RESPONSE TO AGENCY COMMENTS TO THE DRAFT ERAGS STEPS 3 THROUGH 5 REPORT TO SUPPORT THE ECOLOGICAL RISK ASSESSMENT OF KOPPERS POND KENTUCKY AVENUE WELLFIELD SUPERFUND SITE OPERABLE UNIT 4, HORSEHEADS, NEW YORK

PREFACE

This document provides our response to the USEPA Region II and NYSDEC comments dated May 13, 2010 to the draft ERAGS Steps 3 through 5 Report for Koppers Pond to support the Ecological Risk Assessment. The comments have been enumerated, and some of the comments were subdivided using alpha suffixes, for clarity.

SPECIFIC COMMENTS:

Comment No. 1. Section 3.1.1 Refined Surface Water COPEC Screening, Surface Water Inorganics, pages 3-2 - 3-3: It is unclear how a comparison of magnesium concentrations in the pond and outlets would indicate that concentrations "represent an existing condition that does not reflect any contribution from Site related chemicals." This discussion should be removed from the workplan. However, as magnesium is an essential nutrient it may be removed from the contaminant of concern list as it does not need to be further evaluated in the BERA.

> *Response*: We have modified the text under "Surface Water Inorganics in Section 3.1.1 (and removed the embedded table) to reflect that magnesium was not retained as a COPEC because it is considered an essential nutrient.
>
> Related edits included the modification of Table 3-1a to remove the comment concerning use of the spatial distribution in the assessment of the magnesium results.

Comment No. 2. Section 3.1.2 Refined Sediment COPEC Screening, page 3-3: In order to enhance the transparency of the "refinement of contaminants of concern" and ensure that this process is clearly understood, data tables showing SLERA and BERA screening values, along with exceedances of the BERA values should be provided. In addition, site figures showing BERA exceedances would also be useful.

> *Response*: The SLERA and refined screening values are shown on Tables 3-1a, 3-1b, and 3-1c for surface water, sediments, and fish, respectively. Because the maximum reported concentrations were used to compare against the screening values to determine whether a chemical should be evaluated further in the ERA, it is not relevant for the refined

425491

screening to show the number or locations of individual results that exceed the screening benchmark.
A new Table 3-1d was added to the revised report that compiles the maximum media concentrations that were used for the refined screening.

Comment No. 3. Section 3.1.2 Refined Sediment COPEC Screening, page 3-3: Please include a discussion of the range of TOC concentrations in the pond sediments, mudflat areas and outlet channel sediments and note whether elevated concentrations of contaminants are associated with areas noted to have higher TOC concentrations.

> ***Response***: Although we agree that sediment TOC is often associated with elevated levels of chemical contaminants, the focus of Section 3.1.2 is the refined screening for COPECs. Therefore a discussion regarding the potential association between chemical concentrations and TOC is not appropriate for this section. A limited summary of the TOC results was added to the initial paragraphs in Section 3.1.2 in the revised report. We are planning to include such an analysis (and other statistical analyses) in the Supplemental BERA.

Comment No. 4. Section 3.1.2 Refined Sediment COPEC Screening, Sediment VOCs, page 3-2: Please note that the acetone ESV from Region 6 (TCEQ) is also based on equilibrium partitioning and assumed 1 % TOC.

> ***Response***: Additional clarifying text was added to the Sediment VOCs discussion under Section 3.1.2 (Refined Sediment COPEC Screening).

Comment No. 5a. Section 3.1.2 Refined Sediment COPEC Screening, Sediment Inorganics, page 3-5: Site-specific reference data may be used to screen out inorganic contaminants whose concentrations are equal to or below reference inorganic values. However, the use of the USGS Hudson River Watershed and National Geochemical Database - Reformatted Data from the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSRR) Program is not acceptable. There are several concerns associated with using this database, including but not limited to: 1) It is unclear whether the 28 sediments (Elmira quadrant) characterized represent a similar environment to Koppers Pond; 2) It is unknown whether the 28 sediment samples were collected from contaminated locations; and 3) Sampling methodology and analysis are unknown.

Any inorganics (aluminum and iron) removed as a contaminant of concern based on regional reference data should be retained until data are available from an appropriate reference pond.

> ***Response***: We have found for other projects that the USGS (Rice, 1999) and NURE databases provide useful information regarding regional conditions for inorganics. Although we concur that is not known whether the sampling locations originate from

contaminated areas, the latitude and longitude coordinates, land use, and geological setting is reported in both databases. The field collection procedures for the NURE program are also available on-line [see http://pubs.usgs.gov/of/1997/ofr-97-0492/pubs/gjbx_30(77).pdf].

We re-evaluated the sediment results using excluding the use of the USGS or NURE databases as sources for the refined screening values. The table below shows the resulting comparisons for the two inorganics (aluminum and iron) that were screened out using either of these databases.

