Preassessment Screen Determination for the Hanlin-Olin-Allied Superfund Site

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West Virginia Division of Natural Resources,
West Virginia Department of Environmental Protection,
and
United States Department of the Interior, U.S. Fish and Wildlife Service
In their Capacity as the Trustees of Natural Resources

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I. Introduction, Authorities, and Delegations

This determination addresses potential claims for damages to natural resources of the Ohio River and adjacent ecosystems, at and from the Hanlin-Allied-Olin Superfund Site ("Site"), authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), 42 U.S.C. §§ 9601 *et seq.*, as amended, the Clean Water Act ("CWA"), 33 U.S.C. §§ 1251 *et seq.*, as amended, and other applicable Federal and state laws. The U.S. Department of the Interior ("DOI"), acting through the U.S. Fish and Wildlife Service ("Service"), West Virginia Department of Environmental Protection, and the West Virginia Division of Natural Resources ("WVDNR") (collectively, the "Trustees") have determined, based on a review of relevant information gathered as of this date, that it is appropriate to undertake a Natural Resource Damage Assessment ("NRDA") in regard to the Site.

Pursuant to the authority of section 107(f) of CERCLA, 42 U.S.C. § 9607(f), and other applicable Federal and state laws, designated Federal and state authorities may act on behalf of the public as natural resource trustees to pursue claims for natural resource damages for injury to, destruction of, or loss of natural resources resulting from the release of hazardous substances to the environment. Claims may be pursued against parties that have been identified as responsible for releasing hazardous substances to the environment.

The first step in developing a natural resource damages claim is the preparation of a preassessment screen. The purpose of a preassessment screen is to provide a review of readily available information on hazardous substance releases and the potential impacts of those releases on natural resources. The review should ensure that there is a reasonable probability of making a successful claim against parties responsible for releasing hazardous substances to the environment.

This determination was prepared in accordance with the preassessment screen provisions of the Federal regulations for Natural Resource Damage Assessments under CERCLA, 43 CFR Part 11, Subpart B, sections 11.23 through 11.25 (USDOI 1994). The natural resource trustees for the Site who have participated in the preparation of this preassessment screen are the Division of Natural Resources and the Department of Environmental Protection acting on behalf of the State of West Virginia, and the Northeast Regional Director of the U.S. Fish and Wildlife Service acting as Authorized Official on behalf of the Secretary of the Department of the Interior (collectively, the "Trustees").

The President has designated Federal resource trustees in the National Contingency Plan ("NCP"), 40 CFR § 300.600, and through Executive Order 12580, dated January 23, 1987, as amended by Executive Order 13016, dated August 28, 1996. Pursuant to the NCP, the Secretary of the DOI acts as a trustee for natural resources and their supporting ecosystems, managed or controlled by the DOI. In this matter, the Service is acting on behalf of the Secretary of the DOI as trustee for natural resources under its jurisdiction, including but not limited to migratory birds and endangered and threatened species. In accordance with 42 U.S.C. § 9607(f)(2)(B), the NCP and West Virginia Code §20-2-3, the Director of the West Virginia Division of Natural Resources has been designated the natural resource trustee by the Governor of West Virginia. The State trustees act on behalf of the public as trustee for natural resources, including their supporting ecosystems, within the boundaries of their state, or belonging to, managed by, controlled by, or appertaining to West Virginia. The State trustee has or shares trusteeship with the Service over the natural resources potentially affected in this matter. This shared trusteeship is reflected in the coordinated wildlife management practices of the Service and West Virginia, and is consistent with the management policies of West Virginia and the Service.

II. Preassessment Screen Criteria

Title 43 CFR Part 11.23(e) notes the five criteria that must be met before proceeding with a NRDA. The criteria are as follows:

(1) A release of a hazardous substance has occurred;
(2) Natural resources for which the trustees may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the release;
(3) The quantity and concentration of the released hazardous substance is sufficient to potentially cause injury to natural resources;
(4) Data sufficient to pursue an assessment are readily available or likely to be obtained at a reasonable cost; and,
(5) Response actions if any, carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

Based on a review of relevant information gathered as of this date, the Trustees have determined that the above criteria have been met and that it is appropriate to undertake a Natural Resource Damage Assessment in regard to the Site.

III. Information on the Site and Discharges or Releases

III.1 Hanlin-Allied Olin Superfund Site

The Site is located in Marshall County, West Virginia, approximately three miles south of Moundsville. The 382-acre Site contains a former chlor-alkali manufacturing facility that released various contaminants, most notably mercury, into on-site floodplain soils, wetlands, and the adjacent Ohio River. Beginning in 1987, the Site was under investigation under the Resource Conservation and Recovery Act ("RCRA"). On June 22, 1999, the Site was listed in the National Priority List ("NPL") under the CERCLA. Releases of hazardous substances have impacted surface soils, subsurface soils, surface water, groundwater and floodplains on the Site (Figure 2).

From 1953 to 1980, Allied Signal, Inc. operated the entire Site to produce various chemicals. In 1980, the southern portion of the Site was sold to LCP Chemicals-West Virginia. LCP Chemicals-West Virginia underwent a name change and is currently Hanlin Chemicals-West Virginia (Hanlin). In 1981, Allied Signal sold the northeast portion of its facility to Olin Corporation (Olin). Allied Signal retained the northwest potion of the site called Allied Park. In 1991, Hanlin Chemicals filed for Chapter 11 bankruptcy. In 2000, Allied Signal, Inc. also underwent a name change and merged with Honeywell International Inc. (Honeywell) and in 2001, Honeywell reacquired the Hanlin Area. Currently, the two potentially responsible parties ("PRPs") at this Site are Olin Corporation and Honeywell International Inc.

The Site is divided into areas named after the historic ownership of three potentially responsible parties: Olin Corporation, Allied Signal Inc., and Hanlin Chemicals – West Virginia. The 44-acre Allied Park Area in the northwest portion of the Site contained several ponds and solid waste disposal units. No processing was conducted there and the existing units have been closed.
The Olin Area consists of 137 acres in the northeast. At the Olin Area, the primary activities were the production of aniline, nitrobenzene, methylene dianiline (MDA), dinitrotolune (DNT), toluenediamine (TDA), and toluene diisocyanate (TDI) until production was shut down in 1984. Following the shutdown,

Olin conducted a phased decommissioning of this area. By 1989, the equipment had been removed and all buildings demolished. The portion of the Olin Area outside of the floodplain has been redeveloped and now houses the Williams Energy Natural Gas Processing Facility. The floodplain portion is relatively flat with open fields, forested areas, and an emergent wetland. The area also contains water storage ponds and a solid waste disposal unit.

The Hanlin Area consists of the 201-acre southern portion. From approximately 1953 to 1991, the mercury cell chlor-alkali plant released hazardous substances, including mercury, into the Ohio River and its riparian areas. During Site operations, waste water containing mercury was discharged into the Ohio River from an outfall near River Mile 106. LCP Chemicals-West Virginia, Inc. discharged mercury into the Ohio River above permitted levels of mercury once in 1981, twice in 1982, and once in 1990. Until 2000, the companies continued to discharge water contaminated by hazardous substances into the Ohio River in excess of Clean Water Act and State Water Pollution Control Act requirements (WVDEP Order 4330, 2000). In August 2000, Honeywell signed WVDEP Order 4330 which required installation of a waste water treatment plant to remove a minimum of 90% of organic and inorganic contaminants. The treatment plant still functions under this WVDEP Order without numeric discharge limits for mercury to protect aquatic resources and prevent risk to upper trophic level consumers of aquatic prey. In support of providing substantive requirements pursuant to a request from EPA, WVDEP provided EPA with discharge limits consistent with National Pollution Discharge Elimination System requirements. Discharge Monitoring Reports, which contain analytical for mercury analysis of plant effluent, indicate that mercury effluent concentrations consistently exceed the discharge limits identified as substantive requirements above.

