REVISED
SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT
KOPPERS POND
KENTUCKY AVENUE WELLFIELD
SUPERFUND SITE
OPERABLE UNIT 4
HORSEHEADS, NEW YORK

Submitted to:

Koppers Pond RI/FS Group

Submitted by:

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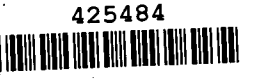

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List of Acronyms

BERA	Baseline Ecological Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPEC	Chemical of Potential Ecological Concern
CSM	Conceptual Site Model
CTRG	Canadian Tissue Residue Guideline
ECW	Environmental Contaminants in Wildlife
ERA	Ecological Risk Assessment
ERAGS	Ecological Risk Assessment Guidance for Superfund
ERED	Environmental Residue-Effects Database
ESL	Ecological Screening Level
ESV	Ecological Screening Value
EWB	Elmira Water Board
HQ_{screen}	Screening Hazard Quotient
LELs	Lowest Effect Levels
NOAA	National Oceanic and Atmospheric Administration
NOED	No Observable Effects Dose
NYNHP	New York Natural Heritage Program
NYSDEC	New York State Department of Environmental Conservation
OME	Ontario Ministry of the Environment
ORNL	Oak Ridge National Laboratory
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RI/FS	Remedial Investigation/Feasibility Study
SLERA	Screening-Level Ecological Risk Assessment
SMDP	Scientific/Management Decision Point
SVOCs	Semi-Volatile Organic Compounds
TCEQ	Texas Commission on Environmental Quality
TECs	Threshold Effect Concentrations
TOC	Total Organic Carbon
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOCs	Volatile Organic Compounds
WHO	World Health Organization

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1.0 INTRODUCTION

The Koppers Pond RI/FS Group (the Group) retained Cummings/Riter Consultants, Inc. and AMEC Earth and Environmental, Inc. (AMEC) to conduct data-gathering and evaluation activities for the performance of a Remedial Investigation and Feasibility Study (RI/FS) for Koppers Pond in Horseheads, New York (the Site). The RI/FS is being performed in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA or "Superfund"); the National Oil and Hazardous Substances Pollution Contingency Plan; and, more specifically, the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, Index No. CERCLA-02-2006-2025 (Settlement Agreement), entered between the Group and the U.S. Environmental Protection Agency (USEPA) on September 28, 2006.

On behalf of the Group, AMEC has prepared this Screening Level Ecological Risk Assessment (SLERA) to meet the requirements of Task VI of the Statement of Work appended to the Settlement Agreement (Section VII.B.1). The work described in this report was performed in accordance with the *RI/FS Work Plan*, submitted on December 6, 2007, and approved by USEPA on May 2, 2008.

1.1 PURPOSE OF REPORT

Pursuant to the Settlement Agreement, the RI for Koppers Pond is being prepared under Operable Unit 4 of the Kentucky Avenue Wellfield Superfund Site. The objective of the RI is to characterize environmental media at the Site sufficiently to allow for the evaluation of the need for remedial action and, if remedial action is deemed necessary, for the development and evaluation of remedial alternatives in the FS. The RI is to provide the necessary physical, chemical, and biological information pertaining to potential impacts to surface water and sediment in Koppers Pond and use these data to evaluate potential human health and ecological risks posed by chemicals of potential concern associated with these media. Because

of their key role in both human health and ecological risk evaluations, the RI also includes tissue analysis of fish taken from Koppers Pond.

In developing and negotiating the Settlement Agreement and the Statement of Work, USEPA and the Group recognized that several pertinent studies of the Kentucky Avenue Wellfield Site have already been completed and that much is known about the Site. As a result, the scope of the envisioned RI was tailored to meet the specific circumstances for Koppers Pond. As described in the RI/FS Work Plan, however, conditions in Koppers Pond are dynamic, and certain aspects and characteristics of the pond have changed since the time data were collected as part of prior studies. Data-gathering activities for the Koppers Pond RI are principally aimed at collecting current information regarding surface water, sediment, and fish tissue.

This draft SLERA presents the results of the first two steps of the ecological risk assessment process under the Ecological Risk Assessment Guidance for Superfund (ERAGS):

- Step 1: Preliminary Problem Formulation and Ecological Effects Evaluation; and
- Step 2: Preliminary Exposure Estimate and Screening Risk Calculation.

The draft SLERA relies on the results of the sampling and analyses conducted as part of the RI. These RI data are presented and summarized in the *Site Characterization Summary Report* (October 2008), which also provides comparisons of the more-recent results to comparable findings from prior investigations.

1.2 SITE BACKGROUND

The Kentucky Avenue Wellfield Superfund Site is located within the Village of Horseheads and the Town of Horseheads in Chemung County, New York (Figure 1-1). The Kentucky Avenue Well is a municipal water supply well owned by the Elmira Water Board (EWB) that was used as part of the EWB system to furnish potable water to local communities. The Kentucky Avenue Well was closed in 1980 when it was found that the groundwater produced from this well contained trichloroethylene. In 1983, USEPA included the Kentucky Avenue Wellfield Site on the National Priorities List for response actions under CERCLA.

Beginning in the mid-1980s, several CERCLA response actions have been completed with respect to the Kentucky Avenue Wellfield Site:

- Operable Unit 1 involved initial Site investigations, identification of potentially impacted private wells, and connection of the affected residents to the public water supply system.

- Operable Unit 2 included supplemental investigations of the degree and extent of groundwater impacts, the installation of barrier wells and groundwater treatment system to intercept groundwater at the downgradient limits of the former Westinghouse Electric Corporation (Westinghouse) Horseheads plant site, and restoration of the Kentucky Avenue Well.

- Operable Unit 3 comprised the investigation and remediation of identified source areas at the former Westinghouse Horseheads plant site, the investigation of a waterway (i.e., the "Industrial Drainageway") that conveys surface water discharges from the former Westinghouse Horseheads plant site to Koppers Pond, and the remediation of the Industrial Drainageway.

The response actions specified under Operable Units 1 and 3 are completed. Operation, maintenance, and monitoring activities are continuing with respect to the barrier wells and attendant groundwater treatment system installed under Operable Unit 2. The RI for Koppers Pond is being conducted under Operable Unit 4.

Koppers Pond is a man-made, V-shaped pond located in the Village of Horseheads, New York (Figure 1-2). At the northern end of its western leg, the pond receives inflow from the Industrial Drainageway, the watershed for which is a largely a commercial and industrial area. The drainageway receives much of its base flow from discharges originating at the former Westinghouse Horseheads plant site (Figure 1-2). The overflow from Koppers Pond discharges to two outlet streams located at the southern end of the pond, which combine to form a single outlet channel.

Koppers Pond is a shallow, flow-through water body with typical water depths of approximately two to six feet. Because of the relatively flat topography, the open water area of the pond is highly dependent on the surface water elevation, and open water areas of approximately seven to more than nine acres have been reported in the various studies of this pond. At a pond surface water elevation of approximately 886 feet above mean sea level, the open water area of the pond covers about 8.9 acres. Water levels have recently declined, presumably due to the removal of beaver dams that had been constructed in the outlets from the pond.

1.3 REPORT ORGANIZATION

Following this introductory chapter, Section 2 presents the results of the Step 1 assessment, which includes a summary of the ecological setting, potential fate and transport mechanisms, potentially complete exposure pathways, and the preliminary Conceptual Site Model (CSM). Section 3 presents the results of the Step 2 assessment, which includes a summary of the data collected to date, the abiotic screening, uncertainty and data gap assessment, and a summary of the Scientific/Management Decision Point (SMDP). Section 4 presents the key elements of the ERAGS Step 3 report that will be prepared following review and approval of the SLERA. Additional supporting documentation is provided in the appendix.

2.0 STEP 1: PRELIMINARY PROBLEM FORMULATION AND ECOLOGICAL EFFECTS EVALUATION

This section provides information concerning the regional and site-specific ecological conditions that are relevant to the ecological risk assessment (ERA).

2.1 REGIONAL ECOLOGICAL SUMMARY

The site-specific ecological features were summarized in the *Preliminary Conceptual Site Model* (February 2007) and are presented below with updates based on observations made during the 2008 field investigation.

2.1.1 Regional Climate

Chemung County, New York is characterized by a temperate climate with mild summer and long, cold winters. The annual average temperature is 47 degrees Fahrenheit (°F). August is the warmest month with average high temperatures above 80°F, but summers are moderate and average just 4 or 5 days per year with a maximum temperature of 90°F or above. Winter temperatures from December through February average below 30°F.

The average annual precipitation in Chemung County is approximately 33.5 inches, including the water equivalent of the annual average of 45 inches of snowfall. Precipitation is relatively uniformly distributed throughout the year. As presented in the Operable Unit 3 RI report (Philip Environmental Services Corporation, 1996), various studies have shown annual average runoff in the range of 7 to 10 inches per year.

2.1.2 Surface Water Hydrology

Historically, the Industrial Drainageway received much of its base flow from discharges originating from permitted outfalls at the former Westinghouse plant site (Figure 1-2). Such discharges included treated process wastewaters, non-contact cooling water, and storm water runoff. Total flows from these sources averaged between 1,000 and 2,000 gallons per minute (gpm) or 2.2 to 4.4 cubic feet per second (cfs). Other sources of flow to the Industrial Drainageway include local surface water runoff. Based on RI reviews of available storm sewer information and field reconnaissance, the contributory watershed area draining to the Industrial Drainageway at the point it enters Koppers Pond is estimated to be 1,350 acres, 59 of which comprise the former Westinghouse plant site. At assumed basin-wide runoff rates of 7 to 10 inches per year, surface water runoff to the pond, excluding runoff from the former Westinghouse plant site, would be about 470 to 670 gpm (1.0 to 1.5 cfs) as an annual average.

Although some process water discharges continue from ongoing manufacturing operations conducted by the Cutler-Hammer Division of Eaton Corporation, current discharges to the Industrial Drainageway from the former Westinghouse plant site are primarily storm water runoff from building roofs and the treated effluent from the barrier well treatment facility installed under Operable Unit 2.

Koppers Pond and its outlet channels are classified as Class C fresh surface waters by the New York State Department of Environmental Conservation (NYSDEC). Class C waters are to be suitable for fish propagation and survival and for primary and secondary contact recreation, such as swimming and boating.

2.1.3 Local Land Use

The pond is surrounded by an area of vacant and active industrial property (Figure 1-2). Immediately to the north and northeast is the Old Horseheads Landfill and to the south is the Kentucky Avenue Well site. Manufacturing facilities operated by Hardinge, Inc. (Hardinge) and the Fairway Spring Co. are located to the southeast and east, respectively. Norfolk Southern Corporation (Norfolk Southern) railroad tracks are located to the west. The property on which the pond is located is partially owned by Hardinge, the Village of Horseheads, and EWB (Figure 1-2). The Industrial Drainageway is bounded by Norfolk Southern railroad tracks to the west, and industrial and commercial properties on the east. These industrial and commercial properties include the Chemung County Department of Public Works maintenance facility and the Old Horseheads Landfill.

2.1.4 Rare, Threatened or Endangered Species

The New York Natural Heritage Program (NYNHP), under authority of NYSDEC, provides information on the locations and identities of rare species to enable fully informed decision-making while protecting these sensitive resources. AMEC contacted the NYNHP in writing concerning information on the rare, threatened, and endangered species that may be present in the Koppers Pond Area. The NYNHP response letter dated 19 November 2008 stated that they had no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats on or near the Site. A subsequent internal correspondence between NYSDEC and NYNHP suggested that an endangered plant, the slender pondweed (*Stuckenia filiformis alpinus*)[1] may be present at this Site.. A record of this correspondence is provided in Appendix A.

[1] A common synonym for this species is *Potamogeton filiformis* var. *alpinus*, which is how this plant is listed under NYCRR, Chapter II, Part §193.3 [http://www.dec.ny.gov/regs/15522.html]

The US Fish and Wildlife Service (lists only the bald eagle as a rare, threatened, or endangered species in Chemung County. On August 8, 2007, the bald eagle (*Haliaeetus leucocephalus*) was delisted as an endangered species but still receives protection under the Bald and Golden Eagle Protection Act of 1940 (last amended in 1978).

2.2 SITE-SPECIFIC ECOLOGICAL FEATURES

The site-specific ecological features were summarized in the *Preliminary Conceptual Site Model* (February 2007). This information is presented below with updates based on observations made during the 2008 field investigation.

2.2.1 Industrial Drainageway

The Industrial Drainageway begins at a point approximately 2,300 feet to the north-northwest of Koppers Pond at the outlet of a 72-inch diameter underground pipe (the "Chemung Street Outfall"). This underground pipe, which is approximately 1,600 feet in length, conveys discharges from the former Westinghouse Horseheads plant site and upstream areas. A 48-inch diameter underground pipe runs in parallel with the 72-inch line for its last 860± feet and receives overflows from the larger pipe. The 48-inch overflow pipe, which only discharges in major storm events, also outlets at the Chemung Street Outfall. From the Chemung Street Outfall, the Industrial Drainageway flows to the south-southeast, discharging into Koppers Pond.

The 1953 U.S. Geological Survey (USGS) map shows the Industrial Drainageway as an open waterway extending to the approximate northern boundary of the former Westinghouse plant site. The underground piping was installed in the 1960s. Throughout most of its current 2,300-foot length, the drainageway is approximately 7 to 10 feet wide and varies in depth from about 0.5 to 2 feet. At its southern end, the Industrial Drainageway widens out to approximately 100 feet as it enters Koppers Pond. In this area, the Industrial Drainageway flows slowly through emergent vegetation (e.g., cattails) and is approximately 0.5 feet deep. The area surrounding the southern portion of the Industrial Drainageway and the northwest corner of Koppers Pond has little topographic relief, and changes in flows and pond water levels due to rainfall conditions can significantly alter the size and shape of these water bodies. Flow data for the Industrial Drainageway are not available from the USGS.

In 2001 and 2002, as part of Operable Unit 3 of the Kentucky Avenue Wellfield site, impacted sediments were removed from the Industrial Drainageway and disposed of in permitted off-site facilities. The removed sediments were replaced with clean imported soils as needed to reshape the channel.

2.2.2 Koppers Pond Open Water Habitat

The open water area of Koppers Pond is comprised of a shallow (three- to six-foot deep) warm water lake, with characteristics consistent with a eutrophic waterbody (Reschke, 1990). The bottom substrate is silty (mucky) and soft over much of the pond. As described in the *Site Characterization Summary Report* (October 2008), the thickness of the silty sediments, based on information collected during historical and the 2008 sediment sampling events, ranged from zero to 38 inches. In the western portion of the pond, observed sediment thicknesses uniformly decreased from the maximum of 38 inches near the outlet of the Industrial Drainageway down to about 12 inches near the mouth of the west outlet channel. In the eastern portion of the pond, observed sediment thicknesses along the perimeter of the pond ranged from 9 to 26 inches, but little to no sediment was observed to be present in much of the eastern portion of the pond further from the shoreline. The hard surface underlying the sediments was predominantly stiff clay. The preliminary hydrology assessment concluded that the underlying clay minimizes the interaction of the pond with local shallow groundwater.

Anthropogenic debris, such as shopping carts, tires, automobiles, and metal drums, has been observed in the past in and around the pond, and some debris was seen during the RI field sampling activities in May and June 2008. Two utility poles are located within the open water of the pond and are reportedly in use.

2.2.3 Outlet Channels

The two outlet streams that flow from the southern end of Koppers Pond merge about 500 feet downstream. After merging, the single outlet channel flows past the Hardinge plant site and converges into Halderman Hollow Creek. From that point, the creek flows south and southeast through mixed industrial, commercial, and residential areas, discharging into Newtown Creek approximately three miles south of Koppers Pond. Newtown Creek is a primary tributary to the Chemung River. Flow data for the pond outlets are not available from the USGS.

2.2.4 Terrestrial Vegetation

The northern and western edges of the pond are vegetated primarily with deciduous trees, and the southern and eastern edges are mostly vegetated with grasses and herbaceous plants. The banks of the Industrial Drainageway are vegetated by occasional cottonwood trees and scrub vegetation. Dominant tree species in the deciduous woods to the north and west of the pond include cottonwood, willow, sugar maple, and quaking aspen. Shrub species in the deciduous forest include honeysuckle and sumac, and teasel, thistle, and mullein are found in the herbaceous layer.

The open-field cover type on the south and east sides of the pond includes the EWB property around the Kentucky Avenue Well and maintained lawn areas that extend to the Hardinge plant facility. This cover type consists of grasses and forbs in the herbaceous layer, with scattered honeysuckle and brambles in the shrub layer. A scrub-shrub upland community dominated by honeysuckle, brambles, and sumac lies between the two outlet channels.

Two areas (one along the south side and the other at the tip of the western arm) of the open water area are composed of emergent marsh. These are shallow water areas and are largely vegetated with wetland species. The northern area was mapped as an emergent palustrine wetland in the wetland delineation survey conducted as part of the remedial design for the Industrial Drainageway Remediation (Hails, 2001).

2.2.5 Wildlife

Wildlife species reported to inhabit the pond include muskrat, beaver, turtle, green frog, and various fish species (e.g., white sucker, common carp, largemouth bass, black crappie, pumpkinseed). Unidentified minnow-sized fish have been observed in the outlet streams, but not during the 2008 field investigation. Terrestrial species that utilize the pond area are believed to include eastern cottontail, woodchuck, raccoon, white-tailed deer, and a variety of birds. Field observations made during various prior ecological investigations of the Koppers Pond area reported that amphibians and aquatic insects were scarce or missing from habitats in and around Koppers Pond. During the 2008 field investigation, however, both tadpoles and insects (e.g., water striders) were observed. Activity by emergent insects (e.g., adult mayflies, mosquitoes) was likely reduced by the rainfall that occurred during the 2008 fish collections. An evaluation of the benthic community was not performed as part of the 2008 field investigation.

2.3 Potential Fate and Transport Mechanisms

Historical sources of chemicals of potential ecological concern (COPECs) to Koppers Pond included historical discharges to the Industrial Drainageway and runoff from industrial and commercial facilities. This transport likely occurred in both the particulate and dissolved phases. The particulate phase included both suspended solids within the water column discharging to the pond and the sediment bed load transported by flows in the Industrial Drainageway.

The Industrial Drainageway continues to represent the principal conveyance to the pond, but flows are limited to surface water runoff and treated groundwater from the Westinghouse facility and non-point source runoff from the upstream watershed. Also, because impacted sediments were removed from the Industrial Drainageway in 2001 and 2002, the sediment bed load in the drainageway no longer represents a source of COPECs to Koppers Pond. Based on the

sediment depth evaluation presented in the *Site Characterization Summary Report*, Koppers Pond represents a solids sink (analogous to a detention basin) which accumulates solids as the water velocities decrease within the pond. Because of the V-shape of the pond, and the fact that the Industrial Drainageway enters the western "wing" of the pond, sediments that have historically entered the pond from the Industrial Drainageway are more likely to accumulate in the western portion of the pond, rather than the eastern portion (the latter would likely accumulate soil runoff from the adjoining properties).

The settled solids represent a potential on-going source of COPECs within the pond. Transfer of the chemicals, via uptake by emergent vegetation and bioturbation by benthic aquatic organisms and food chain transfer to higher trophic level organisms, represent the principal mechanisms that COPECs may move between environmental media within Koppers Pond. As unimpacted sediment (e.g., bed load from the Industrial Drainageway) continues to be transported to and deposited in the pond, the COPEC concentrations in the upper surface of the pond sediments will be reduced and the relative contribution from the sediments will likely decrease with time.

Transport of chemicals out of Koppers Pond into the outlet channels is dependent on water levels and local topography in this area. Most of the area around the pond is low and wet, providing additional detention proximal to the pond when water levels rise. As reported in the *Site Characterization Summary Report*, the RI analytical data for sediment samples collected from the outlet channels show significantly reduced COPEC concentrations compared to Koppers Pond sediments. Similarly, surface soils samples collected in the periodically inundated low-lying areas around the pond also show COPEC concentrations much lower than in the pond sediments. The extent of horizontal transport out of Koppers Pond via the outlet channels appears to be limited, at least for some of the evaluated chemicals, but additional evaluation is needed to fully delineate the limits of affected downstream areas.

2.4 POTENTIALLY COMPLETE EXPOSURE PATHWAYS

This section discusses the CSM and the potential food-chain exposure pathways for ecological receptors at Koppers Pond.

2.4.1 Preliminary Conceptual Site Models

The *Preliminary Conceptual Site Model* (February 2007) presented a preliminary evaluation of potential exposures for the human and ecological receptors. The principal exposure routes for ecological receptors were via direct pathways (ingestion and direct contact of sediments) and indirect pathways (ingestion of prey that may bioaccumulate chemicals from sediments or surface water).

Only complete pathways provide a route of exposure, and therefore a potential risk. Complete pathways are defined by the following four components:

1. A source and mechanism of chemical release (e.g., spills);
2. A retention or transport medium (e.g., sediment from surface runoff);
3. A point of potential contact with the impacted medium, referred to as the exposure point (e.g., exposed sediments); and
4. An exposure route (e.g., dermal contact with sediments).

If any one of the components is missing, the pathway is not considered complete and, therefore, no risk will be associated with that pathway. The CSM developed as part of this SLERA is presented in Figure 2-1. This figure is modified from the version (Figure 5) presented in the *Preliminary Conceptual Site Model*. The changes relative to the prior CSM include the following:

- *Leaching from Old Horseheads Landfill*: This potential source was revised to be an incomplete pathway. This conclusion was based on observations from the 2008 RI field investigation that showed no apparent surface leachate seeps from the landfill. Hydrological assessment also showed that there is limited connection between Koppers Pond and the local shallow groundwater that may have been impacted by the landfill. The *Site Characterization Study Report* provides additional detailed discussion concerning the visual inspection for landfill seeps and the hydrological assessment.

- *Redissolution of COPECs from Sediments to Water*: The redissolution of COPECs from sediments to overlying water may be a *de minimus* pathway due to the absence of dissolved chemical concentrations above water quality criteria or screening benchmarks. The water-based exposure pathways are shown as dashed arrows in Figure 2-1.

As more data are collected and additional field observations made, it may be necessary to refine this model further for use in focusing the ERA.

2.4.2 Ecological Food-Chain Transfer Pathways

The *Preliminary Conceptual Site Model* also presented the potential food-chain transfer pathways and candidate receptors based on prior assessments (Terrestrial Environmental Specialists, Inc., 1995; CDM Federal Programs Corporation [CDM], 1999). These exposure pathways and candidate receptors are presented in Figure 2-2 and will be evaluated further in subsequent steps of the ERAGS process.

2.5 CONCLUSION FROM ERAGS STEP 1

USEPA (1997) recommends that several conclusions be made as part of ERAGS Step 1. These are presented below.

Environmental setting and contaminants known or suspected to exist at the site and the maximum concentrations present (for each medium).