Chemical	Draft Refined Screening Value (mg/kg)	Revised Refined Screening Value (mg/kg)	Maximum Sediment Concentration (mg/kg)	Screen Conclusion
Aluminum	47,128	25,500	17,000	Exclude
Iron	43,000	20,000	37,400	Retain

Aluminum is still screened out using these alternate refined screening values, but iron exceeds the refined ESV. As discussed in the draft report, higher average iron concentrations were observed in outlet channel sediments (24,600 mg/kg) compared to the mudflat sediments (17,650 mg/kg) and Koppers Pond (14,886 mg/kg) sediment. The distribution of iron results suggests contributions from sources other than historical releases from the Industrial Drainageway. However, it will be retained for further evaluation in the ERA.

Although five other inorganics used the USGS or NURE databases for screening values, the maximum observed results exceeded the refined screening values and these were therefore retained for further evaluation in the ERA. Table 3-1b and Table 4-2 were revised to reflect the use of the refined screening values that were not derived from either the USGS or NURE databases. We retained the USGS and NURE data in this table for information purposes only. Table 3-2 was updated to reflect the retention of iron, and appropriate changes were made to the relevant text in Section 3.1.2.

Comment No. 5b. Section 4.1.5 Collection of Sediment and Biota Samples from a Reference Pond. Collection of Sediment and Biota Samples from a Reference Pond should be revised to indicate that inorganic analysis will be included in all media, and inorganics in reference sediment may be used to screen out inorganics identified in site sediments.

Response: Many of the inorganics were retained following the refined screening (12 of the 24 TAL inorganics). Since the TAL inorganics are analyzed concurrently by the analytical laboratory (e.g., EPA Method 6010) any supplemental field samples will include the full TAL inorganic analytes.

Comment No. 6. Section 3.1.2 Refined Sediment COPEC Screening, Sediment Inorganics, *Antimony*, page 3-5: Please provide information regarding how the "probable no effects concentration" reported by the European Chemicals Bureau of the European Union was derived.

> ***Response***: This supporting information was provided to EPA via email on June 4, 2010. Briefly, the alternate sediment ESV for antinomy was obtained from IAA (2008). This document reported that the probable no effects concentration (PNEC) for antimony in sediment of 11.2 mg/kg. The actual No Effects Concentration (NOEC) was 112 mg/kg, which was the lowest value based on sediment testing using three species (*Hyalella*, chironomid and oligochaetes). Although the original studies were not available in the public domain, detailed summaries of the results from these studies are presented in the European Union *Risk Assessment Report for Diantimony Trioxide*. This is available at the following link:
> http://echa.europa.eu/doc/trd_substances/diantimony_trioxide_dat/rar/trd_rar_sweden_diantimony_trioxide.pdf

Comment No. 7. Section 3.1.2 Refined Sediment COPEC Screening, Sediment Inorganics, Selenium, page 3-8: The second to last sentence in this section indicates that "the comparability of the outlet channel and mudflat samples suggests that these values may be similar to regional background concentrations." It is unclear which background samples this statement is referring to, nor is it understood how this determination can be made due to the similarity in selenium concentrations.

> ***Response***: This comment was in reference to the selenium refined screening. Since the outlet channel and mudflat average concentrations were similar (0.77 and 0.78 mg/kg, respectively) and lower than was observed in Koppers Pond (1.31 mg/kg) we speculated in the draft report that the outlet channel and mudflat concentrations may have been representative of regional conditions. However, since this had no effect on the screening results (i.e., the maximum selenium concentration of 2.5 mg/kg was greater than the refined screening value of 0.84 mg/kg that was used in the draft report), the relevant statement was removed from the revised report.

Comment No. 8. Section 3.1.3 Refined Forage Fish COPEC Screening, page 3-9: A discussion should be included regarding the size of the fish commonly consumed by the piscivorous receptors selected. If the receptors are known to consume larger game fish, than data from both the smaller forage fish and larger fish need to be used to model risk to piscivorous receptors. As the remaining carcass of the game fish was not analyzed for contaminants, a fillet to whole fish ratio needs to be used to estimate whole body contaminants prior to further analysis in the BERA. For example, ratios for mercury and total PCB (tPCB) are available in the Onondaga Lake Baseline Ecological Risk Assessment, Volume 1 of 2, (2002). The ratio of fillet to whole body fish for tPCBs is 2.5; therefore, simply multiply the fillet concentrations by 2.5 for an estimate of whole body fish tPCB. The fillet to whole body ratio will need to be applied for all COPECs, and an analysis will need to be done to determine if the extrapolated game fish exceed tissue criteria. Alternately, additional fish collection can be conducted at Koppers Pond.