EPA and WVDEP investigations conducted at the Site revealed that on-site soils were contaminated with mercury from releases during plant operations. The areas around the former mercury cell building had the highest concentration of contaminated soils. Pursuant to a 1995 Administrative Order of Consent (AOC) between the U.S. Environmental Protection Agency (EPA) and Allied Signal (now Honeywell), the Hanlin and Allied Park Areas underwent various decommissioning and demolition activities, including contaminated soil consolidation into capped waste management units. The Site was flooded three times during this period; in 1996, 2004, and 2005. Floodwaters likely carried contaminated soils from the site into the Ohio River. Under a 2001 Administrative Order, Honeywell and Olin were charged with conducting a Remedial Investigation (RI) and Feasibility Study (FS) to address groundwater and soil contaminations. The remedial investigation to assess the risk of the remaining contaminated soils including those in the floodplain and wetlands has been completed. The Feasibility Study for these soils is currently in progress. The groundwater and the Ohio River are part of a separate Operable Unit which will be completed following the soils remediation.

Mercury released from the Site into the soil and groundwater, along with mercury discharged from the historic wells, the abandoned storm sewer system, and the current treatment plant has contaminated the aquatic, island, and floodplain habitats within the Hannibal Pool of the Ohio River. A joint study by USGS and EPA is currently underway to determine the extent and sources of mercury within this Pool. The boundaries of the affected area may be further defined and amended as more data become available.

III.2 Ohio River

The 981-mile Ohio River is formed by the confluence of the Allegheny and Monongahela Rivers at Pittsburgh, PA and drains into the Mississippi River at Cairo, IL. The Ohio River is a historically important waterway for transport and industry and remains one of the busiest waterways in the United States. Within the vicinity of the Site, the Ohio River is controlled by a series of locks and dams. The Site is located between river mile (RM) 104 to 107. The Site is within an area called Hannibal Pool, which is

delineated as the reach between Pike Island Lock and Dam (RM 84.2) and Hannibal Lock and Dam (RM 126.4).

Sport fishing is popular at many locations within the Hannibal Pool. Mercury concentrations in sport fish collected in this Pool exceeded advisory levels when mercury sampling became routine in 1987 (ORSANCO 2018; http://www.orsanco.org/data/fish-tissue/). Current mercury criteria for fish consumption would to limit anglers to one meal per month for two species and to one meal per week for all other species.

III.3 Ohio River Islands National Wildlife Refuge

Despite being heavily polluted, the Ohio River supports diverse aquatic and terrestrial ecosystems, including some of the richest freshwater mussel fauna (USFWS 2004). The Ohio River Islands National Wildlife Refuge was established in 1990 to protect these ecosystems. Hannibal Pool contains three Refuge islands. Wheeling Island is located 17 river miles upstream of the Site, while Captina Island and Fish Creek Island are located 1.5 and 6 river miles downstream of the Site, respectively. In addition, the Captina Mainland area, one of the Refuge's terrestrial floodplain habitats, is located 0.5 river miles downstream of the Site. These areas contain near natural assemblages of plants and animals that are endemic to the river. The interspersion of bottomland and riparian habitats, and deep and shallow water aquatic habitats makes these areas extremely valuable to fish and wildlife species. Waterfowl, shore and wading birds, raptors, neo-tropical migratory land birds, furbearers, fish, aquatic salamanders, and benthic organisms, including freshwater mussels, use these areas for resting, feeding, nesting, spawning, and other necessary life functions. The deep and shallow water habitats associated with the islands are important fish, amphibian and mussel production areas of the Ohio River. Additionally, all refuge properties, including Captina Island and Mainland, are open to the public for sport fishing.

III.4. Damages Excluded from Liability under CERCLA or CWA

The regulations in 43 C.F.R. § 11.24 provide that the Trustees must determine whether the damages being considered are barred by specific defenses or exclusions from liability under CERCLA or the Clean Water Act (CWA). The Trustees have made such determinations and believe that such defenses or exclusions from liability are not dispositive, and are without merit. These required determinations are as follows:

The Trustees must determine whether the damages: (i) Resulting from the discharge or release were specifically identified as an irreversible and irretrievable commitment of natural resources in an environmental impact statement or other comparable environmental analysis, that the decision to grant the permit or license authorizes such commitment of natural resources, and that the facility or project was otherwise operating within the terms of its permit or license, so long as, in the case of damages to an Indian tribe occurring pursuant to a Federal permit or license, the issuance of that permit or license was not inconsistent with the fiduciary duty of the United States with respect to such Indian tribe; or (ii) And the release of a hazardous substance from which the damages have resulted have not occurred wholly before the enactment of CERCLA; or (iii) Resulted from the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. section 135-135k; or (iv) Resulted from any other federally permitted release, as defined in section 101 (10) of CERCLA; or (v) Resulting from the release or threatened release of recycled oil from a service station dealer described in section 107(a)(3) or (4) of CERCLA if such recycled oil is not mixed with any other hazardous substance and is stored, treated, transported or otherwise managed in compliance with regulations or standards promulgated pursuant to section 3014 of the Solid Waste Disposal Act and other applicable authorities.

The Trustees must also determine whether the discharge meets one or more of the exclusions provided in section 311(a)(2) or (b)(3) of the CWA.

The Trustees have determined that the potential injuries referred to herein do not meet one or more of the above criteria, nor are they subject to the exceptions to liability provided in sections 107(f), (i), and (j) and 114(c) of CERCLA, and section 311 (a)(2) or (b)(3) of the CWA. Therefore, the continuation of an assessment is not precluded.

IV. Preliminary Identification of Resources Potentially at Risk

IV.1 Potentially Affected Resources

Numerous trust resources in the Ohio River and its floodplain have likely been affected by the releases of hazardous substances from the Site. Trust resources include the groundwater, surface water, sediment, and biological resources of the Ohio River that provide habitat for fish and wildlife trust species.

Within the Site, several streams and vegetated riparian zones provide habitat for insects, birds, amphibians, and mammals. One such area includes the shallow ephemeral stream located within a forested area in the Olin Area. The gravel and cobble stream contains scattered small pools, with low and vegetated banks. In addition, an intermittent stream flows west through the upland hardwood forest area in the southeast corner of the Hanlin Area. Riparian habitat can also be found in the drainage channel that drains portions of the Olin Area and discharges into the Ohio River. These riparian areas tend to be dominated by deciduous tree species such as American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoides*), and boxelder (*Acer negundo*), and low vegetation, such as tall grasses, cattails, and wildflowers. During the Site survey conducted by Earthtech (1998) and CH2M HILL (2006), eastern cottontail rabbit (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), raccoon (*Procyon lotor*), white tailed deer (*Odocoileus virginianus*), Canada goose (*Branta canadensis*), a variety of passerine bird species, and other wildlife species associated with the field community were documented.

Immediately adjacent to the Site, the Ohio River provides habitat for aquatic species. Within the Hannibal Pool, 86 fish species were surveyed from 2003 to 2015 (Table 1). Within the ten mile reach downstream of the Site, five rare fish species were documented. Specifically, the fish listed were mooneye (*Hiodon tergisus*), river carpsucker (*Carpiodes carpio*), highfin carpsucker (*Carpiodes velifer*), silver chub (*Macrhybopsis storeriana*), and channel darter (*Percina copelandi*). Native freshwater mussels (Tables 2abc) also occur in the vicinity of the Site. Blue Catfish (*Ictalurus furcatus*), which were extirpated, have been reintroduced by WVDNR.

Ohio River Islands National Wildlife Refuge was also likely affected. Directly downstream of the Site, Captina Island and Captina mainland contain diverse habitat types including floodplain forest, riparian, shoreline, and aquatic areas. These areas as well as other islands and floodplains in the pool provide habitat for a number of wildlife species, such as breeding and migrating birds (Tables 3ab) including the federally protected bald eagle (*Haliaeetus leucocephalus*). Mammals such as mink (*Neovison vison*), muskrat (*Ondatra zibethicus*), river otter (*Lontra canadensis*), and the federally endangered Indiana bat (*Myotis sodalis*) are dependent upon these habitats. Amphibians and reptiles (Table 4) and a variety of insects also use aquatic and terrestrial habitats associated with the refuge.

Furthermore, trust natural resources provide opportunities for human recreational use, such as sport fishing, boating, canoeing, hiking, nature observation and other activities. Thus, the loss or diminished

recreational use due to contaminate releases should also be considered as a potentially affected resource.

IV.2 Exposed Areas

The NPL Site consists of 382 acres. However, total areas exposed or affected by contaminants from the Site is currently under investigation and could include downstream portions of the Ohio River and associated riparian area and islands. Although the extent of the contamination is currently undetermined, the potential impacts to the floodplains and islands of the Ohio River and the wildlife they support warrants additional investigation.

