasing in RFA Report	-----
183	Ball Mill Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
184	Ball Mill Waste Oil/Tar Dumpster	NR	No Further Action	Not observed to be releasing in RFA Report	-----
185	Tar Decanter Buggies	RS	No Further Action	Not observed to be releasing in RFA Report	-----
186	Tar Storage Box Area	RS	No Further Action	Not observed to be releasing in RFA Report	-----
187	Langenfelder Wastewater Treatment Tank	NR	No Further Action	Not observed to be releasing in RFA Report	-----
188	Former Sulfur Recovery Plant	NR	No Further Action	Not observed to be releasing in RFA Report	-----
189	Nail Mill Drum Storage Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
190	Humphrey Impoundment Area	SD	Further Action	Consent Decree "Special Study Area"	Humphrey Impoundment
191	Coke Point Landfill	SD	Further Action	Consent Decree "Special Study Area"	Coke Point Landfill
192	Coke Oven Sweepings Pile	SD	Further Action	Contained within SWMU 191	Coke Point Landfill
193	Regulated Storage Area	NR	No Further Action	Not observed to be releasing in RFA Report	-----
194	Waste Oil Stabilization/Packing Area	SD	Further Action	Field observation of 1991 VSI	Outlier (Primary Rolling Mills Area)
195	Former ERS Oily Wastewater Tank	AI	Further Action	Unknown impacts from previous activities	Outlier (Open Hearth Furnace Area)
196	Storm water Sewer System	SD	No Further Action	Storm water and industrial wastewater combined as NPDES permitted discharge	-----
197	Mason's Garage Drums	NR	No Further Action	Not observed to be releasing in RFA Report	-----
198	Spent Pickle Liquor Sump and Trench System	SD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Investigation	Tin Mill Canal/Finishing Mills
199	Bio-Oxidation Plant Oil/Water Separator	NR	No Further Action	Not observed to be releasing in RFA Report	-----

**Table 1**  
**Sparrows Point Remediation Plan**

SWMU/AOC #	Description	Release Potential Defined by RFA	DCCR Recommended Action	Basis For DCCR Recommendation	Investigation Area (Special Study Area or Outlier Area)
200	Bio-Oxidation Plant Depurator Oil Storage Tanks	NR	No Further Action	Not observed to be releasing in RFA Report	-----
201	Coke Battery Repair Shop Baghouse	NR	No Further Action	Not observed to be releasing in RFA Report	-----
202	BOF Treatment Plant Pipeline	NR	No Further Action	Not observed to be releasing in RFA Report	-----
203	Bio-Oxidation Plant Scum Collection Chamber	NR	No Further Action	Not observed to be releasing in RFA Report	-----
A	Former 3/21/91 PCB Spill Area	AD	No Further Action	One time incident occurred indoors, low release potential	-----
B	Former 1988 PCB Spill Area	AD	No Further Action	One time incident occurred indoors, low release potential	-----
C	Former ERS PCB Spill Area	AD	No Further Action	One time incident, soil remediation met EPA guidelines for PCBs	-----
D	Former PCB Spill Area (Sheet Mill)	AD	No Further Action	One time incident occurred indoors, and remediated, low release potential	-----
E	6 PCB Transformers	AD	No Further Action	PCB oil replaced by mineral oil 7/27/95	-----
F	Former Slab Cut Off Spill Area	AD	No Further Action	No current evidence of impact	-----
G	Former Diesel Fuel Spill Area (Slab Haul Road)	AD	No Further Action	Soil remediation approved by MDE	-----
H	Mason's Garage Area	AD	Further Action	UST closure/soil remediation completed but no confirmatory sampling	Outlier (Blast Furnace Area)
I	Former 1991 Acid Leak Area	AD	No Further Action	One time incident discharged to TMC	-----
J	Acid Tanks	AD	Further Action	Condition of tanks, and known releases	Tin Mill Canal and Finishing Mill
K	Truck Dock # 9's Former Diesel Spill & Diesel Fuel UST Area	AD	No Further Action	One time incident, subsequent UST closure indicated no soil contamination	-----
L	Benzene/Litol Process Area	AD	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Areas
M	A Coal Chemicals Plant Area	AD	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Areas
N	Bio-Oxidation Ferric Chloride Spill Site	AD	No Further Action	One time incident of non-hazardous constituent	-----
O	Hydraulic Oil Storage Area	AD	No Further Action	Unit managed non-hazardous, water-based hydraulic oil	-----
P	Former Naphthalene Plant Tank & Pit	AD	Further Action	Former unit with Consent Decree "Special Study Area"	Coke Oven Areas
Q	Former Diesel Fuel UST Area (Slab Haul Road)	AD	No Further Action	UST removal and closure approved by MDE	-----
R	Underground Weak Ammonia Pipeline Spill Sites	AD	Further Action	History of spills, within Consent Decree "Special Study Area"	Coke Oven Areas
S	Former Chromic Acid Spill Area	AD	No Further Action	One time incident primarily indoors with limited discharge to the TMC	-----
T	Former Diesel Fuel UST (Cold Sheet Mill)	AD	No Further Action	UST removed, confirmatory soil samples indicated no contamination	-----
U	B CCP Process Area	AD	Further Action	Within Consent Decree "Special Study Area"	Coke Oven Areas
V	Former Spent Pickle Liquor Tanks	AD	No Further Action	Area same as SWMU 70 (non-releasing unit)	-----
W	Spent Pickle Liquor Tanks	AD	Further Action	Discharges to TMC via SWMU 2, include in SWMU 1 Evaluation	Tin Mill Canal and Finishing Mill
X	Unknown Aboveground Tank	AD	Further Action	Focused closure-oriented project	Rod & Wire Mill
Y	Pipe Mill Selenium Testing Area	AD	No Further Action	Former operations located indoors, low release potential	-----
Z	Pipe Mill Acid Tanks	AD	Further Action	Focused closure-oriented project	Rod & Wire Mill
AA	Pipe Mill Process Area	AI	No Further Action	-----	-----
AB	Rod and Wire Process Area	AI	No Further Action	-----	-----
-----	County Lands	-----	Further Action	Per DCCR, added as an AOC for evaluation	Greys Landfill Area (County Lands Parcel 1A)
-----	Central Supply Fuel Storage Tanks	-----	Further Action	Per DCCR, added as an AOC for evaluation	Outlier
-----	No. 10 Fuel Oil Tank	-----	Further Action	Per DCCR, added as an AOC for evaluation	Outlier
-----	Hot Strip Mill Drum Handling Area	-----	Further Action	Per DCCR, added as an AOC for evaluation	Outlier
-----	Coke Oven Gas Drip Legs	-----	Further Action	Per DCCR, added as an AOC for evaluation	Plant General
<b>Notes:</b>					
DCCR	Description of Current Conditions Report (January 1998)				

