PROJECT OVERVIEW

Site Assessment for Proposed Coke Point Dredged Material Containment Facility at Sparrows Point

Capacity of existing placement sites for dredged material from the Baltimore Harbor remains extremely limited, resulting in an ongoing need to study, select, and implement new sites capable of accepting dredged material from the navigation channels within the Baltimore Harbor. The Coke Point Peninsula (the Peninsula) on the Sparrows Point property (Figure 1) was identified as a potential location to construct a Dredged Material Containment Facility (DMCF) for placement of dredged material from Baltimore Harbor through an extensive screening process by the Maryland Port Administration (MPA) and the Harbor Team (a group of community members, citizens groups, and local government officials). The Sparrows Point Facility is located on approximately 2,300 acres on the north side of the Patapsco River in Baltimore County, Maryland, approximately nine miles southeast of downtown Baltimore. The Coke Point Peninsula comprises about 300 acres of the Sparrows Point property.

Figure 1. ***Coke Point Peninsula on the Sparrows Point Facility.***

The Sparrows Point Facility has a long history of steelmaking activities. Coke production facilities (which were located on the Coke Point Peninsula) were built in the 1930s and operated until 1991. Previous investigations of environmental conditions on the Coke Point Peninsula, which focused on groundwater, indicated that concentrations of multiple organic compounds and metals at the site exceed background concentrations and/or regulatory standards (CH2M 2001, 2002; URS 2005a, 2005b, 2006). These reports concluded that the Coke Point Peninsula, particularly the Coke Oven Area on the Peninsula, is the most impacted portion of the Sparrows Point Facility (USEPA 2009). Of particular concern were materials associated with the steelmaking process, including petroleum oils and coal tar, which are generally referred to as light non-aqueous phase liquids (LNAPLs) and dense non-aqueous phase liquids (DNAPLs).

Prior to the design/construction of a DMCF, a property transaction would be required between MPA and the current property owner. Because groundwater and soil impacts from historical activity on the Peninsula were suspected to have degraded the offshore surface water and

sediment quality, MPA required additional onshore and offshore environmental information before moving forward with consideration of its options regarding the property.

Figure 2. ***Sampling Locations and Areas of Concern. Yellow dots show onshore and offshore sampling locations; yellow hatching shows onshore areas of concern; blue arrows indicate direction of shallow groundwater flow.***

This Site Assessment was undertaken during the summer of 2009 and describes the extent of impacts on the Peninsula and in offshore sediment and surface water. The study focused on three onshore source areas that were identified as having the highest concentrations of organic constituents in groundwater – the Benzol Processing and Graving Dock Areas on the northwestern portion of the Peninsula, and the Coal Tar Storage Area on the eastern portion of the Peninsula (Figure 2).

The onshore and offshore investigations included a drilling component to characterize soil and sediment impacts. Soil and sediment cores were assessed in the field for indications of NAPL, and samples from each location were collected for chemical analysis (volatile organic compounds [VOCs], polycyclic aromatic hydrocarbons [PAHs], and metals). Monitoring wells were also installed onshore, in areas where there were indications of NAPL.

The Benzol Processing Area and the Coal Tar Storage Area on the Peninsula were found to be source areas of various organic constituents, including benzene, ethylbenzene, toluene, and PAHs (especially naphthalene). Each of these constituents is a byproduct of the steelmaking operations, specifically the coke production and byproduct processing, which occurred historically on the Coke Point Peninsula.

Organic constituents from the Peninsula appear to be migrating to surface waters of the Patapsco River and the Turning Basin (off the eastern shore of the Peninsula) through groundwater flow (Figure 3). This is indicated by the association between organic constituents found in groundwater and those found in offshore surface waters. Although metals were also found to be present in groundwater (URS 2005a, 2006) at concentrations above standards set by the Maryland Department of the Environment (MDE 2008), mass flux modeling indicates that metals concentrations in groundwater were not high enough to cause adverse impacts to surface water. However, sediments around the Peninsula have high concentrations of metals and PAHs (Figures 3 and 4), with many constituents present at concentrations that are substantially higher than risk-based sediment quality screening criteria for aquatic life. PAH fingerprint analysis, which identifies the sources of PAHs by comparing the specific PAH signature of the tested

material to the PAH signature of known sources, suggested that the degraded sediment quality is related to historical industrial practices at Sparrows Point.

