CUMMINGS
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CONSULTANTS, INC.

REMEDIAL INVESTIGATION REPORT
KOPPERS POND
KENTUCKY AVENUE WELLFIELD SUPERFUND SITE
OPERABLE UNIT 4
HORSEHEADS, NEW YORK

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LIST OF ACRONYMS

A&P	Great Atlantic & Pacific Tea Company, Inc.
AMEC	AMEC Earth & Environmental, Inc.
AVS/SEM	Acid Volatile Sulfide/Simultaneously Extracted Metals
AWL	Average Water Level
BERA	Baseline Ecological Risk Assessment
bgs	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
BW	Body Weight (of Fish Sample)
CDM	CDM Federal Programs Corporation
CEC	Civil & Environmental Consultants, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CTE	Central Tendency Exposure
cy	Cubic Yards
°C	Degrees Celsius
°F	Degrees Fahrenheit
DO	Dissolved Oxygen
DPW	(Chemung County) Department of Public Works
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESV	Ecological Screening Value
EWB	Elmira Water Board
Feet MSL	Feet above Mean Sea Level
FS	Feasibility Study
FSP	Field Sampling Plan
FWPCA	Federal Water Pollution Control Act Amendments of 1992
g	Gram
GIS	Geographic Information Systems
gpm	Gallons per Minute
GPS	Global Positioning System
HI	Hazard Index

LIST OF ACRONYMS
(CONTINUED)

HQ	Hazard Quotient
HWL	High Water Level
IDW	Investigation-Derived Waste
ISTC	Imaging and Sensing Technology Corporation
ISTD	Imaging and Sensing Technology Division (of Westinghouse)
KCI	Koppers Company, Inc.
µg/kg	Microgram per Kilogram
$\mu g/kg_{ww}$	Microgram per Kilogram, Wet-Weight Basis
µg/L	Microgram per Liter
µS/cm	Microsiemen per Centimeter (equivalent to Micromho per Centimeter [µmho/cm])
mg	Milligram
mg/kg	Milligram per Kilogram
mg/L	Milligram per Liter
mm	Millimeter
mV	Millivolt
MS/MSD	Matrix Spike and Matrix Spike Duplicate (Samples)
MTPDA	MT Picture Display Corporation of America-New York, LLC
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NYCSLAP	New York Citizens Statewide Lake Assessment Program
NYNHP	New York Natural Heritage Program
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
NYSEG	New York State Electric and Gas
OM&M	Operation, Maintenance, and Monitoring
ORP	Oxidation-Reduction Potential
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
Q1	First Quartile
Q3	Third Quartile

LIST OF ACRONYMS (CONTINUED)

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
RL	Reporting Limit
RME	Reasonable Maximum Exposure
RPD	Relative Percent Difference
RPM	(USEPA) Remedial Project Manager
RTE	Rare, Threatened, or Endangered
s.u.	Standard Units (of pH Measurement)
sBERA	Supplemental Baseline Ecological Risk Assessment
SL	Standard Length (the tip of the snout to the base of the caudal peduncle)
SLERA	Screening-Level Ecological Risk Assessment
SPDES	State Pollutant Discharge Elimination System
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCE	Trichloroethylene
TCL	Target Compound List
TDD	Toshiba Display Devices, Inc.
TL	Total Length (the tip of the snout to the tip of the tail fin)
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
TWEC	Toshiba-Westinghouse Electric Corporation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
USGS	U.S. Department of the Interior, Geological Survey
VOC	Volatile Organic Compound
YOY	Young-of-Year

EXECUTIVE SUMMARY

The Koppers Pond RI/FS Group (the Group) is conducting a Remedial Investigation and Feasibility Study (RI/FS) for Koppers Pond in Horseheads, New York (the Site) pursuant to an Administrative Settlement Agreement and Order on Consent entered with the U.S. Environmental Protection Agency (USEPA). This activity is being completed as Operable Unit 4 of the Kentucky Avenue Wellfield Superfund Site.

This *RI Report* documents RI activities and evaluates the data obtained. The work described in this report was performed in accordance with the revised *RI/FS Work Plan* submitted on December 6, 2007 and approved by USEPA on May 1, 2008.

Site characterization studies, including field sampling conducted in May 2008, September 2009, and October 2010, have provided the physical, chemical, and biological data needed to determine the location, extent, and concentrations of Site-related chemicals of potential concern (COPCs) for Koppers Pond.[1] In conjunction with the *Baseline Human Health Risk Assessment* and *Supplemental Baseline Ecological Risk Assessment*, the RI allows for the determination of potential impacts to human and ecological receptors and provides the basis for the decision of whether remedial action is needed. If remedial action is deemed necessary, the RI provides the characterization of Site conditions required for the development and evaluation of remedial alternatives in the Feasibility Study (FS).

SITE SETTING AND HYDROLOGY

Koppers Pond is a shallow, flow-through pond located in the Village of Horseheads, Chemung County, New York (Figure 1). The pond receives most of its inflow from the "Industrial Drainageway," a surface water channel that conveys surface water runoff from a 1,350-acre commercial and industrial watershed as well as discharges from the former Westinghouse Electric Corporation (Westinghouse) Horseheads plant site (Figure 2). At its southern end, the pond discharges to two outlet streams, which then merge about 500 feet downstream to a single channel that flows past the Hardinge, Inc. (Hardinge) plant site and into Halderman Hollow Creek. From there, the creek flows through mixed industrial, commercial, and residential areas and discharges into Newtown Creek approximately 1.5 miles south of Koppers Pond.

Koppers Pond covers approximately 9 to 12 acres with typical water depths under average water level conditions of about 1 to 5 feet. Under these conditions, the volume

[1] The *Baseline Human Health Risk Assessment* identifies chemicals of potential concern (COPCs) to human receptors, whereas the *Supplemental Baseline Ecological Risk Assessment* identifies chemicals of potential ecological concern (COPECs). For simplicity in the RI Report, except where specifically discussing the results of the ecological risk assessment, the acronym "COPCs" is used to identify chemical of potential concern to either human health or ecological receptors.

of water in the pond is about six million gallons. Because the topography around the pond is relatively flat, however, changes in the pond water level significantly affect the open water area. Water level fluctuations on the order of two feet have been observed over the course of the RI field characterization studies, with corresponding total pond water volumes increasing to approximately 12 million gallons. Water levels have recently been higher than average, apparently due to beaver dam-building activity.

Koppers Pond is situated in a previously low-lying, wet area that apparently began to fill with water with the onset of discharges from the former Westinghouse Horseheads plant, which began operating in 1952. About 70 percent of the current base flow of the Industrial Drainageway is comprised of the discharge from a groundwater recovery and treatment system installed and operated as part of Operable Unit 2 at the Kentucky Avenue Wellfield Site. It is not known how much longer this groundwater recovery will be required, and the hydraulics of the pond will be significantly altered once this treatment system discharge is terminated.

The pond bottom is comprised of soft sediments that range in thickness up to 38 inches. The solids content of the sediments ranged from 25 to 59 percent for the shallow (0- to 6-inch) sediment and from 34 to 67 percent for deeper sediments. The solids are predominantly (*i.e.*, 85 to 95+ percent) silt and clay. The total volume of sediments is approximately 21,400 cubic yards.

A hard clay layer generally underlies the sediments throughout most of Koppers Pond, which would be expected from the pond's origin as a low-lying swampy area. Due to the low-permeability of this clay layer, the surface water in the pond does not significantly interact with local groundwater.

Koppers Pond is situated on property owned by the Elmira Water Board, Hardinge, and the Village of Horseheads. The pond is surrounded by an area of vacant and active industrial and governmental properties. To the north and northeast is the Old Horseheads Landfill, to the south is the Kentucky Avenue Well site, to the southeast is the Hardinge facility, to the east is Fairway Spring Company, and to the west is a Norfolk Southern Corporation railroad right-of-way with active tracks.

Access to Koppers Pond is impeded by the railroad tracks and by the adjacent industrial and governmental properties that are partially fenced. Nevertheless, the presence of litter and off-road vehicle tracks suggest that periodic trespassing occurs in the area. Individuals have been observed bank fishing in Koppers Pond. No recreational or other use of the pond is authorized by any of the property owners. "No Trespassing" signs are posted at the Hardinge property, and the Village and Town of Horseheads have periodically undertaken more aggressive efforts to discourage trespassing. Such measures include posting "No Trespassing" signs and increased police patrols.

CHEMICAL AND BIOLOGICAL CHARACTERIZATION

Identified COPCs for Koppers Pond include certain metals, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). Various COPCs have been detected in pond sediments, surface water, and fish tissue at concentrations above screening levels for both human health and ecological risk assessment. Metals of potential concern include arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

Sediment

Metals, PCBs, and PAHs are found in varying concentrations in sediments situated throughout Koppers Pond, although concentrations generally tend to be higher in the western portion of the pond. Concentrations are lower in the outlet channel and surrounding "mudflats" (*i.e.*, areas around the pond shoreline that are inundated only during times of high water) than in the pond sediment. The extent of impacted sediments downstream in the outlet channels was defined by samples collected in 2010.

Vertical profiling sampling did not reveal consistent patterns of concentrations with the depth interval of the sediment. PAH concentrations tend to be higher in the shallow (0- to 6-inch) sediments, whereas PCB concentrations tend to be higher in deeper sediments. Metals concentrations are highly variable with depth with varying patterns depending on the specific metal and the location within the pond.

Metals and PAH concentrations in the 2008 and 2010 surface sediment data collected for Operable Unit 4 are generally similar to the metals and PAH concentrations observed in prior (1995/1998) sampling. Average PCB concentrations in surface sediment have decreased somewhat between the 2008 and the 1995/1998 data, and the 2010 PCB data show a continuing decreasing concentration trend.

Historical sources of metals to the pond included industrial discharges from the former Westinghouse Horseheads plant site, as well as from urban and industrial runoff. The various manufacturing operations and entities at the former Westinghouse plant site have held discharge permits since the early 1970s which provided allowable effluent limits for heavy metals (*e.g.*, cadmium, chromium, copper, lead, nickel, silver, and zinc) and other constituents.

Ongoing sources include runoff and, to some extent, industrial discharges, although these discharges have been significantly reduced with many of the past operations no longer discharging to the Drainageway.

The previously observed "floc" in the Industrial Drainageway, which was indentified as a potential source of metals in Koppers Pond, is no longer present, and suspected accumulations of such floc in the aboveground piping leading to the Chemung Street Outfall was not observed during RI field activities.

The source of the PCBs found in Koppers Pond sediment has not been determined. Fluid-filled electrical equipment was not manufactured at the former Westinghouse plant site and sampling conducted as part of the Operable Unit 3 RI did not find high PCB concentrations in plant site soils. An investigation by the Group identified other possible PCB releases within the Koppers Pond watershed.

Surface Water

Although historical data had indicated elevated concentrations of certain COPCs in industrial discharges to Koppers Pond, surface water in Koppers Pond and its outlet channel is not degraded. The RI sampling did not show exceedances of applicable New York State surface water quality criteria for organic compounds or metals. Exposure to COPCs in surface water does not comprise a significant source of exposure in either the human health or ecological risk assessment.

Biota

Metals and PCBs have been detected in fish tissue in Koppers Pond and its outlet channels. Because of PCB levels in fish found in 1988 sampling, the NYSDOH issued a fish advisory for Koppers Pond. The NYSDOH advisory, which is still in effect, is for carp with a recommendation to eat no more than one meal per month and for infants, children under the age of 15, and women of childbearing age to eat no fish from Koppers Pond.

Metals concentrations in fish samples collected in 2003 and 2008 show variable patterns with no overall temporal trends in concentrations. On a lipid-normalized basis, PCB concentrations in fish samples collected in 2003 and 2008 showed decreasing concentrations in the bottom-feeding species, but increases in pelagic species. These increases may be the result of very low lipids concentrations measured in the 2008 samples.