Koppers Pond is a "V-shaped" lake located in Horseheads, New York. At the northern end of its western leg, the pond receives inflow from the Industrial Drainageway. This drainageway receives much of its base flow from discharges originating at the former Westinghouse plant site. The overflow from Koppers Pond discharges to two outlet streams located at the southern end of the pond, which combine to form the outlet channel. Discharges from historical operations at the former Westinghouse plant site, and drainage from the current watershed, have loaded COPECs into Koppers Pond, which acts as a solids detention basin for surface water flows. COPECs related to historical plant operations, as well as non-point sources (e.g., polycyclic aromatic hydrocarbons [PAHs] from road runoff, pesticides from nuisance insect treatment) have been detected in the surface water, sediments, and fish from Koppers Pond. The source of polychlorinated biphenyls (PCBs) in pond sediments has not been identified.

The media-specific chemical concentrations are summarized in the *Site Characterization Summary Report* tables. The maximum values are shown in the chemical screening tables presented in Section 3.3.

Contaminant fate and transport mechanisms that might exist at the site.

Historical sources of COPECs to Koppers Pond included wastewater discharges to the Industrial Drainageway and runoff from industrial and commercial facilities. The Industrial Drainageway continues to represent the principal conveyance to the pond, but flows of treated wastewaters are much reduced from historical levels. The majority of the flow in the Industrial Drainageway is surface water runoff and treated groundwater from the Westinghouse facility and runoff from the upstream watershed. Koppers Pond represents a solids sink (analogous to a detention basin) which accumulates solids as the water velocities decreased within the pond.

The settled solids represent a potential on-going source of chemicals within the pond. Cycling of the chemicals, via uptake by emergent vegetation and bioturbation by benthic aquatic organisms, and subsequent food chain transfer to higher trophic level organisms, represent the principal mechanisms that cycle COPECs within Koppers

Pond. As unimpacted sediment (e.g., bed load from the Industrial Drainageway) continues to be transported to and deposited in the pond, the COPEC concentrations in the upper surface of the pond sediments will be reduced and the relative contribution from the sediments will likely decrease with time.

Transport out of Koppers Pond into the outlet channels is dependent upon water levels and local topography in this area. Because most of the area surrounding the pond is low-lying, additional detention of solids or chemicals will likely occur proximal to the pond. Sediment samples collected from the outlet channels show significantly reduced COPEC concentrations compared to Koppers Pond sediments, and the extent of horizontal transport out of Koppers Pond via the outlet channels appears to be limited. Additional evaluation is needed, however, to fully delineate the limits of affected downstream areas.

The mechanisms of ecotoxicity associated with contaminants and likely categories of receptors that could be affected.

The primary focus for ecotoxic endpoints are those that are related to survival, growth, and reproduction. Screening values based on critical body burdens for these three key endpoints were also evaluated for the forage fish samples.

The complete exposure pathways that might exist at the site from contaminant sources to receptors that could be affected.

A CSM was developed based upon the *Preliminary Conceptual Site Model* that showed the potential for direct contact exposure pathways and indirect pathways via consumption of prey that may potentially bioaccumulate chemical residues from environmental media (predominantly sediments). The principal receptor groups include aquatic receptors and semi-aquatic receptors that may prey on aquatic organisms from Koppers Pond. Some of these pathways and receptors are not likely to be relevant to the outlet channels.

Screening ecotoxicity values equivalent to chronic NOAELs based on conservative assumptions.

Screening ecotoxicity values are presented in Section 3.2 along with the screening results required as part of the ERAGS Step 2 discussion.

The principal conclusion from ERAGS Step 1 is that chemicals potentially related to historical discharges and other sources have been detected in the environmental media of Koppers Pond

and its outlet channels and that these concentrations should be evaluated using relevant ecological benchmarks in ERAGS Step 2 to determine whether a more refined ERA is warranted.

3.0 STEP 2: PRELIMINARY EXPOSURE ESTIMATE AND SCREENING RISK CALCULATION

This second step of the ERAGS Process (USEPA, 1997) consists of the following components:

- Exposure Estimate; and
- Screening Risk Calculation.

The exposure estimate is based on the collection of field data to assess whether there is the potential for exposure. The screening risk calculations are performed by comparison of the media-specific chemical results to appropriate screening benchmarks. The principal outcomes of this Step are: (1) to determine whether potential exists for an ecological risks, and (2) to develop an initial list of COPECs for further evaluation in subsequent Steps of the ERAGS process.

3.1 EMPIRICAL DATA COLLECTION

The *Site Characterization Summary Report* reviewed the results of sample collections from previous (1994, 1998) field investigations and summarized the chemical results for samples that were collected as part of the 2008 field investigation. The samples collected in 2008 included the following:

- *Surface water*: Surface water samples were collected from the Industrial Drainageway and upstream locations (when available), Koppers Pond, and the pond outlet streams.

- *Sediments*: Sediments were collected from the Industrial Drainageway and upstream locations, Koppers Pond, and the pond outlets. These included both shallow (0- to 6-inch depths) and deeper sediments from a subset of the sampling locations.

- *Fish*: Gamefish and forage fish were collected from throughout Koppers Pond.

These samples were collected in accordance with the approved RI/FS Work Plan, with some adjustments made in the field with the concurrence of EPA and NYSDEC staff that were present during the sampling. The latter are discussed in the *Site Characterization Summary Report.*

Surface water, surface (0- to 6-inch) sediments, and forage fish will be the primary media evaluated in the SLERA. Only the surface sediments were evaluated because these represent the biologically active zone for ecological receptors (e.g., USEPA, 2005).

Figure 3-1 shows the locations for the samples collected as part of the 2008 field investigations from Koppers Pond and its discharge outlets.. Table 3-1 summarizes the descriptions for each of the surface water and sediment locations. Fish were collected from throughout Koppers Pond.

The analytical results were compiled into a Microsoft Access® database to facilitate data evaluation. Sample-specific analytical results are tabulated in the *Site Characterization Summary Report* and are summarized in Tables 3-2, 3-3, and 3-4 for the surface water, sediments, and fish, respectively, that were evaluated in this SLERA. Only the surface (0- to 6-inch) sediment results and surface water collected from within the Koppers Pond and the outlet channels are provided in these tables. Complete summaries for the remaining samples and depths are provided in the *Site Characterization Summary Report*.

3.2 SCREENING VALUES

This section summarizes the ecological screening values used to determine whether the chemical concentrations detected in the environmental media collected as part of the 2008 field sampling event are high enough to warrant further evaluation in subsequent steps of the ERAGs process. The tables that summarize the screening results also include the frequency of detection, the range of positive results, range of detection limits, the location of the maximum positive result, the screening values, and the Screening Hazard Quotient (HQ_{screen}) values, for each chemical detected in the surface water samples. A screen based on the frequency of detection was also performed if more than 20 samples were collected. Maximum detected concentrations are used in the ERAGS Step 2 screening.

3.2.1 Screening Values for Surface Water Samples

The primary benchmarks for the surface water screen were the chronic aquatic organism NYSDEC Class C[2] water quality criteria from TOGS 1.1.1 (NYSDEC, 1998). The Type A(C) guidance values or standards for freshwaters were used. Although the Type W guidance values or standards are also relevant to this SLERA, none of the chemicals detected in the surface water samples had such values.

When there were no appropriate NYSDEC Class C values available, the following alternative sources of surface water screening benchmarks were evaluated:

- ORNL Screening Benchmarks (Suter and Tsao, 1996);

[2] Koppers Pond is designated as a Class C water within the Newtown Creek Drainage Basin, as described in 6 NYCRR Part 810 [http://www.dec.ny.gov/regs/4576.html].

- Ecological Screening Values (ESVs) from USEPA Region 4 (USEPA, 2001);
- Ecological Screening Levels (ESLs) from USEPA Region 5 (USEPA, 2003);
- Ecological Benchmark values from USEPA Region 6 (Texas Commission on Environmental Quality [TCEQ], 2006); and
- EPA's on-line Persistent, Bioaccumulative, and Toxics Estimation Tool (PBT Profiler).

EPA's Office of Pollution Prevention and Toxics developed the PBT Profiler[3] as a screening tool to estimate the bioaccumulation potential and toxicity for organic chemicals that lack experimental data. For this SLERA, it is used to estimate the chronic toxicity value in the absence of screening values from NYSDEC or the other sources.

The screening values used to assess the surface water results are compiled in Table 3-5a. When multiple values were available, precedence was given to the NYSDEC Class C benchmarks. In those cases where NYSDEC values were not available, the lowest of the remaining alternate benchmarks was used as the screening values. Surface water screening values were not available from any of the evaluated sources for three inorganics (i.e., calcium, potassium, and sodium). The PBT Profiler was used to estimate the chronic toxicity values for one volatile organic compound (VOC) (i.e., methyl acetate) and three semi-volatile organic compounds (SVOCs) (i.e., acetophenone, benzaldehyde, and carbazole).

For five inorganics (i.e., aluminum, arsenic, selenium, silver, and cyanide), the NYSDEC Class C criteria are applicable only to the dissolved phase.

3.2.1.1 Hardness-Dependent Screening Values

The acute and chronic aqueous screening values for seven metals (i.e., cadmium, chromium (III), copper, lead, nickel, silver, and zinc) are dependent upon the hardness of the surface water. Hardness, expressed as milligrams per liter (mg/L) $CaCO_3$ was reported in the 10 surface water samples from Koppers Pond and its outlet channels at concentrations ranging from 234 to 262 mg/L. The mean hardness of these 10 samples was determined to be 249 mg/L.

For purposes of screening, the hardness for the particular samples with the maximum positive results was used to calculate the screening value. The equations presented in TOGS 1.1.1 (NYSDEC, 1998) were used to derive the screening values. These equations and the corresponding screening values are shown in Table 3-6.

[3] The PBT profiler can be accessed at the following URL: http://www.pbtprofiler.net/

3.2.1.2 pH-Dependent Screening Values

Pentachlorophenol is the only phenolic compound that has pH-dependent water quality criteria. Pentachlorophenol was not detected in any of the surface water samples, and the pH-dependent screening value was not calculated.

3.2.2 Screening Values for Sediment Samples

The primary benchmarks for the sediment screen were the chronic aquatic organism or bioaccumulation values from the *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999). For non-polar organic chemicals, this document includes three types of ecological sediment screening values:

- Protection of benthic aquatic life to acute toxicity;
- Protection of benthic aquatic life to chronic toxicity, and
- Protection of wildlife for bioaccumulation potential.

The primary values reviewed for this screening were those derived for protection of chronic toxicity and bioaccumulation potential.

NYSDEC (1999) reports the units for the sediment screening benchmarks for the non-polar organics as micrograms per gram of organic carbon ($\mu g/g_{OC}$), i.e., as the organic carbon normalized sediment concentration. When the NYSDEC sediment values are used for screening, they are adjusted by the total organic carbon (TOC) content of the sample by applying the following equation:

$$\text{Sediment Conc (as } \mu g/Kg_{dw}) = \frac{\text{ScreenValue}(\mu g/g_{OC}) \times \text{TOC}(mg_{OC}/Kg_{dw})}{1000\,(mg_{oc}/g_{oc})}$$

The average TOC was not used to calculate the sediment ESVs that were based on the NYSDEC organic carbon normalized criteria. The procedure used for the chemical screening was to first identify the sample that had the largest chemical result, and then calculate the corresponding sample-specific ESV based on the reported TOC for that sample.

As per NYSDEC (1999), this approach should only be applied to sediments with organic carbon fractions between approximately 0.2 to 12 percent (EPA SAB, 1992). Outside of this range, other factors that the equilibrium partitioning methodology does not account for may influence contaminant partitioning. Three samples (SD08-15, SD08-5 Dup, and SD08-1) had TOC contents greater than 12 percent. When the maximum observed chemical concentration was reported in one of these samples, an alternate sediment benchmark was used as the ESV.

For the inorganics, the Lowest Effect Levels (LELs) and Severe Effect Levels, based on Long and Morgan (1990) and Persaud et al. (1992), were reported in this guidance. The LELs were selected as potential screening values because they represent the more conservative (lower) benchmarks.

The following alternative sources of sediment screening benchmarks were evaluated:

- Ecological Screening Levels (ESLs) from USEPA Region 5 (USEPA, 2003);
- Ecological Benchmark values from USEPA Region 6 (TCEQ, 2006); and
- Consensus Threshold Effect Concentration (TEC) Sediment Screening Benchmarks (MacDonald et al., 2000).

The screening values used to assess the sediment results are compiled in Table 3-5b. When multiple values were available, precedence was given to the NYSDEC sediment values. In those cases where NYSDEC values were not available, the lowest of the remaining alternate benchmarks were used as the screening values. The following surrogate values were used for chemicals of similar structure:

- *bis(2-Ethylhexyl) phthalate*: Used as a surrogate for the di-n-butyl phthalate.

- *Naphthalene*: Used as a surrogate for 2-Methylnaphthalene.

Alternate screening values were evaluated for several of the inorganics that lacked values from the four principal sources. These are summarized below:

- *Aluminum*: The World Health Organization (WHO) (1997a) reports mean concentrations ranging from 20,000 to 80,000 milligrams per kilogram (mg/Kg) in sediments. Sediment background levels reported by the National Oceanic and Atmospheric Administration (NOAA) in their *Screening Quick Reference Tables* (SQuiRTs; Buchman, 2008) was 0.26 percent, equivalent to 2,600 mg/Kg. The Hudson River watershed sediment database compiled by USGS (Rice, 1999) showed aluminum concentrations ranging from 54,000 to 89,000 mg/Kg. The geometric mean of the lowest values from these three sources (14,000 mg/Kg) will be used as the ESV.

- *Barium*: The sediment background level reported for barium in the NOAA SQuiRT was 0.7 mg/Kg (Buchman, 2008). Although higher levels were reported by WHO (1990a; 450 to 3,000 mg/Kg), it was unclear whether the latter represented a pristine or impacted waterbody. The value of 0.7 mg/Kg was selected as the ESV.

- *Beryllium*: WHO (1990b) reported that background concentrations in soils and sediments have a similar range from less than 1 to 7 mg/Kg. The value of 1 mg/Kg was selected as the ESV.

- *Selenium*: WHO (1996a) reports that the background concentration in rocks, soils, and sediments is generally less than 1 mg/Kg. The Hudson River watershed sediment database compiled by USGS (Rice, 1999) showed selenium concentrations ranging from 0.2 to 2.4 mg/Kg. Therefore, 0.2 mg/Kg was selected as the ESV.

- *Thallium*: WHO (1996b) reports levels of thallium in aquatic sediments that are unimpacted by wastes are typically less than 1 mg/Kg. This value will be used as the ESV.

- *Vanadium*: The sediment background level reported for vanadium in the NOAA SQuiRT was 50 mg/Kg (Buchman, 2008). This value will be used as the ESV.

Chemicals that lacked suitable screening benchmarks are noted on Table 3-5b. For those chemicals evaluated using the NYSDEC sediment benchmarks, the TOC-adjusted screening values are summarized in Table 3-7.

3.2.3 Screening Values for Fish Samples

The Oak Ridge National Laboratory (ORNL) RAIS website collection of ecological benchmarks[4] provides a limited number of pertinent screening values for biota and the pesticides, PCBs and metals that were detected in the fish samples. These benchmarks are briefly summarized below.

- NYSDEC Benchmarks: NYSDEC (Newell et al., 1987) developed fish tissue criteria for the assessment of potential impacts to piscivorous wildlife in support of the Niagara River Biota Contamination Project in the 1980s. The focus of this effort was the development of tissue benchmarks for 19 organochlorine chemicals that were detected in spottail shiners from the Niagara River and would be protective of wildlife that consumed these fish.

- Environment Canada Fish Screening Benchmarks: Environment Canada developed Canadian Tissue Residue Guidelines (CTRGs) for the protection of wildlife consumers of aquatic biota (Environment Canada, 2004). CTRGs were available for total DDT and methylmercury, only.

[4] RAIS can be accessed at the following URL: http://rais.ornl.gov/homepage/benchmark.shtml

- ECW-Beyer et al (1996) Screening Benchmarks: Beyer et al (1996) compared tissue concentrations and toxic endpoints for a wide variety of chemicals and compiled them into a database.

- U.S. Army Corps of Engineers (USACE) Environmental Residue-Effects Database: The on-line USACE-Environmental Residue-Effects Database (ERED)[5] contains data relating tissue concentrations to toxicological endpoints. The database was used to extract whole body fish data and the No Observable Effects Dose (NOED) that were reported for the chemicals. The principal endpoints that were evaluated were growth, reproduction, and survival. If multiple values were reported, then both the range and the geometric mean of the NOED values were used as ESVs. The most recent database update was in September 2007.

The fish screening benchmarks are provided in Table 3-5c. Screening of the fish results was restricted to the limited number of screening benchmarks and is presented in Section 3.3.3.

3.3 CHEMICAL RESULTS AND ABIOTIC SCREEN

The primary focus of Step 2 of the ERAGS process is to conduct a screening evaluation of the chemicals detected in environmental media at Koppers Pond to determine whether further ecological evaluation (in subsequent steps of the ERAGS process) is necessary, and if so, which chemicals should be considered preliminary COPECs. The Step 2 screening is very conservative. Maximum detected concentrations are compared to conservative ESVs. The comparison results in a screening level Hazard Quotient (HQ_{screen}). If the maximum detected concentration of a particular chemical is less than the ecological screening value of that chemical, the HQ_{screen} is below 1.0, indicating that a potential risk is not present, the chemical is not a COPEC in that environmental medium and can be eliminated from the remainder of the ERAGS process. If the maximum detected concentration of a particular chemical exceeds its ecological screening value, the HQ_{screen} is greater than 1.0, indicating that a potential risk may be present and the chemical is identified as a preliminary COPEC in that environmental medium.

The samples that were evaluated in the SLERA screen are identified on Table 3-1. Sediments from within the Industrial Drainageway were remediated under Operable Unit 3 and are not within the scope of the Operable Unit 4 RI/FS, and therefore were not evaluated in the SLERA screening. Surface water and sediment samples collected from further upstream from the Industrial Drainageway or from other locations upgradient of Koppers Pond were collected to

[5] The ERED database can be accessed on-line from this URL: http://el.erdc.usace.army.mil/ered/

identify and characterize other potential sources. These samples were also not included in the SLERA screening.

The next three sections present results of the screening evaluation for surface water, sediments, and fish.

3.3.1 Surface Water Screening Results

Surface water samples collected from Koppers Pond and from the pond outlet channels were combined for this screen. The HQ_{screen} values were calculated using the maximum positive result for each detected chemical concentration in these samples. The screening results are summarized below by chemical group. The surface water ESVs are shown in Table 3-5a.

3.3.1.1 Surface Water Volatile and Semivolatile Organics Screen

Table 3-8a summarizes the results of the screening of the VOC and SVOCs detected in the surface water samples. Of the VOCs detected in the surface water samples, none exceeded its corresponding ESV value. Therefore, none of the surface water VOCs was retained for further evaluation in the ERA.

None of the SVOCs detected in the surface water samples exceeded their corresponding ESV values, except for one PAH [i.e., benzo(a)anthracene]. This PAH was retained as a SLERA COPEC (as were total PAHs),and will be evaluated further in the refined COPEC screening performed as part of ERAGS Step 3.

3.3.1.2 Surface Water Inorganics Screen

Unfiltered and filtered surface water samples were collected for inorganic analyses, and these two sample preparation methods were evaluated separately for the inorganics screening. Use of unfiltered surface water samples for screening is conservative because the samples include suspended particulates that can increase some of the inorganic results. In addition, since aquatic toxicity is generally related to the dissolved phase chemical concentration, the decision to include the chemical as a COPEC will be based upon the screening of the filtered metal results.

The comparisons of the unfiltered surface water inorganic results to the ESVs are presented in Table 3-8b. ESVs were available for 15 of the 21 inorganic results that were evaluated. Some of the ESVs presented in Table 3-5a were relevant only to filtered samples. Review of Table 3-8b shows that three of the inorganics (i.e., cadmium, iron and magnesium) exhibited HQ_{screen} values greater than one.

As noted above, since aquatic toxicity is generally related to the dissolved phase chemical concentrations, the filtered surface water results were also compared to the ESVs (Table 3-8c). Several of the inorganics that were detected in the unfiltered samples were not detected in the filtered (dissolved phase) analyses (e.g., iron). In addition, for some chemicals, only dissolved phase ESVs were available (e.g., aluminum, arsenic, selenium). HQ_{screen} values were all below one except for magnesium. Therefore, magnesium was retained as a SLERA COPEC and will be evaluated further in the refined COPEC screening performed as part of ERAGS Step 3.

3.3.2 Sediment Screening Results

Surface (0- to 6-inch) sediments collected from Koppers Pond and from the pond outlet channels were combined for the sediment COPEC screen. The HQ_{screen} values were calculated using the maximum detected concentration of each chemical in sediments. The individual sample results are provided in the *Site Characterization Summary Report* for the VOCs, SVOCs, pesticides/PCBs and metals. The sediment ESVs are shown in Table 3-5b.

3.3.2.1 Sediment VOCs

Table 3-9a summarizes the screening results for the sediment VOCs and SVOCs. Four VOCs were reported in the sediment samples. The detection frequency was greater than 5 percent for all VOCs, except for 2-butanone and toluene. A suitable ESV was not available for one of the VOCs (methyl acetate). Of the remaining VOCs, toluene had an HQ_{screen} value less than one. Acetone had an HQ_{screen} value greater than one, and was therefore retained as a SLERA COPEC. The acetone results will be evaluated further in the refined COPEC screening performed as part of ERAGS Step 3.

3.3.2.2 Sediment SVOCs

Table 3-9a summarizes the screening results for the sediment SVOCs. Of the 27 SVOCs reported in the sediment samples, all but two (di-n-butyl phthalate and phenol) had a detection frequency greater than 5 percent. Twenty-three of the SVOCs had ESVs for screening comparisons. The maximum SVOC results occurred in sample SD08-15 for 11 PAHs [2-methylnaphthalene, acenaphthene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, dibenzofuran, fluoranthene, naphthalene, phenanthrene, pyrene and total PAHs]. NYSDEC OC-normalized sediment criteria were available for seven of these PAHs [acenaphthene, anthracene, benzo(a)anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene]. The NYSDEC sediment criteria could not be used for the COPEC screening of these chemicals because sample SW08-15 had a TOC content greater than 12% (22%). Therefore, the alternate ESVs shown in Table 3-5b were used to assess these seven PAH results.

A total of 15 SVOCs had HQ_{screen} values greater than one and were retained as preliminary COPECs. These included 13 individual PAHs, total PAHs and one phenolic compound (4-methylphenol).

3.3.2.3 Sediment Pesticides/PCBs

Table 3-9b summarizes the screening results for the sediment pesticides/PCBs. Three pesticides and PCBs were reported in the sediment samples. All three pesticides were detected at a frequency less than 5 percent, and two of the pesticides (*gamma*-BHC and *gamma*-chlordane) had HQ_{screen} values greater than one. The latter two pesticides were retained as SLERA COPECs and will be evaluated further in the refined COPEC screening performed as part of ERAGS Step 3.

PCBs (as Aroclor 1254) were detected in the sediment samples at a frequency greater than 5 percent. Comparison of the maximum observed concentration to the ESV showed that PCBs had HQ_{screen} values greater than one. Therefore, PCBs were retained as sediment COPECs. These will be evaluated as total PCBs for the subsequent Steps of the ERAGS process.