Response: Issues related to the selection of fish size, designations as game or forage fish, and use of the respective fillet and whole body concentration data in human health and ecological risk assessments were fully vetted and resolved in the RI/FS Work Plan. The field collections, sample preparation, and reporting of results were consistent with the approved RI/FS Work Plan and variations on the agreed approach or alternative approaches (*e.g.*, multiplying fillet concentrations by an assumed value to estimate whole body concentrations) are not warranted at this time.

In lieu of extrapolating whole body concentrations from the fillet data, we evaluated the literature for information regarding the use of forage fish to assess the piscivorous receptors. Table RTC-1 summarizes the standard lengths (in mm and inches) of the gamefish and forage fish that were collected from Koppers Pond (the sample specific results are presented in Table E-1 of the *Site Characterization Study Report*). The forage fish included four composites of bluegills that ranged in size from 63 to 183 mm (2.5 to 7.2"), and two composites (total of five fish) of pumpkinseeds that ranged in size from 68 to 157 mm (2.8 to 6.2"). These are well within the size preference reported for piscivorous birds, such as herons. For example, Short and Cooper (1985) reported that herons preferred fish less than 200 mm in length, while Henning et al (1999) reported that these piscivorous birds prefer fish of lengths of 300 mm or less. Therefore, the existing forage fish data should be sufficient to characterize the potential exposure for piscivorous birds.

Mink, the representative receptor for the piscivorous mammals, have also been reported to prey upon fish of similar size to the forage fish collected from Koppers Pond. For example, Allen (1986) reported that fish of lengths ranging from 70 to 120 mm were the major group of prey fish. Similarly, Heggenes and Borgstrøm (1988) reported that mink prey upon fish less than 150 mm in length. Therefore, the existing forage fish data should be sufficient to characterize the potential exposure for piscivorous mammals.

The information regarding the prey size preferences was added to the Section 3.5.5 of the revised report. This section was also renamed since empirical data on prey/forage items will be collected and there is no need to estimate media concentrations using literature-derived biota transfer factors.

Comment No. 9. Section 3.2 Developing A Refined Conceptual Site Model, page 3-11 : Please provide more information to support the last bullet in this section.

Response: The referenced bullet was deleted in the revised report to reflect our discussions during the June 2, 2010 conference call. It was agreed that because the receptors that may forage in Koppers Pond and the outlet channels can differ (due to the environmental settings of these two areas), they will be segregated in the revised report. To improve clarity, the CSM (Figure 3-1) was further refined to distinguish the potential pathways for Koppers Pond and the outlet channels.

Comment No. 10. Section 3.3 Identifying Assessment and Measurement Endpoints to Frame the Evaluation, page 3-11: This section should be consistent (e.g. identify similar organisms) with Section 3.5 Selecting Representative Receptors To Be Evaluated Further In The ERA. An assessment endpoint for the benthic invertebrate community should be included in this list of endpoints. Measurement endpoints should include comparing measured sediment and surface water concentrations to appropriate screening values as well as conducting toxicity tests. Assessment endpoints identifying herbivorous birds (in addition to piscivorous birds) as well as herbivorous mammals should be included as well.

Response: Section 3.3 has been modified to be consistent with the receptors identified in Section 3.5. Benthic organisms were also added to the CSM (Figure 3-1) in the revised report. The assessment and measurement endpoints were renumbered in the revised report.

Comment No. 11. Section 3.3 Identifying Assessment and Measurement Endpoints to Frame the Evaluation, Assessment Endpoint No.3; No.4 & No.5, Measurement Endpoint No. 3-1, 4-1, & 5-1, pages 3-12 -3-13: The "predicted average daily doses of chemicals" should be calculated using site-specific fish, crayfish and plant tissue data which were previously collected (fish) or will be collected as part of the BERA (crayfish and plant tissue).

Response: We concur with this comment and were planning on using empirical data for this evaluation. No changes were made to the text specified in the comment, but a general statement was added in the introductory paragraphs in Section 3.3 indicating that empirical data will be used for the dose calculations.

Comment No. 12. Section 3.3 Identifying Assessment and Measurement Endpoints to Frame the Evaluation, Assessment Endpoint No.3, No.4 & No.5, Measurement Endpoint No. 3-2, 4-2, & 5-2, pages 3-12 -3-13: The measurement endpoint indicates that "an assessment to determine whether there is any potential relationship between COPEC residues in sediments and the integrity of local [avian, mammalian] populations based on review of the published literature" will be conducted. Additional information regarding this endpoint should be provided.

Response: This statement refers to incorporating the results of any relevant published (or gray literature) studies that evaluated possible population impacts for the COPECs evaluated in the ERA. This information would be used to supplement the risk characterization that will be performed in the ERA, and provide context for the evaluation of the hazard quotients.

Comment No. 13. Section 3.3 Identifying Assessment and Measurement Endpoints to Frame the Evaluation, Assessment Endpoint Assessment Endpoint No.5, Measurement Endpoint No.5-1, page 3-13: The endpoint should refer to omnivores rather than carnivores.