**RCRA Facility Report (RFA) Code**

- SD = SWMU Description included in Section 4.0 of the RFA Report
- AD= AOC Description included in Section 4.0 of the RFA Report in RFA Report
- I= Units located indoors and not observed to be releasing
- TP = Treatment process units managing waste not observed to be releasing
- NR = Units located outdoors but not observed to be releasing
- NH = Unit managing non-hazardous waste
- RS = Units that no longer exist and were removed from site
- AI = Additional information needed to assess potential for release
- CV = Units of concern, inability to assess which unit was releasing



Table 2  
Sparrows Point Remediation Plan

SITE AREAS	SWMU No.	SWMU, AOC, Non-RFA Area Name	Consent Decree Action Complete (yes/no)	Further Remediation Likely?(Low/Med/High)	Rationale for Remedial Action Trigger				Remedial Action Objectives
					Equipment Removed/To be Removed	Located Inside Building/Releases Not to Surface	Cleanup Work Complete/to be Completed with	Other/Description	
TIN MILL CANAL/FINISHING MILLS AREA	1	Tin Mill Canal (TMC)	NO	HIGH					Prevent potential future direct exposure to contaminated sediments located within Tin Mill Canal; • Mitigate impacts to stormwater conveyed by Tin Mill Canal and eliminate need for ongoing treatment of stormwater by wastewater treatment facility
	2	TMC Discharge Pipes	NO	LOW				Limited Impact to Site Condition	
	3	TMC Oil Skimming Devices	NO	LOW	XX				
	5	TMC Waste Oil Storage Tanks	NO	LOW	XX				
	7	Recent TMC Embankment Dredgings	NO	LOW			XX		
	8	TMC Brill Skimmer Pits	NO	LOW			XX	Pits replaced by tank units	
	9	Former TMC Oil Collection Dumpster	NO	LOW	XX				
	14	HCWWTP Spent Pickle Liquor (SPL) Discharge Point	NO	LOW				Beneficial reuse of SPL as wastewater treatment chemical, discharge point is to TMC	
	26	Chrome Recovery Filtrate Sump	NO	LOW		XX	XX		
	54	Coating Lines Blind Sumps	NO	LOW		XX	XX		
	58	Cold Sheet Mill Piping	NO	LOW		XX	XX		
	59	Tandem Mill Trench System	NO	LOW		XX	XX		
	71	PORI Oil / Water Separator	NO	LOW	XX				
	72	PORI Holding Tank	NO	LOW	XX				
	73	PORI Lagoon	NO	HIGH					Prevent potential future direct exposure to contaminated sediments ; • Mitigate impacts to stormwater conveyed by Tin Mill Canal and eliminate need for ongoing treatment of stormwater by wastewater treatment facility
	84	Tin Mill Trenches / Sumps	NO	LOW		XX	XX		
	86	Tin Mill Sump (Acid Area Monitoring)	NO	LOW		XX	XX		
	88	Halogen Lines Trenches / Sumps	NO	LOW		XX	XX		
	198	SPL Sump and Trench System	NO	LOW		XX	XX		
	--	AOC B: Former 1988 PCB Spill Area	NO	LOW		XX	XX		
--	AOC D: Former PCB Spill Area (Sheet Mill)	NO	LOW		XX	XX			
--	AOC I: Former 1991 Acid Leak Area	NO	LOW		XX	XX			
--	AOC J: Acid Tanks	NO	LOW	XX					
--	AOC S: Former Chromic Acid Spill Area	NO	LOW		XX	XX			
--	AOC T: Former Diesel Fuel UST (Cold Sheet Mill)	NO	LOW			XX			
--	AOC W: Spent Pickle Liquor Tanks	NO	LOW	XX					