3.3.2.4 Sediment Inorganics

Table 3-9c summarizes the screening results for the sediment inorganics. Twenty-four inorganics were reported in the sediment samples and the detection frequency was 100 percent for all inorganics except for cyanide. ESVs were available for 20 of the inorganics, and the HQ_{screen} values were greater than one for 15 of the inorganics. Two of the inorganics - aluminum and iron - are commonly observed in pond sediments and will be evaluated further as part of the refined COPEC screening performed as part of ERAGS Step 3.

Based on this analysis, 15 inorganics will be retained as preliminary COPECs for the sediments.

3.3.3 Fish Screening Results

As with the preceding sections, the HQ_{screen} values were calculated using the maximum detected concentration of each chemical in the forage fish samples, independent of species. This screening step was limited because there were only a small number of screening benchmarks available for comparison to the fish results. The fish ESVs are shown in Table 3-5c.

3.3.3.1 Screening of Pesticides in Forage Fish

Table 3-10a compares the observed maximum positive concentrations in the forage fish samples to the pesticide ESV values. There were five pesticides (*beta*-BHC, *alpha*-Chlordane, *gamma*-Chlordane, endosulfan sulfate, and endrin aldehyde) detected in one or more of the forage fish samples. A NYSDEC ESV was available for *beta*-BHC and the remaining four pesticides were compared to tissue-effects values reported in USACE-ERED.

- *Beta-BHC*: The comparison of the maximum observed concentration to the ESV yielded an HQ_{screen} value that was well below one.

- *Alpha-Chlordane and gamma-Chlordane*: The reported NOED for chlordane ranged from 10 to 87,000 µg/Kg (geometric mean: 290 µg/Kg) as a whole body tissue burden. The observed maximum results (4 and 13 µg/Kg, for *alpha*- and *gamma*-chlordane, respectively) yielded HQ_{screen} values well below one.

- *Endosulfan sulfate*: The reported NOED for endosulfan (which included endosulfan sulfate) was 195 µg/Kg. The observed maximum result (2.5 µg/kg) was well below this value resulting in an HQ_{screen} value of less than one.

- *Endrin aldehyde*: The reported NOED for endrin (which included endrin aldehyde) ranged from 19 to 1,800 µg/Kg (geometric mean: 265 µg/Kg) as a whole body tissue burden. The observed maximum result (3 µg/kg) yielded an HQ_{screen} value well below one.

Based on this evaluation, none of the pesticides was retained as forage fish COPECs.

3.3.3.2 Screening of Aroclor PCBs in Forage Fish

Table 3-10a also compares the observed maximum positive concentration in the forage fish samples to the PCB ESV. ESVs were available from both NYSDEC and USACE-ERED. The NYSDEC value was more conservative, and the observed maximum result for total PCBs (1,540 µg/Kg) was greater than the screening benchmark (HQ_{screen} of 14.0). Although the observed maximum result was well within the USACE-ERED no effects range (Table 3-5c), PCBs were retained as a SLERA COPEC in fish based on comparison to the NYSDEC benchmark.

3.3.3.3 Screening of Inorganics in Forage Fish

Table 3-10b compares the observed maximum positive inorganic concentrations in the forage fish samples to the metal screening benchmarks. The mercury ESV was from NYSDEC while

the remaining 10 ESVs were from USACE-ERED. ESVs were not available for seven of the metals from any of the evaluated sources.

None of the maximum observed metal results had HQ_{screen} values greater than one, except for aluminum and iron. In both cases, the HQ_{screen} values were slightly above one. Although in both cases the maximum positive results were well within the USACE-ERED no effects range (Table 3-5c), they will be retained as SLERA COPECs for further assessment as part of ERAGS Step 3.

3.3.4 Summary of COPECs Identified in SLERA Steps 1 and 2

Table 3-11 compiles the COPECs identified as part of this SLERA that will be carried into ERAGS Step 3 for further evaluation and refinement. Several of the organic chemicals retained as SLERA COPECs are also shown as potential bioaccumulative chemicals in USEPA (2000). The SLERA COPECs are summarized below by media.

Surface Water SLERA COPECs

VOCs, SVOCs, pesticides, PCBs, and metals were analyzed in the unfiltered surface water samples, and metals were also analyzed in the filtered water samples. None of the detected chemicals in surface water were retained as SLERA COPECs, except for a single PAH [Benzo(a)anthracene].

Sediment SLERA COPECs

VOCs, SVOCs, pesticides, PCBs and metals were analyzed in the sediment samples. Samples collected from the 0- to 6-inch interval were used for the screening because these are most relevant for estimating potential exposures of ecological receptors. The maximum concentration of the VOCs and pesticides were below their corresponding ESVs, except for acetone. Therefore, acetone will be retained as a SLERA COPEC and will be evaluated further in the refined screening performed in ERAGS Step 3.

The maximum detected concentrations of the pesticides were below their corresponding ESVs, except for two pesticides [*gamma*-BHC (Lindane) and *gamma*-Chlordane]. These two pesticides were retained as SLERA COPECs and will be evaluated further in the refined screening performed in ERAGS Step 3.

Of the 27 SVOCs detected in the sediment samples, a total of 15 SVOCs had HQ_{screen} values greater than one and were retained as preliminary sediment COPECs. These included 13 individual PAHs, total PAHs and one phenolic compound (4-methylphenol).

Twenty-four inorganics were reported in the sediment samples. The HQ_{screen} values were greater than one for 15 inorganics that had ESVs, and these were retained as preliminary COPECs for the sediments.

Fish SLERA COPECs

Pesticides, PCBs, and metals were analyzed in the forage fish samples. Of the detected chemicals, the maximum PCB, aluminum, and iron concentrations exceeded their corresponding ESV value and was retained as SLERA fish COPECs.

3.4 UNCERTAINTY AND DATA GAPS

A variety of factors will contribute to uncertainties associated with risk estimates in the SLERA. Uncertainty is inherent in all aspects of the risk assessment process, and such uncertainties can result in overestimations or underestimations of the true ecological risk present at the site. For the SLERA, the four key areas of uncertainty include the following:

- Selection of screening benchmarks (ESVs);
- Selection of fish tissue media for screening;
- Sampling methods;
- Analytical results;
- Detection limits; and,
- Comparison of SLERA COPECs to CDM (1999) COPECs

These key areas of uncertainty are discussed in the following sections.

3.4.1 Uncertainty in the Selection of ESVs

Surface Water ESVs

NYSDEC Class C water quality criteria for protection of aquatic life were the primary source for the SLERA ESVs, although other data sources were used when an appropriate NYSDEC value was not available. In some cases, these alternate values were not strictly based on direct toxicity, but rather were derived based on potential food chain effects.

Several inorganics lacked suitable ESVs. For the inorganics, the lack of suitable ESVs was not considered to be significant because the affected constituents were typically trace cations that do not represent significant ecotoxic threats (e.g., calcium).

Sediment ESVs

In most cases, the sediment screening criteria were based on potential impacts to benthic invertebrates. Use of benchmarks based on benthic sensitivity to assess sediment quality may be conservative in some cases if the samples are collected from areas that are naturally depauperate of benthic organism due to poor substrate or reduced conditions. Alternatively, they may not necessarily be protective of effects in higher trophic levels if chemicals bioaccumulate in invertebrates or forage fish that serve as a prey base for higher trophic level receptors. This is not expected be an important source of uncertainty at Koppers Pond because PCBs, the preliminary COPEC with the greatest bioaccumulation potential, will be retained as a COPEC in the ecological risk assessment for the Site.

Fish ESVs

The NYSDEC fish screening values were developed for a specific project with a comparatively short list of target chemicals that assessed food-chain transfer to higher trophic level ecological receptors that prey on small fish. Similar approaches have been used elsewhere but have relied upon other piscivorous predators (e.g., mink for deriving the USEPA Region 5 ESLs).

ESVs developed from the USACE ERED database focused those fish tissue body burdens that may be related to potential growth, reproduction and survival impacts, and not food-chain to higher trophic level ecological receptors. For the SLERA, no effort was made to further filter the ERED data to species that may not be found in Koppers Pond (e.g., Atlantic salmon). This refinement may be used at later steps in the ERAGS process.

3.4.2 Uncertainty in the Fish Tissue Media Selected for Screening

A supplemental COPEC evaluation was performed using the gamefish results at the request of NYSDEC. The gamefish results are not relevant to the SLERA (or BERA) because the ecological receptors will be evaluated for exposure to whole organisms, and not the game fish fillets (which will be evaluated in the BHHRA).

The supplemental screening is shown on Tables 3-12a (Pesticides/PCBs) and Table 3-12b (Inorganics). These results are summarized below:

Pesticides/PCBs:

- 4,4'-DDE (and total DDT/DDD/DDE) were detected in the gamefish samples but were not detected in the forage fish samples. The ESV (100 µg/Kg) was the value reported for DDT, DDD, DDE by Newell et al. (1987).

- *beta*-BHC was detected in the forage fish samples but was not detected in the gamefish samples.

- None of the maximum positive pesticide results in the gamefish samples were greater than their corresponding ESVs. The maximum individual Aroclor PCB and total PCB results in the gamefish samples were greater than the ESV, which was also observed in the forage fish samples.

  Therefore, there would be no changes in the pesticide/PCB chemical screening even if the gamefish results were used.

Inorganics:

- One inorganic (vanadium) was detected in the gamefish samples but was not detected in the forage fish samples. The ESV for vanadium (1.9 mg/Kg) was the geometric mean of the carcass and whole body vanadium NOAEL concentrations reported in the USACE-ERED on-line database.

- Four inorganics (aluminum, barium, cadmium and cobalt) were detected in the forage fish samples but were not detected in the gamefish samples.

- None of the maximum positive results in the gamefish samples were greater than the ESVs, with the exception of chromium which just exceeded the ESV (maximum positive result of 1.2 mg/Kg compared to an ESV of 1.1 mg/Kg). This slight exceedance is not considered to be significant.

This supplemental comparison shows that the preliminary fish COPEC list would be unchanged even if the gamefish results were used in lieu of the more ecologically relevant forage fish results.

3.4.3 Uncertainty in the Sampling Methods

Generally, there is less uncertainty in sampling methods used in 2008 than in prior studies because concerted efforts were made to ensure proper sample collections. For example, the

2008 samples were collected from the 0- to 6-inch sediment depth using cores, while much of the prior work involved the collection of simple grab sediments samples of undefined depth.

3.4.4 Uncertainty in the Analytical Results

Generally, there is less uncertainty in the analytical results collected in 2008 than in prior studies because the most recent versions of the SW-846 methods were used and all of the analytical results underwent full data validation. The results of the data validation were provided in the *Site Characterization Study Report*.

As discussed in the *Site Characterization Study Report*, the initial PCB and lipid results reported for fish samples appeared biased low. A corrective measure was implemented where the PCB and lipid results from a second laboratory were used in lieu of the original results. This corrective measure increased the conservatism and reduced the uncertainty in the original reported results for these parameters in the fish samples.

The field duplicate results were treated as independent samples for the chemical screening. This approach was taken to maximize the number of potential results for this initial comparison. In the ERA, appropriate averaging methods of the sample result and corresponding field duplicate will be used to calculate exposure point concentrations.

3.4.5 Uncertainty in the Suitability of the Detection Limits for Chemical Screening

The chemical screening that was performed in Section 3.3 focused on those chemicals that were detected in at least one sample of the evaluated media. The determination of the suitability of the detection limits for evaluating the chemical results (part of the Data Quality Objectives process) presented in the 2007 *Quality Assurance Project Plan* was based on the anticipated detection limits, and not the actual detection limits that were achieved in these samples. At the request of NYSDEC, an additional uncertainty analysis was performed that compared the detection limits for those chemicals that were not detected in the sampled media to readily available ESVs. This analysis focused on SVOCs, metals and pesticides in sediments and forage fish.

Koppers Pond and Outlet Sediments SVOCs

Table 3-13a compares the sediment SVOCs that were not detected in the sediment samples to the available ESVs. This comparison and its results are summarized below.

- A total of 33 SVOCs were not detected in these samples.

- ESVs (or surrogate ESVs) were available for 18 of the 33 SVOCs that were not detected in the sediment samples. The ESVs were all based on the New York Sediment Guidance values (NYSDEC, 1999), and were calculated using the average TOC concentration (61,190 mg/Kg) across these samples. Alternatively, the samples with the highest detection limits could have been used, but use of the average TOC provides a more comprehensive evaluation across all of the samples.

    - The ESVs for three phthalate compounds (Diethyl phthalate, Dimethyl phthalate, Di-n-octyl phthalate) used bis(2-ethylhexyl)phthalate as a surrogate.

    - The ESVs for five phenolic compounds (2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, 2,4-Dichlorophenol, 2-Chlorophenol, and 4-Chloro-3-methylphenol) were evaluated as "total chlorinated phenols" for this comparison.

    - The ESVs for six phenolic compounds (2,4-Dimethylphenol, 2,4-Dinitrophenol, 2-Methylphenol, 2-Nitrophenol, 4,6-Dinitro-2-methylphenol, and 4-Nitrophenol) were evaluated as "total unchlorinated phenols" for this comparison.

- The minimum SQLs for eight of the 18 SVOCs were below their corresponding ESVs. The chlorinated and unchlorinated phenolics had minimum SQLs greater than their surrogate ESVs.

- The maximum SQLs for five of the 18 SVOCs were below their corresponding ESVs. The elevated SQLs were chiefly due to the dilution factors and solids content of these samples. For example, sample SD08-8 (where the 2,4-dinitrophenol SQL was 6,800 µg/Kg), had dilution factor of 10 and a solids content of 25.1%.

Based on this comparison, there is some uncertainty in the selection of SVOC COPECs for the sediment samples. However, this is not likely to be significant because the elevated SQLs were attributable to sample matrix effects on the analytical results.

Koppers Pond and Outlet Sediments Pesticides

Table 3-13b compares the sediment SQLs for the pesticides that were not detected in the sediment samples to the available ESVs. This comparison is summarized below.

- A total of 19 pesticides were not detected in the sediment samples.

- ESVs were available for 18 of these chemicals. The single exception was atrazine[6]. The ESVs were all based on the New York Sediment Guidance values (NYSDEC, 1999), and were calculated using the average TOC concentration (61,190 mg/Kg) across these samples.

- The minimum SQLs for sixteen of the 18 pesticides were below their corresponding ESVs. The two pesticides that had minimum SQLs greater than the ESVs were *alpha*-chlordane and toxaphene.

- The maximum SQLs for five of the 18 pesticides were below their corresponding ESVs. The elevated SQLs were chiefly due to the dilution factors and solids content of these samples. For example, sample SD08-7 (where the toxaphene SQL was 6,300 µg/Kg), had dilution factor of 25 and a solids content of 26.5%.

Based on this comparison, there is some uncertainty in the selection of pesticide COPECs for the sediment samples. As with the SVOC comparisons, this is not likely to be significant because the elevated SQLs were attributable to sample matrix effects on the analytical results.

Forage Fish Samples Pesticides and Inorganics

Table 3-13c compares the fish tissue SQLs for the pesticides and inorganics that were not detected in any of the forage fish samples to the available ESVs. This comparison is summarized below.

- A total of 16 pesticides and five inorganics were not detected in the forage fish samples.

- ESVs were available for 20 of these chemicals. The single exception was antimony.

- The minimum and maximum SQLs were well below their corresponding ESVs.

Based on this comparison, there is little uncertainty in the selection of COPECs for forage fish tissues.

In summary, the comparisons of the sediment SQLs to the ESVs were impacted by the elevated SQLs that resulted from matrix effects (e.g., elevated moisture content, elevated dilution factors). Although this creates some uncertainty about the representativeness of the selection of the sediment COPECs in Section 3.3.2, this is not considered to be significant because these

[6] A search of the ORNL RAIS website showed that there were no sediment benchmarks available for atrazine.

chemicals are unlikely related to historical discharges. The forage fish samples were not subject to these matrix issues, and show that there is little uncertainty in the COPEC screening performed for the biota samples.

3.4.6 Comparison of SLERA COPECs to CDM (1999) COPECs

Table 3-14 compares the COPEC screening approach used in the Baseline Ecological Risk Assessment (BERA) prepared by CDM (1999) and this SLERA. The COPEC screening in the BERA prepared by CDM (1999) focused predominantly on sediments and used the NYSDEC (1999) and Ontario sediment criteria. The CDM (1999) BERA evaluated the data for three areas:

- Lower portion of the industrial drainageway;
- Koppers Pond; and
- Pond outlet streams.

The screening performed in this SLERA used the NYSCEC (1999) values for the sediments, as well as additional data sources, many of which were not yet available when the 1999 BERA was prepared. Separate screening of the surface water and fish tissues was also performed in this SLERA.

The principal differences in the COPEC lists were the following:

- Retention of a large number of pesticides in the BERA COPEC compared to only two for the SLERA; and
- Reduction in the list of sediment inorganic COPECS in the SLERA compared to the BERA.

CDM (1999) used the Ontario LELs (Persaud et al., 1993) for screening the sediment pesticide results. These values are not normalized to the organic carbon content of the sediment, as done in NYSDEC (1999) and as a result their ESVs were lower than calculated using the sample-specific TOC content [see Table 2-2 of CDM (1999) for these comparisons]. For the current SLERA, the NYSDEC (1999) screening values, adjusted for the samples TOC content, were used. In addition, the frequency of detection and observed concentrations of the pesticides were lower in the current study than reported in CDM (1999).

Table 3-15 compares the inorganic COPECs identified in the 1999 BERA (CDM, 1999) and those retained in this SLERA. There were four inorganics retained as COPECs in the BERA that were not retained in this SLERA: beryllium, cobalt, thallium, and vanadium. These were

chiefly retained in the BERA (CDM, 1999) due to a lack of suitable screening benchmarks when that document was prepared.

3.5 SCIENTIFIC/MANAGEMENT DECISION POINT

Generally, SMDPs provide an opportunity to fine tune and focus any additional activities to address the specific goals of the different steps in the ERAGS process (USEPA, 1997). For example, SMDPs provide the opportunity to exit the process where the weight of evidence supports no further action.

At the end of ERAGS Step 2, there are three possible outcomes to the SMDP:

(1) There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk;

(2) The information is not adequate to make a decision at this point, and the ecological risk assessment process will continue to ERAGS Step 3; or

(3) The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

The abiotic chemical screen performed as part of the SLERA indicates that the maximum chemical concentrations for several organics (PAHs, one phenolic, and PCBs) and some inorganics in sediments, and PCBs in fish exceeded their corresponding ESVs (i.e., HQ_{screen} values greater than one). These findings suggest that there is the potential for adverse ecological effects and that there is the need for a more thorough assessment. The further evaluations will include a refined screening of the COPECs based on alternate benchmarks and Site-specific information, and additional weight-of-evidence criteria, such as the ecological condition of the upstream drainage area, Koppers Pond and the pond outlets. These evaluations will be performed in subsequent steps of the ERAGS process. Some of the key elements of ERAGS Step 3 are presented in Section 4.

4.0 COMPONENTS OF ERAGS STEP 3

ERAGS Step 3 (Problem Formulation) is the first step in conducting a quantitative ERA following the initial screening steps (USEPA, 1997). As described by USEPA (1998), it is a process "*for generating and evaluating preliminary hypotheses about why ecological effects have occurred, or may occur, from human activities.*" It includes the following components:

1. Refining the preliminary list of contaminants of ecological concern;
2. Further characterizing the ecological effects of contaminants;
3. Refining information on contaminant fate and transport, complete exposure pathways, and ecosystems potentially at risk;
4. Selecting assessment endpoints, and
5. Developing a conceptual model with working hypotheses or questions that the site investigation will address.

Some of these components have been addressed in the SLERA on a preliminary basis (e.g., developing a preliminary CSM). The components of problem formulation that will be emphasized in the ERA are the following:

- Developing preliminary COPECs based on the evaluation of Site-specific data, including comparisons to nearby reference area(s);
- Assessing the spatial distribution of the preliminary COPECs;
- Developing a refined CSM that reflects the potential fate and transport pathways and exposure routes for ecological receptors;
- Identifying assessment and measurement endpoints to frame the evaluation;
- Developing a recommended procedure to identify suitable reference site(s); and
- Selecting receptors to be evaluated.

4.1 SUPPLEMENTAL SCREENING OF COPECS

As part of the ERAGS Step 3, a supplemental screening will be performed to revise the initial selection of COPECs that were based on conservative benchmarks (USEPA, 1997, 2001).

Supplemental Sediment COPEC Screening

The following additional benchmarks will be used as screening values to refine the surface water COPECs identified in the SLERA:

- Compare the frequency of detection to a value of 5 percent, and assess the pattern and spatial distribution, of the potential COPECs. The spatial distribution of the results is used to determine how representative the COPECs may be for Site conditions, or whether it represents a localized area of contamination only.

- Assess the availability of additional alternative sediment benchmarks, and compare the average and maximum observed sediment concentrations to these values.

- For metals in sediments, the maximum results are compared to the Site-specific background (e.g., reference area)

In addition, essential nutrients (e.g., calcium, iron, magnesium, sodium, and potassium) present at low concentrations or concentrations slightly elevated above background will be eliminated as COPECs for further evaluation.

Supplemental Surface Water COPEC Screening

A supplemental screening of the surface water results is not warranted because none of the observed concentrations exceeded their ESVs.

Supplemental Fish COPEC Screening

A supplemental screening of the forage fish results is not warranted because only one chemical (PCBs) was retained as a COPEC based on the SLERA screening.

4.2 SPATIAL EXTENT OF CHEMICAL RESULTS

The spatial assessment of chemical results, especially for those chemicals that may elicit an adverse effect, can be used to determine how representative the COPEC may be for site conditions, or whether it represents a localized area of contamination only. A limited evaluation of the spatial extent of the potential COPECs was provided in this SLERA. A more detailed examination of these results, as well as for other chemicals in site media will be provided in ERAGS Step 3. This may also include the identification of additional media collections to support the ERA and risk management decision process.

4.3 DEVELOPING A REFINED CONCEPTUAL SITE MODEL

The *Preliminary Conceptual Site Model* and this SLERA have presented a preliminary CSM for Koppers Pond and its outlet channels. Because the CSM is meant to be an evolving model for

potential transport mechanisms and exposure routes, the preliminary CSM will be evaluated and updated as needed as part of ERAGS Step 3.

4.4 IDENTIFYING ASSESSMENT AND MEASUREMENT ENDPOINTS TO FRAME THE EVALUATION

Based on the current CSM, and any refinements, and additional field information regarding habitat quality and use, appropriate assessment and measurement endpoints will be developed. The objective of this effort is to frame the risk evaluation to be performed as part of the quantitative ERA and to relate potential risk management decisions into the risk evaluation process.

4.5 DEVELOPING A RECOMMENDED PROCEDURE TO IDENTIFY SUITABLE REFERENCE SITE(S)

The SLERA, and prior ERAs, did not include an evaluation of regional background conditions from a suitable reference site. As part of the ERAGS Step 3 assessment, a methodology to identify a suitable reference site will be developed.