Response: This typographical error was corrected in the revised report.

Comment No. 14. Section 3.5.3 Recommended Supplemental BERA Receptors, Fish, page 3-16: The document indicates that minnows and/or young-of-year fish will be used to evaluate potential risks to semi-aquatic upper trophic levels. This may skew the modeling efforts to be less conservative because the younger fish often have concentrations of contaminants lower than older fish. Further, the piscivores receptors selected as assessment endpoints may eat fish larger than young-of-year fish. Larger fish tissue results should be used to evaluate potential risks to higher trophic levels. Further, please indicate what measured concentrations of COPECs in fish will be used to support the risk assessment; specifically the maximum concentrations, 95% UCL, or median.

Response: Total PCBs was the only COPEC retained for the fish samples. The table below summarizes the average total PCB concentrations in the forage fish and compares them to the gamefish samples.

Species	Group	Average Total PCB Conc (μg/kg)
Bluegill Sunfish	Forage Fish	1,103
Pumpkinseeds	Forage Fish	568
All Forage Fish	Forage Fish	889
Black Crappie	Gamefish	505
Common Carp	Gamefish	1,259
Largemouth Bass	Gamefish	205
White Sucker	Gamefish	288
All Gamefish	Gamefish	526

The average total PCB concentrations for the forage fish were higher than the average values for the gamefish, with the exception of the carp. However, very large carp (range: 1.7 to 2 ft; see Appendix E of the *Site Characterization Study Report*) were collected from Koppers Pond that are unlikely to serve as live prey for the evaluated receptors. The potential exposure would not be underestimated by using the whole body forage fish results.

Comment No. 15. Section 3.5.3 Recommended Supplemental BERA Receptors, Benthic Macroinvertebrates, page 3-16: It is recommended that toxicity tests be conducted rather than comparing more recent sediment data with past toxicity test results.

Response: Section 4.2 of the *Site Characterization Report* summarized the comparisons between the historical (1995 and 1998) and most current (2008) sediment chemical results. Although there were slight differences in the ranges, medians and averages, the results were generally comparable. The short-term toxicity studies of the 14 sediment samples (plus one field duplicate) were performed in 1998 (CDM, 1999). These included one sample from the Industrial Drainageway, nine samples (plus a field duplicate) from Koppers Pond, and four samples from the outlet channels. There was no acute toxicity (reduction in survival) in any of these samples using the midge, and only one sediment sample (SD-13; located at the juncture of the Industrial Drainageway and Koppers Pond) showed a statistically significant reduction in survival in the amphipod (average of 78%; the range was 50 to 100% for the eight individual replicates in this sample). Therefore, we would anticipate that the sediments currently would also lack short-term toxicity. The Supplemental BERA will include a detailed evaluation of these historical results.

We do agree that there is a data gap relative to the potential longer-term sediment toxicity. Therefore, we are proposing to perform the following longer-term benthic toxicity tests (from USEPA, 2000) using five sediments from Koppers Pond, plus one composite sample from a reference pond:

- Test Method 100.4: *Hyalella azteca* 42-day (chronic) Test for Measuring the Effects of Sediment-associated Contaminants on Survival, Growth, and Reproduction .
- Test Method 100.5: Life-cycle Test for Measuring the Effects of Sediment-associated Contaminants on *Chironomus tentans* .

Table RTC-2 summarizes the 1998 sediment toxicity results and the closest 2008 sediment locations. The five sample locations proposed for this sampling are SD08-01, SD08-03, SD08-04, SD08-06, and SD08-08. These were selected based upon review of the 1998 sediment toxicity results and the associated chemical data [see Appendix C Tables 2-2 and 2-3 from CDM (1999)]. A rank scoring technique was used to identify the samples from Koppers Pond, which is summarized below:

- The nine Koppers Pond samples collected during the 1998 field program were used for this assessment. The results for 1998 sample SD-11 and its field duplicate SD-20 were averaged for these calculations.

- The amphipod and midge survival results were sorted and ranked from lowest to highest. The lowest survival received the highest rank. When multiple samples had the same survival percentage, the average rank value was used for the samples.

- The chemical results for total PCBs and eight COPEC metals (barium, cadmium, copper, chromium, iron, lead, silver, and zinc)[1] were sorted individually from lowest to highest, with the highest concentration receiving the highest rank value. Nickel was not included in this group since it was rejected in three of the nine samples.

- The ranks were then summed across the two toxicity test results, total PCBs, and eight metals. The cumulative values by sample were then sorted and the top five summed ranks were selected for 2010 sediment toxicity testing. These five samples also had the higher reported nickel results compared to the remaining samples. All of the sediments in these samples exceeded their corresponding refined ESVs, except for iron. Four of the five proposed samples also have 2008 AVS/SEM results.