IV.3 Preliminary Identification of Pathways

Contamination emanating from the Site has migrated through numerous pathways with the potential to adversely affect the ecological system of the Ohio River. Primary pathways by which Trust resources have been exposed to hazardous substances from the Site are likely to include surface water transport, groundwater discharge, overland runoff and sedimentation, outfall discharges, and through the food chain.

Potential pathways of contaminants into ecological receptors include direct uptake and indirect exposure. Direct uptake mechanisms include dermal contact, absorption, ingestion, or inhalation of contaminated sediment and surface water. In addition to these direct uptake mechanisms, ecological receptors may be indirectly exposed by consuming contaminated food or prey items. Of these potential exposure routes, benthic invertebrates and fish are primarily expected to be exposed via direct contact with sediment and surface water. Benthic filter feeders, such as freshwater mussels, obtain food by passively filtering the surrounding water and are thus especially vulnerable to toxic compounds in the water column and sediment. Upper tropic level receptors are primarily expected to be exposed by dietary ingestion, making them vulnerable to bioaccumulation.

Bioaccumulation is the process of contaminants being stored in the tissues of biological receptors. This process may lead to biomagnification, where higher levels of contaminants are accumulated with each level of the trophic system. Mercury is a bioaccumulative compound and can potentially have impacts on certain trust resources such as fish, floodplain mammals, and migratory birds. Methylated mercury and other organic mercury species are stored in the nervous system and fatty tissues of affected organisms. Due to the biomagnifying properties of mercury, predators and organisms higher on a many- tiered food chain are at a greater risk of accumulating high levels.

IV.4 Estimates of Concentration

IV.4.1 Exposed surface water estimates and concentrations

Processed water containing contaminants including mercury were being released to the Ohio River in concentrations that exceed EPA's maximum contaminant levels for drinking water (USEPA 1995). Historical records indicate that approximately eight pounds of mercury were discharged per day in 1970. The earliest discharge permit identified indicates that the Site was permitted to discharge 0.24 lbs mercury/day in 1974. By 1985, the permit limits changed and allowed for a total of 0.30 lbs/day. (Geosyntec 2010). Exceedances of these permits (duration undocumented) were observed on:

- August 31, 1981 when 1.55 lbs/day Hg was released
- February 25, 1982, when 0.27 lbs/day Hg was released

- July 1982, when 0.38 lbs/day Hg was released
- April 10, 1990, when 0.436 lbs/day Hg was released

The current WVDEP Order governing wastewater treatment requires only a 90% reduction in mercury; no discharge limits for mercury or other contaminants are specified to protect aquatic life or upper trophic level consumers.

IV.4.2 Exposed groundwater estimates and concentrations

Sampling conducted on the Hanlin Area of the Site indicates the ground water is contaminated with manganese, methylene chloride, chloroform, carbon tetrachloride, and mercury and is being discharged into the Ohio River in concentrations that exceed EPA's maximum contaminants level for drinking water (USEPA 1995). Concentrations of mercury in the groundwater ranged up to 25,000 ug/L (Geosyntec 1998) compared to EPA drinking water standard of 2 ug/L. In addition, concentrations of 0.0001 to 0.002 mg/L total mercury are lethal to sensitive and representative aquatic organisms and 0.00003 to 0.0001 mg/L total mercury was observed to have significant adverse sublethal effects (Eisler 1987).

IV.4.3 Exposed sediment estimates and concentrations

Mercury contamination was detected in sediments from both on-site and off-site locations. On-site mercury sediment concentrations ranged from 8.3 to 68.3 mg/kg and were removed from discharge drainage features (Geosyntec 2001). Approximately 13 miles of the Ohio River have been investigated for the presence of mercury in sediments by Honeywell and Olin as part of the Ohio River Characterization Remedial Investigation. Specifically, samples were collected at varying depths from locations between river mile 101.5 and 114. Mercury concentrations in the Ohio River sediment were observed in concentrations up to 2 mg/kg (Geosyntec 2011). Mercury in surface sediments was observed in upstream sample at concentrations ranging from 0.056 to 0.24 mg/kg. Adjacent to and downstream of the Site, surface sediment concentrations ranged from 0.043 to 0.30 mg/kg. Additional sediment samples were collected in 2016 near Wheeling Island, the Site, Captina Island, Fish Creek Island, and the Hannibal Lock and Dam. Results are expected in 2018.

Based in part on the numerous toxicity studies on mercury, toxicity reference values (TRV) were calculated as part of the EPA risk assessment process to determine thresholds likely to be protective of environmental receptors. The EPA TRV for total mercury in sediment TRV is 0.15 mg/kg (EPA 1992). Sediment sampled from on and off-site of HAO Superfund Site had exceeded this TRV.

IV.4.4 Exposed soil estimates and concentrations

On-site soil investigations revealed mercury contamination across the Site and at varying soil depths. High concentrations of mercury were found in soils near the former mercury cell building, where concentrations were up to 10,000 mg/kg (Geosyntec 2001). The average mercury concentration in soils from 0 to 2 feet was 584.9 mg/kg in the Hanlin Area and 0.25 mg/kg in the Allied Park Area (Geosyntec 2001). Soils from the floodplain areas of the Hanlin and Allied Park areas were also sampled and evaluated for mercury and methylmercury as part of the remedial investigation for the upland portions of the Site. Concentrations of mercury in surface soil ranged from 0.02 to 311 mg/kg, with an average concentration of 16 mg/kg (Geosyntec 2012). In the Hanlin floodplain, mercury concentration ranged from 0.02 to 437 mg/kg total mercury and from 0.00037 to 0.011 mg/kg methylmercury. In the Allied Park floodplain, mercury concentration ranged from 0.033 to 1.9 mg/kg total mercury and from 0.00069 to 0.0019 mg/kg methylmercury (RI/FS workplan 2010). In addition to floodplain areas, mercury was present in on-site wetland soils and drainage ways. Mercury typically ranged up to 1 mg/kg, with 3.4

mg/kg observed in one sample immediately downstream of a removal area. Elevated concentrations in the range of 8.3 mg/kg to 68.3 mg/kg were observed in the Stilling Pond and Outfall 001, which received wastewater from chlor-alkali operations. Mercury was also found at depths from 8 ft to the water table level (Geosyntec 2001). The extent of off-site downstream soil contamination is not yet determined and currently under investigation as part of the RI/FS for OU2 and the USGS-EPA joint study.

The lowest observed effect concentration of mercury on earthworms (*Octochaetus pattoni*) is 0.5 mg/kg (Efroymson 1997b). Using the American woodcock (*Scolopax minor*) as an environmental endpoint, the benchmark for mercury concentration in soil considered to have no effects on birds was calculated to be 0.00051 mg/kg (Efroymson 1997a). On-site soils have been documented to exceed these thresholds.

IV.4.5 Exposed biota estimates and concentrations

Mercury levels are monitored in fish tissue along the Ohio River by the Ohio River Valley Water Sanitation Commission (ORSANCO). The fillets of freshwater fish commonly consumed, such as carp, catfish, sunfish, bass, perch, and walleye, are regularly tested for contaminants. Several species, including freshwater drum (*Aplodinotus grunniens*) and hybrid striper (*M.chrysops x M. saxatilis*) show trends of increased mercury levels within the vicinity of the Site compared to upstream samples (Figure 3). The West Virginia Interagency Technical Committee (2015) implemented the current mercury consumption advisories for several fish species found in the Hannibal pool in 2002, specifically freshwater drum (*Aplodinotus grunniens*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), smallmouth buffalo (*Ictiobus bubalus*), bluegill (*Lepomis macrochirus*), hybrid striped bass (*M.chrysops x M. saxatilis*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), white bass (*Morone chrysops*), black crappie (*Pomoxis nigromaculatus*), flathead catfish (*Pylodictis olivaris*), and sauger (*Sander canadensis*). Mercury concentrations found in these species ranged up to 0.5 mg/kg (Table 5) compared to the ORSANCO methylmercury standards for human consumption of 0.05 mg/kg for 1 meal/week and 0.22 mg/kg for one meal per month. Thus, consumption advisories by the state of West Virginia have been established in Hannibal Pool on the Ohio River for several fish species due to mercury levels found in their fillets (Table 5).