4.6 SELECTING REPRESENTATIVE RECEPTORS TO BE EVALUATED FURTHER IN THE ERA

The *Preliminary Conceptual Site Model* identified candidate receptors for evaluation in the ERA. As part of this portion of the ERAGS Step 3, these receptors, as well as those used in the prior ERAs (CSM, 1999; CEC, 2003) will be reevaluated for their suitability. This will include an evaluation of how well these receptors would be representative of potential risks from Koppers Pond.

4.7 ERAGS STEP 3 REPORT

The focus of this SLERA was on Steps 1 and 2 of the ERAGS process, consistent with USEPA (1997) guidance. Following submission and approval of this SLERA, an ERAGS Step 3 report will be prepared. To facilitate the project schedule, it is recommended to combine the ERAGS Steps 3 through 5 into a single report, since ERAGS Step 5 focuses on the field verification and feasibility of the study design developed as part of ERAGS Step 4.

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Figures

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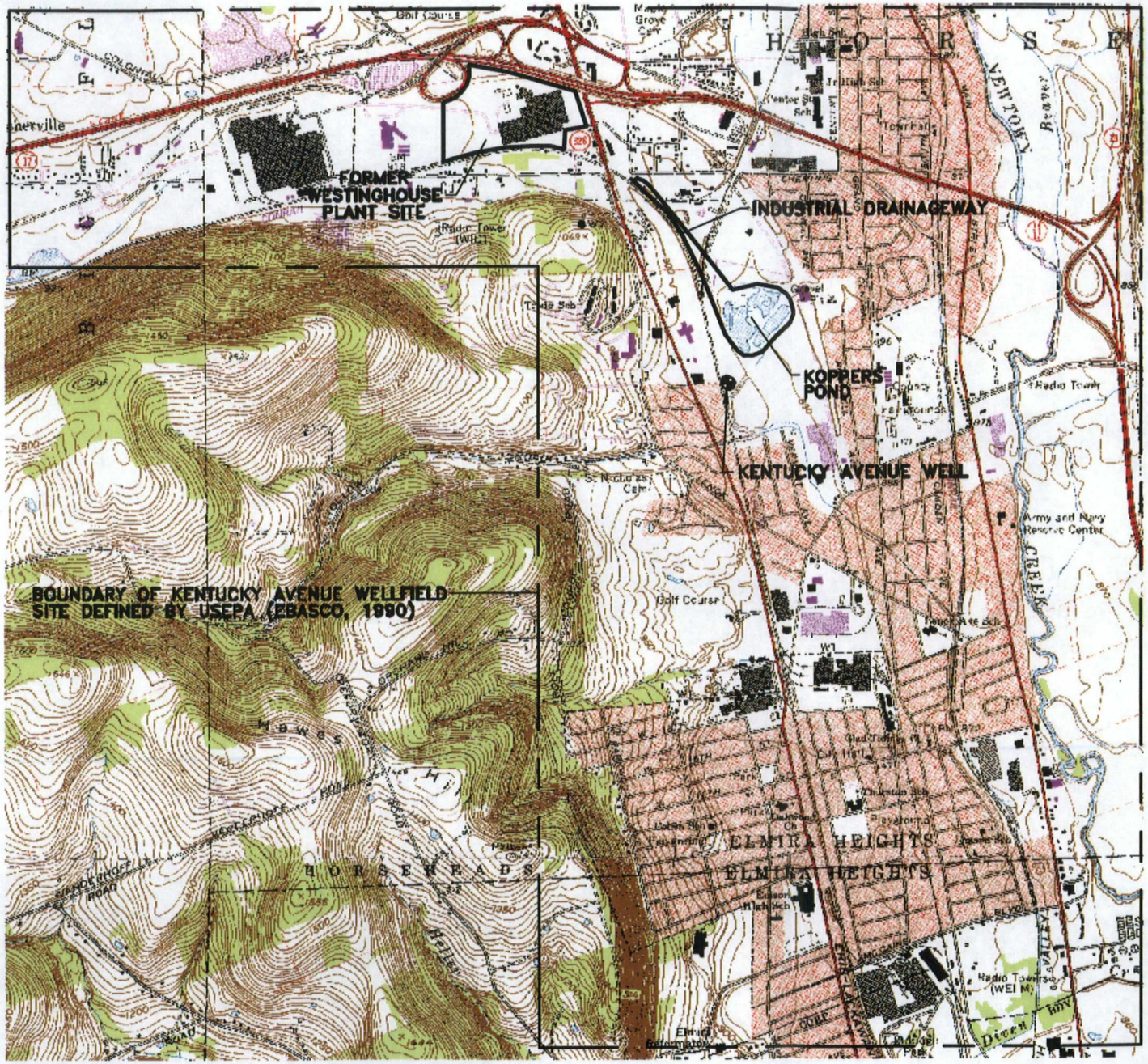

SCALE
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QUADRANGLE LOCATION

REFERENCE:
MODIFIED FROM U.S GEOLOGICAL SURVEY HORSEHEADS, NEW YORK, AND ELIMIRA, NEW YORK–PENNSYLVANIA, QUADRANGLES, PHOTOREVISED 1978.

Figure 1-1
Site Location and Topographic Map
Kentucky Avenue Wellfield OU4 – Koppers Pond, Horseheads, NY

PREPARED FOR
KOPPERS POND RI/FS GROUP

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DRAWN BY: *T.E. McKee*	DATE: *1-31-07*
CHECKED BY:	DATE:
APPROVED BY:	DATE:

PLOT SCALE: 1=1

Figure 1-2
Koppers Pond and Local Setting
Kentucky Avenue Wellfield OU4 –
Koppers Pond, Horseheads, NY

CUMMINGS RITER CONSULTANTS, INC.

Prepared For:
KOPPERS POND RI/FS GROUP

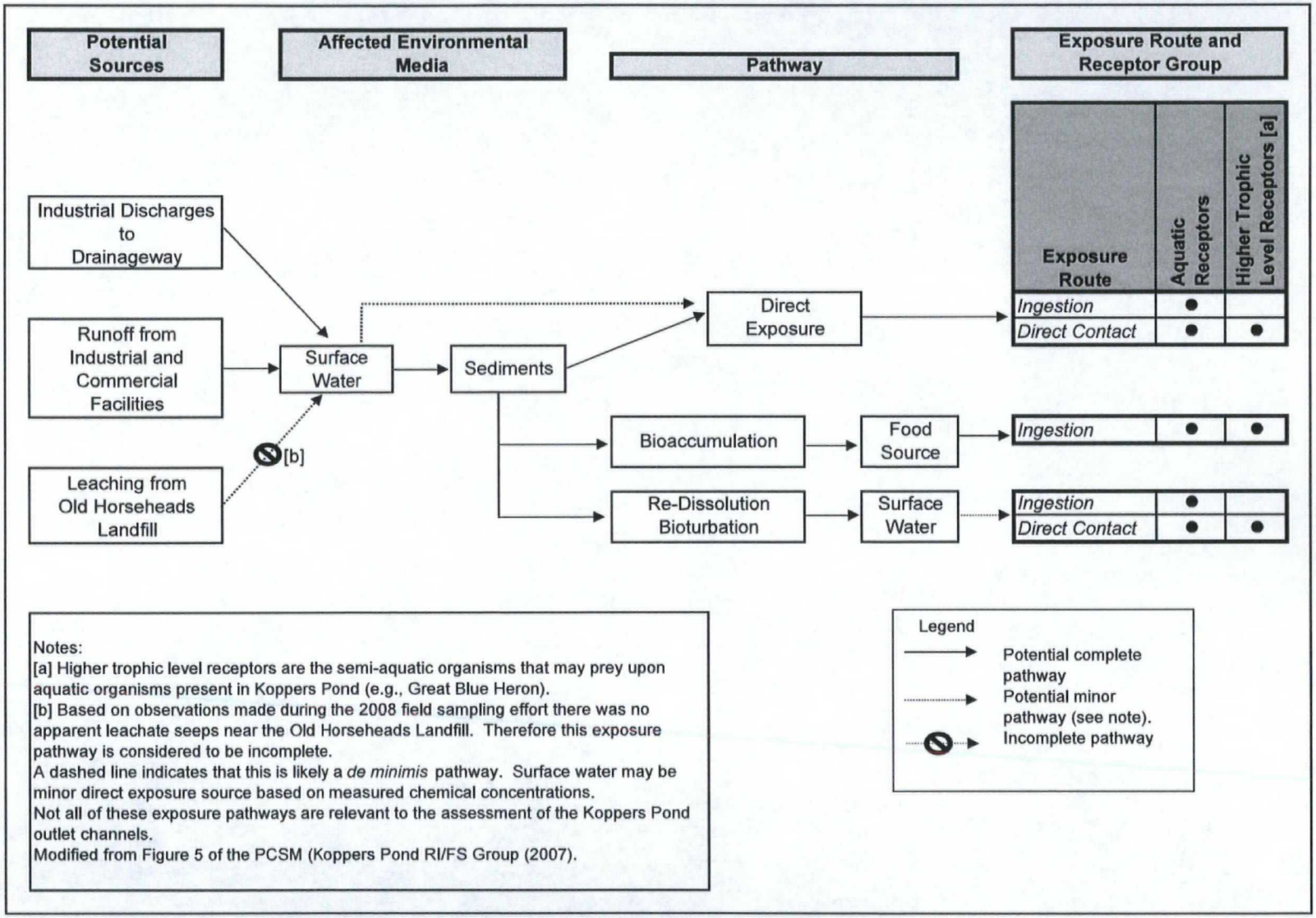


Figure 2-1. Preliminary Conceptual Site Model
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

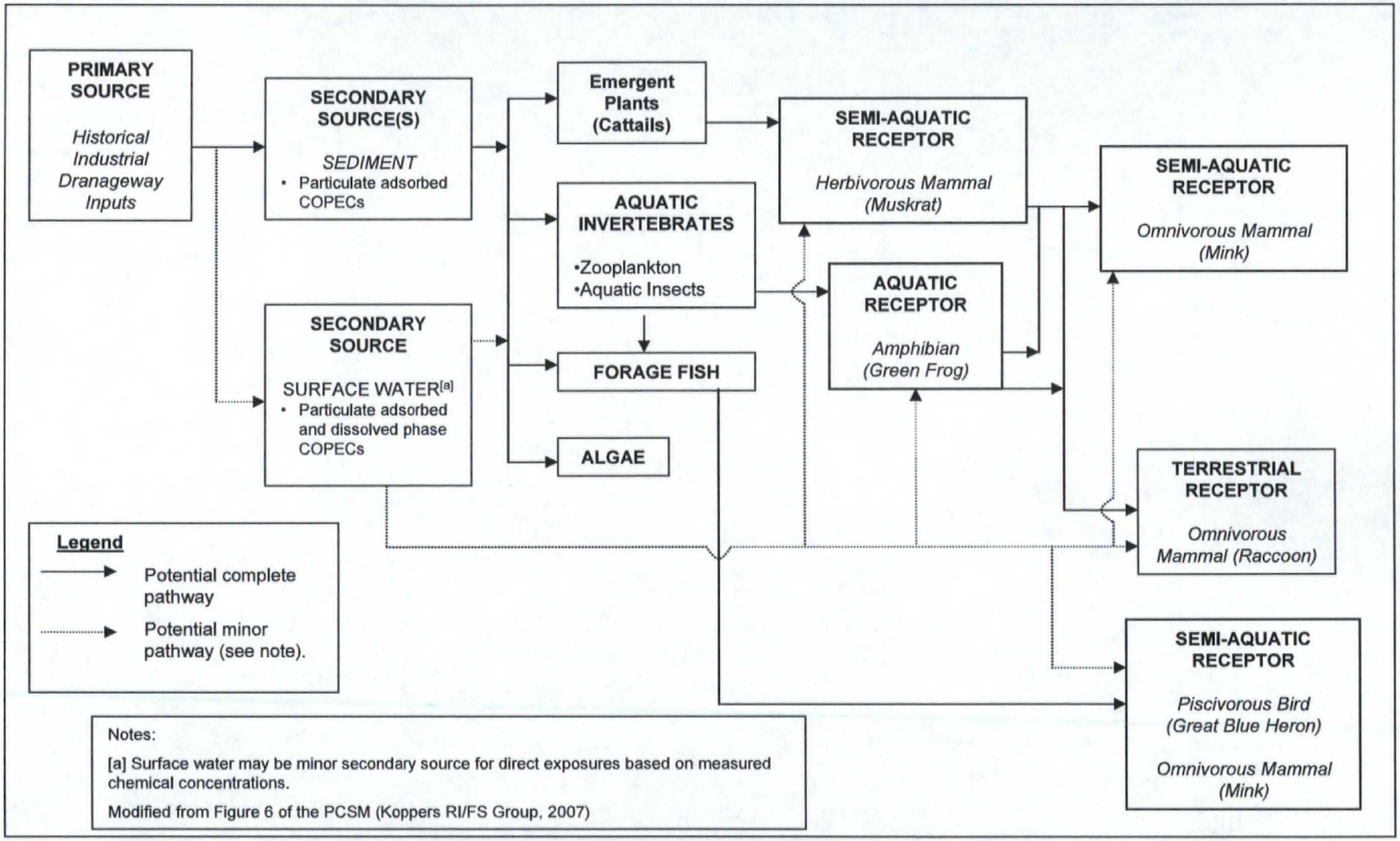


Figure 2-2. Potential Food Chain Exposure Pathways
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Figure 3-1. Sampling Locations from Koppers Pond and Outlets
Kentucky Avenue Wellfield Site - OU4
Horseheads, New York

Tables

Table 3-1. Summary of Surface Water and Sediment Sampling Locations
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Sample Location ID	Surface Water	Sediment	Included in SLERA screen?	Description
08-01		◆	Yes	Western portion of Koppers Pond
08-02	◆	◆	Yes	Western portion of Koppers Pond
08-03		◆	Yes	Western portion of Koppers Pond
08-04	◆	◆	Yes	Western portion of Koppers Pond
08-05	◆	◆	Yes	Western portion of Koppers Pond
08-06		◆	Yes	Western portion of Koppers Pond
08-07		◆	Yes	Western portion of Koppers Pond
08-08	◆	◆	Yes	Western portion of Koppers Pond
08-09		◆	Yes	Western portion of Koppers Pond
08-10	◆	◆	Yes	Eastern portion of Koppers Pond
08-11		◆	Yes	Eastern portion of Koppers Pond
08-12		◆	Yes	Eastern portion of Koppers Pond
08-13	◆	◆	Yes	Eastern portion of Koppers Pond
08-14	◆	◆	Yes	Outlet channel from Koppers Pond
08-15	◆	◆	Yes	Outlet channel from Koppers Pond
08-16	◆	◆	Yes	Outlet channel from Koppers Pond
08-17	◆	◆	Yes	Outlet channel from Koppers Pond
08-20		◆	No	At the outlet of a culvert under the railroad tracks west of Koppers Pond.
08-21	◆	◆	No	Chemung Street Outfall. Field duplicate collected.
08-22	◆	◆	No	Former Westinghouse Plant-Barrier Wall Discharge
08-23	◆	◆	No	Former Westinghouse Plant-Cutler Hammer Discharge
08-24	◆	◆	No	Junction Chamber #4 in underground discharge line
08-25	[a]	[a]	No	Junction Chamber #3 - Sample discarded since does not flow to Chemung St outfall
08-26	[a]	[a]	No	Junction Chamber #2 - Sample discarded since does not flow to Chemung St outfall
08-27	◆	◆	No	Junction Chamber #1 in underground discharge line (upstream of former Westinghouse Plant)
08-28	◆	◆	No	Outlet of stormwater retention pond west of former Westinghouse Plant
08-29	◆	◆	No	Inlet of stormwater retention pond west of former Westinghouse Plant
08-30		◆	No	Mud flat immediately south of Koppers Pond
08-40		◆	No	Mud flat immediately west of Koppers Pond
08-41		◆	No	Drainage channel from Chemung County Department of Public Works facility

Notes:
Surface water samples have the prefix "SW" and the sediment samples have the prefix "SD" in the data tables.
Surface water samples were not collected at all location with sediment samples due to absence of standing water.
Fish were collected from throughout Koppers Pond.
Only those sediment results from the 0-6" depth interval were evaluated in the SLERA.
[a]: Sample was originally collected but discarded because it does not flow to Chemung Street outfall.

Table 3-2a. Summary of VOC and SVOC Analytical Results for Surface Water Samples from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Volatile Organics				
Chloroform	2/10	MNR	0.069 - 0.083	1 - 1
Tetrachloroethene	1/10	MNR	0.22 - 0.22	1 - 1
Toluene	2/10	MNR	0.21 - 0.28	1 - 1
1,1,1-Trichloroethane	2/10	MNR	0.29 - 0.36	1 - 1
Semivolatile Organics				
Acenaphthene	1/10	0.102	0.16 - 0.16	0.19 - 0.19
Benzaldehyde	2/10	MNR	0.057 - 0.13	0.94 - 0.97
Benzo(a)anthracene	1/10	MNR	0.051 - 0.051	0.19 - 0.19
Benzo(b)fluoranthene	2/10	0.128	0.25 - 0.27	0.19 - 0.19
Chrysene	2/10	MNR	0.05 - 0.061	0.19 - 0.19
Dibenzofuran	9/10	MNR	0.16 - 0.17	0.95 - 0.95
Di-n-butyl phthalate	9/10	0.428	0.32 - 0.61	0.95 - 0.95
Fluoranthene	6/10	0.317	0.43 - 0.51	0.19 - 0.19
Fluorene	1/10	0.133	0.47 - 0.47	0.19 - 0.19
Phenanthrene	9/10	0.190	0.17 - 0.26	0.19 - 0.19
Phenol	1/10	0.096	0.1 - 0.1	0.19 - 0.19
Pyrene	2/10	MNR	0.067 - 0.069	0.19 - 0.19
Total PAHs	10/10	0.74	0.17 - 1.922	---
Corresponding Samples	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17			

Notes:
Concentration units are µg/L.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
See Tables 5 and 6 of the Site Characterization Study Report for the individual surface water results for VOCs and SVOCs, respectively.
Total PAHs calculated as sum of detected PAH results.
A dash (---) indicates not required.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.

Table 3-2b. Summary of Inorganic Analytical Results for Unfiltered Surface Water Samples from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Aluminum	10/10	282	126 - 446	-
Antimony	10/10	0.44	0.23 - 0.72	-
Arsenic	6/10	0.40	0.17 - 0.79	1 - 1
Barium	10/10	119.2	104 - 129	-
Cadmium	9/10	2.21	0.52 - 7.1	1 - 1
Calcium	10/10	64,600	54,600 - 70,500	-
Chromium	10/10	6.14	3.8 - 9.3	-
Cobalt	10/10	0.32	0.24 - 0.41	-
Copper	10/10	5.35	2 - 9.9	-
Iron	10/10	399.4	260 - 559	-
Lead	10/10	13.1	6.2 - 25.7	-
Magnesium	10/10	13,170	10,700 - 14,200	-
Manganese	10/10	12.46	8.3 - 28.5	-
Nickel	10/10	2.28	1.5 - 2.8	-
Potassium	10/10	1,098	893 - 1,400	-
Selenium	3/10	MNC	0.28 - 0.44	5 - 5
Silver	6/10	0.39	0.087 - 0.72	1 - 1
Sodium	10/10	88,880	68,300 - 95,600	-
Vanadium	9/10	0.71	0.43 - 1.2	1 - 1
Zinc	10/10	45.3	13.6 - 119	-
Corresponding Samples	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17			

Notes:
Concentration units are µg/L.
See Table 8 of the Site Characterization Study Report for the individual surface water results for inorganics.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
A dash indicates values not presented because they were not relevant to the summary.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.

Table 3-2c. Summary of Inorganic Analytical Results for Filtered Surface Water Samples from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Aluminum	10/10	20.0	16.5 - 24.1	-
Antimony	10/10	0.63	0.36 - 0.99	-
Arsenic	2/10	MNR	0.28 - 0.29	1 - 1
Barium	10/10	119.5	116 - 124	-
Calcium	10/10	68,460	65,400 - 72,600	-
Chromium	10/10	3.11	2.7 - 3.4	-
Cobalt	10/10	0.187	0.16 - 0.21	-
Copper	10/10	MNR	0.57 - 1.3	-
Lead	10/10	2.2	1.4 - 3.2	-
Magnesium	10/10	14,010	13,400 - 14,400	-
Manganese	10/10	3.75	1.2 - 5.7	-
Nickel	10/10	1.214	0.84 - 1.5	-
Potassium	10/10	1087	1,050 - 1,140	-
Selenium	5/10	MNR	0.21 - 0.38	5 - 5
Sodium	10/10	97,880	93,100 - 101,000	-
Thallium	3/10	MNR	0.027 - 0.085	1 - 1
Zinc	10/10	3.31	2.6 - 5.2	-
Corresponding Samples	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17			

Notes:
Concentration units are µg/L.
See Table 8 of the Site Characterization Study Report for the individual surface water results for inorganics.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
A dash indicates values not presented because they were not relevant to the summary.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.

Table 3-2d. Summary of General Chemistry Analytical Results for Unfiltered Surface Water Samples from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Ammonia Nitrogen	10/10	0.077	0.036 - 0.13	---
Hardness, as $CaCO_3$	10/10	249.4	234 - 262	---
Nitrite	4/10	0.044	0.066 - 0.087	0.05 - 0.05
Non-Distilled Fluoride	10/10	0.469	0.39 - 0.5	---
Total Suspended Solids	10/10	19.8	12 - 45	---
Corresponding Samples	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17			

Notes:
Concentration units are mg/L.
See Table 9 of the Site Characterization Study Report for the individual surface water results for general chemical parameters.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
A dash indicates values not presented because they were not relevant to the summary.

Table 3-3a. Summary of VOC and SVOC Analytical Results for Surface Sediments (0-6") from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Volatile Organics				
2-Butanone	1/20	7.9	14 - 14	6.6 - 30
Acetone	6/20	34.9	11 - 79	26 - 80
Methyl acetate	4/20	8.1	5.6 - 23	6.6 - 20
Toluene	1/20	15.2	160 - 160	6.6 - 30
Semivolatile Organics				
2-Methylnaphthalene	6/20	MNR	14 - 48	35 - 270
4-Methylphenol	8/20	344	15 - 1,600	270 - 1,300
Acenaphthene	7/20	81.2	14 - 230	31 - 270
Acenaphthylene	9/20	87.4	24 - 310	31 - 270
Acetophenone	2/20	MNR	58 - 66	150 - 1,300
Anthracene	17/20	184.4	10 - 510	65 - 140
Benzaldehyde	8/20	MNR	28 - 170	310 - 1,300
Benzo(a)anthracene	20/20	417.4	37 - 2,200	---
Benzo(a)pyrene	20/20	468.4	48 - 1,400	---
Benzo(b)fluoranthene	20/20	726.6	72 - 2,600	---
Benzo(ghi)perylene	20/20	382.9	34 - 1,200	---
Benzo(k)fluoranthene	10/20	191.5	21 - 920	31 - 140
bis(2-Ethylhexyl) phthalate	15/20	391.9	20 - 1,400	320 - 890
Butyl benzyl phthalate	7/20	MNR	36 - 130	150 - 1,300
Caprolactam	6/20	MNR	55 - 250	220 - 1,300
Carbazole	10/20	130.8	13 - 490	31 - 270
Chrysene	20/20	623.3	66 - 3,400	---
Dibenz(a,h)anthracene	15/20	105.4	12 - 370	65 - 180
Dibenzofuran	5/20	MNR	12 - 180	170 - 1,300
Di-n-butyl phthalate	1/20	MNR	68 - 68	150 - 1,300
Fluoranthene	20/20	1,390	97 - 10,000	---
Fluorene	9/20	124.4	20 - 670	31 - 270
Indeno(1,2,3-cd)pyrene	20/20	323.8	29 - 1,100	---
Naphthalene	4/20	MNR	18 - 28	35 - 270
Phenanthrene	20/20	391.3	46 - 1,600	---
Phenol	1/20	MNR	29 - 29	31 - 270
Pyrene	20/20	737	45 - 4,600	---
Total PAHs	20/20	6093	629 - 28,040	---
Corresponding Samples	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)			

Notes:
Concentration units are µg/Kg (ppb).
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this summary.
Duplicate samples treated as independent result for this screening.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
See Tables 15 and 16 of the Site Characterization Study Report for the individual sediment results for VOCs and SVOCs, respectively.
Total PAHs calculated as sum of detected PAH results.
ND = not detected.
NC = not calculated.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.
A dash (---) indicates values not presented because they were not relevant to the summary.