Table 2  
Sparrows Point Remediation Plan

SITE AREAS	SWMU No.	SWMU, AOC, Non-RFA Area Name	Consent Decree Action Complete (yes/no)	Further Remediation Likely?(Low/Med/High)	Rationale for Remedial Action Trigger				Remedial Action Objectives
					Equipment Removed/To be Removed	Located Inside Building/Releases Not to Surface	Cleanup Work Complete/to be Completed with Demolition	Other/Description	
ROD AND WIRE AND PIPE MILLS AREA	27	Rod Mill Remediation Area	NO	HIGH					Prevent potential future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential for non-point source discharge of groundwater above acceptable risk-based concentrations and eliminate need for ongoing interim measure requiring pumping and treatment of groundwater
	28	Northwest Pond	NO	LOW				Investigated in 1986 - determined that no significant soil contamination was present in the former pond area.	
	29	East Pond	NO	HIGH					Prevent potential future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential for non-point source discharge of groundwater above acceptable risk-based concentrations and eliminate need for ongoing interim measure requiring pumping and treatment of groundwater
	30	Rod Mill Equalization Tanks	NO	LOW	XX				
	38	Cadmium Treatment Trenches	NO	LOW	XX				
	39	Rod Mill Scale Pits	NO	LOW	XX				
	44	Rod Mill Cooling Tower	NO	LOW	XX				
	45	Rod Mill Trenches/Sumps	NO	LOW	XX	XX			
	48	Pipe Mill Zinc Ammonium Chloride Sludge Storage Area	NO	LOW	XX				
	49	Pipe Mill Trenches / Sump	NO	LOW	XX	XX			
	53	Billet Prep Trenches and Blind Sumps	NO	LOW	XX	XX			
	--	AOC O: Hydraulic Oil Storage Area	NO	LOW	XX				
--	AOC X: Unknown Aboveground Tank	NO	LOW	XX					
--	AOC Y: Pipe Mill Selenium Testing Area	NO	LOW	XX					
--	AOC Z: Pipe Mill Acid Tanks	NO	LOW	XX					
HOT MILL AREA	62	Hot Strip Mill Basins	NO	LOW	XX	XX	XX		
	63	Hot Strip Mill Waste Oil Tank	NO	LOW	XX	XX			
	64	Hot Strip Mill Oil Skimming System	NO	LOW	XX				
	--	AOC A: Former 3/21/91 PCB Spill Area	NO	LOW		XX	XX		
	--	AOC K: Truck Dock #9's Former Diesel Spill & Diesel Fuel UST Area	NO	LOW			XX	Spill at UST area, remediation completed in 1990	
	--	AOC V: Former Spent Pickle Liquor Tanks (2)	NO	LOW	XX			Identified as non-releasing unit, removed in approximately 1986.	
	--	Hot Strip Mill Drum Handling Area	NO	LOW					
GREYS LANDFILL AREA	93	Greys Landfill	NO	LOW				compliance groundwater monitoring program in place	
	94	Greys Tar Decanter Cell	NO	MEDIUM					Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	--	County Land Parcel 1A--contractor area fuel and oil tanks	NO	LOW	XX		XX		
	--	County Land Parcel 1A--tank near Greys Landfill	NO	LOW	XX		XX		
	--	County Land Parcel 1A--former drum storage area	NO	LOW	XX		XX		
	--	County Land Parcel 1A--coal tar area	NO	MEDIUM					Prevent future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations

**Table 2**  
**Sparrows Point Remediation Plan**

SITE AREAS	SWMU No.	SWMU, AOC, Non-RFA Area Name	Consent Decree Action Complete (yes/no)	Further Remediation Likely?(Low/Med/H igh)	Rationale for Remedial Action Trigger				Remedial Action Objectives
					Equipment Removed/To be Removed	Located Inside Building/Releases Not to Surface	Cleanup Work Complete/to be Completed with Demolition	Other/Description	
COKE POINT AREA	105	Battery A Waste Oil Accumulation Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	108	Mechanical Shop Waste Oil Accumulation Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	112	B CCP Tar Storage Tank Containment Areas	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	113	B CCP Underground Weak Ammonia Pipeline	NO	HIGH	XX		XX		Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	114	B CCP Acid Tank Containment Pad	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	115	B CCP Acid Tanks	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	116	B CCP Ammonia Clarifier Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	117	B CCP Lime Collection Bin	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	118	B CCP Ammonia Stills (2)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	119	B CCP Ammonia Saturator	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	120	B CCP Acid Surge Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	121	B CCP Wash Oil Coolers (Spiral)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	122	B CCP Wash Oil Coolers (Shell and Tube)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	123	B CCP Wash Oil Decanters	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	124	B CCP Wastewater Holding Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	125	B CCP Wash Oil Circulating Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	126	B CCP Scrubbers	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	127	B CCP Waste Oil Bin	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	128	B CCP API Light Oil Separators (2)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	129	B CCP Muck Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
130	B CCP Million Gallon Weak Ammonia Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	
136	A CCP Sulfuric Acid Tank Containment	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	
137	A CCP Cyanide Stripper / Stack	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	
138	A CCP Oil / Water Separator	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	
139	A CCP Former Tar Decanters (3)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	

**Table 2**  
**Sparrows Point Remediation Plan**

SITE AREAS	SWMU No.	SWMU, AOC, Non-RFA Area Name	Consent Decree Action Complete (yes/no)	Further Remediation Likely?(Low/Med/High)	Rationale for Remedial Action Trigger				Remedial Action Objectives
					Equipment Removed/To be Removed	Located Inside Building/Releases Not to Surface	Cleanup Work Complete/to be Completed with Demolition	Other/Description	
COKE POINT AREA	140	A CCP Acid Saturator Tanks	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	141	A CCP Overflow Skimmer Box	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	142	A CCP Wash Oil Decanters	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	143	A CCP Scrubbers	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	144	A CCP Wastewater Holding Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	145	A CCP Wash Oil Holding Tank	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	146	A CCP Sump	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	147	B / L Oil / Water Separator	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	148	B / L Tank Sludge Staging Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	149	B / L Tank Sludge Accumulation Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	150	B / L Litol Plant Catalyst Drum Station	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	151	B / L Waste Oil Accumulation Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	152	B / L Litol Drum Staging Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	153	B / L Benzene Truck Loading Area	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	191	Coke Point Landfill	NO	MEDIUM					Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	192	Coke Oven Sweepings Pile	NO	LOW				combine with Coke Point Landfill	
	--	AOC L: Benzene / Litol Process Area (SWMUs 147-153)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	--	AOC M: A Coal Chemical Plant Area (SWMUs 136-146)	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	--	AOC N: Bio-Oxidation Ferric Chloride Spill Site	NO	LOW	XX			Contaminated surface materials at spill site removed.	
--	AOC P: Former Naphthalene Plant Tank & Pit	NO	HIGH	XX				Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	
--	AOC R: Underground Weak Ammonia Pipeline Spill Sites (3)	NO	LOW	XX					
--	AOC U: B Coal Chemicals Plant Process Area (SWMUs 112-130)	NO	HIGH					Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations	