CONCLUSIONS OF BASELINE RISK ASSESSMENTS

Human health and ecological risk assessments were prepared as components of the RI for Koppers Pond. These risk evaluations rely on the analytical results from the 2008 Site investigations, as well as data generated in the supplemental field investigation performed in 2009 and 2010. The combined data set includes samples of surface water, sediment, gamefish, forage fish, aquatic and semi-aquatic vegetation, and mudflat soils associated with Koppers Pond and its outlet channels. Investigation of a nearby Reference Pond also provides comparative data regarding sediment, gamefish, and forage fish.

Baseline Human Health Risk Assessment (BHHRA)

The BHHRA assesses potential risks to human health from exposure to the COPCs present in surface water, sediment, and fish tissue at Koppers Pond. The results of the

BHHRA are used in the evaluation of whether Site-related risks are acceptable or whether remedial actions are needed to address identified unacceptable risks.

The exposure scenarios evaluated in the Koppers Pond BHHRA were the following:

- Dermal contact with and incidental ingestion of surface water from the pond during wading events related to teenage trespassing activities;
- Dermal contact with and incidental ingestion of pond sediment during wading events related to teenage trespassing activities;
- Dermal contact with and incidental ingestion of surface water from the outlet channels during wading events related to teenage trespassing activities;
- Dermal contact with and incidental ingestion of sediment in the outlet channels during wading events related to teenage trespassing activities; and
- Consumption of gamefish taken from Koppers Pond by an adult, adolescent, and young child.

Consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), USEPA uses an acceptable cancer risk range of 10^{-4} to 10^{-6} or a probability of developing cancer of one in ten thousand to one in a million. USEPA uses non-cancer Hazard Indices (HIs) values in determining whether conditions at a site are above or below levels of concern which, for a non-cancer assessment, the goal of protection is an HI=1.

The results of the BHHRA indicate that no adverse non-cancer or cancer effects are expected from direct contact with sediment and surface water for either Koppers Pond or the outlet channels. Direct contact to Koppers Pond and the outlet channel sediment and surface water results in a cumulative potential RME lifetime cancer risk of $9.6\text{x}10^{-7}$ for the teenage trespasser. This risk is below the target risk range of $1\text{x}10^{-6}$ to $1\text{x}10^{-4}$. A total receptor HI across all pathways, media, and exposure points for the teenage trespasser is 0.03, which is also below the health-based target non-cancer HI of 1.

Using the exposure assumptions that comprise the reasonable maximum exposure (RME) case, ingestion of fish taken from Koppers Pond results in a cancer risk of $3.1 \text{ x } 10^{-4}$. This cancer risk represents the total risk by combining risks for a child (ages 1 to 6), adolescent (ages 7 to 13), and an adult (13 years and older). Non-cancer HI values are 21.1 for the young child; 20.3 for adolescent; and 15.6 for the adult. Both the cancer and non-cancer results are based primarily on exposures to PCBs. Exposure assumptions for the RME individual include an assumption of fish ingestion of 25 grams per day for the adult greater than 13 years of age; 8 grams per day for the young child 1 to 6 years; and

16 grams per day for the 7 to 13 year old with an assumed total exposure period of 30 years based on the 90th percentile residence time. The calculated HIs are above the goal of protection of an HI=1.

Central tendency cancer risks and non-cancer health hazards are provided to more fully characterize the variability and uncertainty of cancer risks and non-cancer health hazards among individuals within the potentially exposed population, by describing the health effects associated with average exposure. Central tendency exposures (CTE) were evaluated for fish consumption only. The CTE cancer risk is 2.6×10^{-5}. The CTE non-cancer HIs are 5.7 for the young child; 5.5 for the adolescent; and 4.0 for the adult. Exposure assumptions for the CTE individual include fish ingestion rates of 8 grams per day for the adult; 3 grams per day for the young child; and 5 grams per day for the adolescent with an assumed total exposure period of 9 years based on the 50th percentile residence time. Assumptions also include a 20 percent loss of PCBs from cooking. The calculated CTE HIs exceed the goal of protection of 1 for all age groups.

The process of evaluating human health cancer risks and non-cancer health hazards involves multiple steps. Inherent in each step of the process are uncertainties that affect the final calculated cancer risks and non-cancer health hazard estimates. Uncertainties may exist in numerous areas, including environmental PCB concentration data, derivation of toxicity values, and estimation of potential site exposures. In evaluating exposures from ingestion of fish, the default fish ingestion rate from the 1997 Exposure Factors Handbook of 25 grams/day was used.

Appendix C of the BHHRA provides an alternative risk analysis that developed both RME and CTE fish ingestion rates based on the sustainable yield of fish from Koppers Pond. These rates were used in place of the fish ingestion rates from USEPA's 1997 Exposure Factors Handbook (available at the time of the assessment). The alternative ingestion rates are lower than those used in the BHHRA, which are based on creel surveys. Based on the ingestion rates provided in BHHRA Appendix C, the total alternate RME cancer risk is 7.5×10^{-5}. The non-cancer health hazard for the alternate RME young child (1 to 6 years) is 5.3, for the adolescent (7 to 13 years), the HI is 5.1 and for the adult (13 years and older), the HI is 3.7. Exposure assumptions include fish ingestion rates of 6 grams per day for the adult; 2 grams per day for the young child; and 4 grams per day for the adolescent with an assumed total exposure period of 30 years based on the 90th percentile residence time. The alternate RME HIsexceed USEPA's goal of protection of a HI = 1. The primary contaminant is PCBs.

For the CTE case, which reflects the average (CTE) alternate fish ingestion rates and 20 percent loss of PCBs from cooking, the total cancer risk for the CTE individual is 1.2×10^{-5}. The HI value for the alternate CTE young child (1 to 6 years) is 0.9, for the adolescent (7 to 13 years) is 0.8, and for the adult (13 years and older) is 0.6. Exposure assumptions for the CTE individual include fish ingestion rates of 1.2 grams per day for the adult; 0.4 grams per day for the young child; and 0.8 grams per day for the adolescent with an assumed total exposure period of 30 years based on the 90th percentile residence time. A 20 percent loss of PCBs due to cooking is also assumed. The non-cancer health hazards are less than USEPA's goal of protection of a HI = 1.

Supplemental Baseline Ecological Risk Assessment (sBERA) [2]

The sBERA assesses potential risks to ecological receptors from exposure to COPECs present in environmental media at Koppers Pond. The results of the sBERA are used to evaluate whether potential Site-related risks are acceptable or whether remedial actions are needed to address identified unacceptable risks.

The evaluated assessment and measurement endpoints were associated with the following ecological receptors:

- Benthic Invertebrates;
- Amphibians and Reptiles;
- Forage Fish;
- Herbivorous Birds;
- Piscivorous Birds;
- Herbivorous Mammals;
- Piscivorous Mammals; and
- Omnivorous Mammals.

For all of the receptors except the benthic invertebrates, amphibians and reptiles, the HQ approach has been used to assess the potential risks. For the benthic invertebrates, amphibians and reptiles, the approach taken is discussed below. The results for each receptor are summarized as follows:

- ***Aquatic Receptor (Benthic Invertebrates)***: The risk characterization for the benthic invertebrates is based on four endpoints. These included: (1) comparison of observed sediment concentrations to benchmarks, (2) assessment of divalent metal bioavailability, (3) benthic community assessment, and (4) sediment toxicity testing.

  The simple chemical and benchmark screenings show that the metals in Koppers Pond exceed their relevant benchmarks. In addition, the AVS/SEM/TOC evaluation shows that there is the potential for increased bioavailability in two of the samples (SD08-03 and SD08-04). However, the *Hyalella* and chironomid toxicity studies show no significant toxicity in either of these samples, relative to the Reference Pond sample. Therefore, despite the potential for increased

2 The current baseline ecological risk assessment (BERA) is identified as the sBERA to minimize confusion with the draft BERA prepared for Koppers Pond by CDM Federal Programs, Inc. in 1999.

bioavailability of some metals in this sample, no manifestation of toxicity is observed. Potential toxicity was observed in the chironomid bioassay at SD-01. However, none of the measured endpoints correlates with any of the COPEC sediment concentrations. In addition, there are no significant differences in the benthic communities at the evaluated locations (chironomids were the predominant invertebrate at both Koppers Pond and the Reference Pond) or in relation to sediment COPEC concentrations.

Media concentrations are far lower in the Outlet Tributary sediment samples relative to Koppers Pond. Neither benthic community analysis nor benthic toxicity testing has been performed on these sediment samples. However, it is anticipated that the results from Koppers Pond, which show that there is no apparent correlation between the media concentrations and toxicity or benthic community metrics, are also relevant to the outlet area.

- ***Aquatic Receptor (Amphibians and Reptiles):*** The risk characterization for the amphibian and reptiles focuses on PCBs and is based on a comparison to studies that evaluate the potential linkage(s) between sediment PCB concentrations and amphibian population effects. There is no conclusive linkage between sediment PCB concentrations and amphibian population effects. The sediment and mudflat PCB concentrations are well below those concentrations reported in the literature that are reported to elicit toxicity to this receptor group. Based on this result, and in conjunction with the lack of a correlation between benthic toxicity (generally regarded as a more sensitive receptor than amphibians) and PCB levels in sediments, it is concluded that the amphibians and reptiles do not have a significant risk from PCBs present in the sediments at Koppers Pond and the Outlet/Mudflat Area.

- ***Aquatic Receptor (Forage Fish):*** The risk characterization for the fish is based on a comparison of whole body fish tissue PCB concentrations to tissue benchmarks. PCBs were detected in the forage fish collected from Koppers Pond in 2008, and the forage fish collected from the West Outlet in 2010, but none of the individual forage fish PCB results exceeds the whole-body tissue-based toxicity reference value (TRV) for PCBs. Therefore, it is unlikely that there is a significant risk to fish populations at or near the Site due to their PCB body burdens.

- ***Herbivorous Bird (Mallard Duck):*** The assessment of exposures to COPECs is based on the ingestion of sediments or mudflat soils, terrestrial invertebrates, and vegetation. The evaluated exposure areas include Koppers Pond and the Outlet/Mudflat Area, and the Reference Pond. The HI values are below one for all of the evaluated areas under the average water level (AWL) and high water level (HWL) scenarios. Based on these results, this receptor is unlikely to be at a significant risk based on exposure to the environmental media, prey, or forage items at Koppers Pond or the Outlet/Mudflat area.

- ***Piscivorous Birds (Great Blue Heron):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, and fish. The latter is the predominant dietary component. The evaluated exposure areas include Koppers Pond and the Outlet/Mudflat Area, under the AWL and HWL scenarios, and the Reference Pond. The HI values for Koppers Pond under the AWL and HWL scenarios are greater than one, but none of the individual COPECs has HQ values that exceed one. When iron is excluded from the HI calculation, the HI value does not exceed one. This receptor is unlikely to have a potential risk based on exposure to the environmental media, prey, or forage items at Koppers Pond or the Outlet/Mudflat area.

- ***Herbivorous Mammals (Muskrat):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, and plants. The muskrat has the smallest home range of the evaluated receptors and the largest calculated risks. The evaluated exposure areas include Koppers Pond and the Outlet/Mudflat Area, under the AWL and HWL scenarios, and the Reference Pond. The HI values exceed one for all evaluated areas, including the Reference Pond. Iron and cadmium contribute the greatest amount to the calculated HI values. When iron is excluded from the HI calculations, the HI value is reduced but still exceeds one for Koppers Pond and the Outlet/Mudflat Areas under both the AWL and HWL scenarios. The sediment and biota iron concentrations in Koppers Pond and the Reference Pond are similar, suggesting that they are representative of regional levels and unrelated to any history of releases to the Site. Based on these results, this receptor has a potential risk as a result of exposure to the cadmium levels in the environmental media, prey, or forage items at Koppers Pond and the Outlet/Mudflat area.