V. Preliminary Determination Regarding Preassessment Screen Criteria

In accordance with section 11.23(e) of the Federal Natural Resource Damage Assessment Regulations (43 CFR Part 11.23(e)), the Trustees have determined that all of the following criteria have been met.

V.1 Criterion 1 - A release of a hazardous substance has occurred.

Mercury and other hazardous substances (as defined by CERCLA) have been released at the Site and accumulated in the on-site soil and the sediments of the Ohio River, likely injuring trusted resources. Contaminants of concern for the Site include but are not limited to 2, 4-diaminotoluene, 2, 4-dinitrotoluene, aniline, and nitrobenzene, carbon tetrachloride, chloroform, methylene chloride, and mercury, all of which are listed as hazardous substances in 40 C.F.R. § 302.4.

Elemental and organic forms of mercury are the pollutants of primary concern at the Site. These forms of mercury are listed as hazardous in Table 302.4, List of Hazardous Substances and Reportable Quantities under CERCLA (40 C.F.R. § 302.4(A)), and as toxic pollutants pursuant to 40 C.F.R. § 401.15, as amended. Mercury and its compounds are regarded to have no known biological function, and its

presence in living organisms is undesirable and potentially hazardous. Mercury is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects (Eisler 1987). Through biological and other processes, forms of mercury with relatively low toxicity can be transformed into forms with very high toxicity, such as methylmercury. Methylmercury exhibits high stability and lipid solubility and possesses ionic properties that lead to a high ability to penetrate membranes in living organisms (Beijer and Jernelov 1979). Due to these characteristics, methylmercury can bioaccumulate in organisms and biomagnify through food chains, transporting mercury directly to upper trophic level consumers in concentrated form.

V.2 Criterion 2 - Natural resources for which the Trustees may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the release.

Contaminants have entered the soil, groundwater, surface water and sediment at the Site and the adjacent Ohio River and have adversely affected resources within the trusteeship of the Trustees as defined under CERCLA. The full geographic extent of the contaminants released has not been delineated, thus the geographic range of injured resources potentially include habitat and wildlife of the Ohio River adjacent to and downstream of the Site. Specific affected areas of trusteeship include land, surface water, ground water, sediments, floodplain and island soils, and biotic resources. These natural resources are under the trusteeship of the West Virginia Division of Natural Resources and the Department of Environmental Protection. In addition to migratory birds and federally listed species, natural resources at Captina Island, Captina mainland, Fish Creek Island, and their surrounding aquatic habitats are under the trusteeship of U.S. Fish and Wildlife Service as part of Ohio River Islands National Wildlife Refuge.

V.3 Criterion 3 - The quantity and concentration of the released hazardous substance is sufficient to potentially cause injury to natural resources.

Injury is defined as a measurable adverse change, either long or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge or release of a hazardous substance, or exposure to a product of reactions resulting from such discharge or release (43 C.F.R. §11.14(v)).

The quantity and concentration of the released mercury was/is sufficient to likely cause both lethal and sublethal effects on environmental receptors such as benthic invertebrates, fish, birds, and mammals. Concentrations of mercury were documented in groundwater to exceed standards set for drinking water. Through bioaccumulation, higher tropic level species are exposed to and injured by mercury when they eat contaminated prey species. Several fish species surveyed in Hannibal Pool were found to contain mercury concentrations which exceed 0.2 mg/kg, the level that Beckvar et al. (2005) suggested to be protective for juvenile and adult fish. Mink (*Neovison vison*) given a dietary concentration of 1.1 mg/kg methylmercury exhibited symptoms of poisoning (Wobeser et al. 1976). American black ducks (*Anas rubripes*) fed 3.0 mg/kg methylmercury for 28 weeks were observed with brain lesions and inhibited reproduction (Eisler 1987, Finley and Stendell 1978). Mallards fed 0.5 mg/kg dry weight methylmercury had fewer eggs and produced fewer ducklings (Wolfe 1997). Eisler (1987) recommended that prey items should probably not exceed 0.1 mg/kg in protection of birds that regularly consume fish and other aquatic organisms, and 1.1 mg/kg in protection of piscivorous mammals. Based on the above studies, the quantity of mercury released from the Site is sufficient to potentially cause injury to trusted natural resources.

V.4 Criterion 4 - Data sufficient to pursue an assessment are readily available or are likely to be obtained at a reasonable cost.

On-site assessment data are readily available. These data include information on contaminant releases, concentrations in the environment, and the effect of contamination on natural resources. USGS-EPA data on river porewater, surface water, sediment, island soil, mussels, and fish will be available in 2018. The availability of this information will facilitate the preparation of a natural resource damage assessment, thereby reducing associated costs. If the review of the existing and 2018 data indicates that additional targeted sampling is warranted, those data could be obtained at a reasonable cost.

V.5 Criterion 5 – Response actions carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

The Trustees do not expect that the remedial measures carried out to date, or those planned for the future, will fully address the various sources and pathways of exposure of natural resources to mercury and other hazardous substances, or the past, current, and future injuries resulting from such exposure. For example, activities anticipated as part of the remedial process will not address interim lost use, nor the injuries and lost services from the time of release, nor necessarily ensure a return to baseline. Also, the ongoing and anticipated cleanup may not fully address cumulative ecosystem impacts of hazardous substance releases, such as residual contamination in sediment and bioaccumulation in biota. Therefore, the Trustees have determined that the response actions carried out or currently planned do not or will not sufficiently remedy the injury to the natural resources in the impacted areas of the Ohio River without further action.

VI. Preassessment Screen Determination

Following the review of information described in this Preassessment Screen, the Trustees have made a preliminary determination that the criteria specified in 43 C.F.R. Part 11 (Natural Resource Damage Assessments) have been met. The Trustees have further determined that there is a reasonable probability of making a successful claim for damages with respect to natural resources over which the Trustees have trusteeship. Therefore, the Trustees have determined that an assessment of natural resource damages is warranted.