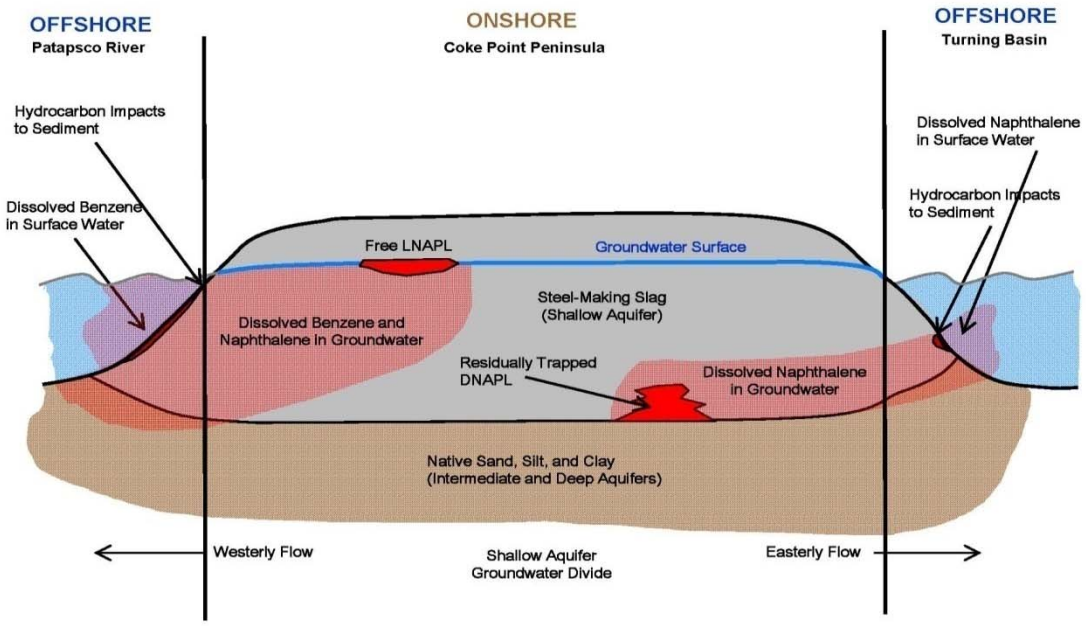

Figure 3. ***Conceptual diagram showing groundwater, surface water and sediment impacts at the Coke Point Peninsula based on MPA investigation.***

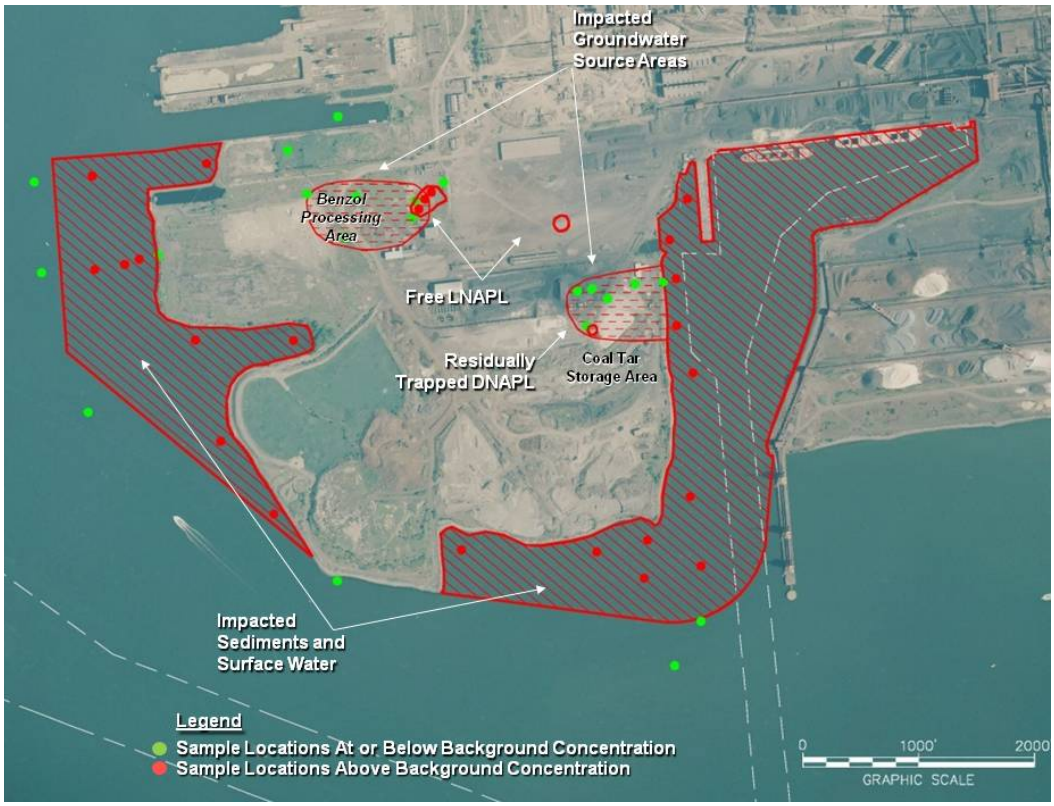

Figure 4. ***Locations with concentrations of benzene, ethylbenzene, toluene, and/or PAHs above background.***

Various remedial technologies and process options (Remedial Options) were considered in a preliminary screening level evaluation (not intended to replace a Resource Conservation and Recovery Act [RCRA] corrective measures study) to address potential alternative measures for impacted onshore and offshore areas on and around the Peninsula (Figure 5). Remedial Options that were incompatible with future DMCF use or site conditions were not considered further. Options that were retained during the preliminary screening evaluation include:

- ***Onshore NAPL Removal*** - *Multi-Phase Extraction* (removal of impacted groundwater, separate-phase petroleum product, and/or hydrocarbon vapor using a high-vacuum system) and *Surfactant Enhanced Product Recovery* (addition of non-toxic food-grade surfactants to mobilize and recover NAPL from impacted regions of the subsurface);
- ***Onshore Groundwater Containment/Control*** - *Slurry Wall Containment* (trenches filled with a low-permeability semi-liquid mixture of soil, bentonite, and water, to cut off, contain, or divert impacted groundwater) and *Aerobically Enhanced Bioremediation* (adding oxygen into groundwater to stimulate biodegradation of organic constituents);
- ***Isolation of Onshore Slag Fill Material*** - *DMCF Capping* (placement of low permeability dredged material over the existing land surface) and *Engineered Capping* (placement of low-permeability geotextiles, liners, or clay material from offsite over the existing land surface); and
- ***Removal and/or Isolation of Offshore Impacted Sediments*** - *DMCF Capping* (low permeability dredged material placed offshore within the dikes constructed for the DMCF), *Offshore Impermeable Capping* (placing a layer of low-permeability material at a thickness of up to 5 feet over impacted sediments), and *Dredging* (removing impacted sediments for placement on land).

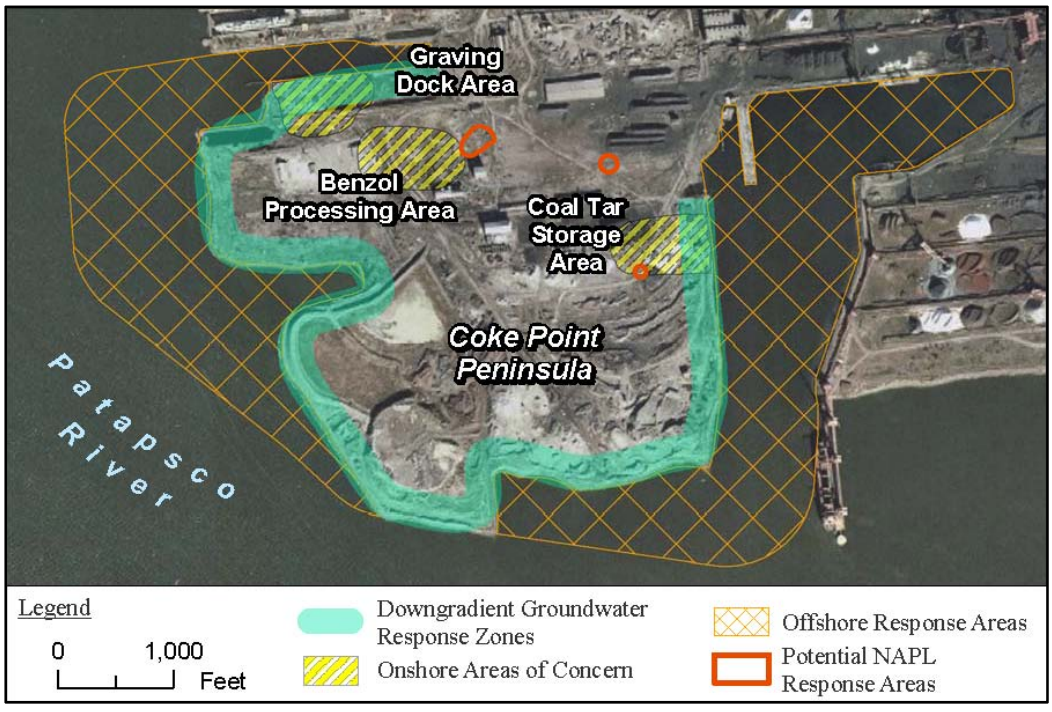

Figure 5. ***Areas Potentially Requiring Environmental Response Actions.***

It should be noted that the preliminary screening evaluation only identifies and describes the Remedial Options evaluated, and indicates that certain Remedial Options have been screened out. However, the preliminary evaluation indicates that several Options (in particular, capping and containment remedies) would be feasible, implementable, and effective corrective measures for protection of human health and the environment given the conditions at the Site, and could be seamlessly implemented with DMCF construction. If MPA were to acquire the Coke Point Peninsula for use as a DMCF, the Remedial Options for the impacted media would be further evaluated within the framework of a RCRA Corrective Measures Study (CMS).

It is important to stress the preliminary nature of this screening evaluation, and the fact that the MPA has not finished its executive deliberations on Remedial Options under consideration, or on other matters related to acquiring a portion of the Sparrows Point Property. Once MPA's internal deliberations are complete, they anticipate that any recommendations arising from their deliberations would be shared and discussed with the Harbor Team. Further, any Remedial Options that could ultimately serve as corrective measures at the site will need to be further evaluated within the framework of the RCRA CMS process in accordance with MDE and US Environmental Protection Agency (USEPA) review and concurrence.

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