Table 2  
Sparrows Point Remediation Plan

SITE AREAS	SWMU No.	SWMU, AOC, Non-RFA Area Name	Consent Decree Action Complete (yes/no)	Further Remediation Likely?(Low/Med/High)	Rationale for Remedial Action Trigger				Remedial Action Objectives
					Equipment Removed/To be Removed	Located Inside Building/Releases Not to Surface	Cleanup Work Complete/to be Completed with Demolition	Other/Description	
FURNACE AREAS	165	L Furnace Slag Piles	NO	LOW	XX			slag by-product materials	
	--	AOC H: Mason's Garage Area	NO	LOW	XX		XX	UST remediation.	
	195	Former ERS Oily Wastewater Tank	NO	LOW				Tank removed late 1980's	
	--	AOC C: Former ERS PCB Spill Area	NO	LOW	XX			Materials excavated and disposed off-site. Area backfilled with slag.	
HUMPHREY IMPOUNDMENT	190	Humphrey Impoundment	NO	MEDIUM					Prevent future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	4	TMC Dredging Containment Areas	NO	HIGH					Prevent future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
	6	TMC Impoundments	NO	HIGH					Prevent future direct exposure to contaminated surface soil; • Mitigate future leaching to groundwater; • Mitigate potential future non-point source discharge of groundwater above acceptable risk-based concentrations
PRIMARY ROLLING MILLS AREA	92	Plate Mill Scale Pit	NO	LOW			XX		
	194	Waste Oil Stabilization/Packing Area	NO	LOW	XX		XX		
	--	AOC F: Former Slab Cut Off Spill Area	NO	LOW			XX	No oil-stained soil observed during April 1997 site inspection	
	--	AOC G: Former Diesel Fuel Spill Area (Slab Haul Road)	NO	LOW			XX		
	--	AOC Q: Former Diesel Fuel UST Area (Slab Haul Road)	NO	LOW	XX		XX		
GENERAL	--	County Land Parcel 1B	NO	LOW				BERA work	
	--	County Land Parcel 2	NO	LOW				BERA work	
	--	County Land Parcel 3A	NO	LOW				land use	
	--	County Land Parcel 3B	NO	LOW				land use	
	--	Central Supply Fuel Storage Tanks	NO	LOW	XX				
	--	No. 10 Fuel Oil Tank	NO	LOW	XX		XX	UST remediation complete	
	--	Coke Oven Gas Drip Legs	NO	MEDIUM					
	196	Stormwater Sewer System	NO	LOW				NPDES coverage	
--	AOC E: 6 PCB Transformers	NO	LOW				Transformers replaced in 1995.		