The rank results are summarized in Table RTC-3. A new Appendix D was added to the revised report providing additional detail regarding the selection of the samples and related supporting information.

A single composite sample will also be collected from a reference pond to provide information on the potential sediment toxicity of ponds that are reflective of background conditions. Additional discussion regarding the toxicity testing was added to a new Section 4.1.5 of the revised report. The existing Section 4.1.5 from the draft report was relabeled as Section 4.1.6 in the revised report.

Comment No. 16. Section 3.5.3 Recommended Supplemental BERA Receptors, last paragraph, page 3-16: The uncertainty section should not be used to evaluate risks to receptors which may be present during low water conditions. All pathways of concern and their appropriate receptors should be evaluated in the main body of the report.

Response: This statement has been removed from this section in the revised report.

Comment No. 17. Section 3.5.4 Exposure Calculations and Preliminary Exposure Assessments for Supplemental BERA Receptors, page 3-17: Area Use Factors (AUFs) should reflect site

---

[1] Iron was included in this analysis (even though none of the sediments exceeded the refined ESV) since iron is involved with sulfide geochemistry which can affect the bioavailability of metals from sediments (e.g., Wang and Chapman, 1999). The remaining COPEC metals were not included in this ranking due to low detection frequency, no positive results, or analytical quality control issues (see Appendix D of revised report for discussion).

specific circumstances. For example, if Koppers Pond is the only area available within a likely forage range, then more weight should be given to Koppers Pond in an AUF.

Response: We agree that the AUFs should be reflective of site-specific circumstances. With respect to aquatic and semi-aquatic receptors, based on the site reconnaissance effort that was made to identify candidate reference sites, there are a number of other waterbodies nearby that may also be used as habitat for these receptors, and the availability of these habitats will be considered when the AUFs are developed.

Comment No. 18. Section 3.5.4 Exposure Calculations and Preliminary Exposure Assessments for Supplemental BERA Receptors, page 3-17: The average daily dose calculations should include sediment/soil ingestion (C_{sed} x IR_{sed}).

Response: The contribution from exposure to sediment was inadvertently excluded from the referenced equation. This has been added for the revised report.

Comment No. 19. Section 3.5.4 Exposure Calculations and Preliminary Exposure Assessments for Supplemental BERA Receptors, Area Use Factor, page 3-18: The area use factor should include the entire area of Koppers Pond including the outlet channels. Tables 3-4a - 3-4e (exposure assumptions) all indicate that the outlet channels will not be used by any receptor due to lack of standing water. It is unclear why this habitat would not be suitable for herbivorous birds and herbivorous and omnivorous mammals. Further, these channels may also be appropriate habitat for invertivores. Information should be included regarding what receptors will be using this area.

Response: We have updated the CSM (Figure 3-1) to better define the potential receptor groups that may utilize the narrow outlet channels. Since the water depths are shallow and no fish were present in these outlet channels during the prior sampling events, they are unlikely to be utilized by ducks or herons as forage areas. Herbivorous and omnivorous mammals may utilize these areas for forage on plant material and may have incidental ingestion of soils in the outlet channel area.

Comment No. 20. Section 3.5.5 Preliminary Biota Transfer Factors for Estimating COPEC Concentrations in Prey or Forage Items, page 3-18: Sampling of terrestrial plants should be clearly discussed in Section 4.1.3 Collection of Additional Biota Samples.

Response: Additional discussion was provided in Section 4.1.3, and a new appendix was added to the revised report for the plant sampling. These included discussion regarding the collection of both aquatic and terrestrial plants that may be used as forage by the ERA receptors.

Comment No. 21. Section 3.5.6 Derivation of Toxicity Reference Values, page 3-18: An additional literature source that should be considered is Bursian, et.al, June 2003, "Dietary Exposure of Mink to Fish from the Housatonic River: Effects on Reproduction and Survival."

> *Response*: We will be evaluating the available literature for the derivation of the TRVs, including the Bursian et al (2003) reference for PCBs, as well as the critiques of these other data sources.

Comment No. 22. Section 4.1, Study Design, page 4-2: The proposed additional work should also include conducting toxicity tests in Koppers Pond and in the reference pond.

> *Response*: See response to Comment No. 15 regarding the toxicity testing in Koppers Pond and a reference pond.

Comment No. 23. Section 4.1.2 Field Reconnaissance of Candidate Reference Pond(s), page 4-3: The NYSDEC (Mary Jo Crance, DFWMR Hazardous Waste Site Evaluation Unit) has indicated that the ponds identified at the "Center at Horseheads" industrial park are at the location of two State Superfund Sites, and therefore not appropriate to use as reference locations. The NYSDEC has identified some other ponds in the area which may be suitable to use as a reference. It is suggested that a conference call be held between the Agencies to further discuss these candidate sites prior to making a recommendation to the Koppers Pond RI/FS Group.