- ***Piscivorous Mammals (Mink):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, vegetation, and fish. The latter is the predominant dietary component. The evaluated exposure areas include Koppers Pond the Outlet/Mudflat Area, and the Reference Pond. The HI values are less than one for all of the evaluated areas under the AWL and HWL scenarios. Based on these results, this receptor is unlikely to be at a significant risk as a result of exposure to the environmental media, prey or forage items at Koppers Pond or the Outlet/Mudflat area.

- ***Omnivorous Mammals (Raccoon):*** The assessment of exposures to COPECs is based on the ingestion of sediments or mudflat soils, terrestrial invertebrates, and vegetation. The evaluated exposure areas include Koppers Pond, the Outlet/Mudflat Area, and the Reference Pond. The HI values are less than one for all of the evaluated areas under the AWL and HWL scenarios. Based on these results, this receptor is unlikely to be at a significant risk as a result of exposure to the environmental media, prey or forage items at Koppers Pond or the Outlet/Mudflat area.

The exposure assumptions and uptake factors used to estimate aquatic invertebrate COPEC concentrations, and the TRVs used to assess the potential ecological risks, include some degree of uncertainty. When all of the uncertainty is combined, it is likely that actual risks are overestimated.

The results of the sBERA indicate that exposures to COPECs in the environmental media of Koppers Pond and its outlet channels do not pose a significant ecological concern for any of the evaluated receptors, except for cadmium in the muskrat (piscivorous mammal). The muskrat risks may be not be accurate because the risks include exposure resulting from consumption of aquatic invertebrates, and the concentrations in these invertebrates have been modeled as there are no empirical data regarding concentrations in invertebrates to support this exposure pathway.

REMEDIAL INVESTIGATION REPORT
KOPPERS POND
KENTUCKY AVENUE WELLFIELD SUPERFUND SITE
OPERABLE UNIT 4
HORSEHEADS, NEW YORK

1.0 INTRODUCTION

The Koppers Pond RI/FS Group (the Group) retained Cummings/Riter Consultants, Inc. (Cummings/Riter) and Integral Consulting, Inc. (Integral) to conduct a Remedial Investigation and Feasibility Study (RI/FS) for Koppers Pond in Horseheads, New York (the Site).[1] 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 (NCP); 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 29, 2006.

This Remedial Investigation (RI) Report has been prepared by Cummings/Riter to meet the requirements of Task VIII of the Statement of Work appended to the Settlement Agreement (Section VII). This RI Report follows USEPA (1988) guidance in both format and content. It documents the RI activities and presents an evaluation of the data obtained. The work described in this report was performed in accordance with the revised *RI/FS Work Plan* submitted on December 6, 2007 and approved by USEPA on May 1, 2008 (Cummings/Riter and AMEC, 2007). A draft RI Report was submitted to USEPA in September 2011, and this revised report addresses comments provided by USEPA from its review of that draft.

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[1] The Group had originally contracted with AMEC Earth & Environmental, Inc. (AMEC) to perform the human health and ecological risk assessments in support of the Koppers Pond RI/FS, and AMEC personnel conducted the risk assessment tasks over the 2007 through 2009 timeframe. In late 2009 and early 2010, however, several project team members moved from AMEC to other consulting firms, including Integral and ARCADIS US, Inc. (ARCADIS). To maintain technical continuity on the project and reduce potential delays in the project schedule, the Group retained Integral, with support from ARCADIS, to complete the risk assessments and support the RI/FS for the Koppers Pond Site.

1.1 PURPOSE OF REPORT

Pursuant to the Settlement Agreement, the RI for Koppers Pond has been prepared as part of Operable Unit 4 for the Kentucky Avenue Wellfield Superfund Site. The objective of the RI is to characterize environmental media at the Site sufficiently so that the needed data are available for completing the *Baseline Human Health Risk Assessment* (BHHRA) (Integral, 2012a) and *Supplemental Baseline Ecological Risk Assessment* (sBERA) (Integral, 2012b),[2] and so that the need for remedial action can be evaluated. The RI provides the physical and chemical data and summarizes the biological information collected to examine surface water, sediment, and biota in Koppers Pond. These data are used in the BHHRA and sBERA to evaluate potential human health and ecological risks posed by exposure to chemicals of potential concern associated with these media.[3] If remedial action is deemed necessary, the RI provides the characterization of Site conditions required for the development and evaluation of remedial alternatives in the Feasibility Study (FS).

In developing and negotiating the Settlement Agreement and the Statement of Work, USEPA and the Group recognized that several pertinent studies of the Site had already been completed prior to 2006 and that much was known about the Site. As a result, the scope of the RI was tailored to meet the specific circumstances for Koppers Pond. As described in the revised *RI/FS Work Plan*, however, conditions in Koppers Pond are dynamic, and certain aspects and characteristics of the pond had changed since the time data were collected as part of prior studies. Data-gathering activities for the Koppers Pond RI were principally aimed at collecting updated information regarding surface water, sediment, and biota. This RI Report presents the results of sampling and provides the Conceptual Site Model (CSM) that includes an evaluation of the fate and transport of the COPCs. In accordance with USEPA guidance and the approved *RI/FS Work Plan*,

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[2] The current baseline ecological risk assessment (BERA) is identified as the sBERA to minimize confusion with the draft BERA prepared for Koppers Pond by CDM Federal Programs, Inc. (CDM) in 1999.

[3] The BHHRA identifies chemicals of potential concern (COPCs) to human receptors, whereas the sBERA identifies chemicals of potential ecological concern (COPECs). For simplicity in this RI Report, except where specifically discussing the results of the ecological risk assessment, the acronym "COPCs" is used to identify chemical of potential concern to either human health or ecological receptors.

the baseline human health and ecological risk assessments are part of the RI and are summarized in this report. Because of the size of the volumes, however, the BHHRA and sBERA are bound separately.

1.2 SITE BACKGROUND

1.2.1 Site Description

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). The Kentucky Avenue Well is a former 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 (TCE), and this well is no longer in use. In 1983, USEPA included the Kentucky Avenue Wellfield Superfund 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 Superfund Site:

- Operable Unit 1 involved initial investigations, identification of potentially impacted private wells, and connection of potentially 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 a groundwater treatment system to intercept groundwater at the downgradient limits of the former Westinghouse Electric Corporation (Westinghouse) Horseheads plant site, and installation of a water treatment (air stripping) system at 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 to Koppers Pond, and the remediation of the Industrial Drainageway.

The response actions specified for Operable Units 1 and 3 of the Kentucky Avenue Wellfield Superfund Site are completed. The RI for Koppers Pond is being conducted as part of Operable Unit 4.

Operation, maintenance, and monitoring (OM&M) activities are continuing with respect to the barrier wells and attendant groundwater treatment system installed for Operable Unit 2. Concentrations of TCE and other constituents in the influent to the Operable Unit 2 groundwater treatment system continue to decrease, and the future duration of OM&M is not known.

Following the Operable Unit 2 work, EWB elected not to use the Kentucky Avenue Well and removed some parts and equipment from the air stripping treatment system. At this time, the Kentucky Avenue Well remains out of service, and it is unknown whether the installed treatment system is operational.

Koppers Pond is a V-shaped pond located in the Village of Horseheads (Figure 2). 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 drainageway receives much of its base flow from discharges originating at the former Westinghouse Horseheads plant site (Figure 2). Although historically such discharges included treated process wastewater, at this time the discharges from the former Westinghouse site are comprised of the effluent from the Operable Unit 2 groundwater treatment system, storm water runoff, and cooling water from the Cutler-Hammer Division of Eaton Corporation (Cutler-Hammer) manufacturing facility. The Old Horseheads Landfill forms much of the northern bank of Koppers Pond and the eastern bank of a portion of the lower Industrial Drainageway.

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. The outlet channel flows into Halderman Hollow Creek and winds through residential and commercial areas before discharging to Newtown Creek approximately 1.5 miles downstream of Koppers Pond.

Koppers Pond is a shallow, flow-through water body with typical water depths of approximately one to five feet at a pond surface water elevation of approximately 886 feet above mean sea level (feet MSL). 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 7 acres to more than 12 acres have been reported in the various studies of this pond. With the pond surface water elevation at approximately 886 feet MSL, as was observed during RI field sampling in May 2008, the open water area of the pond covers approximately 8.9 acres. Observed water levels were slightly lower in the summer of 2008 (nominal elevation of 885 feet MSL), but were higher during the initial field work in 2007 and during the supplemental field investigations conducted 2009 and 2010. At those times, the pond surface elevation was approximately 887 to 888 feet MSL, and the pond surface area was estimated to be approximately 10 to 12 acres.

1.2.2 Site History

Koppers Pond is situated in a previously low-lying, wet area that apparently began to fill with water with the onset of discharges from the former Westinghouse plant, which began operating in 1952. The pond area may have been excavated as a borrow pit (Fagan Engineers, 1990).

Examination of the 1953 U.S. Department of the Interior, Geological Survey (USGS) map of the 7.5-minute Horseheads topographic quadrangle (Figure 3) does not show the pond or industrial activity to the south, but shows the Industrial Drainageway flowing through a 20+ acre marshy area in the vicinity of the current pond location. The marshy area lies below approximate elevation 890 feet MSL. In an August 7, 1953 plant schematic prepared of the Koppers Company, Inc. (KCI) Horseheads Wood Treating Plant (the "KCI Horseheads Plant"), there was an area referred to as a "swamp" that lay to the north and northwestern portions of the KCI Horseheads Plant property, approximately at the location of the current Koppers Pond.

The 1969 USGS map of the same topographic quadrangle shows the pond at its current location, but much larger (20± acres) and in a somewhat different configuration (Figure 3). In the 1969 map, an additional section of pond is situated to the north within the current "V." This section of the pond was apparently filled by operations at the Old Horseheads Landfill after 1969. Also since 1969, the southern bank, including the pond outlet, appears to have been reworked with a second outlet added on the western side of the pond. Chemung County Sewer and Water Conservation District aerial photographs from 1977 and 1985 show Koppers Pond in its present configuration.

1.2.3 Site Property Ownership and Land Use

The property on which Koppers Pond is situated is owned by Hardinge, Inc. (Hardinge), the Village of Horseheads, and EWB. Koppers Pond is surrounded by an area of vacant and active industrial property. 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 and the Fennell Spring Company (f/k/a Fairway Spring Company) are located to the southeast and east, respectively. A Norfolk Southern Corporation (Norfolk Southern) railroad right-of-way with active tracks is located to the west. The portion of the pond located in the Village of Horseheads is zoned M-1 Industrial; the portion in the Town of Horseheads is zoned for manufacturing use.

Hardinge and the Village are participating members of the Group. Neither has expressed any plan in the foreseeable future for the use of Koppers Pond or the surrounding land area. The Village (as wells as the Town of Horseheads and Chemung County) have indicated that there is no demand for additional parkland or fishing opportunities in the local area.

1.2.4 Previous Investigations and Remediation

Koppers Pond has been the subject of several environmental investigations to define the nature and extent of COPCs in environmental media. These earlier studies are identified in the following sections. Where data are relevant to the current Operable Unit 4 RI, these results are incorporated into the discussions in Sections 4.0 and 5.0.

1.2.4.1 1988 NYSDEC Fish Sampling

In sampling conducted in 1988, the New York State Department of Environmental Conservation (NYSDEC) reported the detection of polychlorinated biphenyls (PCBs) in largemouth bass and carp collected from Koppers Pond. These findings led to the issuance of a fish advisory for Koppers Pond by the New York State Department of Health (NYSDOH). The NYSDOH advisory currently in effect is for women under 50 years and children under 15 years not to eat any fish from Koppers Pond. For all others, the recommendation is to eat no more than one meal of carp from Koppers Pond per month (NYDOH, 2011).