Table 3-3b. Summary of Pesticides and PCB Analytical Results for Surface Sediments (0-6") from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Pesticides				
delta-BHC	1/20	MNR	4.9 - 4.9	1.6 - 160
gamma-BHC (Lindane)	1/20	MNR	15 - 15	0.36 - 160
gamma-Chlordane	1/20	MNR	1.5 - 1.5	0.75 - 160
PCBs				
Aroclor 1254	19/20	602	20 - 2,700	16 - 16
Total PCBs	19/20	602	20 - 2,700	16 - 16
Corresponding Samples	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)			

Notes:
Concentration units are µg/Kg (ppb).
See Table 17 of the Site Characterization Study Report for the individual sediment results for pesticides and PCBs.
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this summary.
Duplicate samples treated as independent result for this screening.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
ND = not detected.
NC = not calculated.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.

Table 3-3c. Summary of Inorganic Analytical Results for Surface Sediments (0-6") from Koppers Pond and Outlet Channels
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

Analyte	Frequency of Detection	Mean	Range of Detected Concentrations	Range of Non-Detects
Aluminum	20/20	11,538	5,910 - 17,000	-
Antimony	20/20	2.54	0.27 - 6	-
Arsenic	20/20	3.26	1.9 - 7.2	-
Barium	20/20	380	187 - 596	-
Beryllium	20/20	0.55	0.26 - 0.93	-
Cadmium	20/20	179.6	1.3 - 739	-
Calcium	20/20	99,892	3,630 - 199,000	-
Chromium	20/20	186.0	17.5 - 462	-
Cobalt	20/20	9.30	5 - 13.3	-
Copper	20/20	261.2	21.2 - 820	-
Cyanide, Total	6/20	0.67	0.17 - 2.1	0.34 - 3
Iron	20/20	17,105	11,800 - 37,400	-
Lead	20/20	470	34.3 - 1620	-
Magnesium	20/20	4,857	2,290 - 6,540	-
Manganese	20/20	146.7	77.8 - 415	-
Mercury	20/20	0.40	0.044 - 1.4	-
Nickel	20/20	81.8	16.3 - 180	-
Potassium	20/20	879.7	475 - 1,220	-
Selenium	20/20	1.15	0.32 - 2.5	-
Silver	20/20	14.36	0.34 - 52.5	-
Sodium	20/20	503.4	158 - 875	-
Thallium	18/20	0.25	0.13 - 0.42	0.18 - 0.3
Vanadium	20/20	18.48	9.8 - 27.5	-
Zinc	20/20	2,985	94.5 - 12,500	-
Total Organic Carbon	20/20	6.12	1.55 - 22.2	-
Corresponding Samples	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)			

Notes:
Concentration units are mg/Kg (ppm), except for Total Organic Carbon (%).
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this summary.
See Tables 18 and 20 of the Site Characterization Study Report for the individual sediment results for inorganics and total organic carbon (respectively).
Duplicate samples treated as independent result for this screening.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
A dash indicates values not presented because they were not relevant to the summary.

Table 3-4a. Summary of Pesticide and PCB Analytical Results for Forage Fish Collected from Koppers Pond in May 2008
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

		FF-Bluegill Sunfish				FF-Pumpkinseeds				All Forage Fish			
Chemical	**Units**	**Freq**	**Mean**	**ND Range**	**Pos Range**	**Freq**	**Mean**	**ND Range**	**Pos Range**	**Freq**	**Mean**	**ND Range**	**Pos Range**
PESTICIDES/PCBs													
beta-BHC	µg/Kg (ww)	1/4	0.35	0.42 - 0.78	0.58 - 0.58	0/2	0.21	0.42 - 0.42	-	1/6	0.30	0.42 - 0.78	0.58 - 0.58
alpha-Chlordane	µg/Kg (ww)	1/4	1.64	2.5 - 4	2 - 2	0/2	0.9	1.6 - 2	-	1/6	1.39	1.6 - 4	2 - 2
gamma-Chlordane	µg/Kg (ww)	3/4	10.85	19 - 19	9.9 - 13	1/2	5.65	11 - 11	5.8 - 5.8	4/6	9.12	11 - 19	5.8 - 13
Endosulfan sulfate	µg/Kg (ww)	1/4	1.30	1.4 - 2.4	2.5 - 2.5	0/2	0.5625	0.55 - 1.7	-	1/6	1.05	0.55 - 2.4	2.5 - 2.5
Endrin aldehyde	µg/Kg (ww)	1/4	0.93	0.42 - 0.6	3 - 3	1/2	0.955	0.42 - 0.42	1.7 - 1.7	2/6	0.94	0.42 - 0.6	1.7 - 3
Aroclor 1254	µg/Kg (ww)	3/3	943	---	640 - 1,300	2/2	485	---	400 - 570	5/5	760	---	400 - 1300
Aroclor 1260	µg/Kg (ww)	3/3	160	---	99 - 240	2/2	83	---	75 - 91	5/5	129	---	75 - 240
Total PCBs	µg/Kg (ww)	3/3	1103	---	739 - 1,540	2/2	568	---	491 - 645	5/5	889	---	491 - 1,540
MISCELLANEOUS													
Percent Lipid	% ww	3/3	1.3	---	1.2 - 1.5	1/1	1.6	---	1.6 - 1.6	4/4	1.4	---	1.2 - 1.6
Corresponding Samples		FF08-01, FF08-02, FF08-03, and FF08-04				FF08-05 and FF08-06				FF08-01, FF08-02, FF08-03, FF08-04, FF08-05, and FF08-06			

Notes:
See Table 33 of the *Site Characterization Study Report* for the individual fish results for pesticides, PCBs, and lipids.
The Aroclor PCB and lipid results were from samples re-analyzed by TA-Burlington (insufficient mass was avaialble for some samples - see text discussion). The remaining analyses were performed by TA-Pittsburgh.
Forage fish results include some individual fish and also composites of smaller fish.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
ND = not detected.
A dash indicates values not presented because they were not relevant to the summary.

Table 3-4b. Summary of Inorganic Analytical Results for Forage Fish Collected from Koppers Pond in May 2008
Kentucky Avenue Wellfield Site, OU 4 - Koppers Pond
Horseheads, New York

		FF-Bluegill Sunfish				FF-Pumpkinseeds				All Forage Fish			
Chemical	**Units**	**Freq**	**Mean**	**ND Range**	**Pos Range**	**Freq**	**Mean**	**ND Range**	**Pos Range**	**Freq**	**Mean**	**ND Range**	**Pos Range**
Aluminum	mg/Kg (ww)	4/4	5.23	—	3.2 -8.6	2/2	11.10	—	8.6 -12.6	6/6	7.60	—	3.2 -12.6
Antimony	mg/Kg (ww)	2/4	0.053	0.1 - 0.1	0.0047 -0.0068	1/2	MNR	0.1 - 0.1	0.021 -0.021	3/6	0.055	0.1 - 0.1	0.0047 -0.021
Arsenic	mg/Kg (ww)	4/4	0.10	—	0.053 -0.13	2/2	0.083	—	0.073 -0.097	6/6	0.092	—	0.053 -0.13
Barium	mg/Kg (ww)	4/4	1.49	—	0.85 -2.2	2/2	1.57	—	1.4 -1.7	6/6	1.51	—	0.85 -2.2
Cadmium	mg/Kg (ww)	4/4	0.07	0.1 - 0.1	0.04 -0.12	2/2	0.08	—	0.055 -0.12	6/6	0.073	—	0.04 -0.12
Calcium	mg/Kg (ww)	4/4	8,993	—	5300 -12900	2/2	10,000	—	8140 -13700	6/6	9,638	—	5300 -13700
Chromium	mg/Kg (ww)	4/4	0.35	—	0.26 -0.42	2/2	0.46	—	0.42 -0.51	6/6	0.39	—	0.26 -0.51
Cobalt	mg/Kg (ww)	4/4	0.034	—	0.022 -0.043	2/2	0.041	—	0.035 -0.052	6/6	0.038	—	0.022 -0.052
Copper	mg/Kg (ww)	4/4	0.49	—	0.45 -0.61	2/2	0.58	—	0.51 -0.62	6/6	0.52	—	0.45 -0.62
Iron	mg/Kg (ww)	4/4	13.53	—	9.8 -18.4	2/2	25.07	—	18.4 -29.1	6/6	18.48	—	9.8 -29.1
Lead	mg/Kg (ww)	4/4	0.32	—	0.23 -0.4	2/2	0.47	—	0.4 -0.53	6/6	0.38	—	0.23 -0.53
Magnesium	mg/Kg (ww)	4/4	425	—	348 -526	2/2	461	—	435 -501	6/6	439	—	348 -526
Manganese	mg/Kg (ww)	4/4	1.30	—	0.81 -1.7	2/2	0.92	—	0.78 -1.1	6/6	1.14	—	0.78 -1.7
Nickel	mg/Kg (ww)	4/4	0.107	—	0.056 -0.13	2/2	0.157	—	0.13 -0.18	6/6	0.128	—	0.056 -0.18
Potassium	mg/Kg (ww)	4/4	2,358	—	2160 -2610	2/2	2,473	—	2190 -2750	6/6	2,395	—	2160 -2750
Selenium	mg/Kg (ww)	4/4	0.325	—	0.28 -0.35	2/2	0.25	—	0.18 -0.35	6/6	0.28	—	0.18 -0.35
Silver	mg/Kg (ww)	1/4	0.039	0.1 - 0.1	0.005 -0.005	2/2	0.007	—	0.0028 -0.013	3/6	0.028	0.1 - 0.1	0.0028 -0.013
Sodium	mg/Kg (ww)	4/4	880	—	839 -946	2/2	930	—	885 -1010	6/6	904	—	839 -1010
Thallium	mg/Kg (ww)	2/4	0.027	0.1 - 0.1	0.0034 -0.0044	1/2	0.042	0.1 - 0.1	0.026 -0.026	3/6	0.031	0.1 - 0.1	0.0034 -0.026
Vanadium	mg/Kg (ww)	3/4	0.071	0.1 - 0.1	0.018 -0.12	2/2	0.077	—	0.031 -0.15	5/6	0.078	0.1 - 0.1	0.018 -0.15
Zinc	mg/Kg (ww)	4/4	15.55	—	13 -18.6	2/2	18.53	—	17.3 -19.7	6/6	16.53	—	13 -19.7
Mercury	mg/Kg (ww)	4/4	0.027	—	0.019 -0.046	2/2	0.016	—	0.011 -0.019	6/6	0.023	—	0.011 -0.046
Corresponding Samples		FF08-01, FF08-02, FF08-03, and FF08-04				FF08-05 and FF08-06				FF08-01, FF08-02, FF08-03, FF08-04, FF08-05, and FF08-06			

Notes:
See Table 34 of the Site Characterization Study Report for the individual fish results for inorganics.
Forage fish results include some individual fish and also composites of smaller fish.
Mean values calculated by setting non-detect results to one-half the reported detection limit.
Only the target analytes with at least one positive detection are summarized in this table.
MNR: Mean not reported because the calculated value exceeds the maximum positive result.
A dash indicates values not presented because they were not relevant to the summary.

Table 3-5a. Compilation of Surface Water Screening Benchmarks and Selected Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	NY Class C Water Quality [Type A(C)] Standard	NY Class C Water Quality [Type A(C)] Guidance Value	ORNL Screening Benchmarks (Suter and Tsao, 1996)	EPA Region 4 Chronic Surface Water Screening Benchmark (USEPA, 2001)	EPA Region 5 Surface Water ESLs (USEPA, 2003)	EPA Region 6 Surface Water Screening Benchmark (TCEQ, 2006)	EPA OPPT PBT Profiler	Ecological Screening Value	Comment
Volatile Organics									
Chloroform	NA	NA	1,240	289	140	890	[a]	289	
Tetrachloroethene	NA	NA	750	84	45	790	[a]	45	
Toluene	NA	100	1,269	175	253	2,900	[a]	100	
1,1,1-Trichloroethane	NA	NA	3,493	528	76	4,900	[a]	76	
Semivolatile Organics									
Acenaphthene	NA	5.3	74	17	38	23	[a]	5.3	
Benzaldehyde	NA	NA	NA	NA	NA	NA	1,100	1,100	
Benzo(a)anthracene	NA	0.03	0.65	NA	0.025	34.6	[a]	0.03	
Benzo(b)fluoranthene	NA	NA	NA	NA	9.07	NA	[a]	9.07	
Chrysene	NA	NA	NA	NA	NA	7	[a]	7	
Dibenzofuran	NA	NA	1,003	NA	4	94	[a]	4	
Di-n-butyl phthalate	NA	NA	697	9.4	NA	7	[a]	7	
Fluoranthene	NA	NA	15	39.8	1.9	6.16	[a]	1.9	
Fluorene	NA	0.54	NA	NA	19	11	[a]	0.54	
Phenanthrene	NA	5	200	NA	3.6	30	[a]	5	NYSDEC value took precedence over other data sources.
Phenol	NA	5	200	256	180	110	[a]	5	NYSDEC value took precedence over other data sources.
Pyrene	NA	4.6	NA	NA	0.3	7	[a]	4.6	NYSDEC value took precedence over other data sources.
Total PAHs	NA	NA	NA	NA	NA	NA	NA	17	ESV for total PAHs from USEPA Region IV
Inorganics									
Aluminum	100	NA	460	87	NA	NA	NA	100	Dissolved phase only.
Antimony	NA	NA	610	160	80	160	NA	80	
Arsenic	150	NA	914	190	148	190	NA	150	Dissolved phase only.
Barium	NA	NA	NA	NA	220	16,000	NA	220	
Beryllium	1,100	NA	5..3	0.53	3.6	5.3	NA	1,100	Hardness greater than 75 mg/L so used upper end value.
Cadmium	Calc	NA	0.15	0.66	0.15	0.6	NA	Calc	See Table 3-6 for hardness-dependent calculation
Calcium	NA	NA	116,000	NA	NA	NA	NA	116,000	No value available from any key sources
Chromium	Calc	NA	2	117.32	42	100.8	NA	Calc	See Table 3-6 for hardness-dependent calculation
Cobalt	5	NA	5.1	NA	24	1,500	NA	5	
Copper	Calc	NA	0.23	6.54	1.58	7	NA	Calc	See Table 3-6 for hardness-dependent calculation
Iron	300	NA	158	1,000	NA	1,000	NA	300	
Lead	Calc	NA	12.3	1.32	1.17	1	NA	Calc	See Table 3-6 for hardness-dependent calculation
Magnesium	NA	NA	82,000	NA	NA	3,230	NA	3,230	Also used ORNL value as an alternate ESV since the EPA Region 6 value is below surface water background.
Manganese	NA	NA	1,100	NA	NA	120	NA	120	
Mercury	0.77	NA	0.23	0.012	0.0013	1.3	NA	0.77	Dissolved phase only. Not detected in any of the surface water samples.
Nickel	Calc	NA	5	87.71	28.9	87.4	NA	Calc	See Table 3-6 for hardness-dependent calculation
Potassium	NA	NA	53,000	NA	NA	NA	NA	53,000	
Selenium	4.6	NA	88.3	5	5	5	NA	4.6	Dissolved phase only.
Silver	0.1	NA	0.12	0.012	0.12	0.1	NA	0.1	Dissolved phase only.
Sodium	NA	NA	680,000	NA	NA	NA	NA	680,000	
Thallium	8	NA	57	4	10	4	NA	8	NYSDEC value took precedence over other data sources.
Vanadium	14	NA	80	NA	12	20	NA	14	

Table 3-5a. Compilation of Surface Water Screening Benchmarks and Selected Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	NY Class C Water Quality [Type A(C)] Standard	NY Class C Water Quality [Type A(C)] Guidance Value	ORNL Screening Benchmarks (Suter and Tsao, 1996)	EPA Region 4 Chronic Surface Water Screening Benchmark (USEPA, 2001)	EPA Region 5 Surface Water ESLs (USEPA, 2003)	EPA Region 6 Surface Water Screening Benchmark (TCEQ, 2006)	EPA OPPT PBT Profiler	Ecological Screening Value	Comment
Zinc	Calc	NA	30	58.91	65.7	58.1	NA	Calc	See Table 3-6 for hardness-dependent calculation
Cyanide	5.2	NA	7.8	5.2	5.2	10.7	NA	5.2	Dissolved phase only.

Notes:
All concentration units are in ug/L.
There were no detectable pesticides or PCBs in any of the surface water samples so screening values were not compiled for these chemicals.
NA = not available.
Calc = calculated based on sample-specific hardness.
NYSDEC Class C water quality criteria were from TOGS 1.1.1 (NYSDEC, 2003), Type A(C)-fish propagation in freshwaters.
Additional surface water screening benchmarks were obtained from ORNL RAIS website (http://rais.ornl.gov/homepage/benchmark.shtml) and were updated following review of original source references: EPA Region 4 (USEPA, 2001), EPA Region 5 ESLs (EPA, 2003) and EPA Region 6 (TCEQ, 2006).
[a] The EPA OPPT PBT Profiler was evaluated only if screening values were not available from the other data sources in this table.

Table 3-5b. Compilation of Sediment Screening Benchmarks and Selected Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	NY Sediment Criteria (NYSDEC, 1999)		EPA Region 5 Sediment ESLs (USEPA, 2003)	EPA Region 6 Sediment Screening Benchmark (TCEQ, 2006)	Consensus TEC Sediment Screening Benchmark (MacDonald et al., 2000)	Ecological Screening Value	Comment
	Chronic Tox	Bioaccum					
Volatile Organics (µg/Kg, unless noted)							
2-Butanone	NA	NA	42.4	25,710	NA	42.4	
Acetone	NA	NA	9.9	60,030	NA	9.9	
Methyl acetate	NA	NA	NA	NA	NA	NC	No value available.
Toluene	49 [a]	NA	1,220	2,880	NA	49	NYSDEC value has units of µg/gOC.
Semivolatile Organics (µg/Kg, unless noted)							
2-Methylnaphthalene	NA	NA	176	NA	NA	176	Uses naphthalene as a surrogate
4-Methylphenol	NA	NA	20.2	NA	NA	20.2	
Acenaphthene	140 [a]	NA	6.71	6.7	NA	140 [a]	NYSDEC value has units of µg/gOC
						6.71	Alternate ESV (as µg/Kg) if TOC>12%
Acenaphthylene	NA	NA	5.87	5.9	NA	5.9	
Acetophenone	NA	NA	NA	NA	NA	NC	No value available.
Anthracene	107 [a]	NA	57.2	57.2	84.5	107 [a]	NYSDEC value has units of µg/gOC.
						57.2	Alternate ESV (as µg/Kg) if TOC>12%
Benzaldehyde	NA	NA	NA	NA	NA	NC	No value available.
Benzo(a)anthracene	12 [a]	NA	108	108	1,050	12 [a]	NYSDEC value has units of µg/gOC.
						108	Alternate ESV (as µg/Kg) if TOC>12%
Benzo(a)pyrene	NA	NA	150	150	1,450	150	
Benzo(b)fluoranthene	NA	NA	10,400	NA	NA	10,400	
Benzo(ghi)perylene	NA	NA	170	NA	NA	170	
Benzo(k)fluoranthene	NA	NA	240	NA	NA	240	
bis(2-Ethylhexyl) phthalate	199.5 [a]	NA	182	182	NA	199.5 [a]	NYSDEC value has units of µg/gOC.
						182	Alternate ESV (as µg/Kg) if TOC>12%
Butyl benzyl phthalate	NA	NA	1970	NA	NA	1,970	
Caprolactam	NA	NA	NA	NA	NA	NC	No value available.
Carbazole	NA	NA	NA	NA	NA	NC	No value available.
Chrysene	NA	NA	166	166	1,290	166	
Dibenz(a,h)anthracene	NA	NA	33	33	NA	33	
Dibenzofuran	NA	NA	449	NA	NA	449	
Di-n-butyl phthalate	NA	NA	NA	NA	NA	199.5 [a]	No value available. Using BEHP as surrogate.
Fluoranthene	1,020 [a]	NA	423	423	2,230	1,020 [a]	NYSDEC value has units of µg/gOC.
						423	Alternate ESV (as µg/Kg) if TOC>12%
Fluorene	8 [a]	NA	77.4	77.4	536	8 [a]	NYSDEC value has units of µg/gOC.
						77.4	Alternate ESV (as µg/Kg) if TOC>12%
Indeno(1,2,3-cd)pyrene	NA	NA	200	NA	NA	200	
Naphthalene	30 [a]	NA	176	176	561	30 [a]	NYSDEC value has units of µg/gOC.
						176	Alternate ESV (as µg/Kg) if TOC>12%
Phenanthrene	120 [a]	NA	204	204	1,170	120 [a]	NYSDEC value has units of µg/gOC.
						204	Alternate ESV (as µg/Kg) if TOC>12%
Phenol	NA	NA	49.1	NA	NA	49.1	
Pyrene	NA	NA	195	195	1,520	195	
Total PAHs	4,022	NA	NA	4,000	1,610	1,610	NYSDEC value has units of µg/Kg and is equivalent to the ER-L.