## Table 3 REMEDIATION PLAN OUTLINE

FORMER RG STEEL FACILITY  
SPARROWS POINT, MARYLAND

April 4, 2014

Area of Concern	General Description of Impacts	Corrective Action/Remediation Objective Driver	Redevelopment Objective	Item or Task	Description of Activities to Complete	Technical Strategy For Closure	Expected Timeframe
Coke Oven Area	1. Contaminants of Concern (COCs) include benzene, naphthalene, and NAPL affecting primarily: <ol style="list-style-type: none"> <li>a. Subsurface fill and deeper soil</li> <li>b. Groundwater</li> </ol> 2. NAPL plume impacting several acres 3. Dissolved benzene/naphthalene plumes impacting shallow and intermediate GW 4. Potential off-site migration of impacted groundwater	1. Remove NAPL/source areas to mitigate continuing migration to GW 2. Mitigate benzene and naphthalene migration through groundwater to Point of Compliance (shoreline) and non-point source discharge of GW above acceptable risk-based concentrations 3. Mitigate potential off-site migration of benzene	Achieve closure of this Special Study Area (SSA) consistent with 1997 Consent Decree and/or the mechanism outlined within the Agreement between HRP Sparrows Point LLC (HRP), Sparrows Point LLC (SPLLC) and the Regulator(s).	Site Wide Investigation (SWI)/Interim Measure (IM) Upgrade Work Plan	<ul style="list-style-type: none"> <li>• Site Investigation Work</li> <li>• Groundwater fate and transport modeling</li> <li>• Risk Assessment</li> <li>• IM Upgrade Workplan</li> </ul>	Additional data collection required to scope final remedy; contemplated that groundwater modeling and risk assessment may be part of CMS.	12 to 24 Months from Closing: IM Upgrade Work Plans/CMS Completed and Submitted for Regulatory Approval.  12 to 36 Months from Approval: Corrective Measures Implementation Complete.  ~120 Months from CMI Completion: Semi-Annual groundwater monitoring.
				IM Upgrade Work	<ul style="list-style-type: none"> <li>• In-situ source area treatment</li> <li>• Removal/treatment of Cell 6 source materials</li> <li>• In-situ barrier/flow-thru treatment Cell 2</li> <li>• Operate pump and treat system Cell 2 temporary basis</li> <li>• Decommission Cells 1,3, and 6 and cell 2 (future)</li> <li>• Modify cells 4/5 to incorporate source area treatment</li> </ul>	Treat source areas with physical removal of NAPL materials followed by in-situ treatment of benzene and naphthalene; install an in-situ barrier (slurry wall ~60 ft. deep) for portion of area near Cell 2 to minimize migration of impacted groundwater to shoreline and shipyard area. Slurry wall may also incorporate funnel and gate features.	
				Corrective Measure Study (CMS)	<ul style="list-style-type: none"> <li>• Additional data collection Cell 4/5</li> <li>• Risk assessment</li> <li>• Alternative analysis</li> <li>• Engineering plans</li> </ul>	See above.	
				Corrective Measure Implementation (CMI)	<ul style="list-style-type: none"> <li>• In-situ source treatment Cell 4/5 area</li> <li>• Semi-annual groundwater monitoring 10 years</li> </ul>	See above.	
Humphrey Impoundment	1. COCs likely to include metals, organics, or oil & grease affecting: <ol style="list-style-type: none"> <li>a. Surface Material</li> <li>b. Groundwater</li> </ol>	1. Mitigate unacceptable future exposure to surface material 2. Mitigate future leaching to groundwater 3. Mitigate migration through groundwater to Point of Compliance (shoreline) and non-point source discharge of GW above acceptable risk-based concentrations	Achieve closure of this SSA consistent with 1997 Consent Decree and/or the mechanism outlined within the Agreement between HRP, SPLLC, and the Regulator(s).	CMS	<ul style="list-style-type: none"> <li>• BERA Results</li> <li>• Remedial action to be integrated with future development</li> <li>• Institutional controls to limit direct contact exposure pathway</li> </ul>	Final BERA submitted to agency in 2011 (requires agency approval); surgical hot spot removal (possibly as part of development); further investigation work may be needed for risk assessment or TMC dredge spoil containment areas; use modeling and risk-based approach through BERA and risk assessment to confirm no additional action required.	12 to 24 Months from Closing: CMS Completed and Submitted for Regulatory Approval.  12 to 24 Months from Approval: Corrective Measures Implementation Complete.
				CMI	<ul style="list-style-type: none"> <li>• Institutional controls, fencing, etc.</li> <li>• Regrading, establishment and delineation of permanent wetlands</li> <li>• Groundwater Monitoring</li> </ul>	Depending on risk assessment, may require additional GW monitoring.	~60 Months from CMI Completion: Semi-Annual groundwater monitoring .
Former Rod and Wire/Pipe Mill	1. Contaminants of Concern (COCs) include elevated cadmium and zinc affecting: <ol style="list-style-type: none"> <li>a. Surface soil</li> <li>b. Subsurface soil</li> <li>c. Groundwater</li> </ol> 2. Groundwater plume affects on the order of 3 to 10 acres	1. Mitigate future exposure to surface soil 2. Mitigate future leaching to groundwater 3. Mitigate migration through groundwater to Point of Compliance (shoreline) and non-point source discharge of GW above acceptable risk-based concentrations 4. Eliminate remedial GW discharge requiring treatment	Achieve closure of this area through the mechanism outlined within the Agreement between HRP, SPLLC, and the Regulator(s).	SWI/IM Upgrade Work Plan	<ul style="list-style-type: none"> <li>• IM Workplan</li> <li>• Site Investigation Work</li> <li>• Groundwater flow modeling (incl. fate &amp; transport)</li> <li>• Risk Assessment</li> <li>• IM engineering plan</li> </ul>	Define extent of area to be treated through additional sampling; sample for COCs and treatability parameters (grain size, etc.); update GW flow modeling and risk assessment to assist in development of remedial objectives and corrective measure.	12 to 24 Months from Closing and Regulatory Approval: Revised IM Work Plan and Construction Completion.  ~120 Months from Construction Completion: Completion of Semi-Annual groundwater and performance monitoring.
				IM Upgrade Work	<ul style="list-style-type: none"> <li>• IM Workplan</li> <li>• In-situ source area treatment</li> <li>• Excavation/removal of surface soil materials</li> <li>• Clean soil cover 5 acres</li> <li>• Decommission pump and treat system</li> </ul>	Source Area: In-situ stabilization (pozzolanic cement material) of impacted zones (estimated at an aggregate of 2 acres from the ground surface to a depth of approximately 20' to 30' below grade); decommission pump and treat system.  Downgradient/Shoreline Area: Possibly install continuous permeable reactive barrier (PRB) or funnel & gate PRB system using BOF slag, ZVI material (possibly in a replaceable "cassette" format); continuing groundwater monitoring.	
				CMS	<ul style="list-style-type: none"> <li>• Review of adequacy of IM as final corrective action</li> </ul>	Same as above	
				CMI	<ul style="list-style-type: none"> <li>• Semi-annual groundwater monitoring for 10 years</li> </ul>	Same as above; expect additional GW monitoring to confirm final remedy effective.	