1.2.4.2 Operable Unit 2 RI

On behalf of USEPA, Ebasco Services Incorporated (Ebasco) completed a "Supplemental RI" for Operable Unit 2 in 1990. Although primarily focused on groundwater issues, the Operable Unit 2 included some sampling of surface soils at the Old Horseheads Landfill. The Operable Unit 2 also concluded that Koppers Pond was perched above the groundwater because of the presence of low permeability materials at and below the pond bottom (Ebasco, 1990).

1.2.4.3 Operable Unit 3 RI

Under the terms of an administrative consent order entered with USEPA, Westinghouse conducted an RI as part of Operable Unit 3 for the Kentucky Avenue Wellfield Site. The Operable Unit 3 RI involved field work conducted in 1994 and 1995, including two rounds of surface water sampling from the Industrial Drainageway and Koppers Pond. Three sampling locations were in Koppers Pond, and three were located in the outlet channels. One sample was located in the Industrial Drainageway near its discharge to Koppers Pond.

The first round of surface water samples collected for the Operable Unit 3 RI (*i.e.*, those from June 1994) were analyzed for target compound list (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and PCBs, target analyte list (TAL) metals, and total cyanides. Selected samples were also analyzed for fluoride. Surface water samples from the second event in June 1995 were analyzed for TAL metals, total suspended solids, and hardness.

The Operable Unit 3 RI also included two rounds of sediment samples collected at the same time as the corresponding surface water samples. The initial round of samples was collected in 1994 and included six locations in Koppers Pond and its outlet channels. These sediment samples were collected to a maximum depth of 24 inches and were composited throughout the depth of recovery. Collected samples were analyzed for TCL VOCs, SVOCs, pesticides and PCBs, and for TAL metals and total cyanides.

The second round of Operable Unit 3 RI sediment sampling was conducted in May and June 1995 to further characterize site conditions. These second-round sediment samples were originally to be analyzed for TCL SVOCs, PCBs and pesticides, mercury, and total organic carbon (TOC). Analyses for other metals were not planned, because such metals were listed as permitted discharge parameters on the two State Pollutant Discharge Elimination System (SPDES) permits for the former Westinghouse plant site and had already been detected in the earlier sediment samples. Prior to commencement of the June 1995 sampling activities, however, a whitish-brown floc was observed floating in the Industrial Drainageway. This material was first reported to NYSDEC in March 1995 and continued to be observed in the Industrial Drainageway throughout the remainder of 1995 and 1996. Analysis of this material showed it contained several metals, and, based on these analytical results, USEPA requested that the second-round sediment samples also be analyzed for cadmium, chromium, and lead. Also, unlike the earlier samples that were composites collected over depths ranging to 24 inches, the second-round sediment samples were collected from the uppermost six inches of encountered material.

To follow-up the 1988 NYSDEC fish data, the Operable Unit 3 RI also included supplemental fish sampling. After an initial attempt in the spring of 1994 to collect fish samples using normal angling techniques was unsuccessful, fish sampling from Koppers Pond using electroshocking was completed in June 1995 as part of the Operable Unit 3 RI. This sampling resulted in the collection and tissue analysis from 15 fish samples (*i.e.*, six white sucker and nine common carp). Skinless fish fillets from collected specimens were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL metals and cyanide, although limited sample size did not allow for analysis of all parameters in all samples.

Sections 4.2.3.1 and 4.3.2.1 examine the data from the 1994 and 1994 Operable Unit 3 RI and compare these data to the results from the sampling conducted in 2008 through 2010 for the Operable Unit 4 RI.

1.2.4.4 Operable Unit 3 Human Health Evaluation

Using the data developed under the Operable Unit 3 RI, CDM conducted a BHHRA on behalf of USEPA (CDM, 1995). The Operable Unit 3 BHHRA evaluated potential exposure pathways for area residents potentially contacting COPCs in surface waters and sediments in the Industrial Drainageway and Koppers Pond and potentially consuming fish taken from these water bodies.

The 1995 Operable Unit 3 BHHRA showed potential cancer risks associated with individual exposure pathways ranging from 2.8 x 10^{-7} for surface water exposure routes to 1.5 x 10^{-6} for contact with sediment. The NCP defines acceptable exposure levels as those that represent an excess upper bound lifetime cancer risk to an individual of 10^{-6} to 10^{-4} [40 CFR 300.430(e)(i)(A)(2)]. The sediment cancer risk was driven by materials in the Industrial Drainageway, and Koppers Pond sediments did not contribute to this calculated risk. The calculated hazardous indices (HIs) for non-cancer effects via all exposure pathways fell well below USEPA's target of 1.0. On this basis, USEPA concluded that direct exposure to surface waters and sediments associated with Koppers Pond did not pose an unacceptable human health risk.

The 1995 BHHRA also examined potential risks associated with consumption of fish taken from Koppers Pond. For this evaluation, the risk assessment used the fish tissue data gathered in the 1995 Operable Unit 3 RI sampling (Section 1.2.4.3) and applied an exposure rate based on consumption of fish caught in Koppers Pond at a rate of 0.5 pounds of fish per meal for 50 meals per year. Based on these assumptions, the 1995 BHHRA an incremental lifetime cancer risk of 3.8×10^{-4} associated with fish consumption. The calculated HI for non-cancer effects equaled 6.9. The cancer risk associated with fish consumption was due to the presence of PCBs and arsenic in fish tissue samples. The non-cancer HI of 6.9 was almost entirely the result of PCBs (Aroclor 1254). These exposure levels, which are above the NCP acceptable cancer risk range and USEPA's target for non-cancer hazards (HI=1.0), drove the requirements for remediation of Industrial Drainageway sediments, where PCBs levels were higher, under Operable Unit 3 (Section 1.2.4.8).

1.2.4.5 USEPA Screening-Level Ecological Risk Assessment

In March 1996, USEPA conducted a Screening-Level Ecological Risk Assessment (SLERA) for the Industrial Drainageway and Koppers Pond. The SLERA was prepared in accordance with USEPA guidance used at that time (USEPA, 1994) to assess whether COPCs in the sediments and surface water at the Industrial Drainageway and Koppers Pond area had the potential to adversely impact ecological receptors at the Site. In the SLERA, USEPA screened constituent concentrations determined during the Operable Unit 3 RI against ecological benchmarks and state of New York fish criteria. Following this screening, constituents identified as primary contributors to ecological hazard were then used to characterize potential ecological risk to select receptor species (*i.e.*, great blue heron and raccoon).

1.2.4.6 1998 CDM Sampling

In August 1998, CDM, on behalf of USEPA, collected sediment samples from 14 locations in Koppers Pond and adjacent waterways. The sediment samples were typically collected from the uppermost six inches of the sediment surface, although vertical sediment profiles with multiple samples were collected at two locations. Collected sediment samples were analyzed for TAL metals and cyanide and for TCL pesticides and PCBs.

In addition to chemical analysis, CDM conducted toxicity testing of sediments using the *Hyalella azteca* (amphipod) 10-day survival test and the *Chironomus tentans* (midge) 10-day survival and growth test. CDM also performed a benthic macroinvertebrate community survey and analysis.

Section 4.2.3.2 examines the 1998 CDM investigation data and compares these data to the results from the sampling conducted in 2008 through 2010 for the Operable Unit 4 RI.

1.2.4.7 Draft BERA

In 1999, under contract to USEPA, CDM completed a draft BERA focused on Koppers Pond (CDM, 1999). In this study, CDM calculated ecological hazard quotients (HQs) as the ratios of observed concentrations of COPCs in sediment to sediment screening values and modeled uptake of COPCs from sediment into higher trophic level species (*i.e.*, mink, raccoon, and great blue heron). The draft BERA used the chemical data (*i.e.*, metals, PCBs, and pesticides) collected in CDM's 1998 sampling (Section 1.2.4.6) to update the information available from the Operable Unit 3 RI. The 1999 draft BERA modeled uptake and bioaccumulation of metals and PCBs from sediments into fish (instead of using measured fish data) when evaluating potential risk to higher trophic levels.

1.2.4.8 Industrial Drainageway Remediation

In 2002 and 2003, Viacom Inc. (Viacom)[4] completed the Operable Unit 3 remediation of the Industrial Drainageway under an administrative order on consent entered with USEPA (Cummings/Riter, 2004). This remediation involved removal and off-site

[4] At that time, Viacom Inc. was the corporate successor to Westinghouse.

disposal of sediment and bank soils exhibiting total PCB concentrations above the established remediation goal of 1.0 milligram per kilogram (mg/kg) total PCBs. In this effort, approximately 6,400 cubic yards (cy) of sediments, bank soils, and other floodplain soils were excavated and transported off-site for disposal. Clean soils were imported as needed to replace the excavated sediments and bank soils and reshape the channel. Riprap was placed as needed to protect the stream banks from excess scour.

1.2.4.9 2003 Fish Sampling

In 2003, Civil & Environmental Consultant, Inc. (CEC), under contract to Viacom, conducted fish sampling in Koppers Pond to provide updated information on PCB and metals concentrations in fish tissue. Fish were collected using electroshocking techniques, resulting in a total of 24 fish samples for analysis. Collected species included both bottom-feeding (*i.e.*, common carp and white sucker) and pelagic species (*i.e.*, largemouth bass, pumpkinseed, black crappie, and green sunfish). The samples of fish for potential human consumption (*i.e.*, common carp, white sucker, and largemouth bass) were prepared as skin-on fillets with the belly flap included, in accordance with NYSDEC (2002) procedures. Smaller fish species for ecological evaluation (*i.e.*, pumpkinseed, black crappie, and green sunfish) were analyzed as whole-body samples. Section 4.3.2.2 examines the data from the 2003 CEC fish sampling and compares these data to the results from the sampling conducted in 2008 through 2010 for the Operable Unit 4 RI.

1.3 REPORT ORGANIZATION

The organization of this RI report generally tracks the suggested RI report format given in USEPA (1988) guidance, but with some modifications to more clearly and concisely present the results of Site characterization studies and risk assessment. Following this introductory chapter, Section 2.0 describes the investigation of Site features and physical characteristics, including tasks for pond bathymetry, sediment thickness, and groundwater and surface water interaction. Section 3.0 describes chemical characterization activities for surface water, sediment, and biota, as well as related biological studies. Section 4.0 describes the results of the field activities to determine physical and chemical characteristics, with comparisons to the results of prior Site investigations, where appropriate. Section 5.0 describes the CSM, including potential sources and contaminant fate and transport mechanisms. Section 6.0 presents a summary of the baseline risk assessments, including both human health and environmental evaluations. Because of the size of the volumes, however, the BHHRA and sBERA, which are part of the RI, are bound separately. Finally, Section 7.0 presents a summary of the findings and conclusions of the RI.

2.0 INVESTIGATION OF SITE FEATURES AND PHYSICAL SETTING

This section describes methods employed in completing investigations of Site features and physical characteristics. These investigations were conducted in accordance with the revised *RI/FS Work Plan* (Cummings/Riter and AMEC, 2007) and the accompanying *Sampling and Analysis Plan*, including both the *Field Sampling Plan* (FSP) and *Quality Assurance Project Plan* (QAPP).

2.1 SURVEYING AND MAPPING

Cummings/Riter performed the field surveying for the RI using differential global positioning system (GPS) equipment. Field survey control was established from New York State Department of Transportation (NYSDOT) monuments (NYSDOT GPS-11 and GPS-12) as well as Site monitoring wells that had been previously surveyed by Fagan Engineers LP (Fagan) as part of the ongoing Operable Unit 2 groundwater monitoring program.

The base topographic map for Operable Unit 4 activities was prepared from aerial photography flown in November 1991 for Operable Unit 2. Given the nature of the anticipated Operable Unit 4 activities and the limited change in physical Site conditions since the time of base map preparation, this 1991 mapping is considered to be of suitable horizontal scale (1 inch = 50 feet) and contour interval (1 foot) for use as the base map for the Operable Unit 4 RI.