Table 3-5b. Compilation of Sediment Screening Benchmarks and Selected Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	NY Sediment Criteria (NYSDEC, 1999)		EPA Region 5 Sediment ESLs (USEPA, 2003)	EPA Region 6 Sediment Screening Benchmark (TCEQ, 2006)	Consensus TEC Sediment Screening Benchmark (MacDonald et al., 2000)	Ecological Screening Value	Comment
	Chronic Tox	Bioaccum					
Pesticides/PCBs (µg/Kg, unless noted)							
delta-BHC	NA	NA	71,500	NA	NA	71,500	
gamma-BHC (Lindane)	NA	NA	2.37	2.37	2.37	2.37	
gamma-Chlordane	0.03 [a]	0.006 [a]	3.24	3.24	3.24	0.006 [a]	NYSDEC value has units of µg/gOC.
						3.24	Alternate ESV (as µg/Kg) if TOC>12%
Total PCBs	19.3 [a]	1.4 [a]	59.8	59.8	NA	19.3 [a]	NYSDEC value has units of µg/gOC.
						59.8	Alternate ESV (as µg/Kg) if TOC>12%
Inorganics (mg/Kg, unless noted)							
Aluminum	NA	NA	NA	NA	NA	14,000	Geometric mean from three alternate sources (see text).
Antimony	2 [b]	NA	NA	2	9.79	2	
Arsenic	6 [b]	NA	9.79	9.79	NA	6	
Barium	NA	NA	NA	NA	NA	0.7	NOAA SQuiRT (Buchman, 2008)
Beryllium	NA	NA	NA	NA	NA	1	Value from WHO (1990b).
Cadmium	0.6 [b]	NA	0.99	0.99	0.99	0.6	
Calcium	NA	NA	NA	NA	NA	NC	No value available.
Chromium	26 [b]	NA	43	43.4	43.4	26	
Cobalt	NA	NA	50	50	NA	50	
Copper	16 [b]	NA	31.6	31.6	31.6	16	
Cyanide, Total	NA	NA	0.001	NA	NA	0.001	
Iron	20,000 [b]	NA	NA	20,000	NA	20,000	
Lead	31 [b]	NA	35.8	35.8	35.8	31	
Magnesium	NA	NA	NA	NA	NA	NC	No value available.
Manganese	460 [b]	NA	NA	460	NA	460	
Mercury	0.15 [b]	NA	0.174	0.18	0.18	0.15	
Nickel	16 [b]	NA	22.7	22.7	22.7	16	
Potassium	NA	NA	NA	NA	NA	NC	No value available.
Selenium	NA	NA	NA	NA	NA	0.2	ESV from Rice (1999)
Silver	1 [b]	NA	NA	1	NA	1	
Sodium	NA	NA	NA	NA	NA	NC	No value available.
Thallium	NA	NA	NA	NA	NA	1	ESV from WHO (1996b)
Vanadium	NA	NA	NA	NA	NA	50	NOAA SQuiRT (Buchman, 2008)
Zinc	120 [b]	NA	121	121	121	120	

Notes:
NA = Not available.
NC = No criteria.
Additional sediment were obtained from ORNL RAIS website (http://rais.ornl.gov/homepage/benchmark.shtml) and were updated following review of original source references: EPA Region 4 (USEPA, 2001), EPA Region 5 ESLs (EPA, 2003) and EPA Region 6 (TCEQ, 2006).
[a] NYSDEC sed criteria for organics have units of µg/gOC.
[b] NYSDEC sed criteria shown are the Low Effect Levels.

Table 3-5c. Compilation of Fish Benchmarks and Selected Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	NYSDEC Niagara River Benchmarks [a]	MOE Piscivorous Wildlife Screening Benchmark [b]	ECW Fish Muscle Screening Benchmark [c]	USACE ERED No Effect Levels [d]		Ecological Screening Value	Comment
				Range	Geomean		
Pesticides (µg/Kg)							
beta-BHC	100	NA	NA	NA	NA	100	
alpha-Chlordane	500	NA	NA	10 - 87,000	295	295	NYSDEC value was for chlordane
gamma-Chlordane	500	NA	NA	10 - 87,000	295	295	NYSDEC value was for chlordane
Endosulfan sulfate	NA	NA	NA	195	195	195	
Endrin aldehyde	25	NA	NA	19 - 1,800	265	25	NYSDEC and USACE-ERED values were for endrin
Aroclor PCBs (µg/Kg)							
Aroclor 1254	110	NA	NA	NA	NA	110	
Aroclor 1260	110	NA	NA	NA	NA	110	
Total PCBs	110	NA	NA	160 - 4,240,000	13,860	110	
Inorganics (mg/Kg)							
Aluminum	NA	NA	NA	8.53 - 12.5	10.3	10.3	
Arsenic	NA	NA	NA	0.5 - 5.5	1.59	1.59	
Barium	NA	NA	NA	NA	NA	NA	No ESV available
Cadmium	NA	NA	NA	0.032 - 144	1.59	1.59	
Calcium	NA	NA	NA	NA	NA	NA	No ESV available
Chromium	NA	NA	NA	0.263 - 1.76	1.07	1.07	
Cobalt	NA	NA	NA	NA	NA	NA	No ESV available
Copper	NA	NA	NA	1.68 - 19.79	4.9	4.9	
Iron	NA	NA	NA	9 - 54	22	22	
Lead	NA	NA	NA	2.54 - 4.02	3.20	3.20	
Magnesium	NA	NA	NA	NA	NA	NA	No ESV available
Manganese	NA	NA	NA	2.2	2.2	2.2	
Mercury	NA	0.5	5	0.093 - 12	1.7	0.5	
Nickel	NA	NA	NA	70 - 70	70	70	
Potassium	NA	NA	NA	NA	NA	NA	No ESV available
Silver	NA	NA	NA	0.003 - 2.02	0.264	0.264	
Sodium	NA	NA	NA	NA	NA	NA	No ESV available
Zinc	NA	NA	NA	0.284 - 300	39.4	39.4	

Notes:
VOCs and SVOCs were not evaluated in the fish samples so no screeing values were identified.
NA = not available.
Only those chemicals that were detected in at least one sample were retained.
Fish screening benchmarks were obtained from ORNL RAIS website (http://rais.ornl.gov/homepage/benchmark.shtml).
[a] NYSDEC Niagara River screening benchmarks from Newell et al (1987).
[b] MOE (1994).
[c] ECW: Environmental Contaminants in Wildlife - Interpreting Tissue Concentrations (Beyer et al., 1996).
[d] USACE-ERED on-line database.

Table 3-6. Calculation of Hardness-dependent NYSDEC Class C Criteria for Inorganics
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Sample with Maximum Detected Concentration	Hardness (mg/L)	Calculated Screen Value (µg/L)	Comment
Unfiltered Surface Water Samples				
Cadmium	SW08-02	254	4.35	
Chromium	SW08-02	254	159.0	
Copper	SW08-02	254	19.9	
Lead	SW08-02	254	NA	Dissolved form only
Nickel	SW08-02	254	114.4	
Zinc	SW08-02	254	182.5	Dissolved form only
Filtered Surface Water Samples				
Cadmium	ND	NA	NA	Not Detected
Chromium	SW08-04	248	155.9	
	SW08-17	254	159.0	
Copper	SW08-02	254	19.9	
Lead	SW08-02	254	3.2	Dissolved form only
Nickel	SW08-16	244	110.6	
Zinc	SW08-15	234	170.2	Dissolved form only
Equations				
Cadmium	(0.85) exp(0.7852 [ln (ppm hardness)] - 2.715)			
Chromium	(0.86) exp(0.819 [ln (ppm hardness)] + 0.6848)			
Copper	(0.96) exp(0.8545 [ln (ppm hardness)] - 1.702)			
Lead	{1.46203 - [ln (hardness) (0.145712)]} exp (1.273 [ln (hardness)] - 4.297)			
Nickel	(0.997) exp (0.846 [ln (hardness)] + 0.0584)			
Zinc	exp(0.85 [ln(ppm hardness)] + 0.50)			

Note:
NA = not applicable.
ND = not detected.
Equations to calculate screening values were from NYSDEC (1998).

Table 3-7. Adjusted NYSDEC Sediment Criteria based on Sample-specific Organic Carbon Content
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	Maximum Detected Concentration (µg/Kg)	Associated Sample	Corresponding TOC (mg/Kg)	NY Sed Criteria ($\mu g/g_{oc}$)	NY Sed ESV ($\mu g/Kg_{dw}$)	Alternate ESV ($\mu g/Kg_{dw}$) [a]
Volatile Organics						
Toluene	160	SD08-16	29,900	49	1,465	NA
Semivolatile Organics						
Acenaphthene	2,300	SD08-15	222,000	140	NA	6.7
Anthracene	4,900	SD08-1	135,000	107	NA	57.2
Benzo(a)anthracene	17,000	SD08-15	222,000	12	NA	108
bis(2-Ethylhexyl) phthalate	4,600	SD08-3	83,600	199.5	16,678	NA
Fluoranthene	71,000	SD08-15	222,000	1020	NA	423
Fluorene	2,800	SD08-1	135,000	8	NA	77.4
Naphthalene	2,800	SD08-15	222,000	30	NA	176
Phenanthrene	27,000	SD08-15	222,000	120	NA	204
Pesticides						
gamma-Chlordane	1.5	SD08-14	17,900	0.006	0.1074	NA
PCBs						
Aroclor 1254	2,700	SD08-13	75,100	19.3	1,449	NA
Total PCBs	2,700	SD08-13	75,100	19.3	1,449	NA

Note:
Only those chemicals that were detected in the sediments and evaluated using the NYSDEC sediment criteria are shown in this table.
NA = Not applicable.
[a] Alternate ESV was used since the TOC Content exceeded 12%. These are shown on Table 3-5b.

Table 3-8a. Screening of Volatile and Semivolatile Organic COPECs from Unfiltered Surface Water
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection Min.	Q	Max.	Q	Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
Volatile Organics												
Acetone	0/10					NA	5 - 5		1,700			Exclude
Bromodichloromethane	0/10					NA	1 - 1		4,320			Exclude
2-Butanone	0/10					NA	5 - 5		2,200			Exclude
Chloroform	2/10	0.069	J	0.1	J	SW08-02	1 - 1	0.1	289		0.0003	Exclude
cis-1,2-Dichloroethene	0/10					NA	1 - 1		1,350			Exclude
Methyl acetate	0/10					NA	1 - 1		96,000			Exclude
Tetrachloroethene	1/10	0.22	J	0.2	J	SW08-16	1 - 1	0.2	45		0.005	Exclude
Toluene	2/10	0.21	J	0.3	J	SW08-02	1 - 1	0.3	100		0.003	Exclude
1,1,1-Trichloroethane	2/10	0.29	J	0.4	J	SW08-02	1 - 1	0.4	76		0.005	Exclude
Trichloroethene	0/10					NA	1 - 1		47			Exclude
Semivolatile Organics												
1,1'-Biphenyl	0/10					NA	0.94 - 0.97		14			Exclude
4-Chloroaniline	0/10					NA	0.94 - 0.97		232			Exclude
Acenaphthene	1/10	0.16	J	0.16	J	SW08-15	0.19 - 0.19	0.16	5.3		0.030	Exclude
Acetophenone	0/10					NA	0.94 - 0.97		22000			Exclude
Anthracene	0/10					NA	0.19 - 0.19		3.8			Exclude
Benzaldehyde	2/10	0.057	J	0.13	J	SW08-15	0.94 - 0.97	0.13	1100		0.0001	Exclude
Benzo(a)anthracene	1/10	0.051	J	0.051	J	SW08-15	0.19 - 0.19	0.051	0.03		**1.7**	**Retain**
Benzo(a)pyrene	0/10					NA	0.19 - 0.19		0.014			Exclude
Benzo(b)fluoranthene	2/10	0.25		0.27		SW08-15	0.19 - 0.19	0.27	9.07		0.030	Exclude
Benzo(ghi)perylene	0/10					NA	0.19 - 0.19		7.64			Exclude
Benzo(k)fluoranthene	0/10					NA	0.19 - 0.19		9.07			Exclude
Carbazole	0/10					NA	0.19 - 0.19		1400			Exclude
Chrysene	2/10	0.05	J	0.061	J	SW08-15	0.19 - 0.19	0.061	7		0.009	Exclude
Dibenz(a,h)anthracene	0/10					NA	0.19 - 0.19		5			Exclude
Dibenzofuran	9/10	0.16	J	0.17	J	SW08-02 SW08-05 SW08-08 SW08-10 SW08-13 SW08-15 SW08-17	0.95 - 0.95	0.17	4		0.043	Exclude

Table 3-8a. Screening of Volatile and Semivolatile Organic COPECs from Unfiltered Surface Water
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Semivolatile Organics (continued)												
Di-n-butyl phthalate	9/10	0.32	J	0.61	J	SW08-15	0.95 - 0.95	0.61	7		0.087	Exclude
Di-n-octyl phthalate	0/10					NA	0.94 - 0.97		7			Exclude
Fluoranthene	6/10	0.43		0.51		SW08-02 SW08-15	0.19 - 0.19	0.51	1.9		0.27	Exclude
Fluorene	1/10	0.47		0.47		SW08-15	0.19 - 0.19	0.47	0.54		0.87	Exclude
Indeno(1,2,3-cd)pyrene	0/10		J			NA	0.19 - 0.19		4.31			Exclude
Nitrobenzene	0/10		J			NA	0.19 - 0.19		220			Exclude
Phenanthrene	9/10	0.17	J	0.26		SW08-02	0.19 - 0.19	0.26	5		0.052	Exclude
Phenol	1/10	0.1	J	0.1		SW08-13	0.19 - 0.19	0.1	5		0.020	Exclude
Pyrene	2/10	0.067	J	0.069	J	SW08-15	0.19 - 0.19	0.069	4.6		0.015	Exclude
Total PAHs	10/10	0.17		1.922		SW08-15	---	1.922	NC			Exclude
Samples Included in Screen	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17											

Notes:
Concentration units are µg/L (ppb).
Surface water samples collected from Koppers Pond and from the pond outlet channels were combined for this screen.
Only those chemicals detected in at least one sample were included in this table.
See Table 3-3a for data sources of surface water ESVs.
COPEC = Contaminant of Potential Ecological Concern.
NA = Not Available or Relevant
NC = No criteria. Q = Data Qualifier; J = estimated value
SQL = Sample Quantitation Limit

Table 3-8b. Screening of Inorganic COPECs from Unfiltered Surface Water
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Aluminum	10/10	126		446		SW08-05	-	446	NA		NA	Exclude
Antimony	10/10	0.23	BJ	0.7	BJ	SW08-10	-	0.72	80		0.01	Exclude
Arsenic	6/10	0.17	BJ	0.8	BJ	SW08-15	1 - 1	0.79	NA		NA	Exclude
Barium	10/10	104		129		SW08-14	-	129	220		0.6	Exclude
Cadmium	9/10	0.52	BJ	7.1		SW08-02	1 - 1	7.1	4.35	h	**1.6**	**Retain**
Calcium	10/10	54,600		70,500		SW08-14	-	70,500	116,000		0.6	Exclude
Chromium	10/10	3.8	J	9.3	J	SW08-02	-	9.3	140.5	h	0.1	Exclude
Cobalt	10/10	0.24	BJ	0.4	BJ	SW08-17	-	0.4	5		0.1	Exclude
Copper	10/10	2.0		10		SW08-02	-	10	25.4	h	0.4	Exclude
Iron	10/10	260		559		SW08-14	-	559	300		**1.9**	**Retain**
Lead	10/10	6.2		26		SW08-02	-	26	NC	h	NA	Exclude
Magnesium	10/10	10,700		14,200		SW08-14	-	14,200	3,230		**4.4**	**Retain**
Manganese	10/10	8.3		29		SW08-15	-	29	120		0.2	Exclude
Nickel	10/10	1.5		2.8		SW08-02	-	2.8	113.4	h	0.02	Exclude
						SW08-17	-	2.8	113.4		0.02	Exclude
Potassium	10/10	893		1,400		SW08-15	-	1,400	53,000		0.0	Exclude
Selenium	3/10	0.28	BJ	0.44	BJ	SW08-10	5 - 5	0.44	NA		NA	Exclude
Silver	6/10	0.087	BJ	0.72	BJ	SW08-02	1 - 1	0.72	NC	h	NA	Exclude
Sodium	10/10	68,300		95,600		SW08-16	-	95,600	680,000		0.1	Exclude
Vanadium	9/10	0.43	BJ	1.2		SW08-05	1 - 1	1.20	14		0.1	Exclude
Zinc	10/10	13.6	J	119	J	SW08-02	-	119	NC	h	NA	Exclude
Samples Included in Screen	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17											

Notes:
Concentration units are µg/L (ppb).
Surface water samples collected from Koppers Pond and from the pond outlet channels were combined for this screen.
COPEC = Contaminant of Potential Ecological Concern.
Only those chemicals detected in at least one sample were included in this table.
See Table 3-3a for data sources of surface water ESVs.
A dash indicates that the summary was not required.
h = hardness dependent screening value. Value shown is the screening value for location with maximum positive result.
NA = Not Available or Relevant
NC = No criteria. The NYSDEC Class C criteria for lead and zinc are for the filtered samples only, and the value for silver is the ionic form (equivalent to filtered samples).
Q = Data Qualifier; J = estimated value; B = value reported below reporting limit.
SQL = Sample Quantitation Limit.

Table 3-8c. Screening of Inorganic COPECs from Filtered Surface Water
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Aluminum	10/10	16.5		24.1		SW08-02	-	24.1	100		0.24	Exclude
Antimony	10/10	0.36		0.99		SW08-13	-	0.99	80		0.01	Exclude
Arsenic	2/10	0.28		0.29		SW08-14	1 - 1	0.29	150		0.002	Exclude
Barium	10/10	116		124.0		SW08-05	-	124.0	220		0.6	Exclude
Calcium	10/10	65,400		72,600		SW08-02	-	72,600	116,000		0.6	Exclude
Chromium	10/10	2.7		3.4		SW08-04	-	3.4	137.8	h	0.02	Exclude
						SW08-17	-	3.4	140.5	h	0.02	Exclude
Cobalt	10/10	0.16		0.21		SW08-14	-	0.21	5		0.04	Exclude
						SW08-17	-	0.21	5		0.04	Exclude
Copper	10/10	0.57		1.3		SW08-02	-	1.3	25.4	h	0.1	Exclude
Lead	10/10	1.4		3.2		SW08-02	-	3.2	3.2	h	1.0	Exclude
Magnesium	10/10	13,400		14,400		SW08-02 SW08-04	-	14,400	3,230		**4.5**	**Retain**
Manganese	10/10	1.2		5.7		SW08-14 SW08-15	-	5.7	120		0.05	Exclude
Nickel	10/10	0.84		1.5		SW08-16	-	1.5	109.6	h	0.01	Exclude
Potassium	10/10	1,050		1,140		SW08-17	-	1,140	53,000		0.02	Exclude
Selenium	5/10	0.21		0.38		SW08-05	5 - 5	0.38	4.6		0.08	Exclude
Sodium	10/10	93,100		101,000		SW08-04	-	101,000	680,000		0.15	Exclude
Thallium	3/10	0.027		0.09		SW08-13	1 - 1	0.09	8		0.01	Exclude
Zinc	10/10	2.6		5.2		SW08-15	-	5.2	157.9	h	0.03	Exclude
Samples Included in Screen	SW08-02, SW08-04, SW08-05, SW08-08, SW08-10, SW08-13, SW08-14, SW08-15, SW08-16, and SW08-17											

Notes:
Concentration units are µg/L (ppb).
Surface water samples collected from Koppers Pond and from the pond outlet channels were combined for this screen.
Only those chemicals detected in at least one sample were included in this table.
See Table 3-3a for data sources of surface water ESVs.
A dash indicates that the summary was not required.
COPEC = Contaminant of Potential Ecological Concern.
h = hardness dependent screening value. Value shown is the screening value for location with maximum positive result.
NA = Not Available or Relevant
Q = Data Qualifier; J = estimated value; B = value reported below reporting limit.
SQL = Sample Quantitation Limit

Table 3-9a. COPEC Screening of Volatile and Semivolatile Organics from Sediments
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection Min.	Q	Max.	Q	Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
Volatile Organics												
2-Butanone	1/20	14	J	14	J	SD08-13	6.6 - 30	14	42	[a]	0.33	Exclude
Acetone	6/20	11	J	79	J	SD08-15	26 - 80	79	10	[a]	**8.0**	**Retain**
Methyl acetate	4/20	5.6	J	23	J	SD08-15	6.6 - 20	23	NC		NA	Exclude
Toluene	1/20	160		160		SD08-16	6.6 - 30	160	1,465	[b]	0.11	Exclude
Semivolatile Organics												
2-Methylnaphthalene	6/20	14		48		SD08-15	35 - 270	48	176	[c]	0.3	Exclude
4-Methylphenol	8/20	15		1,600		SD08-16	270 - 1,300	1,600	20.2	[a]	**79**	**Retain**
Acenaphthene	7/20	14		230		SD08-15	31 - 270	230	6.71	[c]	**34**	**Retain**
Acenaphthylene	9/20	24		310		SD08-3	31 - 270	310	5.9	[a]	**53**	**Retain**
Acetophenone	2/20	58		66		SD08-14	150 - 1,300	66	NC		NA	—
Anthracene	17/20	10		510		SD08-1	65 - 140	510	57.2	[a]	**9**	**Retain**
Benzaldehyde	8/20	28		170		SD08-15	310 - 1,300	170	NC		NA	—
Benzo(a)anthracene	20/20	37		2,200		SD08-15	-	2,200	108	[a]	**20**	**Retain**
Benzo(a)pyrene	20/20	48		1,400		SD08-3	-	1,400	150	[a]	**9**	**Retain**
Benzo(b)fluoranthene	20/20	72		2,600		SD08-15	-	2,600	10,400	[a]	0.3	Exclude
Benzo(ghi)perylene	20/20	34		1,200		SD08-1	-	1,200	170	[a]	**7**	**Retain**
Benzo(k)fluoranthene	10/20	21		920		SD08-3	31 - 140	920	240	[a]	**4**	**Retain**
bis(2-Ethylhexyl) phthalate	15/20	20		1,400		SD08-3	320 - 890	1,400	16,678	[b]	0.1	Exclude
Butyl benzyl phthalate	7/20	36		130		SD08-1	150 - 1,300	130	1,970	[b]	0.1	Exclude
Caprolactam	6/20	55		250		SD08-15	220 - 1,300	250	NC		NA	—
Carbazole	10/20	13		490		SD08-1	31 - 270	490	NC		NA	—
Chrysene	20/20	66		3,400		SD08-15	-	3,400	166	[a]	**20**	**Retain**
Dibenz(a,h)anthracene	15/20	12		370		SD08-1	65 - 180	370	33	[a]	**11**	**Retain**
Dibenzofuran	5/20	12		180		SD08-15	170 - 1,300	180	449	[a]	0.4	Exclude
Di-n-butyl phthalate	1/20	68		68		SD08-16	150 - 1,300	68	16,678	[d]	0.004	Exclude
Fluoranthene	20/20	97		10,000		SD08-15	-	10,000	423	[a]	**24**	**Retain**
Fluorene	9/20	20		670		SD08-1	31 - 270	670	1,080	[b]	0.6	Exclude
Indeno(1,2,3-cd)pyrene	20/20	29		1,100		SD08-3	-	1,100	200	[a]	**6**	**Retain**
Naphthalene	4/20	18		28		SD08-15	35 - 270	28	176	[a]	0.159	Exclude
Phenanthrene	20/20	46		1,600		SD08-15	-	1,600	204	[a]	**7.8**	**Retain**
Phenol	1/20	29		29		SD08-16	31 - 270	29	49.1	[a]	0.6	Exclude
Pyrene	20/20	45		4,600		SD08-15	-	4,600	195	[a]	**24**	**Retain**
Total PAHs	20/20	629		28,040		SD08-15	-	28,040	1,610	[e]	**17**	**Retain**
Samples Included in Screen	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)											

Notes:
Concentration units are µg/Kg (ppb).
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this screening.
Duplicate samples treated as independent result for this screening.
Only those chemicals detected in at least one sample were included in this table.
Total PAHs calculated as the sum of the detected individual PAHs.
COPEC = Contaminant of Potential Ecological Concern.
A dash indicates the summary was not required.
NA = Not Available or Relevant
NC = No criteria. Q = Data Qualifier; J = estimated value
SQL = Sample Quantitation Limit
See Table 3-5b for data sources of sediment ESVs.
[a] ESV was EPA Region 5 ESL.
[b] NYSDEC sediment criteria was used as ESV.
[c] ESV was EPA Region 5 ESL (used naphthalene as surrogate).
[d] NYSDEC sediment criteria was used as ESV (used bis(2-ethylhexyl)phthalate as surrogate).
[e] Used Consensus TEC benchmark (MacDonald et al., 2000)

Table 3-9b. COPEC Screening of Pesticides and PCBs from Surface Sediments
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Pesticides												
delta-BHC	1/20	4.9	J	4.9	J	SD08-10	1.6 - 160	4.9	71,500	[a]	0.0001	Exclude
gamma-BHC (Lindane)	1/20	15	J	15	J	SD08-13	0.36 - 160	15	2.37	[a]	**6.3**	**Retain**
gamma-Chlordane	1/20	1.5	J	1.5	J	SD08-14	0.75 - 160	1.5	0.107	[b]	**14**	**Retain**
PCBs												
Aroclor 1254	19/20	20		2,700		SD08-13	16 - 16	2,700	1,449	[b]	**1.9**	**Retain [b]**
Total PCBs	19/20	20		2,700		SD08-13	16 - 16	2,700	1,449	[b, c]	**1.9**	**Retain**
Samples Included in Screen	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)											

Notes:
Concentration units are µg/Kg (ppb).
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this screening.
Duplicate samples treated as independent result for this screening.
Only those chemicals detected in at least one sample were included in this table.
See Table 3-5b for data sources of sediment ESVs.
COPEC = Contaminant Of Potential Ecological Concern.
Q = Data Qualifier; J = estimated value
SQL = Sample Quantitation Limit
[a] ESV was the EPA Region 5 ESL. A NYSDEC screening value was not available for this chemical.
[b] NYSDEC screening value adjusted for TOC content of sample with maximum positive result.
[c] Individual Aroclor PCBs evaluated as total PCBs.