### Table 3 REMEDIATION PLAN OUTLINE

FORMER RG STEEL FACILITY  
SPARROWS POINT, MARYLAND

April 4, 2014

<u>Area of Concern</u>	<u>General Description of Impacts</u>	<u>Corrective Action/Remediation Objective Driver</u>	<u>Redevelopment Objective</u>	<u>Item or Task</u>	<u>Description of Activities to Complete</u>	<u>Technical Strategy For Closure</u>	<u>Expected Timeframe</u>
Tin Mill Canal (TMC)/Finishing Mills	1. COCs include elevated metals, organics or oil & grease affecting: a. Canal sediment and banks b. Stormwater conveyed by canal 2. Affected area appears to include entire length and width of the canal	1. Mitigate future exposure to sediment and banks 2. Eliminate potential future discharges from process outfalls to canal 3. Mitigate COC impact to stormwater conveyed by canal 4. Eliminate discharge of stormwater requiring treatment by HCWWTP	Achieve closure of this SSA consistent with 1997 Consent Decree and/or the mechanism outlined within the Agreement between HRP, SPLLC, and the Regulator(s).	TMC Sediment Removal Work Plan	<ul style="list-style-type: none"> <li>Investigation Work</li> <li>Engineering Plans</li> </ul>	Additional data collection required to define area of sediments that require removal and to provide a waste characterization.	Timing somewhat dependent on ongoing demolition activities. Also timing may tie in with development activities. <u>12 to 24 Months from Closing:</u> Investigative Work, Engineering Plans, CMS Completed and Submitted for Regulatory Approval. <u>12 to 24 Months from Approval and Completion of Nearby Demolition Activities:</u> Sediment removal and channel stabilization complete.
				TMC Sediment Removal and Channel Stabilization	<ul style="list-style-type: none"> <li>Sediment Removal and Disposal</li> <li>TMC stabilization with rip rap</li> </ul>	Plan to remove and dispose of impacted sediments; assume approximately 50,000 - 60,000 cu yds. of material to be removed; assume approximately 75% non-hazardous and taken to Greys Landfill and approximately 25% hazardous and taken off-site for proper disposal; backfill will consist of rip rap from clean demo materials, slag aggregate, etc.	
				CMS	<ul style="list-style-type: none"> <li>Coordination with NPDES requirements, surface water discharge modeling</li> </ul>	Conduct surfacewater modeling and risk assessment to demonstrate meet objectives at the point of compliance (outfall discharge point).	
				CMI	<ul style="list-style-type: none"> <li>Stormwater retention basin(s), possible constructed wetland treatment, gravity discharge to bypass HCWWTP (design dependent upon site development requirements)</li> </ul>	Stormwater retention basin(s), or possibly constructed wetland treatment may be effective solutions (design dependent upon site development requirements).	
Greys Landfill Area (County Lands)	1. COCs include VOCs or SVOCs affecting: a. Surface soil b. Groundwater 2. Areas affected include Spare parts/ Contractor's Area; former County Lands; Small source of VOC impact	1. Mitigate future exposure to surface soil over a 5 to 10 acre area (to be further defined) 2. Mitigate future leaching to groundwater 3. Mitigate migration through groundwater to Point of Compliance (shoreline) and non-point source discharge of GW above acceptable risk-based concentrations	Achieve closure of this area through the mechanism outlined within the Agreement between HRP, SPLLC, and the Regulator(s). Possibly through the Maryland Department of Environment (MDE) Voluntary Cleanup Program (VCP) or similar process.	CMS	<ul style="list-style-type: none"> <li>Additional data collection</li> <li>Risk assessment</li> <li>Alternative analysis</li> </ul>	Additional data collection required to define area of GW impacts.	<u>12 to 24 Months from Closing:</u> Investigative Work, Risk Assessment, Alternatives Analysis Completed and Submitted for Regulatory Approval. <u>12 to 24 Months from Approval:</u> In-Situ Source Treatment and Cover Completed. <u>~60 Months from Construction Completion:</u> Semi-Annual Groundwater Monitoring.
				CMI	<ul style="list-style-type: none"> <li>In-situ source treatment</li> <li>Cover materials placed over approximately 10 acres</li> <li>Groundwater monitoring</li> </ul>	Apply 1 to 2 applications of in-situ treatment followed by groundwater monitoring activities; anticipate that some cover material may be placed over 5 to 10 acres to mitigate contact exposure; use modeling and risk assessment to demonstrate compliance.	
Greys Landfill Operation, Closure and Post Closure Care	1. Operating landfill that will require closure by placement of final cover and post closure care 2. Limited occurrence(s) of elevated metals, benzene or naphthalene affecting local GW	1. Closure at end of operating life 2. Mitigation of migration to groundwater	Certification of Closure from the MDE and Certification that Post Closure Care requirements have been met	Active landfill operation	Anticipate landfill will operate for approximately 5 years accepting non-hazardous remediation waste, HCWWTP sludge, groundwater monitoring	Plan to keep active until reach closure elevation; anticipate that approximately 300,000 - 400,000 cu yds. remain available.	<u>12 to 24 Months from Acceptance of Final Load of Waste (or as otherwise specified in the permit):</u> Final closure of landfill complete. <u>60 Months from Final Closure:</u> Post-Closure Monitoring complete as specified in permit/Consent Decree.
				Final Closure	Per the approved engineering design, continuation of closure cap from 85' bench	Will close in accordance with approved Landfill Closure Plan.	
				Post Closure Care	A minimum of 5 years.	Estimated that Post Closure Care will last a minimum of 5 years.	