In addition to the 1991 mapping, aerial photography from 2006 and later 2010 (six-inch resolution, natural color) was downloaded from the New York State Geographic Information Systems (GIS) Clearinghouse. This photography has been used as a base for preparation of a project GIS using ESRI ArcView® software. In this RI Report, the 2010 aerial photography replaces the 2006 photography used in earlier Operable Unit 4 reports.

2.2 BATHYMETRIC SURVEY

2.2.1 Survey Methods

Cummings/Riter performed a bathymetric survey of Koppers Pond on May 6, 2008 using an Odom® single-beam echo sounder integrated with a differential GPS to assign horizontal positions to the depth data. The echo sounder was calibrated by using a portable depth gauge at two locations and adjusting the echo sounder to equate to the manual reading. The horizontal and vertical positional accuracy of the echo sounding equipment is approximately plus or minus 0.1 foot. The GPS data were post-processed using a fixed-base reference station, which improves the accuracy of GPS data by providing error corrections based on measured fluctuations of GPS signals at the fixed location. The Site survey control (Section 2.1) was used to establish the vertical datum for the survey.

The Cummings/Riter hydrographic survey team conducted the survey using random track lines, as opposed to pre-defined cross-section lines, and recorded depth and position data every 10 feet along the traveled path. The random track line approach allowed for more flexibility in increasing data collection in areas where the pond bottom was irregular. In the shallow, non-navigable portions of the pond in the northwest corner near the Industrial Drainageway, GPS survey equipment was used to survey the pond bottom and obtain water depth measurements. These measurements were taken by placing the survey rod atop the pond bottom sediments and recording the elevation. The resulting pond bottom elevation map, which was developed using both the echo sounder and the manual measurement data, is shown as Figure 4.

2.2.2 Pond Bathymetry

Based on a measured water surface elevation of 885.75 feet MSL on the day of the May 6, 2008 survey, examination of Figure 4 shows that water depths at the time of the survey typically ranged from approximately one foot in the northwest portion of the pond to a maximum of five feet near Sample Location 13 in the eastern portion of the pond. From these data, the total calculated volume of water in the pond was approximately 5.7 million gallons. Water marks on trees and telephone poles adjacent to the pond indicated that the water level in the pond was approximately 2.1 feet below recent high water levels, consistent with the survey conducted by Fagan on October 22, 2007 that reported a pond elevation of 887.9 feet MSL. During field investigations conducted in

October 2010, the pond water surface elevation was also observed to be approximately two feet higher than that observed in May 2008. At this higher surface water elevation, the total calculated volume of water in the pond is about 12 million gallons.

2.3 Sediment Thickness Assessment

During the May 2008 field activities, and in advance of pond sediment sampling, sediment thickness was measured to determine the depths of sediment samples to be collected at each of 13 sediment sampling locations. These locations, which were identified in the approved *RI/FS Work* Plan, were selected to provide spatial coverage of the pond with emphasis on the western leg that receives inflows from the Industrial Drainageway. In addition, the data collected from these thickness measurements were used with the pond bottom data obtained from the bathymetric survey to estimate the sediment thickness and volume of sediment in the pond.

To determine sediment thickness, a tape measure was secured to a retractable metal probe, and the probe was manually advanced into the sediment until refusal by the clay or sand and gravel deposits beneath the sediment. A total of 20 measurements were collected from the pond. One measurement was taken at each of the 13 planned sampling locations, and 7 measurement locations were selected to provide additional information in those portions of the pond where the sediment thickness appeared to be more variable.

In all of the sediment probing locations, a hard surface was encountered that allowed for defining the bottom of the soft sediments. In subsequent sediment sampling (Section 3.1.2), this hard layer was found to be a stiff clay present throughout most of the pond. At some locations, particularly on the eastern leg of the pond, the material underlying the soft sediments was characterized as sand and gravel, based on the refusal of the retractable metal probe on the pond bottom and observed material type located along the eastern shoreline. The sediment thickness measurement locations, along with inferred thickness isopach, are shown on Figure 5. The sediment thickness assessment is presented in Section 4.2.1.

2.4 Landfill Seepage

An inspection was conducted on May 6 and May 7, 2008 by boat and by foot along the northern shore of Koppers Pond and the east bank in the lower reach of the Industrial

Drainageway that abut the Old Horseheads Landfill (Figure 2). This survey was specifically focused on identifying any physical evidence of seeps that may drain into the pond.

No physical evidence of active seeps (*i.e.*, seep flow or dampness) or past seepage (*i.e.*, surface staining or development of rivulets) was observed at any location during the survey. Most of the near-shore topography along the northern side of the pond was found to be too flat for the formation of seeps. Where the topography is steep (*i.e.*, along the lower reach of the Industrial Drainageway), no seeps were found, and no evidence of past seepage was identified. In addition, no obvious signs of soil erosion or other concentrated surface water discharge (*e.g.*, gullies, well-developed rill patterns) were noted between the landfill and the lower Industrial Drainageway or Koppers Pond.

2.5 POND HYDROLOGY ASSESSMENT

A study was performed to assess the degree of interaction of the surface water in Koppers Pond with local groundwater and the extent to which Koppers Pond discharges to or receives inflow from shallow groundwater. An evaluation of this interaction was needed to complete the understanding of the pond water balance and the potential flux of water through pond sediments.

For this pond hydrology study, groundwater elevations were measured for a period of 15 weeks (from May 6 through August 20, 2008) by installing transducers with data loggers in five existing groundwater monitoring wells proximal to Koppers Pond (*i.e.*, CW-9S/9D, CW-10S/10D, and MW-112S). In addition, a staff gauge and transducer were installed in the western portion of the pond for simultaneous measurement of pond water levels. Wells MW-103D and MW-103I were not included in this study, as there is no shallow well associated with this well cluster. Installation details for the monitoring wells and staff gauge are summarized in Table 1. Locations of the monitoring wells and staff gauge are included on Figure 4.

The data collected by the transducers were downloaded monthly, and manual measurements of pond surface water elevations using the staff gauge and of monitoring well water levels were collected monthly using a water level meter. The manually collected data were used as quality control measurements to verify the transducer readings.

2.6 SURFACE WATER HYDROLOGY

In advance of field sampling, Fagan, under contract to the Group, examined available records and conducted field reconnaissance to define the extent of the watershed and the routes of surface water flow to Koppers Pond. Included in this research was the NYSDOT as-built information for the underground pipe leading to the Chemung Street Outfall. Village of Horseheads records and the Southern Tier Central Regional Planning database were also researched regarding storm sewer systems (*i.e.*, inlets, catch basins, and underground piping) that contribute to the flow that emanates from the Chemung Street Outfall. This information provided a basis for identifying potential sampling points within the drainage area as part of the assessment of potential ongoing sources of COPCs to Koppers Pond. Figure 6 presents the compiled drainage map. As shown on Figure 6, the area that drains to the Chemung Street Outfall, Industrial Drainageway, and Koppers Pond includes a large commercial, industrial, and residential area that extends approximately 1.5 miles west of the former Westinghouse Horseheads plant site and, at its maximum, 0.6 mile north of Interstate 86.

Prior to examining the sources of information described above, the extent to which culverts and other underground piping directed flows toward the Industrial Drainageway and the Chemung Street Outfall was not fully understood, and the extent and area of the watershed was determined in the RI to be much larger than what had previously been estimated. Whereas a total watershed area contributing to Koppers Pond of 604 acres was estimated in the *Preliminary Site Conceptual Model* (PCSM) (Koppers Pond RI/FS Group, 2007), the revised estimate is 1,350 acres. At assumed basin-wide runoff rates of 7 to 10 inches per year (Philip Environmental Services Corporation, 1996), surface water runoff to the pond, excluding runoff from the 59-acre former Westinghouse Horseheads plant site, would be approximately 470 to 670 gallons per minute (gpm) as an annual average (calculated as follows for 10 inches per year):

$$\frac{10\text{ inches}}{\text{year}} \times \frac{1\text{ foot}}{12\text{ inches}} \times \frac{43{,}560\text{ ft}^2}{\text{acre}} = \frac{36{,}300\text{ ft}^3}{\text{year acre}}$$

$$\frac{36{,}300\text{ ft}^3}{\text{year acre}} \times 1{,}291\text{ acres} \times \frac{7.48\text{ gal}}{\text{ft}^3} \times \frac{1\text{ yr}}{365\text{ days}} \times \frac{1\text{ day}}{1{,}440\text{ minutes}} = 667\,\frac{\text{gallons}}{\text{minute}}$$

In addition to the flow from the Industrial Drainageway, local surface water runs off to the pond, primarily from the Old Horseheads Landfill that forms much of the northern bank of Koppers Pond and the eastern bank of a portion of the lower Industrial Drainageway. Local runoff also enters the pond from the Norfolk Southern railroad right-of-way to the east. Runoff from the west, which is generally flat-lying vacant property owned by Hardinge, appear to be minimal.

2.7 SEWER VIDEO INSPECTION

A video survey of the underground piping carrying industrial wastewater and storm water to the Chemung Street Outfall was conducted to verify the alignment of the piping, identify significant sources of inflow, and inspect for the presence of "floc" that had previously been reported in the discharge at the outfall. Other piping was not investigated except to the extent needed to identify piping that drained to the Chemung Street Outfall. The pipe survey began at Junction Chamber #1, which is the downstream point of concentration for surface water flows that originate upstream of the former Westinghouse Horseheads plant site (Figure 7). The survey terminated at the Chemung Street Outfall. In all, 2,416 lineal feet of underground piping were inspected. Figure 7 depicts locations of piping subject to this video survey.

The video survey was performed by National Vacuum Corporation on June 17, 2008 using a remote-controlled crawler camera. The camera provided full-color video and had the ability to pan and tilt to better inspect observed features within the pipe. To improve the quality of the video images, the discharge from the barrier well treatment system at the former Westinghouse Horseheads plant site was turned off during the survey. Appendix A provides the video survey report, including a copy of the DVD of the actual video footage.

The findings of the video survey generally confirmed the information compiled from the records review regarding the configuration of the underground piping (Section 2.6). The video survey clarified the locations of Junction Chambers #2 and #3, showing that the previously presumed locations of these manholes actually corresponded to sanitary sewer manholes. The video survey also confirmed that a second, 36-inch diameter pipe runs parallel to the main line 72-inch diameter pipe that flows to the Chemung Street Outfall. This second pipe, which is configured to take overflow from the 72-inch line, was found to be mostly filled with sand and gravel and was dry at the time of the inspection.

In the video survey, no floc was found adhering to the walls of the underground piping at any location, and none was observed in the water flow in the pipes. It is concluded that the formerly observed floc material is no longer being formed and previously generated materials have not accumulated for potential future releases to surface water in the Industrial Drainageway or Koppers Pond.

3.0 CHEMICAL AND BIOLOGICAL CHARACTERIZATION ACTIVITIES

This section describes the methods employed in Site characterization studies conducted in accordance with the revised *RI/FS Work Plan* to determine the location, extent, and concentrations of Site-related COPCs, as well as related biological studies. Field sampling efforts were conducted in May 2008, September 2009, and October 2010. The May 2008 field investigation comprised the primary data-gathering activity for the Operable Unit 4 RI. Included in this sampling effort were the collection of surface water and sediment samples from Koppers Pond and the outlet channels for chemical analyses. Surface water and sediment samples were also selected along drainage paths leading to Koppers Pond. The May 2008 sampling work also included the collection and chemical analysis of game fish and forage fish to develop data needed for the BHHRA and sBERA.

The September 2009 field investigation specifically focused on determining whether the native New York State endangered plant slender pondweed (*Stuckenia filiformis alpinus*) is present in Koppers Pond or its outlet channels. Results from this survey are discussed in Section 3.4.1. During this field sampling, candidate reference ponds for use in ecological risk evaluations were also identified and inspected.