Table 3-9c. COPEC Screening of Inorganics from Sediments
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Aluminum	20/20	5,910	J	17,000		SD08-6	-	17,000	14,000	[a]	**1.2**	**Retain**
Antimony	20/20	0.27	J	6	J	SD08-15	-	6.0	2.0	[b]	**3.0**	**Retain**
Arsenic	20/20	1.9	J	7.2	J	SD08-14	-	7.2	6.0	[b]	**1.2**	**Retain**
Barium	20/20	187		596	J	SD08-3	-	596	0.7	[c]	**851**	**Retain**
Beryllium	20/20	0.26	J	0.93		SD08-14	-	0.9	1.0	[d]	0.9	Exclude
Cadmium	20/20	1.30		739	J	SD08-1	-	739	0.6	[b]	**1,232**	**Retain**
Calcium	20/20	3,630		199,000	J	SD08-12	-	199,000	NC		NA	—
Chromium	20/20	18	J	462	J	SD08-1	-	462	26	[b]	**17.8**	**Retain**
Cobalt	20/20	5.0		13	J	SD08-1	-	13	50	[e]	0.3	Exclude
Copper	20/20	21		820	J	SD08-1	-	820	16	[b]	**51.3**	**Retain**
Cyanide, Total	6/20	0.17	BJ	2.10	J	SD08-2	0.34 - 3	2.1	1.0E-03	[e]	**2,100**	**Retain**
Iron	20/20	11,800	J	37,400		SD08-14	-	37,400	20,000	[b]	**1.9**	**Retain**
Lead	20/20	34	J	1,620	J	SD08-2	-	1,620	31	[b]	**52.3**	**Retain**
Magnesium	20/20	2,290		6,540	J	SD08-15	-	6,540	NC		NA	—
Manganese	20/20	78		415	J	SD08-14	-	415	460	[b]	0.9	Exclude
Mercury	20/20	0.04		1.40		SD08-2	-	1.4	0.2	[b]	**9.3**	**Retain**
Nickel	20/20	16		180	J	SD08-1	-	180	16	[b]	**11.3**	**Retain**
Potassium	20/20	475		1,220	J	SD08-13	-	1,220	NC		NA	—
Selenium	20/20	0.32	BJ	2.5	J	SD08-1	-	2.5	0.2	[f]	**12.5**	**Retain**
Silver	20/20	0.34		53		SD08-2	-	53	1.0	[b]	**52.5**	**Retain**
Sodium	20/20	158	J	875	J	SD08-15	-	875	NC		NA	—
Thallium	18/20	0.13		0.42	J	SD08-4	0.18 - 0.3	0.42	1.0	[g]	0.4	Exclude
Vanadium	20/20	10	J	28	J	SD08-1	-	28	50	[c]	0.6	Exclude
Zinc	20/20	95	J	12,500	J	SD08-1	-	12,500	120	[b]	**104**	**Retain**
Samples Included in Screen	SD08-1(0-6), SD08-2(0-6), SD08-3(0-6), SD08-4(0-6), SD08-5(0-6), SD-DUP1 [SD08-5(0-6)Dup], SD08-6(0-6), SD08-7(0-6), SD08-8(0-6), SD08-9 (0-6), SD08-10 (0-6), SD08-11 (0-6), SD08-12 (0-6), SD08-13 (0-6),SD08-14, SD08-15, SD08-16, SD08-17, SD08-30(0-6), and SD08-40(0-6)											

Notes:
Concentration units are mg/Kg (ppm).
Sediment results from the surface (0-6") depth collected from Koppers Pond and the pond outlets were combined for this screening.
Duplicate samples treated as independent result for this screening.
Only those chemicals detected in at least one sample were included in this table.
A dash indicates the summary was not required.
COPEC = Contaminant Of Potential Ecological Concern.
NA = Not Available or Relevant
NC = No criteria.
Q = Data Qualifier; J = estimated value
SQL = Sample Quantitation Limit
See Table 3-5b for data sources of sediment ESVs.
[a] ESV was calculated from three sources. A NYSDEC screening value was not available for this chemical.
[b] NYSDEC sediment criteria was used as ESV.
[c] ESV was from NOAA SQuiRT (Buchman, 2008).
[d] ESV was from WHO (1990b).
[e] ESV was EPA Region 5 ESL.
[f] ESV was from Rice (1999).
[g] ESV was from WHO (1996b).

Table 3-10a. Screening for Pesticide and PCB COPECs in Forage Fish Samples
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Pesticides												
beta-BHC	1/6	0.58		0.58		FF08-04	0.42 - 0.78	0.58	100	[a]	0.006	Exclude
alpha-Chlordane	1/6	2		2		FF08-03	1.6 - 4	2	290	[b]	0.007	Exclude
gamma-Chlordane	4/6	5.8		13		FF08-02	11 - 19	13	290	[b]	0.045	Exclude
Endosulfan sulfate	1/6	2.5		2.5		FF08-02	0.55 - 2.4	2.5	195	[b]	0.013	Exclude
Endrin aldehyde	2/6	1.7		3.0		FF08-04	0.42 - 0.6	3	25	[a]	0.120	Exclude
Aroclor PCBs												
Aroclor 1254	5/5	400		1300		FF08-01	---	1300	110	[a]	**11.8**	**Retain**
Aroclor 1260	5/5	75		240		FF08-01	---	240	110	[a]	**2.2**	**Retain**
Total PCBs	5/5	491		1540		FF08-01	---	1540	110	[a]	**14.0**	**Retain**

Notes:
Concentration units are µg/Kg (wet weight).
Duplicate samples treated as independent result for this screening.
Only those chemicals detected in at least one sample were included in this table.
Aroclors 1254 and 1260 were detected in the forage fish samples but were screened as total PCBs.
A dash indicates the summary was not required.
COPEC = Contaminant of Potential Ecological Concern.
NA = Not Available or Relevant
Q = Data Qualifier; J = estimated value
SQL = Sample Quantitation Limit
[a] ESV based on NYSDEC value
[b] ESV based on USACE-ERED tissue burden value

Table 3-10b. Screening for Inorganic COPECs in Forage Fish
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Frequency of Detection	Range of Detection				Location of Maximum Concentration	Range of SQLs	Concentration Used For Screening	Ecological Screening Value		HQ_{screen}	Screen Conclusion
		Min.	Q	Max.	Q							
Aluminum	6/6	3.2		12.8		FF08-06	-	12.8	10.3	[b]	**1.2**	**Retain**
Arsenic	6/6	0.053		0.13		FF08-01	-	0.13	1.6	[b]	0.1	Exclude
Barium	5/6	1.3		2.2		FF08-01	1 - 1	2.2	NC		---	---
Cadmium	6/6	0.04		0.12		FF08-01 FF08-05	-	0.12	1.6	[b]	0.1	Exclude
Calcium	6/6	5,300		13,700		FF08-06	-	13,700	NC		---	---
Chromium	1/1	0.41		0.41		FF08-02	-	0.41	1.1	[b]	0.4	Exclude
Cobalt	1/6	0.052		0.052		FF08-06	0.05 - 0.05	0.052	NC		---	---
Copper	6/6	0.45		0.62		FF08-05	-	0.62	4.9	[b]	0.1	Exclude
Iron	6/6	9.8		29		FF08-05	-	29	22.0	[b]	**1.3**	**Retain**
Lead	6/6	0.23		0.5		FF08-05	-	0.5	3.2	[b]	0.2	Exclude
Magnesium	6/6	348		526		FF08-01	-	526	NC		---	---
Manganese	6/6	0.78		1.7		FF08-01	-	1.7	2.2	[b]	0.8	Exclude
Mercury	6/6	0.011		0.046		FF08-03	-	0.046	0.5	[a]	0.1	Exclude
Nickel	6/6	0.056		0.180		FF08-06	-	0.180	70.0	[b]	0.0	Exclude
Potassium	6/6	2,160		2,750		FF08-05	-	2,750	NC		---	---
Silver	3/6	0.0028		0.013		FF08-05	0.1 - 0.1	0.013	0.3	[b]	0.0	Exclude
Sodium	6/6	839		1,010		FF08-06	-	1,010	NC		---	---
Zinc	6/6	13.0		19.7		FF08-05	-	19.7	39.4	[b]	0.5	Exclude

Notes:
Concentration units are mg/Kg (wet weight).
Duplicate samples treated as independent result for this screening.
Forage fish results were combined for this screening.
A dash indicates the summary was not required.
COPEC = Contaminant of Potential Ecological Concern
NA = Not Available or Relevant
NC = No criteria.
Q = Data Qualifier; J = estimated value; B = value reported below reporting limit.
SQL = Sample Quantitation Limit
[a] ESV based on NYSDEC value
[b] ESV based on USACE-ERED tissue burden value

Table 3-11. Compilation of Preliminary COPECs based on the SLERA Screening
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Chemical Class	Preliminary Sediment COPEC	Preliminary Surface Water COPEC	Preliminary Forage Fish COPEC
VOCs	Acetone	[None]	[None]
SVOCs	4-Methylphenol	Benzo(a)anthracene	NA
	Acenaphthylene		
	Benzo(a)anthracene		
	Benzo(a)pyrene		
	Benzo(ghi)perylene		
	Benzo(k)fluoranthene		
	Chrysene		
	Dibenz(a,h)anthracene		
	Indeno(1,2,3-cd)pyrene		
	Pyrene		
	Total PAHs		
Aroclor PCBs	Total PCBs	[None]	Total PCBs
Pesticides	*gamma*-BHC (Lindane)	[None]	[None]
	gamma-Chlordane		
Inorganics	Aluminum	Magnesium	Aluminum
	Antimony		Iron
	Arsenic		
	Barium		
	Cadmium		
	Chromium		
	Copper		
	Cyanide, Total		
	Iron		
	Lead		
	Mercury		
	Nickel		
	Selenium		
	Silver		
	Zinc		

Note:
The preliminary COPECs were identified based on comparison to conservative screening benchmarks. A refined COPEC screening will be performed as part of ERAGS Step 3. See Section 4 of text for discussion.
Only those chemicals that were detected in at least one sample are shown in this table.
NA: Not analyzed.

Table 3-12a. Uncertainty Assessment - Comparison of Screening for Pesticide and PCB COPECs Using Gamefish and Forage Fish Results
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Forage Fish		Gamefish		Ecological Screening Value		Forage Fish HQ_{screen}	Gamefish HQ_{screen}	Forage Fish Screen Conclusion	Gamefish Screen Conclusion
	Frequency of Detection	Range of Detections	Frequency of Detection	Range of Detections						
Pesticides										
beta-BHC	1/6	0.58 - 0.58	0/20	ND [0.41 U - 0.42 U]	100	[a]	0.01	---	Exclude	—
alpha-Chlordane	1/6	2 - 2	3/20	1.3 - 2.5	290	[b]	0.01	0.01	Exclude	Exclude
gamma-Chlordane	4/6	5.8 - 13	6/20	4.8 - 13	290	[b]	0.04	0.04	Exclude	Exclude
4,4'-DDE	0/6	ND [1.1 U - 3.7 U]	1/20	10 - 10	200	[a]	---	0.05	—	Exclude
Endosulfan sulfate	1/6	2.5 - 2.5	13/20	0.45 - 3.8	195	[b]	0.01	0.02	Exclude	Exclude
Endrin aldehyde	2/6	1.7 - 3	1/20	1.4 - 1.4	25	[a]	0.12	0.06	Exclude	Exclude
Total DDT/DDD/DDE	0/6	ND [1.1 U - 3.7 U]	1/20	10 - 10	200	[a]	---	0.05	—	Exclude
Aroclor PCBs										
Aroclor 1254	5/5	400 - 1300	17/17	73 - 1700	110	[a]	**11.8**	**15.5**	**Retain**	**Retain**
Aroclor 1260	5/5	75 - 240	13/17	17 - 360	110	[a]	**2.2**	**3.3**	**Retain**	**Retain**
Total PCBs	5/5	491 - 1540	17/17	90 - 2060	110	[a]	**14.0**	**18.7**	**Retain**	**Retain**

Notes:
Concentration units are µg/Kg (wet weight).
Duplicate samples treated as independent result for this screening.
Only those chemicals detected in at least one sample were included in this table.
Aroclors 1254 and 1260 were detected in the fish samples but will be evaluated as total PCBs in the ERA.
A dash indicates the summary was not required.
COPEC = Contaminant of Potential Ecological Concern.
NA = Not Available or Relevant
ND = Not detected. Detection limits are shown in brackets with "U" flag.
[a] ESV based on NYSDEC value
[b] ESC based on USACE-ERED tissue burden value

Table 3-12b. Uncertainty Assessment - Comparison of Screening for Inorganic COPECs Using Gamefish and Forage Fish Results
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Forage Fish		Gamefish		Ecological Screening Value		Forage Fish HQ_{screen}	Gamefish HQ_{screen}	Forage Fish Screen Conclusion	Gamefish Screen Conclusion
	Frequency of Detection	Range of Detections	Frequency of Detection	Range of Detections						
Aluminum	6/6	3.2 - 12.8	0/20	ND [3 U]	10.3	[b]	**1.2**	---	**Retain**	—
Arsenic	6/6	0.053 - 0.13	16/20	0.018 - 0.15	1.6	[b]	0.1	0.1	Exclude	Exclude
Barium	5/6	1.3 - 2.2	0/20	ND [1 U]	NC		---	---	—	—
Cadmium	6/6	0.04 - 0.12	0/20	ND [0.1 U]	1.6	[b]	0.1	---	Exclude	—
Calcium	6/6	5300 - 13700	19/19	100 - 2130	NC		---	---	—	—
Chromium	1/1	0.41 - 0.41	5/5	0.81 - 1.2	1.1	[b]	0.4	**1.1**	Exclude	**Retain**
Cobalt	1/6	0.052 - 0.052	0/20	ND [0.05 U]	NC		---	---	—	—
Copper	6/6	0.45 - 0.62	20/20	0.21 - 1	4.9	[b]	0.1	0.2	Exclude	Exclude
Iron	6/6	9.8 - 29.1	20/20	0.85 - 15.2	22.0	[b]	**1.3**	0.7	**Retain**	Exclude
Lead	6/6	0.23 - 0.53	3/20	0.14 - 0.17	3.2	[b]	0.2	0.1	Exclude	Exclude
Magnesium	6/6	348 - 526	20/20	220 - 315	NC		---	---	—	—
Manganese	6/6	0.78 - 1.7	20/20	0.069 - 0.26	2.2	[b]	0.8	0.1	Exclude	Exclude
Mercury	6/6	0.011 - 0.046	20/20	0.011 - 0.37	0.5	[a]	0.1	0.7	Exclude	Exclude
Nickel	6/6	0.056 - 0.18	20/20	0.012 - 0.1	70.0	[b]	0.0	0.0	Exclude	Exclude
Potassium	6/6	2160 - 2750	20/20	2530 - 3480	NC		---	---	—	—
Silver	3/6	0.0028 - 0.013	1/20	0.0049 - 0.0049	0.3	[b]	0.0	0.0	Exclude	Exclude
Sodium	6/6	839 - 1010	20/20	355 - 592	NC		---	---	—	—
Vanadium	0/4	ND [0.1 U]	5/14	0.18 - 0.28	1.9	[b]	---	0.1	—	Exclude
Zinc	6/6	13 - 19.7	20/20	4.8 - 26.1	39.4	[b]	0.5	0.7	Exclude	Exclude

Notes:
Concentration units are mg/Kg (wet weight).
Duplicate samples treated as independent result for this screening.
Forage fish results were combined for this screening.
A dash indicates the summary was not required.
COPEC = Contaminant of Potential Ecological Concern
NA = Not Available or Relevant
NC = No criteria.
ND = Not detected. Detection limits are shown in brackets with "U" flag.
[a] ESV based on NYSDEC value.
[b] ESC based on USACE-ERED tissue burden value.

Table 3-13a. Uncertainty Assessment - Comparison of SVOC Sample Quantitation Limits for Non-Detect Chemicals in the Sediment Samples to Ecological Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Units	Range of SQLs	Ecological Screening Value		Minimum Non-Detect/ESV Ratio	Maximum Non-Detect/ESV Ratio	Comment
Semivolatile Organics							
1,1'-Biphenyl	µg/Kg	150 - 1,300	NC		---	---	
2,4,5-Trichlorophenol	µg/Kg	150 - 1,300	37	[a]	**4.1**	**35.4**	As total chlorinated phenols
2,4,6-Trichlorophenol	µg/Kg	150 - 1,300	37	[a]	**4.1**	**35.4**	As total chlorinated phenols
2,4-Dichlorophenol	µg/Kg	31 - 270	37	[a]	0.8	**7.4**	As total chlorinated phenols
2,4-Dimethylphenol	µg/Kg	150 - 1,300	31	[a]	**4.9**	**42.5**	As total unchlorinated phenols
2,4-Dinitrophenol	µg/Kg	780 - 6800	31	[a]	**25.5**	**222.3**	As total unchlorinated phenols
2,4-Dinitrotoluene	µg/Kg	150 - 1,300	NC		---	---	
2,6-Dinitrotoluene	µg/Kg	150 - 1,300	NC		---	---	
2-Chloronaphthalene	µg/Kg	31 - 270	NC		---	---	
2-Chlorophenol	µg/Kg	150 - 1,300	37	[a]	**4.1**	**35.4**	As total chlorinated phenols
2-Methylphenol	µg/Kg	150 - 1,300	31	[a]	**4.9**	**42.5**	As total unchlorinated phenols
2-Nitroaniline	µg/Kg	780 - 6800	NC		---	---	
2-Nitrophenol	µg/Kg	150 - 1,300	31	[a]	**4.9**	**42.5**	As total unchlorinated phenols
3,3'-Dichlorobenzidine	µg/Kg	150 - 1,300	NC		---	---	
3-Nitroaniline	µg/Kg	780 - 6800	NC		---	---	
4,6-Dinitro-2-methylphenol	µg/Kg	780 - 6800	31	[a]	**25.5**	**222.3**	As total unchlorinated phenols
4-Chloro-3-methylphenol	µg/Kg	150 - 1,300	37	[a]	**4.1**	**35.4**	As total chlorinated phenols
4-Nitroaniline	µg/Kg	780 - 6,800	NC		---	---	
4-Nitrophenol	µg/Kg	780 - 6,800	31	[a]	**25.5**	**222.3**	As total unchlorinated phenols
bis(2-Chloroethoxy)methane	µg/Kg	150 - 1,300	NC		---	---	
bis(2-Chloroethyl) ether	µg/Kg	31 - 270	NC		---	---	
Diethyl phthalate	µg/Kg	150 - 1,300	12,207	[a]	0.012	0.1	Uses BEHP as surrogate
Dimethyl phthalate	µg/Kg	150 - 1,300	12,207	[a]	0.012	0.1	Uses BEHP as surrogate
Di-n-octyl phthalate	µg/Kg	150 - 1,300	12,207	[a]	0.012	0.1	Uses BEHP as surrogate
Hexachlorobenzene	µg/Kg	31 - 270	734	[b]	0.042	0.4	
Hexachlorobutadiene	µg/Kg	31 - 270	245	[b]	0.127	**1.1**	
Hexachlorocyclopentadiene	µg/Kg	150 - 1,300	269	[a]	0.557	**4.8**	
Hexachloroethane	µg/Kg	150 - 1,300	NC		---	---	
Isophorone	µg/Kg	150 - 1,300	NC		---	---	
Nitrobenzene	µg/Kg	31 - 270	NC		---	---	
N-Nitrosodi-n-propylamine	µg/Kg	31 - 270	NC		---	---	
N-Nitrosodiphenylamine	µg/Kg	31 - 270	NC		---	---	
Pentachlorophenol	µg/Kg	150 - 1,300	2,448	[a]	0.061	0.5	

Notes:
Concentration units are on a dry weight basis.
COPEC = Contaminant of Potential Ecological Concern.
NC = No ESV available
SQL = Sample Quantitation Limit
[a] ESV based on chronic benthic NYSDEC value. The organic carbon normalized sediment critieria were calculated using the average TOC (61,190 mg/Kg).
[b] ESV based on wildlife bioaccumulaiton NYSDEC value. The organic carbon normalized sediment critieria were calculated using the average TOC (61,190 mg/Kg).