VII. References

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VIII. Figures

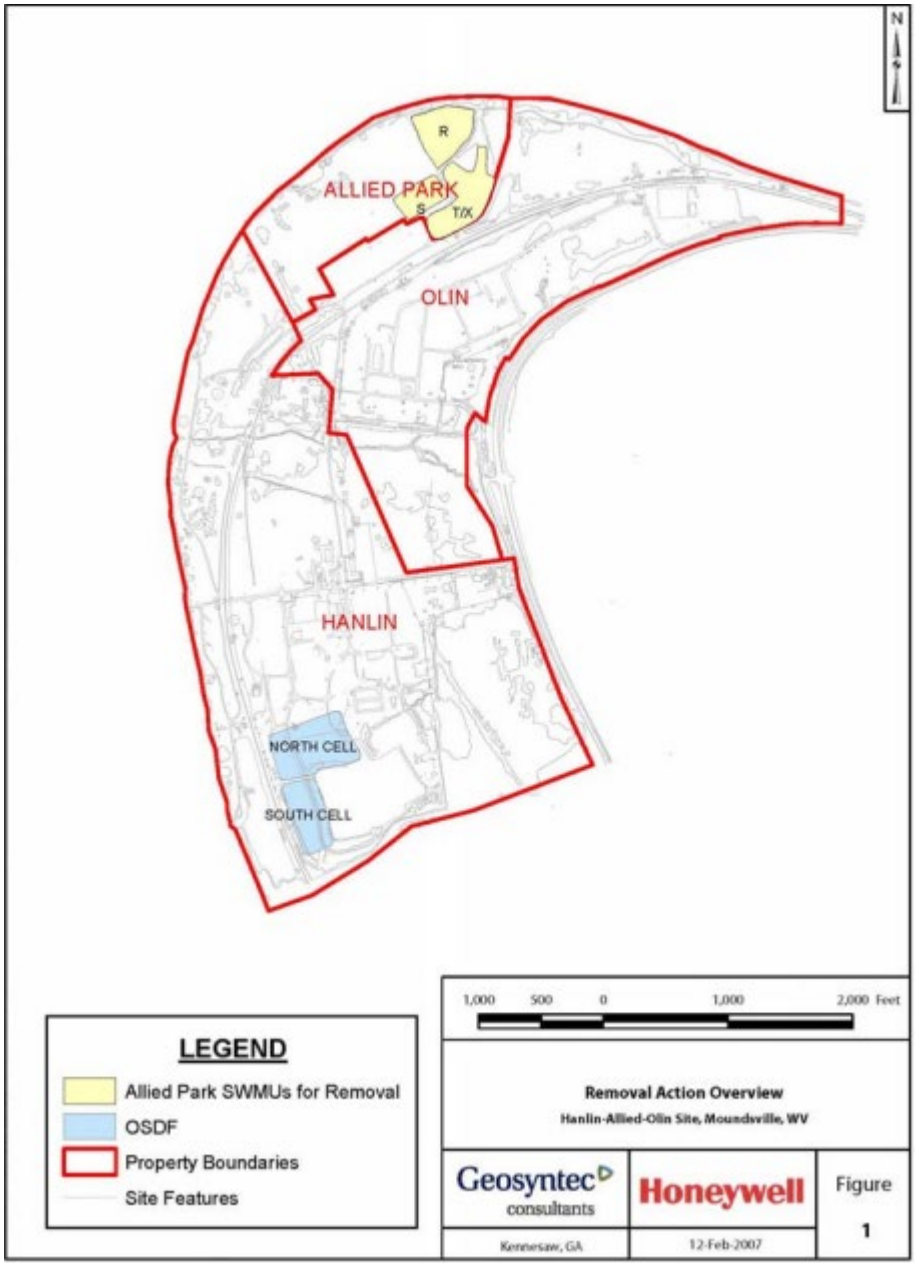

Figure 1: Areas of Hanlin-Allied-Olin Superfund Site. The Site is divided by past ownership. Allied Park Area is located in the northwest portion of the Site; Olin Area is located in the northeast; Hanlin Area is located in the south. (USEPA 2007)

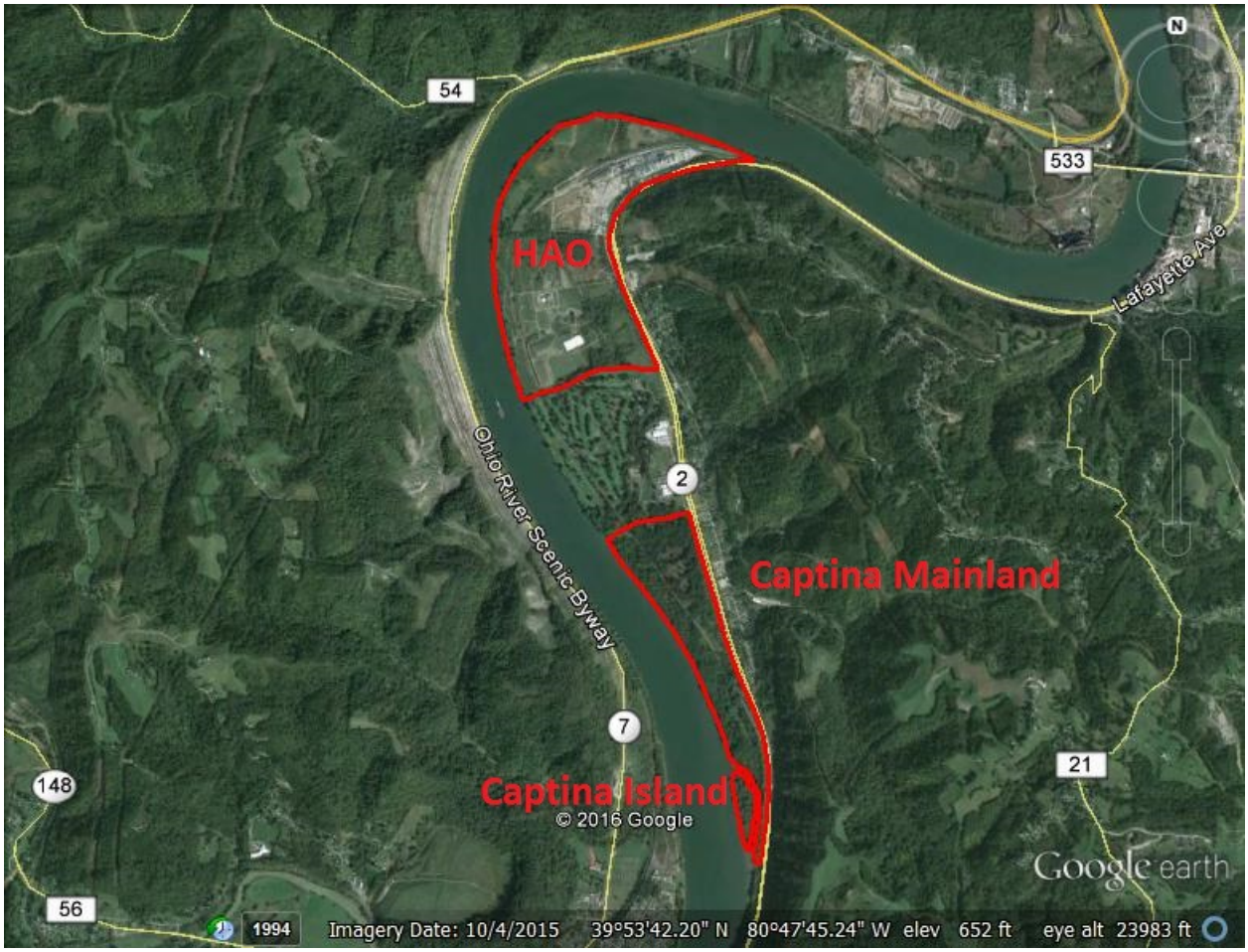

Figure 2: Hanlin-Allied-Olin Superfund Site and the Potentially Impacted Areas of Ohio River Islands National Wildlife Refuge. Captina Mainland and Captina Island are approximately 0.5 miles and 1.5 miles downstream of the Site, respectively.