The October 2010 field investigation was conducted to address data gaps that were identified in the ecological risk assessment reports and evaluations based on the 2008 data set. This supplemental investigation included collection of the following:

- Additional biota samples from Koppers Pond for tissue chemical analysis to better characterize receptor exposure;

- Sediments from a subset of Koppers Pond locations sampled in May 2008 for chemical analysis and evaluations of sediment toxicity and benthic communities;

- Additional mud flat sediment samples from the area between the outlet channels to better characterize exposures to the receptors in this area;

- Additional sampling of outlet channel sediments to better define the downstream limits of potentially affected sediments;
- One composite sediment sample from the selected Reference Pond for chemical analysis and evaluations of sediment toxicity and benthic communities, and
- Biota from the selected Reference Pond for tissue chemical analysis.

Sections 3.1, 3.2, and 3.3 address the primary data collection activities conducted in May 2008. Section 3.1 describes the locations and procedures used in sampling each medium, Section 3.2 presents sample handling and related field procedures, and Section 3.3 describes laboratory analyses and data validation. Sections 3.4 and 3.5 provide additional information regarding the supplemental characterization activities performed in September 2009 and October 2010, respectively. Discussions of data collection methods are not repeated in Sections 3.4 and 3.5 where such procedures mirrored those used in the May 2008 sampling.

3.1 SAMPLE LOCATIONS AND COLLECTION METHODS FOR 2008

This section describes the locations of and methods used in collecting surface water, sediment, and fish tissue and other biota samples as part of the Operable Unit 4 RI field investigations in May 2008. Table 2 summarizes the surface water and sediment sampling locations, and Table 3 summarizes the fish samples.

3.1.1 Pond and Outlet Channel Surface Water

During the May 2008 field activities, Cummings/Riter personnel collected six surface water samples from Koppers Pond for laboratory analysis. The decision to reduce the number of surface water samples collected from the pond from 13 (as specified in the revised *RI/FS Work Plan*) to 6 was based on discussions between the Group's Project Coordinator and the USEPA Remedial Project Manager (RPM) and the expectation that surface water quality would not vary significantly throughout the pond. The six surface water samples were collected from Locations 2, 4, 5, 8, 10, and 13 (Figure 8) at mid-depth of the water column using a peristaltic pump and disposable C-Flex® tubing. The intake end of the tubing was lowered, and the pump was turned on and allowed to run until the tubing had been fully rinsed with water from the mid-depth sample zone. Water samples were then collected by directing the pump discharge to the sample bottles.

Along with the pond water samples, four surface water samples were collected from the outlet channels. Samples were collected from Locations 14, 15, 16, and 17 (Figure 8). Water samples obtained from the outlet channel were collected by submersing a disposable sample bottle and using this water to fill the sample bottles. A quality assurance sample was collected at Sample Location 14 (*i.e.*, matrix spike and matrix spike duplicate [MS/MSD]).

Dissolved oxygen (DO), pH, oxidation-reduction potential (ORP), temperature, and specific conductance readings were collected in the field using a HI 9828 Multi-parameter Portable Meter, documented on water sample collection reports, and are presented in Tables 4 and 5 for Koppers Pond and the outlet channels, respectively. The water sample collection reports are provided in Appendix B.

The surface water samples were collected from both the pond and outlet channels for laboratory analysis of TCL VOCs, SVOCs, pesticides, and PCBs. These samples were also analyzed for TAL inorganic parameters. The TAL metals were analyzed for total and dissolved fractions to facilitate direct comparisons to ambient water quality criteria. Samples for dissolved metals were filtered in the field using disposable 0.45-micron filters. In addition, in accordance with the approved *RI/FS Work Plan*, surface water samples were analyzed for general chemistry parameters (*i.e.*, ammonia, nitrites, fluoride, hardness, and total suspended solids).

3.1.2 Pond and Outlet Channel Sediment

During the May 2008 field activities, Cummings/Riter personnel collected 44 sediment samples from Koppers Pond and the outlet channels for laboratory analysis. Multi-depth sediment samples were collected from the pond (up to four samples per location) at Locations 1 through 13 (Figure 8). This sampling density provides sufficient coverage to allow comparison to previously collected data, to investigate the range of sediment deposition conditions present in the pond, and evaluate depth-concentrations relationship for COPCs. Pond sediments were characterized vertically, and the number of samples collected at each location was determined by the thickness of the sediment. The sampling strategy for pond sediments was to collect a sample representative of the uppermost 6 inches of sediment and additional samples as needed to characterize each 12-inch increment of deeper sediments.

The sediment samples from the outlet channels were collected from Locations 14 through 17 (Figure 8), including one sample from the east outlet, one from the west outlet, and two from the channel downstream of where the two outlet channels combine. In addition, two mud flat sediment samples were collected from areas adjacent to the pond that appeared to have been inundated during previous periods of high water in the pond (*i.e.*, Figure 8, Sample Locations 30 and 40).

The pond sediment samples were collected by using manual push coring techniques. Samples were obtained using 4- to 8-foot lengths of disposable 2-inch diameter acetate tubes, where sediments were soft and cohesive, or with a Russian Peat Borer, where the stiffness or lack of cohesiveness of the sediment precluded the use of the acetate tubes. For both sampling tools, the sediment removed from the sampler was segregated according to the depth increments as described above, placed onto disposable aluminum pie plates, drained of free water, and transferred onto shore. Once on shore, pH and ORP readings were collected for each sample using an HI 98121 pH, ORP, and temperature meter for all samples that contained sufficient liquid to allow these measurements. With the exception of VOC and acid volatile sulfide/simultaneously extracted metals (AVS/SEM) sample fractions, which were collected as discrete, non-homogenized grab samples, the remaining sediment was blended and placed directly into the appropriate sample containers.

The outlet channel sediments were collected from the uppermost six inches of material using disposable plastic scoops. The sediment was then placed directly into the appropriate sample containers.

The mud flat sediment samples from Locations 30 and 40 were collected by first digging a core-type hole approximately six inches deep using a shovel and removing the plug of sediment from the hole. A disposable plastic scoop was then used to collect the sample from the loosened material, taking care not to include any materials that had been in direct contact with the blade of the shovel. The shovel was decontaminated between each use according to the procedure described in Section 3.2.6, but this sampling technique avoided the need for collection of an equipment blank for the shovel. The collected sample material was placed directly into the appropriate sample containers.

The sediment samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL inorganic parameters, and TOC. Selected samples (*i.e.*, SD08-1, SD08-2, SD08-3, SD08-4, SD08-6, and SD08-10) were analyzed for AVS/SEM. The selection of samples for AVS/SEM analysis was biased toward the western leg of Koppers Pond due to the expected higher metals concentrations in this area relative to other portions of the pond. At each location, the AVS/SEM analyses were performed on the 0- to 6-inch depth sample (*i.e.*, uppermost interval). Additionally, Samples SD08-3 (6 to 18 inches), SD08-6 (6 to 9 inches), and SD08-10 (6 to 23 inches) were the subject of grain-size determinations. The selection of sediment samples for grain-size determination analysis was based on visual inspection of samples collected in the field, with the objective of evaluating the range of sediment materials present in the pond. The May 2008 sediment field collection reports are provided in Appendix C.

Duplicate samples were collected for Samples SD08-5 (0-6) and SD08-2 (6-18). MS/MSD samples were collected for Samples SD08-7 (6-18) and SD-08-17. An equipment blank sample was collected by pouring laboratory-supplied deionized water over the Russian Peat Borer and into the sample jars. One trip blank for VOC analysis was included with each shipping cooler of VOC samples sent to the laboratory.

3.1.3 Drainage Area Surface Water and Sediments

Sampling was conducted to evaluate drainage and discharges to Koppers Pond to provide an assessment of the possible locations and contributions of ongoing sources of COPCs to the pond.

3.1.3.1 Former Westinghouse Horseheads Plant

On May 6, 2008, surface water samples were collected of the barrier well treatment system discharge (Sample Location 22) and the Cutler-Hammer discharge at Outfall 001W (Sample Location 23). These sample locations are shown on Figure 7.

These two discharges comprise the remaining non-storm discharges from the former Westinghouse Horseheads plant site to the Industrial Drainageway. The purpose of this sampling was to provide data for a synoptic sampling event that included the Chemung Street Outfall (Sample Location 21) and Junction Chamber #1 (Sample Location 27) upstream of the Westinghouse Horseheads plant site. Both the barrier well and Cutler-Hammer discharges are monitored under their respective SPDES permits.

The barrier well sample was collected by opening the sample port located on the underside of the treatment system discharge line. After allowing the port to drain, the water sample was collected by directly filling the sample containers. The sample of the Cutler-Hammer outfall was collected using a dipping pole with attached disposable plastic bucket. The bucket was lowered into the water stream and then raised. The dip pole was configured to allow the bucket to tip to fill the sample containers.

Both of these water samples were submitted to the laboratory for analysis of TCL and TAL analytes and for the general chemistry parameters ammonia, nitrites, fluoride, hardness, and total suspended solids. DO, pH, ORP, temperature, and specific conductance were measured as field parameters.

The barrier well treatment system flow rate at the time of sampling was approximately 1,120 gpm. The Cutler-Hammer discharge flow rate was approximately 78 gpm. No sediments were associated with these discharges, and no sediment samples were collected.

3.1.3.2 Underground Discharge Pipe and Chemung Street Outfall

Treated discharges and storm water originating at the former Westinghouse Horseheads plant, among other facilities, are conveyed to the Industrial Drainageway and ultimately to Koppers Pond via an underground pipe that terminates at the Chemung Street Outfall (Figure 7). Samples of the water discharge at the Chemung Street Outfall (Sample Location 21) and the Junction Chamber #4 (Sample Location 24) were collected on May 6 and May 7, 2008, respectively. Junction Chamber #4 is the first upstream manhole on the 72-inch diameter pipe that leads to the Chemung Street Outfall (Figure 7).

At both locations, surface water samples were collected using the dipping pole and attached disposable plastic bucket. The bucket was lowered into the water stream and then raised. The dip pole was configured to allow the bucket to tip to fill the sample containers.

At the Chemung Street Outfall, the sediment sample was collected by digging several shallow core-type holes using a shovel. The removed sediment was then carried to shore on the upturned blade of the shovel, where a disposable plastic scoop was used to collect the sample from the loosened material, taking care not to include any materials that had been in direct contact with the blade of the shovel. The scooped sediment was then used to fill the sample containers.

At Junction Chamber #4, the sediment sample was collected using the dipping pole and attached disposable plastic bucket. The bucket was dragged along the sediment surface and then raised. The collected materials were then poured directly from the bucket to fill the sample containers.

Surface water samples were analyzed for TCL and TAL parameters and for the general chemistry parameters ammonia, nitrites, fluoride, hardness, and total suspended solids. Field parameters measured on these samples included DO, pH, ORP, temperature, and specific conductance. The sediment samples collected from both locations were analyzed for TCL and TAL parameters, plus TOC. The flow rate from the outfall was estimated to be approximately 1,800 gpm at the time of sampling, based on observed flow velocity and depth. The flow rate through the Junction Chamber #4 was estimated at approximately 1,500 gpm.

No floc was observed to be present in the underground pipe or Industrial Drainageway at the time of sample collection.

Water samples were also collected from two additional manholes believed to be Junction Chambers #2 and #3 associated with the underground pipe discharging at the Chemung Street Outfall. It was later determined during the video survey, however, that these two junction chambers were, in fact, part of the sanitary sewer system and did not ultimately flow to the Chemung Street Outfall. Accordingly, the results from those samples are not relevant to assessing discharges to Koppers Pond and have been discarded.

3.1.3.3 Storm Water Runoff

The Site characterization studies also investigated sources of significant storm water runoff that enters the underground discharge pipe upstream of the Chemung Street Outfall or the Industrial Drainageway downstream of the Chemung Street Outfall or directly flow into Koppers Pond.