Table 3-13b. Uncertainty Assessment - Comparison of Pesticide Sample Quantitation Limits for Non-Detect Chemicals in the Sediment Samples to Ecological Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Units	Range of SQLs	Ecological Screening Value		Minimum Non-Detect/ESV Ratio	Maximum Non-Detect/ESV Ratio
Pesticides						
4,4'-DDD	µg/Kg	0.72 - 160	61	[a]	0.012	**2.6**
4,4'-DDE	µg/Kg	1.6 - 160	61	[a]	0.026	**2.6**
4,4'-DDT	µg/Kg	1.6 - 160	61	[a]	0.026	**2.6**
Aldrin	µg/Kg	1.8 - 230	47	[b]	0.038	**4.9**
alpha-BHC	µg/Kg	0.53 - 160	734	[b]	0.001	0.2
alpha-Chlordane	µg/Kg	1.6 - 160	0.37	[b]	**4.4**	**435.8**
Atrazine	µg/Kg	150 - 1300	NC	[a]	---	---
beta-BHC	µg/Kg	1.6 - 160	734	[b]	0.002	0.2
Dieldrin	µg/Kg	0.8 - 160	47	[b]	0.017	**3.4**
Endosulfan I	µg/Kg	1.6 - 160	2	[a]	0.872	**87.2**
Endosulfan II	µg/Kg	1.6 - 160	2	[a]	0.872	**87.2**
Endosulfan sulfate	µg/Kg	1.6 - 160	2	[a]	0.872	**87.2**
Endrin	µg/Kg	1.6 - 160	245	[a]	0.007	0.7
Endrin aldehyde	µg/Kg	1.6 - 160	245	[a]	0.007	0.7
Endrin ketone	µg/Kg	0.75 - 160	245	[a]	0.003	0.7
Heptachlor	µg/Kg	1.6 - 160	2	[b]	0.872	**87.2**
Heptachlor epoxide	µg/Kg	1.4 - 160	2	[b]	0.763	**87.2**
Methoxychlor	µg/Kg	3.1 - 310	37	[a]	0.084	**8.4**
Toxaphene	µg/Kg	62 - 6300	1	[a]	**101**	**10,296**

Notes:
Concentration units are on a dry weight basis.
COPEC = Contaminant of Potential Ecological Concern.
NC = No ESV available
SQL = Sample Quantitation Limit
[a] ESV based on chronic benthic NYSDEC value. The organic carbon normalized sediment critieria were calculated using the average TOC (61,190 mg/Kg).
[b] ESV based on wildlife bioaccumulaiton NYSDEC value. The organic carbon normalized sediment critieria were calculated using the average TOC (61,190 mg/Kg).

Table 3-13c. Uncertainty Assessment - Comparison of Sample Quantitation Limits for Non-Detect Chemicals in the Forage Fish Samples to Ecological Screening Values
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Analyte	Units	Range of SQLs	Ecological Screening Value		Minimum Non-Detect/ESV Ratio	Maximum Non-Detect/ESV Ratio	Comment
Pesticides							
4,4'-DDD	µg/Kg	0.42 - 3.9	200	[a]	0.0021	0.0195	
4,4'-DDE	µg/Kg	1.1 - 3.7	200	[a]	0.0055	0.0185	
4,4'-DDT	µg/Kg	0.42 - 0.42	200	[a]	0.0021	0.0021	
Aldrin	µg/Kg	0.11 - 0.85	120	[a]	0.0009	0.0071	
alpha-BHC	µg/Kg	0.42 - 0.89	100	[a]	0.0042	0.0089	
delta-BHC	µg/Kg	0.15 - 0.42	100	[a]	0.0015	0.0042	
Dieldrin	µg/Kg	1.2 - 4.2	120	[a]	0.0100	0.0350	
Endosulfan I	µg/Kg	0.42 - 0.42	195	[b]	0.0022	0.0022	
Endosulfan II	µg/Kg	0.42 - 0.42	195	[b]	0.0022	0.0022	
Endrin	µg/Kg	0.42 - 0.42	25	[a]	0.0168	0.0168	
Endrin ketone	µg/Kg	0.42 - 0.42	25	[a]	0.0168	0.0168	Used endrin as surrogate
gamma-BHC (Lindane)	µg/Kg	0.42 - 0.42	100	[a]	0.0042	0.0042	
Heptachlor	µg/Kg	0.35 - 1.2	200	[a]	0.0018	0.0060	
Heptachlor epoxide	µg/Kg	0.75 - 2.7	200	[a]	0.0038	0.0135	
Methoxychlor	µg/Kg	0.82 - 0.82	272	[b]	0.0030	0.0030	
Toxaphene	µg/Kg	17 - 17	2,450	[b]	0.0069	0.0069	
Inorganics							
Antimony	mg/Kg	0.2 - 0.2	NC		---	---	No ESV available from standard references.
Beryllium	mg/Kg	0.1 - 0.1	5.13	[b]	0.0195	0.0195	
Selenium	mg/Kg	0.5 - 0.5	1.22	[b]	0.4085	0.4085	
Thallium	mg/Kg	0.1 - 0.1	2.72	[b]	0.0368	0.0368	
Vanadium	mg/Kg	0.1 - 0.1	1.90	[b]	0.0526	0.0526	

Notes:
Concentration units are on a wet weight basis.
COPEC = Contaminant of Potential Ecological Concern.
NC = No ESV available
SQL = Sample Quantitation Limit
[a] ESV based on NYSDEC value
[b] ESC based on USACE-ERED tissue burden value

Table 3-14. Comparison of BERA and SLERA COPEC Screening Methods
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Item	BERA (CDM, 1999)	SLERA	Comment
Evaluated Media	Sediments only	Surface water, sediments, and fish evaluated separately	
ESV Data sources	NYSDEC Sediment Criteria (NYSDEC, 1999) Ontario Low Effect Levels	Mulitple sources, including NYSDEC (1999) - see Table 3-5 series.	Many of the SLERA ESV data sources were not available when the BERA (CDM, 1999) was prepared.
Evaluated Areas	Evaluated areas separately: • Lower portion of the Industrial Drainageway • Koppers Pond • Pond outlet channels	Combined all results by media for screening.	
COPECs - VOCs	Not evaluated	SW: Not detected Sediment: Retained one Fish: Not evaluated.	VOCs were not quantified in the fish samples used in the SLERA due to their low bioaccumulation potential.
- SVOCs	Not evaluated	SW: Retained 2. Sediment: Retained 15 Fish: Not evaluated	The SLERA SW and sediment SVOCs include individual PAHs and total PAHs in the COPEC count. SVOCs were not quantified in the fish samples used in the SLERA due to their low bioaccumulation potential.
- Pesticides	Retained 5 to 7, depending on area	SW: Not detected. Sed: Retained 2. Fish: Evaluated and none retained.	
- PCBs	Retained as Aroclor 1254	SW: Not detected Sediment: Retained as total PCBs Fish: Retained as total PCBs	
- Inorganics	Retained 14 to 15, depending on area	SW: Retained 1. Sediment: Retained 15. Fish: Retained 2.	See Table 3-15 for comparison of the inorganics that were retained in the BERA (CDM, 1999) and SLERA.

Table 3-15. Compilation of BERA and SLERA Sediment COPEC Inorganics by Area
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Parameter	BERA (CDM, 1999)			SLERA	
	Industrial Drainageway	Koppers Pond	Pond Outlets	SW	Sediment
Aluminum	◆	◆	◆		◆
Antimony	◆	◆	◆		◆
Arsenic	◆				◆
Barium	◆	◆	◆		◆
Beryllium		◆	◆		
Cadmium	◆	◆	◆		◆
Chromium	◆	◆	◆		◆
Cobalt	◆	◆	◆		
Copper	◆	◆	◆	◆	◆
Cyanide, Total		◆			◆
Iron					◆
Lead	◆	◆	◆		◆
Mercury	◆	◆			◆
Nickel	◆	◆	◆		◆
Selenium			◆		◆
Silver	◆	◆	◆		◆
Thallium			◆		
Vanadium	◆	◆	◆		
Zinc	◆	◆	◆		◆

Note:
There were no inorganics retained as fish COPECs.
A blank entry indicates that the chemical was not retained as a COPEC.

Appendix A
Correspondences with the New York Natural Heritage Program

Appendix A
Correspondences with the New York Natural Heritage Program

Preface

This appendix contains the following information regarding the correspondences with the New York Natural Heritage Program (NYNHP) concerning whether there are any reported observations of rare, threatened or endangered (RTE) species at or near the Koppers Pond Site. The following information is included in this appendix:

- Letter dated 24 October 2008 from AMEC to NYNHP requesting information on the presence of RTE species at the Site;
- Letter dated 19 November 2008 from NYNHP to AMEC providing RTE information; and
- E-mail correspondence (December 2008) from NYSDEC correcting the NYNHP RTE information.

The only change made in the December 2008 e-mail correspondence relative to the 19 November 2008 NYNHP was the addition of the potential presence of slender pondweed (*Stuckenia filiformis alpinus*)[7] at or near Koppers Pond. This was based on a historical record (from 1943) that this species was reported "in cold brook, Chemung Street, Horseheads." The presence of this species in Koppers Pond under current environmental conditions will be determined as part of the field investigation that will be presented as part of ERAGS Step 4.

[7] A common synonym for this species is *Potamogeton filiformis alpinus,* which is how this plant is listed under NYCRR, Chapter II, Part §193.3 [http://www.dec.ny.gov/regs/15522.html]

24 October 2008

NYSDEC-DFWMR
NY Natural Heritage Program-Information Services
625 Broadway, 5th Floor
Albany, NY 12233-4757

Re: Request for Information Concerning Rare, Threatened or Endangered Species
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

Dear Sir or Madam:

We are requesting information from the New York Natural Heritage Program (NYNHP) concerning the potential presence of any records of rare species or significant natural communities near the Kentucky Avenue Wellfield OU4 - Koppers Pond Site, located in Horseheads, NY. As specified at your website, we are providing the following information to facilitate the compilation of this information:

- Why you need the information (e.g., environmental assessment under SEQR, management plan)
- Brief description of the proposed project or activity (e.g., residential development, landfill siting)
- Brief description of the current land use at the project site
- Name of all counties and towns where the proposed project is located
- Photocopy of a map, preferably a 7½ minute U.S.G.S. topographical map, at a scale that includes identifiable geographic features
- Boundary of the proposed project clearly marked or highlighted on the map photocopy

This information is provided in Attachment 1. Please respond to my address below.

Thank you for your assistance.

Sincerely,

John H. Samuelian, Ph.D.
Senior Environmental Scientist

AMEC Earth & Environmental, Inc.
15 Franklin Street
Portland, ME 04101
E-mail: john.samuelian@amec.com

amec

Attachment 1
Request for Information Concerning Rare, Threatened or Endangered Species
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, NY

We are providing the NYNHP the following information, as requested at the website (http://www.nynhp.org/) to facilitate preparation of a summary of the rare species or significant natural communities near the Kentucky Avenue Wellfield OU4 - Koppers Pond Site (heretofore identified as "Koppers Pond Site"), located in Horseheads, NY.

1. Why you need the information (e.g., environmental assessment under SEQR, management plan)

   A Remedial Investigation and Feasibility Study (RI/FS) under the oversight of EPA Region 2 and NYSDEC is being performed for Koppers Pond.

2. Brief description of the proposed project or activity (e.g., residential development, landfill siting)

   Information concerning the presence of rare species and communities will be used as part of the Ecological Risk Assessment to address potential ecological risks and to develop and assess appropriate remedial measures, if needed, for Koppers Pond and its outlet channels.

3. Brief description of the current land use at the project site

   Koppers Pond is a man-made, V-shaped pond located in the Village of Horseheads, NY. At the northern end of its western leg, the pond receives inflow from the Industrial Drainageway, the watershed for which is largely a commercial and industrial area. The overflow from Koppers Pond discharges to two outlet streams located at the southern end of the pond, which combine to form the outlet channel.

   Koppers Pond is a shallow, flow-through water body with typical water depths of approximately two to five feet. It is bounded to the immediate north by the old Horseheads Landfill and commercial properties (several of which are currently unused) to the east, west and south.

4. Name of all counties and towns where the proposed project is located

   Koppers Pond site is located entirely in Chemung County in the Village of Horseheads and the Town of Horseheads, NY.

5. Photocopy of a map, preferably a 7½ minute U.S.G.S. topographical map, at a scale that includes identifiable geographic features

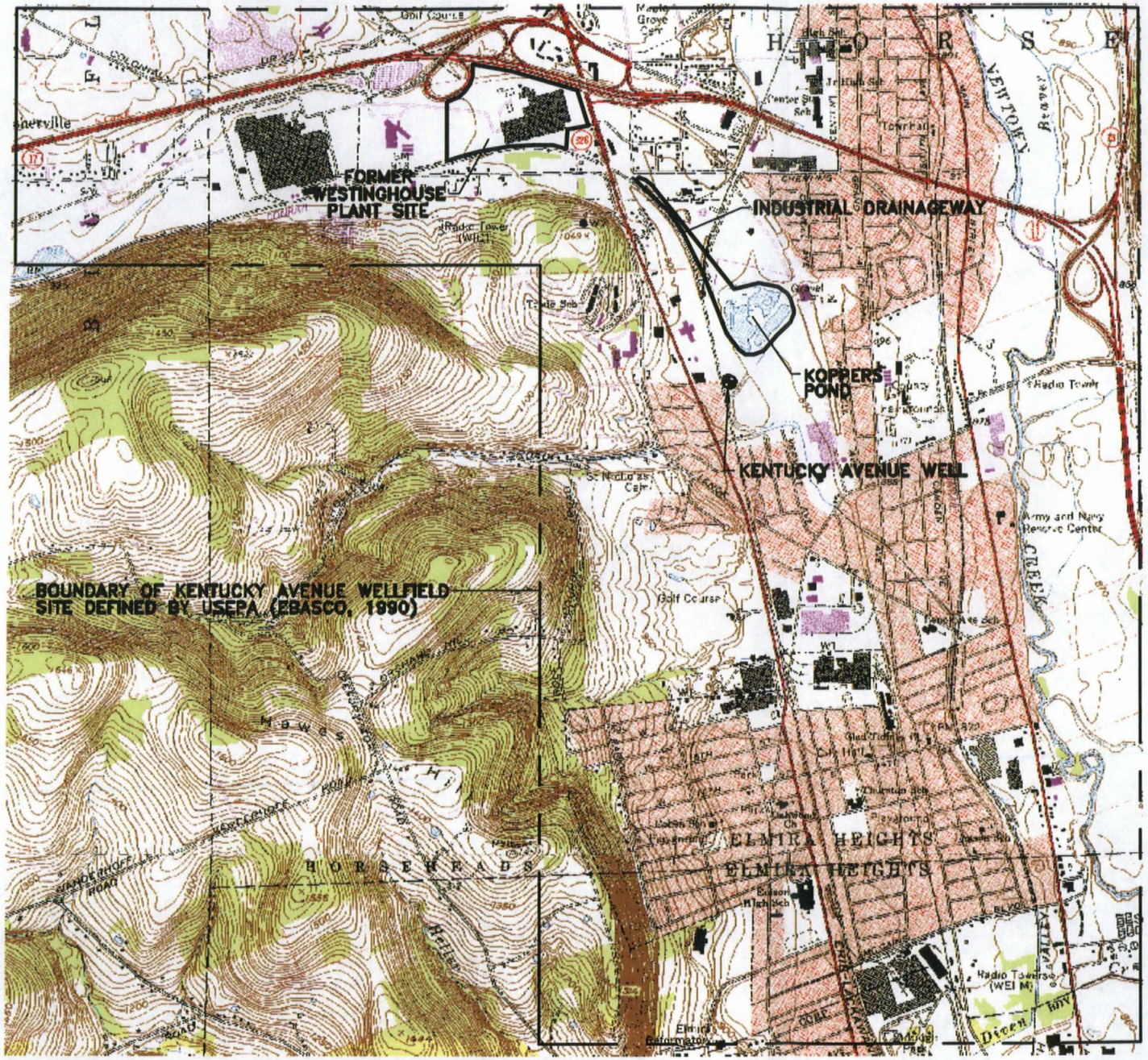
   A topographic map of the evaluated area (Koppers Pond and outlet channels) has been provided as Figure 1. This is the most recent version available from USGS (photorevised in

1978) which does not reflect the current shape of the pond. The latter is better conveyed on Figure 2, which provides an aerial photograph of the area.

6. Boundary of the proposed project clearly marked or highlighted on the map photocopy

   The approximate boundary is shown within the orange border on Figure 2.

DRAWING NUMBER 98245B48



SCALE
0 2000 4000 FEET

QUADRANGLE LOCATION

REFERENCE:

MODIFIED FROM U.S GEOLOGICAL SURVEY HORSEHEADS, NEW YORK, AND ELIMIRA, NEW YORK–PENNSYLVANIA, QUADRANGLES, PHOTOREVISED 1978.

Figure 1
Site Location and Topographic Map
Kentucky Avenue Wellfield OU4 – Koppers Pond, Horseheads, NY

PREPARED FOR
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.	DRAWING NUMBER 98245B48
DRAWN BY: T.E. McKee	DATE: 1-31-07
CHECKED BY:	DATE:
APPROVED BY:	DATE:

PLOT SCALE: 1=1

Figure 2
Koppers Pond and Local Setting
Kentucky Avenue Wellfield OU4 –
Koppers Pond, Horseheads, NY

CUMMINGS RITER CONSULTANTS, INC

Prepared For:
KOPPERS POND RI/FS GROUP

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925

Alexander B. Grannis
Commissioner

November 19, 2008

RECEIVED 11-21-2008

John H. Samuelian
AMEC Earth & Environmental
15 Franklin Street
Portland, ME 04101

Dear Mr. Samuelian:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for the proposed Remedial Investigation and Feasibility Study, near Kentucky Avenue Wellfield OU4 - Koppers Pond area, site as indicated on the map you provided, located in the Town and Village of Horseheads, Chemung County.

We have no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats, on or in the immediate vicinity of your site.

The absence of data does not necessarily mean that rare or state-listed species, natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain any information which indicates their presence. For most sites, comprehensive field surveys have not been conducted. For these reasons, we cannot provide a definitive statement on t he presence or absence of rare or state-listed species, or of significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

This response applies only to known occurrences of rare or state-listed animals and plants, significant natural communities and other significant habitats maintained in the Natural Heritage Data bases. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

Sincerely,
Tara Salerno jp
Tara Salerno, Information Services
NY Natural Heritage Program

Enc.
cc: Reg. 8, Wildlife Mgr.

Samuelian, John H

From: Leo M. Brausch [lbrausch@fyi.net]
Sent: Monday, March 23, 2009 2:45 PM
To: Samuelian, John H
Subject: Fw: Koppers Pond - NYNHP Feedback

Here is the thread of emails on rare and endangered species that Mary Jo referred to on the call about the SLERA.

Leo M. Brausch
Office: (724) 444-0377
Cell: (412) 720-8549
Fax: (724) 444-0351
----- Original Message -----
From: Rodrigues.Isabel@epamail.epa.gov
To: lbrausch@fyi.net
Sent: Thursday, February 26, 2009 3:56 PM
Subject: Fw: Koppers Pond - NYNHP Feedback

I believe this is the email sent by Mary Jo. I thought I had sent it to you in December

----- Forwarded by Isabel Rodrigues/R2/USEPA/US on 02/26/2009 02:54 PM -----

"Mary Jo Crance" <mjcrance@gw.dec.state.ny.us>
12/02/2008 03:21 PM

To: James Doyle/R2/USEPA/US@EPA, Isabel Rodrigues/R2/USEPA/US@EPA, Sergio Lopez/R2/USEPA/US@EPA, Kevin Lynch/R2/USEPA/US@EPA, Richard Henry/ERT/R2/USEPA/US@EPA, Charles Nace/R2/USEPA/US@EPA, Gary Newhart/CI/USEPA/US@EPA, Marian Olsen/R2/USEPA/US@EPA, Mindy Pensak/R2/USEPA/US@EPA, Isabel Rodrigues/R2/USEPA/US@EPA, Michael Scorca/R2/USEPA/US@EPA, <Amy_Roe@fws.gov>, "Matthew Dunham" <mddunham@gw.dec.state.ny.us>, <jmg07@health.state.ny.us>

cc

Subject: Re: Fw: Koppers Pond - NYNHP Feedback

Hi all,
There is a chance of an endangered plant species being present in our project area. Please read the emails below.

MJC

Hi,
I just looked at that project again and talked to our botanist Steve Young. I should have reported the plant. Our record is from 1943 and the directions say "in cold brook, Chemung Street, Horseheads" so there is a chance it could be found at the pond site as well.
Thanks,
Tara

Tara Salerno
Environmental Review Specialist
NY Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233-4757
Office: 518-402-8926
Fax: 518-402-8925
tmsalern@gw.dec.state.ny.us

Mary Jo Crance
DFWMR, Biologist
(518) 402-8972 w
(716) 989-9655 c

>>> Mary Jo Crance 12/2/2008 12:04 PM >>>
Hello Tara,
I am a biologist in the Hazardous Waste Site Evaluation Unit in DFWMR, Central Office. I have just received your memo on the Koppers Pond Site. I noticed in the GIS database that the endangered plant, slender pondweed, is listed in the vicinity of the site. Is there a reason to discount this species?

Thanks in advance for your reply,

MJ

Mary Jo Crance
DFWMR, Biologist
(518) 402-8972 w
(716) 989-9655 c

>>> <Rodrigues.Isabel@epamail.epa.gov> 12/2/2008 11:05 AM >>>

FYI!!!

Isabel Rocha Rodrigues
Remedial Project Manager
U.S EPA
290 Broadway, 20th Floor
New York, NY 10007
(212) 637-4248

----- Forwarded by Isabel Rodrigues/R2/USEPA/US on 12/02/2008 11:04 AM -----

"Leo M. Brausch" <lbrausch@fyi.net>
12/02/2008 10:05 AM

To: Isabel Rodrigues/R2/USEPA/US@EPA

cc: "Anderson, Donald D." <ddanderson@mcguirewoods.com>, "Keenan, Russell E." <russell.keenan@amec.com>, "Samuelian, John H." <john.samuelian@amec.com>, "Maurer, Bryan R." <bmaurer@cummingsriter.com>, "Johnson, Nelson D." <nelson_johnson@aporter.com>, "Baer, Rachel" <rbaer@horseheads.org>, "Groff, John G." <jgroff@horseheads.org>, "Hutchinson, Cynthia S. \(2\)" <chutchinson50@stny.rr.com>, "Maggs, Bryan J." <bmaggs@co.chemung.ny.us>, "Mastrantonio, Susan" <smastrantonio@saylesevans.com>, "McCheseney, Charles E." <charles.mcchesney@hanson.biz>, "Mustico, John P." <jpmustico@stny.rr.com>, "Patarcity, Jane" <Jane.Patarcity@hanson.biz>,

"Smith, Richard K."
<richard.smith@cbs.com>, "Wall,
William D."
<william.wall@cbs.com>, "Dunham,
Matthew D."
<mddunham@gw.dec.state.ny.us>,
Mindy Pensak/R2/USEPA/US@EPA,
"Krance, Mary Jo"
<mjkrance@gw.dec.state.ny.us>

Subject
Koppers Pond - NYNHP Feedback

In accordance with Section 2.1.4 of the Draft Screening-Level Ecological Risk Assessment, attached is a copy of the letter received from the NYSDEC National Heritage Program on November 21, 2008. The NYSDEC National Heritage Program reports no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats on or in the immediate vicinity of the Koppers Pond site.

Please contact me with any questions. Thanks.

Leo M. Brausch
Office: (724) 444-0377
Cell: (412) 720-8549
Fax: (724) 444-0351(See attached file: RTE-NYSDECResponse.pdf)