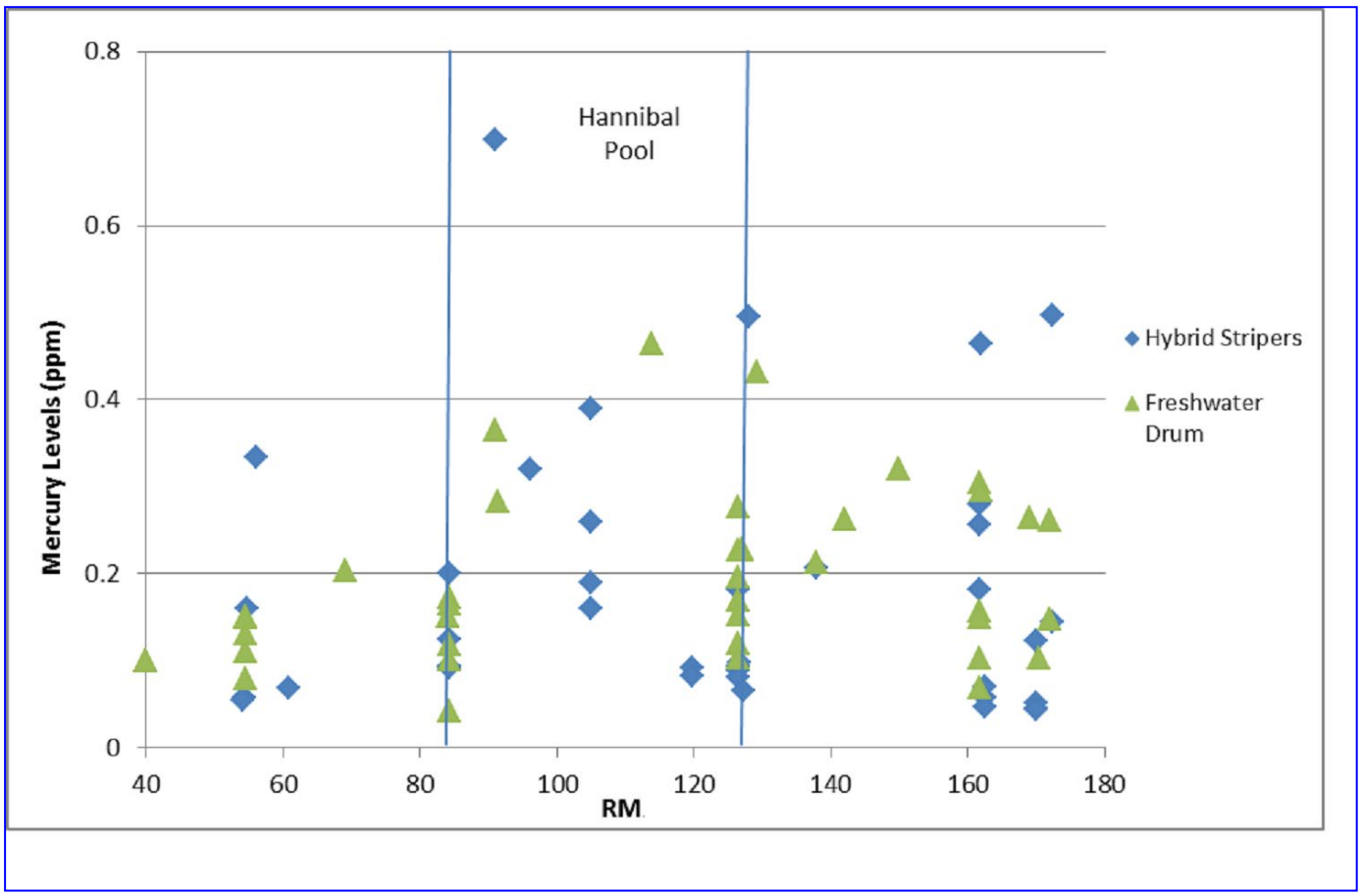

Figure 3. Mercury concentration of Hybrid Stripers and Freshwater Drum along the Ohio River. The Site is located at RM 107 between Pike Island Locks and Dam (RM 84) and Hannibal Locks and Dam (RM 126). New Cumberland Locks and Dam (RM 54) is upstream of the Site. Collection period spans from 1985 to 2014 (ORSCANCO 2015b). Beckvar et al. (2005) suggested 0.2 mg/kg Hg as the threshold to be protective for juvenile and adult fish.

IX. Tables

Table 1a. Sport Fish of Hannibal Pool from 2003 to 2015. (ORSANCO 2015a and WVDNR stocking records 2018)

Common Name	Scientific Name
Rock Bass	*Ambloplites rupestris*
Freshwater Drum	*Aplodinotus grunniens*
Common Carp	*Cyprinus carpio*
Northern Pike	*Esox lucius*
Muskellunge	*Esox masquinongy*
Blue Catfish	*Ictalurus furcatus*
Channel Catfish	*Ictalurus punctatus*
Bluegill	*Lepomis macrochirus*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
White Bass	*Morone chrysops*
Striped Bass	*Morone saxatilis*
Hybrid Striped Bass	*Morone saxatilis x M. chrysops*
Yellow Perch	*Perca flavescens*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Flathead Catfish	*Pylodictis olivaris*
Sauger	*Sander canadensis*
Saugeye	*Sander canadensis x S. vitreus*
Walleye	*Sander vitreus*

Table 1b. Non-Sport Fish of Hannibal Pool from 2003 to 2015. (ORSANCO 2015a and WVDNR stocking records 2018)

NON-SPORTFISH	
Skipjack Herring	*Alosa chrysochloris*
Yellow Bullhead	*Ameiurus natalis*
Central Stoneroller	*Campostoma anomalum*
River Carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
Highfin Carpsucker	*Carpiodes velifer*
Spotfin Shiner	*Cyprinella spiloptera*
Steelcolor Shiner	*Cyprinella whipplei*
Gizzard Shad	*Dorosoma cepedianum*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Bluebreast Darter	*Etheostoma camurum*
Fantail Darter	*Etheostoma flabellare*
Johnny Darter	*Etheostoma nigrum*
Tippecanoe Darter	*Etheostoma tippecanoe*
Variegate Darter	*Etheostoma variatum*
Banded Darter	*Etheostoma zonale*
Banded Killifish	*Fundulus diaphanus*
Mooneye	*Hiodon tergisus*
Northern Hogsucker	*Hypentelium nigricans*
Smallmouth Buffalo	*Ictiobus bubalus*
Black Buffalo	*Ictiobus niger*
Ictiobus sp	*Ictiobus sp*
Brook Silverside	*Labidesthes sicculus*
Longnose Gar	*Lepisosteus osseus*
Green Sunfish	*Lepomis cyanellus*
Pumpkinseed	*Lepomis gibbosus*
Orangespotted Sunfish	*Lepomis humilis*
Lepomis hybrid	*Lepomis hybrid*
Bluegill x Green	*Lepomis macrochirus x L.*
Longear Sunfish	*Lepomis megalotis*
Longear x Green	*Lepomis megalotis x L. cyanellus*
Redear Sunfish	*Lepomis microlophus*
Lepomis sp	*Lepomis sp*
Striped Shiner	*Luxilus chrysocephalus*
Shoal Chub	*Macrhybopsis hyostoma*
Silver Chub	*Macrhybopsis storeriana*

Micropterus sp	*Micropterus sp*
Spotted Sucker	*Minytrema melanops*
White Perch	*Morone americana*
Morone sp	*Morone sp*
Silver Redhorse	*Moxostoma anisurum*
Smallmouth Redhorse	*Moxostoma breviceps*
River Redhorse	*Moxostoma carinatum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Moxostoma sp	*Moxostoma sp*
River Chub	*Nocomis micropogon*
Emerald Shiner	*Notropis atherinoides*
River Shiner	*Notropis blennius*
Silverjaw Minnow	*Notropis buccatus*
Spottail Shiner	*Notropis hudsonius*
Silver Shiner	*Notropis photogenis*
Sand Shiner	*Notropis stramineus*
Channel Shiner	*Notropis wickliffi*
Freckled Madtom	*Noturus nocturnus*
Logperch	*Percina caprodes*
Channel Darter	*Percina copelandi*
Slenderhead Darter	*Percina phoxocephala*
River Darter	*Percina shumardi*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Paddlefish	*Polyodon spathula*
Sander sp	*Sander sp*

Table 2a. Mussels in Hannibal Pool surveyed from 1996 to 2017. (ORINWR and WVDNR, unpublished; AllStar Ecology 2014a; Ecological Specialist 2006, 2011, 2012, 2015; Environmental Solutions and Innovations 2014; Lewis 2011, 2015; Oney 2017)

Common Name	Scientific Name
Mucket	*Actinonaias ligamentina*
Threeridge	*Amblema plicata*
Pimpleback	*Cyclonaias pustulosa*
Wabash Pigtoe	*Fusconaia flava*
Plain Pocketbook	*Lampsilis cardium*
Fat Mucket	*Lampsilis siliquoidea*
Flutedshell	*Lasmigona costata*
White Heelsplitter	*Lasmigona complanata*
Fragile Papershell	*Leptodea fragilis*
Black Sandshell	*Ligumia recta*
Threehorn Wartyback	*Obliquaria reflexa*
Pink Heelsplitter	*Potamilus alatus*
Pink Papershell	*Potamilus ohiensis*
Giant Floater	*Pyganodon grandis*
Mapleleaf	*Quadrula quadrula*
Fawnsfoot	*Truncilla donaciformis*
Paper Pondshell	*Utterbackia imbecillis*
Flat Floater	*Utterbackiana suborbiculata*

Table 2b. Historic mussel species from 1901 to 1910 for the Hannibal Pool. (Carnegie Museum, Sterki and Ortmann collections)

Common Name	Scientific Name
Mucket	*Actinonaias ligamentina*
Elktoe	*Alasmidonta marginata*
Pimpleback	*Cyclonaias pustulosa*
Purple Wartyback	*Cyclonaias tuberculata*
Fanshell	*Cyprogenia stegaria*
Butterfly	*Ellipsaria lineolata*
Elephantear	*Elliptio crassidens*
Spike	*Eurynia dilatata*
Longsolid	*Fusconaia subrotunda*
Pocketbook	*Lampsilis ovata*
Fragile Papershell	*Leptodea fragilis*
Threehorn Wartyback	*Obliquaria reflexa*
Hickorynut	*Obovaria olivaria*
Ring Pink	*Obovaria retusa*
White Wartyback	*Plethobasus cicatricosus*
Orange Pimpleback	*Plethobasus cooperianus*
Ohio Pigtoe	*Pleurobema cordatum*
Rough Pigtoe	*Pleurobema plenum*
Pyramid Pigtoe	*Pleurobema rubrum*
Round Pigtoe	*Pleurobema sintoxia*
Pink Heelsplitter	*Potamilus alatus*
Kidneyshell	*Ptychobranchus fasciolaris*
Mapleleaf	*Quadrula quadrula*
Ebonyshell	*Reginaia ebenus*
Rabbitsfoot	*Theliderma cylindrica*
Monkeyface	*Theliderma metanevra*

