Summary of the Phase I Offshore Investigation Report for the Sparrows Point Site, March 2016

The Sparrows Point Site in Baltimore County, Maryland is the location of a historic and long operating steel-making facility that ceased all operations in 2012. The Site is surrounded by Bear Creek, the Patapsco River, and Old Road Bay. The facility has been subject to a Maryland Department of the Environment (MDE) and U.S. Environmental Protection Agency Region III (EPA) multimedia Consent Decree since 1997 to investigate hazardous releases from the facility. The Sparrows Point Environmental Trust was established in 2014 to investigate offshore areas for facility-related releases of hazardous waste and/or chemicals, excluding those areas previously investigated by the Maryland Port Administration (offshore area surrounding Coke Point). The Sparrows Point Environmental Trust contracted EA Engineering, Science, and Technology, Inc., PBC to conduct the investigation with oversight by MDE and EPA.

The investigation area, termed Phase I, extended along the Bear Creek shoreline from the Tin Mill Canal outfall to the northern property boundary. The purpose of the Phase I Investigation was to collect sufficient offshore data to conduct ecological and human health risk assessments for the Phase I area. These assessments were based on identification of Site-related impacts to the offshore environment. Existing on-site groundwater and stormwater data was used for this identification, as these are the only current potential sources from the Site. The investigation included the collection and analysis of near-shore sediment samples, sediment pore water samples, and stormwater samples. In addition, a second round of sampling included sediment cores collected from the area surrounding the Tin Mill Canal outfall after initial results indicated that likely historical wastewater discharge from this outfall continues to pose risks.

Based on the results, the Phase I area was divided into southern and northern data groups for the risk assessments. The Southwest/Tin Mill Canal (SWTM) data group has silt/clay sediments with evidence of impacts from historical Tin Mill Canal effluent, while the Northeast/Near Shore (NNS) data group has coarser sediments with less observable impact. The risk assessments used the following data: sediment data collected in the investigation, surface water concentrations modeled from the collected stormwater data, fish and crab tissue data collected from Coke Point and Sollers Point in Fall 2010, and estimates of fish and crab tissue concentrations from the sediment and modeled surface water data of the investigation.

The chemicals evaluated for the NNS risk assessments included those found in perimeter groundwater and stormwater samples. The NNS ecological risk assessment concluded that sediment chromium and zinc as well as cyanide in surface water (only during storm events) may pose risk to aquatic and benthic organisms. Aquatic organisms live in the water column (e.g., fish) and benthic organisms reside on or within the bottom sediment (e.g., mussels, worms). Exposure to the NNS-related sediment and surface water chemicals was modeled for foraging wildlife via the foodchain, and found to pose no excess risk to wildlife.

In contrast, all analyzed chemicals were included in the SWTM risk assessments, since these could have been present in historical Tin Mill Canal discharges. The SWTM ecological risk assessment concluded that sediment metals, total polycyclic aromatic hydrocarbons (PAHs), total polychlorinated biphenyls (PCBs), and oil and grease likely pose risk to aquatic and benthic organisms, as well as cyanide in surface water (only during storm events). In addition, modeling of exposure to foraging wildlife of the SWTM chemicals via the foodchain found excess risk to wildlife from total PCBs and selenium.

The human health risk assessments evaluated potential recreational users for the NNS and SWTM areas, as well as commercial fishermen (watermen). Adults, adolescents (6 – 16 years old), and children (3 – 6 years old) were considered recreational users, with potential swimming exposure (including dermal contact with sediments) and fish/crab ingestion exposure. The recreational users were assumed to swim on a limited basis, four days/year, due to the unattractive nature of this industrialized shoreline compared to residential and park areas across Bear Creek. Recreational users were assumed to consume 16 crab meals and 16 fish meals per year obtained from this specific offshore area (2 days/week spent fishing during warm months). These conservative consumption assumptions exceed the existing MDE fish consumption advisories for the Patapsco River/Baltimore Harbor waterbody. The MDE consumption advisory for blue crab in Baltimore Harbor allows for 6 meals/month for adults, and 5 for children, excluding crab "mustard"; however, blue crab are typically physically present in these waters only during the mid and late summer season. Consumption advisories for all other fish species in Baltimore Harbor range from "avoid" to "one every other month." Watermen were conservatively assumed to fish in the offshore area one day/week during the entire fishing season for a total of 39 days, consuming 19.5 fish meals and 19.5 crab meals.

EPA has established an acceptable excess cancer risk range of 1 in 10^{-4} to 1 in 10^{-6} and a non-cancer target hazard of 1, for evaluating the results of human health risk assessments in relation to the need for remediation or corrective action should results exceed the acceptable risks or hazards. MDE has established a more conservative acceptable excess cancer risk range of 1 in 10^{-5} to 1 in 10^{-6} and the same non-cancer target hazard of 1. To place the cancer risk ranges in context, it is important to recognize that the existing lifetime risk of developing cancer in the U.S. population ranges from 1 in 2 to 1 in 3, highlighting the protective nature of the Agencies' acceptable cancer risk ranges.

The results of the human health risk assessment for the NNS portion of the offshore area indicated no excess cancer risk or hazard for consumption of field-collected fish and crab, and no excess risk for the swimming exposure assumptions. The assessment of exposure to field-collected fish and crab is the most realistic scenario. The results of the NNS assessment of consumption of modeled fish and crab exceeded MDE's more conservative acceptable cancer risk range, but not EPA's. The modeling appeared to over-predict bioaccumulation of PAHs into fish and crab compared to the field-collected fish and crab data.

The results of the human health risk assessment for the SWTM portion of the offshore area also found no excess risk for the swimming exposure assumptions. For consumption of field-collected fish and crab, the assessment indicated exceedance of MDE's more conservative acceptable cancer risk range, but not EPA's. It is important to note that the risk assessment assumed far greater consumption than that recommended in the MDE fish consumption advisories for the bay area. The non-cancer hazard was acceptable for the field-collected data. The results of the SWTM assessment of consumption of modeled fish and crab exceeded both Agencies' acceptable cancer risk ranges and target hazards. The modeling appeared to greatly over-predict PCB bioaccumulation into fish and crab compared to the field-collected fish and crab data.