### Table 3 REMEDIATION PLAN OUTLINE

FORMER RG STEEL FACILITY  
SPARROWS POINT, MARYLAND

April 4, 2014

<u>Area of Concern</u>	<u>General Description of Impacts</u>	<u>Corrective Action/Remediation Objective Driver</u>	<u>Redevelopment Objective</u>	<u>Item or Task</u>	<u>Description of Activities to Complete</u>	<u>Technical Strategy For Closure</u>	<u>Expected Timeframe</u>
Coke Point Landfill Closure and Post Closure Care	1. Non-operating landfill requiring closure by placement of final cover and post closure care 2. Limited occurrence(s) of elevated metals, benzene or naphthalene affecting local GW	1. Closure of this non-operating landfill 2. Potential mitigation to groundwater; transport to shoreline point of compliance	Certification of Closure from the MDE and Certification that Post Closure Care requirements have been met	Final Closure	<ul style="list-style-type: none"> <li>• Conceptual design</li> <li>• Final engineering design</li> <li>• Closure cap installation</li> </ul>	Due to location in close proximity to shoreline and high profile nature, expect that acceptance for additional use of this landfill will be extremely difficult to achieve; In process of proposing to reduce footprint of landfill to 20 acres for closure obligation; anticipate closure plan to look similar to Greys with no interim closures and a 3-layer cap on level areas and 1-layer cap on side slopes.	Expect to finalize a Closure Plan during 2015. <u>12 to 24 Months from Closing:</u> Closure Plan Submitted for Regulatory Approval. <u>12 to 24 Months from Approval:</u> Closure Construction Complete.
				Post Closure Care	A minimum of 5 years.		
Site Wide Work (outside of SSAs)	1. Unknown; Phase I ESA in process; RECs will be evaluated to assess whether further assessment is warranted. 2. COCs anticipated to be consistent with site-wide conditions and include hazardous substances and petroleum products.	Anticipate that drivers will be consistent with the process set forth by the MDE VCP.	Achieve closure of select areas parcel by parcel through the mechanism outlined within the Agreement between HRP, SPCCL, and the Regulator(s). Possibly through the MDE VCP or similar process.	Phase I ESA	<ul style="list-style-type: none"> <li>• Complete Phase I ESA; identify RECs that fall outside of SSAs</li> <li>• Evaluate whether additional assessment is warranted</li> </ul>	Risk-based remediation and closure approach anticipated to include institutional controls or engineered barriers; dependent on results of the Phase I ESA and Phase II ESA (if needed).	Phase I ESA to be completed as part of due diligence activities prior to Closing. Select Phase II ESA activities may be completed prior to Closing. <u>12 to 24 Months from Closing:</u> Complete additional investigation as needed and evaluate need for remediation.
				Phase II ESA	<ul style="list-style-type: none"> <li>• Perform Phase II ESA work in areas selected for further assessment</li> <li>• Evaluate human health risk pathways focused on worker exposure/future development</li> <li>• Develop plan to mitigate identified exposures</li> <li>• Evaluate risk-based closures through use of institutional controls and engineered barriers</li> </ul>		
				Remediation Implementation (if needed)	<ul style="list-style-type: none"> <li>• Implement remediation in areas unable to be closed through risk-based options</li> <li>• Prepare appropriate reports documenting compliance with remediation objectives</li> </ul>		