Table 2c. Mussels in Hannibal Pool observed from 2003 to 2015 upstream of the Hanolin-Allied-Olin Site. (ORINWR and WVDNR, unpublished; AllStar Ecology 2014b, 2015; Civil & Environmental Consultants 2015; Ecological Specialist 2003; EnviroScience 2009, 2014 a and b)

Common Name	Scientific Name
Mucket	*Actinonaias ligamentina*
Threeridge	*Amblema plicata*
Pimpleback	*Cyclonaias pustulosa*
Butterfly	*Ellipsaria lineolata*
Plain Pocketbook	*Lampsilis cardium*
Fat Mucket	*Lampsilis siliquoidea*
Flutedshell	*Lasmigona costata*
White Heelsplitter	*Lasmigona complanata*
Fragile Papershell	*Leptodea fragilis*
Black Sandshell	*Ligumia recta*
Washboard	*Megalonaias nervosa*
Threehorn Wartyback	*Obliquaria reflexa*
Pink Heelsplitter	*Potamilus alatus*
Giant Floater	*Pyganodon grandis*
Mapleleaf	*Quadrula quadrula*
Creeper	*Strophitus undulatus*
Pistolgrip	*Tritogonia verrucosa*
Fawnsfoot	*Truncilla donaciformis*
Deertoe	*Truncilla truncata*
Paper Pondshell	*Utterbackia imbecillis*

Table 3a. Breeding Bird Species of Captina Mainland from 2002 to 2010 (ORINWR, unpublished), **and 2009-2014** (WVDNR Breeding Bird Atlas 2, unpublished).

Common Name	Scientific Name
Red-winged Blackbird	*Agelaius phoeniceus*
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Ruby-throated Hummingbird	*Archilochus colubris*
Great Blue Heron	*Ardea herodias*
Tufted Titmouse	*Baeolophus bicolor*
Cedar Waxwing	*Bombycilla cedrorum*
Canada Goose	*Branta canadensis*
Broad-winged Hawk	*Buteo platypterus*
Northern Cardinal	*Cardinalis cardinalis*
Turkey Vulture	*Cathartes aura*
Chimney Swift	*Chaetura pelagica*
Killdeer	*Charadrius vociferus*
Yellow-billed Cuckoo	*Coccyzus americanus*
Northern Flicker	*Colaptes auratus*
Eastern Wood-Pewee	*Contopus virens*
American Crow	*Corvus brachyrhynchos*
Blue Jay	*Cyanocitta cristata*
Pileated Woodpecker	*Dryocopus pileatus*
Gray Catbird	*Dumetella carolinensis*
Acadian Flycatcher	*Empidonax virescens*
Common Yellowthroat	*Geothlypis trichas*
House Finch	*Haemorhous mexicanus*
Barn Swallow	*Hirundo rustica*
Wood Thrush	*Hylocichla mustelina*
Yellow-breasted Chat	*Icteria virens*
Baltimore Oriole	*Icterus galbula*
Belted Kingfisher	*Megaceryle alcyon*
Red-bellied Woodpecker	*Melanerpes carolinus*
Song Sparrow	*Melospiza melodia*
Brown-headed Cowbird	*Molothrus ater*
Great Crested Flycatcher	*Myiarchus crinitus*
Indigo Bunting	*Passerina cyanea*
Cliff Swallow	*Petrochelidon pyrrhonota*
Downy Woodpecker	*Picoides pubescens*
Eastern Towhee	*Pipilo erythrophthalmus*
Scarlet Tanager	*Piranga olivacea*

Carolina Chickadee	*Poecile carolinensis*
Prothonotary Warbler	*Protonotaria citrea*
Common Grackle	*Quiscalus quiscula*
Hooded Warbler	*Setophaga citrina*
Yellow-throated Warbler	*Setophaga dominica*
Yellow Warbler	*Setophaga petechia*
American Redstart	*Setophaga ruticilla*
Eastern Bluebird	*Sialia sialis*
White-breasted Nuthatch	*Sitta carolinensis*
American Goldfinch	*Spinus tristis*
Chipping Sparrow	*Spizella passerina*
Field Sparrow	*Spizella pusilla*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Carolina Wren	*Thryothorus ludovicianus*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
White-eyed Vireo	*Vireo griseus*
Red-eyed Vireo	*Vireo olivaceus*
Mourning Dove	*Zenaida macroura*

Table 3b. Possible/Probable Breeding Bird Species of Captina Mainland from 2009-2014 (WVDNR Breeding Bird Atlas 2, unpublished).

Common Name	Scientific Name
Cooper's Hawk	*Accipiter cooperii*
Grasshopper Sparrow	*Ammodramus savannarum*
Great Horned Owl	*Bubo virginianus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-shouldered Hawk	*Buteo lineatus*
Green Heron	*Butorides virescens*
Common Nighthawk	*Chordeiles minor*
Black Vulture	*Coragyps atratus*
Willow Flycatcher	*Empidonax traillii*
Peregrine Falcon	*Falco peregrinus*
Bald Eagle	*Haliaeetus leucocephalus*
Orchard Oriole	*Icterus spurius*
Hairy woodpecker	*Leuconotopicus villosus*
Eastern Screech-owl	*Megascops asio*
Common Merganser	*Mergus merganser*
Northern Mockingbird	*Mimus polyglottos*
Osprey	*Pandion haliaetus*
Blue Grosbeak	*Passerina caerulea*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Purple Martin	*Progne subis*
Eastern Phoebe	*Sayornis phoebe*
American Woodcock	*Scolopax minor*
Northern Parula	*Setophaga americana*
Prairie Warbler	*Setophaga discolor*
Barred Owl	*Strix varia*
Tree Swallow	*Tachycineta bicolor*
Brown Thrasher	*Toxostoma rufum*
Eastern Kingbird	*Tyrannus tyrannus*
Barn Owl	*Tyto alba*

Table 4. Amphibians and Reptiles of the ORINWR and surrounding areas (WVDNR, unpublished; Powell et al. 2016)

Common Name	Scientific Name
American Toad	*Anaxyrus americanus*
Fowler's Toad	*Anaxyrus fowleri*
Eastern Spiny Softshell	*Apalone s. spinifera*
Eastern Snapping Turtle	*Chlydra serpentina*
Midland Painted Turtle	*Chrysemys picta marginata*
Eastern Hellbender	*Cryptobranchus a.alleghaniensis*
Cope's Gray Treefrog	*Hyla chrysoscelis*
American Bullfrog	*Lithobates catesbianus*
Green Frog	*Lithobates clamitans*
Pickerel Frog	*Lithobates palustris*
Northern Leopard Frog	*Lithobates pipiens*
Wood Frog	*Lithobates sylvaticus*
Common Mudpuppy	*Necturus m. maculosus*
Common Waternsnake	*Nerodia sipedon*
Red-spotted Newt	*Notophthalamus v. viridescens*
Mountain Chorus Frog	*Pseudacris brachyphona*
Spring Peeper	*Psudacris crucifer*
Queensnake	*Regina septemvittata*
Eastern Box Turtle	*Terrapene carolina*
Eastern Gartersnake	*Thamnophis s. sirtalis*

Table 5. West Virginia Fish Tissue Concentrations (ORSANCO 2018) in the Hannibal Pool of the Ohio River (1987 to 2015) and Advisories (WVDHHR 2018). Fish fillets with mercury concentration between 0.05 to 0.22 ppm are recommended to be consumed at no more than four meals per month (blue). Fillets with concentration between 0.22 to 0.47 ppm are recommended to be consumed at no more than two meals per month (purple), while recommended consumption limits for those fish with mercury concentration between 0.47 to 0.94 at no more than one meal per month (yellow).