Response: The information that was available in the public domain concerning NY Superfund Sites[2] near the candidate reference ponds was reviewed and we were able to identify two former sites near the Center at Horseheads (Ref Pond #9):

- *Corning Glass-Horseheads Industrial Center:* This site has New York site code 808015 and was located at Building A, Horseheads Industrial Center. Spills of PCB-containing transformer oil contaminated a section of the warehouse floor and several areas adjacent to the building. All remedial work was completed in March 1986, and the Site was delisted in December 1987.

- *Aikman Property*: This site has New York site code 808017 and was located at 104 Wygant Road at the corner of Route 14 in Horseheads. Approximately 100 drums were disposed of on the 10 acre property. Thirty of the drum were full and most contained waste oil. An unknown amount of chlorinated solvents were also reported at this site. The drum removal was completed in the summer of 1988 with additional sampling in the summer of 1990. Investigations conducted to date do not indicate any potential concerns. However, a soil vapor evaluation is planned for 2010.

---

[2] Available at http://www.dec.ny.gov/cfmx/extapps/derexternal/haz/results.cfm?pageid=3

Both of these have site class code of "C", which is used for sites where NYSDEC has determined that remediation has been satisfactorily completed.

The three ponds proposed by NYSDEC would be considered "background" ponds rather than reference ponds for Koppers Pond. Background ponds are those that have minimal potential or no known anthropogenic inputs. Reference ponds are those that have similar characteristics to Koppers Pond, less the principal sources of chemical inputs (industrial wastewater discharge). The background ponds are more suitable for the sediment toxicity testing, while the reference ponds are more suitable to assess chemical residues.

Comment No. 24. Section 4.1.3 Collection of Additional Biota Samples, page 4-4: Please indicate where samples will be collected from and what analysis they will undergo. Please indicate what receptors diets will include crayfish. A sample collection plan for plant material should also be included. Sediment samples should be collocated with collection of biota.

Response: Section 4.1.3 has been expanded to include additional detail concerning the proposed sampling locations. We included the analytical parameters in the existing discussion, but have also clarified this in the revised document and in Table 4-1.

The crayfish will be used predominantly as a surrogate for aquatic invertebrates as a prey source, although they can be directly preyed upon by aquatic mammals (e.g., mink) and terrestrial mammals (e.g., raccoons).

We have prepared a new appendix (Appendix C) that provides the SOP for the plant material collections.

Comment No. 25. Section 4.1.4 Collection of Additional Sediment Samples from Koppers Pond Mud Flat Areas, page 4-5: Please indicate the sampling depth(s) of the three proposed mudflat samples.

Response: The planned collection depth is 0-6" for the mudflat samples. This was added to Section 4.1.1 in the revised report.

Comment No. 26. Section 4.1.5 Collection of Sediment and Biota Samples from a Reference Pond, page 4-5: At a minimum, ten surface water and ten sediment samples should be collected from the reference pond. It is unclear why terrestrial plants will be collected and evaluated, as terrestrial plants are not being considered for Koppers Pond. Further, it is unclear why the vegetated portions of the aquatic plants and the root material/tubers will be analyzed separately, as this is not being proposed for the macrophytes collected on-site. All media should undergo a complete TAL and TCL analysis. A separate work plan/sampling plan/QAPP will need to be submitted to support the proposed reference pond sampling event.

Response: We had suggested to collect the similar groupings of biota that have been (or will ultimately be) collected for Koppers Pond (i.e., forage fish, crayfish, aquatic plants) from the reference pond so that the comparisons of the calculated risks from these waterbodies are derived from empirical data. The revised report clarifies those samples that are proposed for the reference pond sampling.

The PRP group and their consultants do not feel there is a need to develop a separate work plan/sampling plan/QAPP for the reference pond sampling. The sampling techniques are well established and are presented as either SOPs to the ERAGS 3 to 5 report, or as part of the existing FSAP and QAPP for this project. The preparation, review, and revision cycle of such documents would delay the field sampling to 2011.

The reference pond sampling will consist of the collection of 15 biota samples - five composites each of forage fish and gamefish, two crayfish samples, and three plant composite samples. Although one sediment sample is proposed from the reference it will be a composite of 5 to 10 surface grab samples collected from throughout the pond. Discrete samples are not required from the reference pond since the primary use of the data will be to support the sediment toxicity evaluation. In addition, since the average media concentrations will be used for the risk characterization in the ERA the composite sample will be representative of the average conditions across the reference pond sediments.

Comment No. 27. Section 6 References: Page 6-5 is missing from the report.

Response: This page was inadvertently missing from the printed version of the draft report but was in the electronic copy. The enclosed revised document includes all of the cited references.