A field reconnaissance was first conducted of the study area on May 5, 2008 to identify potential sampling locations, including storm water inflow points (*e.g.*, catch basins, storm inlets), road culverts, culverts under the railroad, and runoff from the Chemung County Department of Public Works (DPW) yard (*e.g.*, road cinder and salt storage) and the Norfolk Southern railroad. Runoff pathways were also assessed by examination of available mapping (Figures 6 and 7) and field reconnaissance focused on topography and channelization.

Based on the field reconnaissance, surface water and sediment samples were collected on May 7, 2008 from Junction Chamber #1, upstream of the discharge from the former Westinghouse Horseheads plant site (Sample Location 27, Figure 7). In addition, surface water and sediment samples were also collected from an inlet channel and near the outlet culvert of the storm water retention pond one-half mile west (and upstream) of the former Westinghouse Horseheads plant site (Sample Locations 29 and 28, respectively).

These surface water samples were collected using the dipping pole and attached disposable plastic bucket. In collecting the surface water samples, the bucket was lowered into the approximate mid-depth of water stream. For sediment sampling at Junction Chamber #1, the dipping pole and attached disposable plastic bucket were used to collect materials along the bottom and corners of this square chamber. At the remaining locations, sediment samples were collected using a shovel and disposal plastic scoop in the same manner as the sediment sample was collected at the Chemung Street Outfall (Section 3.1.3.2).

Surface water samples were analyzed for TCL and TAL analytes and for the general chemistry parameters ammonia, fluoride, hardness, nitrites, and total suspended solids, as well as field parameters. Sediment samples were analyzed for TCL and TAL analytes plus TOC. The flow rate through Junction Chamber #1 at the time of sampling was determined to be negligible, while the flow rate through the storm water retention pond was estimated to be 40 gpm, based on observed flow velocity and depth and the pond outlet structure.

A sediment sample (Sample Location 20) was collected on May 6, 2008 at the outlet of a culvert beneath the Norfolk Southern railroad tracks just northwest of Koppers Pond (Figure 7). The sediment sample was collected using a shovel and disposal plastic scoop in the same manner as the sediment sample was collected at the Chemung Street Outfall (Section 3.1.3.2). There was no flowing water at this location, and no surface water sample was collected.

Finally, a sediment sample (Sample Location 41) was collected on May 15, 2008 at a point of concentrated surface water runoff from the Chemung County DPW yard (Figure 7). The sediment sample was collected using a shovel and disposal plastic scoop in the same manner as the sediment sample was collected at the Chemung Street Outfall (Section 3.1.3.2). There was no flowing water at this location, and no surface water sample was collected.

3.1.4 Fish Tissue Sampling

AMEC conducted the fish collection from Koppers Pond on May 16, 2008 with the assistance of CEC. CEC had also performed the previous fish tissue sampling event in 2003. The objective of the fish tissue sampling was to collect fish for laboratory analyses of COPCs in support of the evaluations of potential risks to human and ecological receptors. Fish sampling was conducted in accordance with the revised *RI/FS Work Plan* (Cummings/Riter and AMEC, 2007), which, in turn, was founded on relevant USEPA and other guidance, including the following:

- *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories* (Volume 1) (USEPA, 2000a); and
- *Draft Procedure for Collection and Preparation of Aquatic Biota for Contaminant Analysis* (NYSDEC, 2002).

The fish sampling was also conducted in accordance with conditions set forth in the New York Scientific Collector's Permit License, Number 1270, effective date May 2, 2008 through May 31, 2009) issued to AMEC by the NYSDEC Division of Fish, Wildlife, and Marine Resources. A copy of this permit is included in Appendix D.

At the time of the fish collections, the air temperature was 45 to 50 degrees Fahrenheit (°F) [7 to 10 degrees Celsius (°C)]. There was a light wind, with intermittent showers and cloud cover. All of the fish collections were completed in one day.

Measurements of water quality parameters were performed near the shore by the staging area. The staging area was on the eastern shore of the eastern leg of the pond, approximately 250 feet north of the east outlet channel. The observed water pH was 8.17, the water temperature was 16.9°C, DO was 9.7 milligrams per liter (mg/L), and water conductivity was 754 microsiemens per centimeter (μS/cm) (equivalent to micromhos per centimeter [μmho/cm]).

Electrofishing was conducted during daylight in the various available habitats (*i.e.*, near-shore and offshore) that exist in Koppers Pond. The field team used a 14-foot aluminum flat bottom boat equipped with a variable voltage, pulsed direct-current output electrofishing unit. The boat had been custom modified with a 42-inch high rubberized aluminum hand rail on the bow to allow one operator to safely stand while netting fish. The boat was driven by a battery-powered electric trolling motor on the stern. The team used a Smith-Root Variable Voltage Pulsator Electrofisher (Model VVP-15B) powered by a gas generator. Two fiberglass outriggers were affixed to the bow to hang the two electrode arrays just below the surface of the water. The biologist on the bow used a foot pedal to energize the electrodes and a fiberglass long-handled net to catch the fish as they were drawn to and stunned by the electric field.

A large (approximately 30-gallon) plastic container was placed in the center of the boat for use as a live well to hold fish prior to processing. The container was filled with site water, and two aeration stones were added to maintain the oxygen level.

The fish collection team consisted of three biologists. One person stood in the bow of the boat, operating the electrodes and netting fish. One person stood mid-ship to net fish and to maintain the live-well. The third person stood in the stern to drive the boat, maintain the generator, and adjust the electrical output.

Random passes were made along the shoreline and throughout the pond. The team initiated shocking in the eastern leg of the pond. After approximately one hour, the collected fish were returned to the staging area and placed in a mesh-lined holding pen in the shallow water near the bank. After processing the first batch of fish, the team shocked the western leg of the pond, the main pool, and the southern end of the eastern leg for approximately another hour before returning to the staging area. The western leg of the pond was very shallow, with little cover, so few fish were present. No attempt was made to differentiate the fish collected from any particular area of the pond. Consistent with the revised *RI/FS Work Plan* and FSP, fish collections in May 2008 were not performed in the shallow east or west outlet channels, or in the Industrial Drainageway.

A total of 20 individual game fish were collected and submitted for tissue analysis as follows:

- Five common carp (*Cyprinus carpio*);
- Five white sucker (*Catostomus commersoni*);
- Six largemouth bass (*Micropterus salmoides*); and
- Four black crappie (*Pomoxis nigromaculatus*).

The common carp and white sucker were selected as bottom-feeding species, while the black crappie and largemouth bass are pelagic predators. The largemouth bass represents the top predatory fish species.

In addition, six forage fish samples were also collected as follows:

- One sample comprised of an individual pumpkinseed (*Lepomis gibbosus*);

- One composite sample comprised of four pumpkinseeds (*Lepomis gibbosus*);

- Three samples comprised of individual bluegill sunfish (*Lepomis macrochirus*); and

- One composite sample comprised of four bluegill sunfish (*Lepomis macrochirus*).

Fish were lifted individually from the holding pen for processing. Investigators measured the fish for standard length (SL - the tip of the snout to the base of the caudal peduncle) in millimeters (mm) against a standard fish measurement board. Although total length (TL - the tip of the snout to the tip of the tail fin) was originally proposed in the *RI/FS Work Plan* and FSP, SL was measured, as opposed to TL, at the request of NYSDEC field representative because of a possible concern that some fish might exhibit fin erosion, making the TL measurements less reliable. The presence of fish disease, tumors, lesions, erosions, fin damage, deformities, or skeletal anomalies was recorded for each fish. Fish were then weighed to the nearest 0.1 gram (g) on a top-loader balance. Experienced biologists examined each fish for anomalies (*e.g.*, lesions, tumors, fin erosion, parasites). The species, length, weight, and anomalies were recorded along with a unique sample identification number. These morphometric parameters are summarized in Table 3.

When all of the fish had been processed, the electrofishing boat was pulled from the water, and the team left the site. The fish samples were brought to the barrier well treatment building at the former Westinghouse Horseheads plant site where the chain-of-custody forms were prepared and the fish packaged for shipment to the laboratory. Fish samples were driven to the TestAmerica Laboratories, Inc. (TestAmerica) facility in Pittsburgh, Pennsylvania and hand delivered on the same day they were collected.

The revised *RI/FS Work Plan* stated that the team would collect up to 20 edible-sized game fish samples (*e.g.*, carp, largemouth bass, crappie, and sunfish), with the final species distribution similar to that of historic (CEC, 2003) sampling species distribution. The team would also collect three composite samples of small forage fish (30 to 100 mm) and three composite samples of larger forage fish (100 to 300 mm). Although a total of six forage fish samples were collected as planned, there was a limited number of smaller forage fish observed during the sampling. The actual forage fish samples consisted of two composites of smaller forage fish (30 to 100 mm) and four individual samples (not composites) of larger forage fish (100 to 300 mm). These consisted of bluegill or pumpkinseed sunfish.

Additionally, if any fish were observed to have deformities (*e.g.*, lesions, tumors) that could potentially be attributed to polycyclic aromatic hydrocarbons (PAHs), an even number of similar-sized fish with and without deformities were to be submitted for analysis of PAHs.

The fish collection operation was assisted by the USEPA RPM (Ms. Isabel Rodrigues), the U.S. Department of the Interior, Fish and Wildlife Service (USFWS) Liaison to USEPA (Mr. Rich Henry), and the NYSDEC representative (Ms. Mary Jo Krantz). In all instances, the three agency representatives agreed on which fish to retain for analysis: five carp, five white suckers, six largemouth bass, four black crappies, three individual bluegill samples, one composite bluegill sample, and one individual pumpkinseed sample, and one composite pumpkinseed sample (Table 3). This series was selected taking into consideration the species composition of the 2003 sampling survey: five carp, five white suckers, two largemouth bass, six pumpkinseed, three black crappie, and three green sunfish.

None of the fish that were to be submitted for analysis showed any sign of deformity or disease. One gizzard shad that was collected had some fin erosion and a lip tumor. It was released back to the pond with the agreement of USEPA, NYSDEC, and USFWS as a non-target species and an isolated case of deformity. Therefore, no fish samples were submitted for PAH analysis.

The revised *RI/FS Work Plan* specified the performance of a qualitative assessment of the available fish habitat during the fish collections, including the following habitat conditions:

- Assessment of in-pond cover (*e.g.*, large woody debris, root wads, root mats, undercut banks, gravel bars, and macrophytes);
- Floodplain and land use around the pond, and
- Degree of canopy cover.

Due to the weather conditions at the time of sampling, the collection of this information was limited. CEC staff indicated that the habitat conditions of the pond had not changed significantly since the prior fish sampling in 2003, although it was noted that the water levels had declined. Appendix E includes the 2008 fish habitat assessment report prepared by the field sampling team. More detailed evaluations of fish habitat, including an evaluation of the pond fishery, were performed as part of the BHHRA (Integral, 2012a) and sBERA (Integral, 2012b).

3.2 SAMPLING HANDLING

3.2.1 Sample Identification and Labeling

A uniform identification numbering system was used to describe the sample medium and location of samples collected during RI field activities. Samples from the various locations carried the following prefixes:

- Surface Water: SW08-;
- Sediment: SD08-; and
- Fish: CC08- (common carp), WS08- (white sucker), LB08- (largemouth bass), BC08- (black crappie), and FF08- (forage fish [individual or composite]).

The "08" designation indicates that the sample was collected in 2008 and differentiates these RI samples from prior (or later) samples that employed similar labeling. The identification also included a number to allow for identifying the location from which the sample was collected or the sequential sample number (for fish). Where more than one sample was collected at a specific location, the depth interval was also used to modify the sample identification. For example, a sample identified as SD08-2 (6 to 18 inches) indicates a sediment sample collected at Sample Location 2 in 2008 from a depth of 6 to 18 inches.

The laboratory supplied blank labels for sample containers. The labels were filled out at the time of sample collection by the field personnel performing the sampling. Information marked on the label included the following:

- Sample identification number,
- Collector's initials,
- Date of collection,
- Type of sample,
- Preservatives used, and
- Analysis to be performed.