Fish	River Mile	Length (cm)	Year	Mercury (mg/kg)
black crappie	84	23	2007	0.046
channel catfish	84	38.5	2007	0.051
channel catfish	84	44	2007	0.077
smallmouth bass	84	27.6	2007	0.078
sauger	84	32.258	2007	0.082
smallmouth bass	84	29.7	2007	0.083
flathead catfish	84	42.8	2007	0.086
sauger	84	30.6	2007	0.12
flathead catfish	84	53.5	2007	0.13
freshwater drum	84	37.1	2007	0.15
white crappie	84.2		1987	0.02
channel catfish	84.2		1992	0.03
white bass	84.2	22	1993	0.033
channel catfish	84.2	39.8	2001	0.035
channel catfish	84.2		1987	0.04
freshwater drum	84.2	34.50001	1989	0.0423
common carp	84.2	55	2003	0.0482
channel catfish	84.2	48	2003	0.0492
channel catfish	84.2	40.5	1999	0.05
channel catfish	84.2	37.9	1997	0.051
channel catfish	84.2	40	2003	0.0564
channel catfish	84.2		1992	0.06
channel catfish	84.2		1992	0.063
sauger	84.2		1988	0.07
channel catfish	84.2	41.91	1990	0.074
sauger	84.2	34.7	1997	0.075
channel catfish	84.2	44.7	1989	0.0773
channel catfish	84.2	53.2	2001	0.079
common carp	84.2		1987	0.08
channel catfish	84.2	53.9	1995	0.082
flathead catfish	84.2	52.4	1999	0.086
hybrid striper	84.2		1992	0.091
common carp	84.2	53.6	1995	0.091
flathead catfish	84.2	44.2	1997	0.092
channel catfish	84.2	47.3	1997	0.093

hybrid striper	84.2	44	1999	0.094
channel catfish	84.2	55.8	1999	0.099
walleye	84.2	47.7	1997	0.101
freshwater drum	84.2	42.164	2003	0.101
channel catfish	84.2	49.3	1995	0.108
walleye	84.2	43	2003	0.108
sauger	84.2	27.7114	1990	0.11
smallmouth bass	84.2	34.5	2002	0.11
common carp	84.2		1997	0.118
freshwater drum	84.2	41.19999	2001	0.118
flathead catfish	84.2	50	2003	0.118
hybrid striper	84.2	34.5	1997	0.124
walleye	84.2	44.7	1999	0.128
channel catfish	84.2	66.1	1997	0.129
sauger	84.2	35	2003	0.13
white bass	84.2	29.6	1999	0.137
common carp	84.2	56	2001	0.138
flathead catfish	84.2	58	2001	0.14
sauger	84.2		1989	0.141
channel catfish	84.2	50.3936	1990	0.145
white bass	84.2	29.0068	1990	0.146
smallmouth bass	84.2		1992	0.146
common carp	84.2	52.52	2002	0.151
common carp	84.2		1992	0.155
largemouth bass	84.2	39.7	2002	0.159
saugeye	84.2	40.8	1999	0.16
common carp	84.2	42	2003	0.162
freshwater drum	84.2	35.1536	1990	0.165
freshwater drum	84.2	58.00001	1997	0.172
sauger	84.2		1989	0.1751
channel catfish	84.2	33.8	1995	0.192
hybrid striper	84.2	43	1991	0.201
common carp	84.2	44.6532	1990	0.227
white bass	84.2	34	2003	0.229
channel catfish	84.4	37	1994	0.0293
channel catfish	84.4	40.08	1994	0.0367
white bass	84.4	22.725	1994	0.0368
sauger	84.4	33.025	1994	0.0433
smallmouth bass	84.4	28.425	1994	0.0434
walleye	84.4	33.73333	1994	0.0454
walleye	84.4	37.36666	1998	0.0455
walleye	84.4	33	1994	0.0487
smallmouth bass	84.4	26.525	1994	0.0512

sauger	84.4	27.7	1994	0.0629
white bass	84.4	25.075	1994	0.0679
walleye	84.4	40.26667	1998	0.0835
walleye	84.4	43.66667	1998	0.104
walleye	84.4	46.075	1998	0.121
smallmouth buffalo	84.9	49.17	2013	0.121
smallmouth bass	86.7	41.3	2013	0.21
white bass	89	30.83	2012	0.12
sauger	90.3	30.099	1990	0.06
common carp	90.3	53.848	1990	0.078
silver redhorse	90.3	39.4462	1990	0.088
freshwater drum	91	60.33	2010	0.365
hybrid striper	91	56.16667	2010	0.699
smallmouth buffalo	91.3	45.17	2012	0.074
common carp	91.3	60	2012	0.178
freshwater drum	91.3	54.67	2012	0.282
common carp	95	59.8	2013	0.135
common carp	95	59.8	2013	0.135
hybrid striper	96	57.46667	2009	0.32
channel catfish	99.2	39	2006	0.04
sauger	100	30.7	2005	0.055
sauger	100	30.7	2005	0.055
channel catfish	100	41	2004	0.0609
black crappie	100	31.7	2010	0.076
black crappie	100	31.7	2010	0.076
channel catfish	100	41.3	2015	0.0793
sauger	100	37.7	2004	0.137
channel catfish	100	46.7	2014	0.225
sauger	100	43	2013	0.255
channel catfish	100.5	43.6	2012	0.0771
smallmouth bass	102	32	1993	0.044
channel catfish	102	39.6	2003	0.0631
common carp	102	59.4	2003	0.106
sauger	102	32.4	2003	0.139
sauger	102.5	29.43333	1994	0.0605
sauger	102.5	30.775	1994	0.0659
smallmouth bass	103.2	34.72	1994	0.0578
smallmouth bass	103.2	30.08	1994	0.0659
hybrid striper	105	52.8	2009	0.16
hybrid striper	105	64.9	2009	0.26
hybrid striper	105	61.4	2009	0.308
hybrid striper	105	57.86666	2009	0.325
hybrid striper	105	66.5	2009	0.39

HAO	107			
channel catfish	113.5	66	2010	0.19
freshwater drum	113.8	64.83	2010	0.464
bluegill	116.4	15.6	2011	0.05
bluegill	116.4	16.9	2011	0.054
white bass	118	23.175	1994	0.0488
largemouth bass	118	35.64	1994	0.0742
largemouth bass	118	34.38	1994	0.101
channel catfish	118	43.58	1994	0.103
channel catfish	119.7	45.8	2011	0.05
bluegill	119.7	16.6	2011	0.053
bluegill	119.7	16	2011	0.061
channel catfish	119.7		2011	0.069
hybrid striper	119.7	45	2011	0.082
largemouth bass	119.7		2011	0.086
hybrid striper	119.7	45	2011	0.091
flathead catfish	119.7		2011	0.117
largemouth bass	119.7	34.1	2011	0.156
bluegill	120.9	17.5	2011	0.065
bluegill	120.9	17.3	2011	0.106
sauger	122.2	43.3	2013	0.3
bluegill	126	18	2008	0.044
bluegill	126	18	2008	0.044
common carp	126	58	2008	0.075
common carp	126	58	2008	0.075
smallmouth buffalo	126	48	2008	0.085
smallmouth buffalo	126	48	2008	0.085
white bass	126	31	2008	0.085
white bass	126	30	2008	0.1
smallmouth bass	126	36	2008	0.18

PREASSESSMENT SCREEN
FOR THE
Hanlin-Allied-Olin Superfund Site
27 September 2018
PREPARED BY THE
US Fish and Wildlife Service
United States Department of the Interior
REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT & RESTORATION

State of West Virginia
Acting by and Through

West Virginia Division of Natural Resources:

By: _____ Date 11/27/18

Paul Johansen, Chief
324 4th Avenue
South Charleston, West Virginia 25303

Approved as to legality and form

Jane Charnock
Authorized Agency Attorney

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State of West Virginia
Acting by and Through

West Virginia Department of Environmental Protection:

By: _____ Date 12-4-18

Austin Caperton, Cabinet Secretary
601 57th Street SE
Charleston, WV 25304

Approved as to legality and form

Jason Wandling
Authorized Agency Attorney

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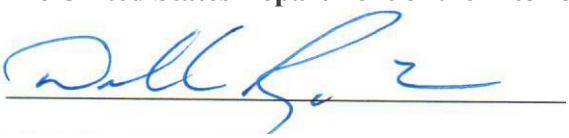
The United States Department of the Interior:

By: 

Deborah Rocque, Deputy Regional Director

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Date 25 OCT 2018