Comment No. 28. Table 3-1 b Compilation of SLERA COPEC Sediment Ecological Screening Values and Refined Ecological Screening Values: Contrary to the text (Section 3.1.2 Refined Sediment COPEC Screening, Sediment VOCs, page 3-3) the refined ESV for acetone is indicated as being 9.9 micrograms/kg rather than 60,030 micrograms/kilogram. Please correct this discrepancy.

Response: Table 3-1b was revised to show the value of 60,030 μg/kg as the refined screening benchmark for acetone.

Comment No. 29. Tables 3-4a - 3-4e: Please include the allometric equations and show all calculations. Please check all food ingestion rate conversions from kg/g-day to g/day.

Response: A new column was added to Tables 3-4a through 3-4e in the revised report to show the allometric (or other supporting) equations. The muskrat food ingestion rate was reported on a fresh weight basis in the draft Table 3-4c. For consistency with the other receptors, this was revised to reflect the dry weight allometric equation. Additional descriptions for the basis of the values were also added to the Comment columns. The ingestion rates were all adjusted to be on a g/day basis.

Comment No. 30. Table 3-4d: Exposure Assumptions for the Piscivorous Mammal - Mink: The home range reported in EPA (1993) was 259 - 380 ha, please revise the area use factor accordingly.

Response: The value that was shown in the draft Table 3-4d (406 ha) was incorrectly cited as being from EPA (1993). We have updated the table to show the range from the comment above and recalculated the area use factors.

Comment No. 31. Table 3-4e Exposure Assumptions for the Omnivorous Mammal - Raccoon: Please include an incidental ingestion rate for soil of 9.4%, as per USEP A (1993).

Response: Table 3-4e was updated to reflect the USEPA (1993) value, which is the same as that reported by Beyer et al (1994). The value of 9.4% was based on a limited number of samples (a total of four) from Maryland, and the revised soil/sediment ingestion rate is 0.027 kg/d.

Comment No. 32. Appendix B Crayfish Collection Methodology - The crayfish sampling techniques seem reasonable. Although these collection methods are typically used to obtain crayfish, baited minnow traps do not consistently capture crayfish. Capture success depends a lot on the time of year, available habitat, and crayfish population size. Another technique which may be considered is to use traps and nets in combination with electrofishing. Electrofishing works particularly well in streams to capture crayfish, but not as well in lakes. Electrofishing may be the best method to capture crayfish in the outlet streams.

Response: We agree that electrofishing or a combination of electrofishing and hand picking will likely be the most efficient methods to collect crayfish from the Koppers Pond. The SOP included several alternate methods to provide contingencies if initial methods prove to be inefficient. We have updated this appendix to include the option for electrofishing.

References Cited

Allen, A.W. 1986. *Habitat Suitability Index Models: Mink, Revised.* Available at: http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-061.pdf. US Department of the Interior, U.S. Fish and Wildlife Service. Biological Report 82(10.127). November. 23 p.

Bursian, S.J., R.J. Aulerich, B. Yamini, and D.E. Tillitt. 2003. Dietary exposure of mink to fish from the Housatonic River: effects on reproduction and survival. Available at: http://www.epa.gov/region1/ge/thesite/restofriver/reports/final_era/SupportingInformationStudies4HousatonicRiverProject/Dietary_Exposure_of_Mink.pdf. Report to: Weston Solutions, Inc., 1 Weston Way, West Chester, PA 19380-1499.

CDM. 1999. Revised draft ecological risk assessment, Kentucky Avenue Wellfield Site, Horseheads, New York. Document No. 7720-038-RA-CSSM. Prepared for the U.S. Environmental Protection Agency, Region 2, New York, New York. CDM Federal Programs Corporation. February.

Heggenes, J. and R.Borgstrøm. 1988. Effect of mink, *Mustela vison* Schreber, predation on cohorts of juvenile Atlantic salmon, *Salmo salar* L., in three small streams. *Journal of Fish Biology.* 33(6): 885-894.

Henning, M.H., N.M. Shear Weinberg, N.D. Wilson, and T.J. Iannuzzi. 1999. Distributions of key exposure factors controlling the uptake of xenobiotic chemicals by Great Blue Herons (*Ardea herodius*) through ingestion of fish. *Human and Ecological Risk Assessment.* 5(1): 125-144.

Short, H. L. and R. J. Cooper. 1985. *Habitat Suitability Index Models: Great Blue Heron.* Available at: http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-099.pdf. US Department of the Interior, U.S. Fish and Wildlife Service. Biological Report 82(10.99). July.

USEPA. 1993. Wildlife Exposure Factors Handbook. EPA/600/R-93/187. Available from: http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=489605. U.S. Environmental Protection Agency, Office Research and Development. December.

Wang, F. and P.M. Chapman. 1999. Biological implications of sulfide in sediment—a review focusing on sediment toxicity. Environmental Toxicology and Chemistry. 18(11): 2526–2532.

Table RTC-1. Summary of Standards Lengths of Gamefish and Forage Fish Collected from Koppers Pond in May 2008

	Standard Lengths					
	In mm			In inches		
	Min	Max	Average	Min	Max	Average
Carp	517	621	565	20.4	24.4	22.2
White sucker	342	412	387	13.5	16.2	15.2
Largemouth Bass	377	407	387	14.8	16.0	15.2
Black Crappie	218	292	263	8.6	11.5	10.4
All Fillets	218	621	407	8.6	24.4	16.0
Bluegill	63	183	123	2.5	7.2	4.8
Pumpkinseed	68	157	101	2.7	6.2	4.0
All Forage Fish	63	183	114	2.5	7.2	4.5

Note:

Data summarized from Table E-1 of the *Site Characterization Summary Report*.

Table RTC-2. Summary of 1998 Sediment Toxicity Testing Results, Corresponding 2008 Sampling Locations, and Proposed Samples for Additional Longer-Term Toxicity Testing

			1998 Sediment Toxicity Results (Survival)				
Site Area	1998 Sample (CDM 1999)	Closest 2008 Sample	Chironomid Set 1	Chironomid Set 2	Amphipod	20/28-day Toxicity Testing	Comment
Control	--	--	83%	95%	96%	--	Control sediment. Chironomid tests were performed in two batches.
Industrial Drainageway	SD-14	NA	79%	--	84%	NA	Sample was collected prior to implementation of remedial measures in the Industrial Drainageway.
KP sample	SD-5	SD08-13	90%	--	99%	No	
KP sample	SD-6	SD08-12	89%	--	100%	No	
KP sample	SD-7	SD08-10	89%	--	99%	No	
KP sample	SD-8	SD08-09	--	90%	91%	No	
KP sample	SD-9	SD08-08	--	83%	99%	**Yes**	
KP sample	SD-10	SD08-06	89%	--	99%	**Yes**	
KP sample	SD-11/SD-20	SD08-04	--	96%/86%	99%/93%	**Yes**	
KP sample	SD-12	SD08-03	91%	--	96%	**Yes**	
KP sample	SD-13	SD08-01	74%	--	78% [a]	**Yes**	
Outlet Channels	SD-1	SD08-17	71%	--	100%	No	
Outlet Channels	SD-2	SD08-16	79%	--	99%	No	
Outlet Channels	SD-3	SD08-15	86%	--	90%	No	
Outlet Channels	SD-4	SD08-14	69%	--	100%	No	

Notes:

The 2008 sample locations are shown on Figure 2-1 in this report. See Figure 2-1 of CDM (1999) for figure showing 1998 sediment sampling locations.

The 2008 samples that were not near any of the 1998 sample locations were SD08-02, SD08-05, SD08-07, SD08-30, and SD08-40.

The 1998 samples SD-11 and SD-20 were field duplicates.

NA = not applicable

[a] Statistically significant reduction in survival.

Table RTC-3. Summary of Ranks of Amphipod and Midge Survival and Chemical Results from Sediments Collected in 1998 from Koppers Pond

		Rank Scores													
1998 Sample	Closest 2008 Sample	Amphipod Survival	Midge Survival	Total PCBs	Barium	Cadmium	Copper	Chromium	Iron	Lead	Silver	Zinc	Sum of Ranks	2008 AVS/SEM Sample?	2010 Sample
SD-13	SD08-01	9	9	5.5	9	7	8	9	6	9	9	8	88.5	Yes	Yes
SD-12	SD08-03	6	1.5	7	8	9	9	7	5	8	8	9	77.5	Yes	Yes
SD-11/SD-20	SD08-04	7	1.5	9	5	8	7	6	2	7	7	7	66.5	Yes	Yes
SD-9	SD08-08	3	8	5.5	6	6	6	5	7	5	6	6	63.5	No	Yes
SD-10	SD08-06	3	6	4	3	4	5	8	9	4	4	4	54.0	Yes	Yes
SD-8	SD08-09	8	3.5	8	2	5	4	3	1	2	5	5	46.5	No	No
SD-5	SD08-13	5	3.5	1	7	1	2	2	8	6	3	2	40.5	No	No
SD-6	SD08-12	1	6	3	4	2	3	4	3	3	2	1	32	No	No
SD-7	SD08-10	3	6	2	1	3	1	1	4	1	1	3	26	Yes	No

Notes:

The amphipod and midge survival results were sorted and ranked from lowest to highest. The lowest survival received the highest rank.

The chemical results for total PCBs and eight metals were sorted individually from lowest to highest, with the highest concentration receiving the highest rank value.

Nickel was not included in this assessment since it was rejected in three of the nine samples. However, the five proposed 2010 samples all had greater nickel results compared to the other samples using the 1998 sample results.