3.2.2 Sample Containers and Preservation

For surface water and sediments, sample containers were supplied by the analytical laboratory as certified pre-cleaned, in accordance with appropriate USEPA guidelines. Sample containers were filled completely wherever possible to ensure that sufficient sample volume was obtained for laboratory analysis and associated laboratory quality assurance/quality control (QA/QC) procedures.

As needed, laboratory personnel added the required preservatives to each individual laboratory-supplied sample bottle. Preservation also included maintaining the samples in a chilled condition (4°C) once they were collected.

For fish tissue samples, after initial processing to determine species, size, and morphological abnormalities, each fish or composite selected for analysis was wrapped in hexane-rinsed aluminum foil per NYSDEC guidance, placed in a food-grade, waterproof plastic bag, and sealed and placed into a second labeled bag with a label placed on the outside of the bag. A label on the inside of the plastic bag was also applied recognizing that the outer labels could become detached, especially when placed in the coolers with ice.

Fish samples were cooled immediately after packaging and preserved on wet ice for hand delivery on the day of sampling to the TestAmerica Pittsburgh laboratory. After the samples were logged into the laboratory, they were frozen to ensure sample integrity prior to further processing.

3.2.3 Sampling Documentation

Sampling personnel documented activities on sample collection forms. The following information was recorded at each sample location, as appropriate:

- The time the sample was collected,
- Sampling personnel,
- Sample number,
- Results of field parameter determinations, and
- Any pertinent field observations.

Copies of sample collection forms for surface water and sediment are provided in Appendices B and C, respectively. Appendix E provides relevant information related to the fish sample collections.

3.2.4 Sample Custody and Delivery

The chain-of-custody procedures specified in Section 5.1 of the QAPP were applied for samples collected during the RI field activities. Copies of completed chain-of-custody forms are included in the corresponding analytical laboratory data reports.

The samples were transported to the laboratory in durable, secured metal or plastic coolers, or laboratory-supplied, insulated shipping containers. Containers were shipped by Federal Express or hand delivered. Samples were shipped in accordance with U.S. Department of Transportation and NYSDOT regulations. Chain-of-custody documentation accompanied the samples.

3.2.5 Field Quality Control Samples

As a check on field sampling QA/QC, trip blanks (one with each shipment of VOC samples), equipment rinsate samples (one associated with the sediment sampling equipment), and field duplicates (two for surface water and two for sediment samples) were prepared and sent to the laboratory at specified frequencies. In addition to the field QA/QC samples, MS/MSD samples (two for surface water and two for sediment samples) were collected for laboratory QA/QC.

3.2.6 Decontamination

Small tools and other apparatus used for sampling (*i.e.*, Russian Peat Borer, sampling shovel) were decontaminated between each use. The decontamination process consisted of the following steps:

- Removing sediment from the sampler,
- Scrubbing and rinsing with a solution of Liqui-Nox® and distilled water, and
- Rinsing with distilled water.

Decontamination was not required for any of the field sampling equipment used for the fish collections or field measurements of the collected fish. Filleting of the fish samples was performed at the laboratory.

3.2.7 Investigation-Derived Waste

With the permission of CBS Corporation (CBS), the liquid investigation-derived waste (IDW) was disposed of at the barrier well groundwater treatment plant located at the former Westinghouse Horseheads plant site. Solid IDW from field sampling activities was disposed of as commercial trash.

3.3 LABORATORY ANALYSIS AND DATA VALIDATION

Under contract to the Group, TestAmerica analyzed the collected surface water, sediment, and fish tissue samples. AMEC performed independent data validation in accordance with Section 10.0 of the QAPP. Analytical data reports and data validation reports are provided in electronic format in Appendices F and G, respectively.

3.3.1 Laboratory Sample Receipt and Custody

After receiving samples shipped from the Site, TestAmerica maintained a custody record throughout sample preparation and analysis in accordance with Section 5.2 of the QAPP and the applicable laboratory Standard Operating Procedures. After completing the required analyses, remaining project samples were released for disposal in accordance with applicable regulations.

3.3.2 Sample Preservation and Holding Times

As needed, laboratory personnel added the required preservatives to each individual laboratory-supplied sample bottle. Preservation also included maintaining the samples in a chilled condition (4°C) after collection.

In the laboratory, surface water and sediment samples were stored at 4°C prior to analysis. Fish samples were cooled immediately after packaging and preserved on wet ice for hand delivery to the analytical laboratory on the day of sampling. After the samples were logged into the laboratory, they were frozen to ensure sample integrity prior to further processing. The laboratory processed and prepared the fish tissue samples (*e.g.*, weighing, filleting, homogenizing) in accordance with NYSDEC (2002) protocols, with one modification. NYSDEC (2002) indicates that the fillets are to include the ribs but no backbone, while USEPA guidance specifies that fillets should be free of ribs (USEPA, 2000a). With the concurrence of the USEPA RPM and risk technical staff, the USEPA fillet tissue preparation method was used for the game fish samples.

3.3.3 Analytical Procedures

Chemical analyses of surface water, sediment, potential source, and fish samples were conducted by TestAmerica for the parameters listed in Tables B2-4 and B2-5 of the revised *RI/FS Work Plan*. Analytical methods for sediment and water consisted of appropriate USEPA SW-846 methods using the TCL organic and TAL inorganic analyte lists.

Game fish tissue fillets were prepared by the analytical laboratory from previously frozen samples. The fillets (skin-on with belly flaps) were analyzed for TCL pesticides and PCBs, TAL inorganics, and percent lipids. The forage fish were prepared as whole-body homogenates and analyzed for the same parameters as the game fish. Both forage fish and game fish samples were also analyzed for lipid content using a TestAmerica method as provided in the QAPP.

3.3.4 Data Validation

AMEC performed a validation of the analytical reports and raw data and provided a written assessment of data usability and limitations for the project. The data validation was performed with reference to the specific QA/QC requirements of specific method (*i.e.*, SW-846), USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (USEPA, 2004), USEPA CLP National Functional Guidelines for Organic Data Review (USEPA, 1999), including USEPA Region II modifications.

A data usability evaluation is provided in Appendix G that summarizes the results of the data validation. The data validation reports are also included in this appendix.

Upon review of the initial results of the 2008 fish lipid analyses, it was apparent that the reported lipid values were anomalously low based on AMEC's experience in fish tissue evaluations. To confirm these unanticipated lipids results, three fish tissue samples were forwarded to the TestAmerica laboratory in Burlington, Vermont, for comparative analysis of both lipid content and PCBs. The data received from the TestAmerica Burlington reanalysis showed lipid contents that were in line with expectations and higher PCB concentrations than were reported from the analyses in the TestAmerica Pittsburgh laboratory.

Upon receipt of the data showing divergent lipid and PCBs results, AMEC investigated the fish tissue handling, preparation, extraction, and analytical methods employed by both TestAmerica laboratories. This investigation found that both laboratories handled, prepared, extracted, and analyzed the fish tissue samples in accordance with published USEPA and NYSDEC methods. Both laboratories used the same solvents for extraction (*i.e.*, methylene chloride for lipids and a mixture of hexane and acetone for PCBs), and neither laboratory employed the gel permeation chromatography cleanup step in preparing PCB samples. The only identified difference in sample preparation between the two laboratories is the use of a Tekmar Tissumizer® at the TestAmerica Burlington laboratory. This sample preparation tool is very effective at breaking down the tissue to the cellular level, allowing for a greater extraction efficiency of both the lipids and PCBs compared to other tissue processing methods.

Based on this assessment, TestAmerica Burlington reanalyzed lipids and PCBs in all of the fish tissue samples for which sufficient sample quantity was available (*i.e.*, 25 of the 26 total samples). The data from the TestAmerica Burlington reanalysis showed lipid contents consistent with expectation and generally higher PCB concentrations. Although both the TestAmerica Pittsburgh and the TestAmerica Burlington data were developed in accordance with USEPA and NYSDEC methods, the TestAmerica Burlington data in fish are considered more representative of the lipid content of these samples and more useful in assessing the exposure to PCBs that may be available to a human or higher trophic level ecological receptor consuming these fish. The fish tissue PCB data from the analyses by TestAmerica Burlington were used in subsequent evaluations and risk assessment, but the TestAmerica Pittsburgh fish tissue PCB data were not used. This decision was made to ensure the best available and most conservative data were used in risk assessment.

3.4 SEPTEMBER 2009 SAMPLING

Additional field work was performed in September 2009 to fill data gaps and assist in the evaluation of potential ecological risks from Koppers Pond and its outlet channels. The field work was performed following submission of the SLERA (AMEC, 2009a) and included the following:

- Field survey to determine whether there is any evidence of slender pondweed (*Stuckenia filiformis alpinus*) in Koppers Pond and its outlet channels; and

- Field reconnaissance of candidate reference ponds to determine their accessibility and whether one or more ponds could serve as a suitable representative of regional conditions.

The methods used in these investigations were described in *Technical Memorandum No. 1: 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* (AMEC, 2009b) and the *Ecological Risk Assessment Guidance for Superfund (ERAGS) Steps 3 through 5 Report* (Integral, 2010a).

3.4.1 Slender Pondweed Field Survey

Appendix A of the SLERA (AMEC, 2009a) compiled correspondence with the New York Natural Heritage Program (NYNHP) and NYSDEC concerning reported observations of rare, threatened, or endangered (RTE) species at or near the Koppers Pond Site. In December 2008, the RTE summary was updated by NYNHP to include the potential presence of slender pondweed at or near Koppers Pond. This inclusion was based on a historical record (from 1943), prior to the original construction of Koppers Pond, that this species was reported "in cold brook, Chemung Street, Horseheads."

The 2009 supplemental field investigation was conducted to determine if this species is present in Koppers Pond under current environmental conditions and if the habitats of Koppers Pond and the outlet channels are suitable to support this species. AMEC (2009b) and Integral (2010b) present information on slender pondweed identification and life history.

3.4.1.1 Survey Methods

In September 2009, Integral conducted an investigation to determine the presence of slender pondweed in Koppers Pond and the outlet channels. The field survey methodology was included as part of *Technical Memorandum No. 1: 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* (AMEC, 2009b), approved by USEPA and NYSDEC in August 2009, and the field program was implemented in September 2009.

There are several USEPA and New York guidance documents available for surveying aquatic macrophytes. USEPA (1998) provides guidance for surveying of aquatic macrophytes that can be performed as part of the bioassessment of lakes and reservoirs. New York guidance documents describing aquatic plant survey methods include NYSDEC (1995, 2006) and the New York Citizens Statewide Lake Assessment Program (NYCSLAP) (2009). Because the slender pondweed is an RTE species in New York, a nondestructive sampling method was used, and the selected survey method primarily focused on the visual determination of the presence or absence of the slender pondweed from Koppers Pond or its outlet channels and whether the habitats are available to support this species. Worksheets similar to the NYCSLAP Aquatic Plant Survey Form (NYCSLAP, 2009) were used for this survey. Copies of these forms for the pond and its outlet channels are provided in Appendix H.

The slender pondweed survey at Koppers Pond was performed on September 16, 2009. The day was sunny, and the daily temperatures ranged from 44 to 73 °F (7 to 23 °C). It was moderately breezy at the time of the survey. It was noted that the water levels were 12 to 18 inches higher at Koppers Pond during the September 2009 effort compared to the May 2008 field investigation, but were apparently comparable to historical water levels. This conclusion was based on the comparison of Site photographs during the two sampling events and water levels on the utility pole located within the pond. This change in water level may be due to several factors, including the increased precipitation in 2009 relative to 2008.

The shoreline survey consisted of a visual inspection performed by walking along the accessible portions of the shoreline and the adjoining littoral zone to inspect for the presence of slender pondweed. An estimate of the total macrophyte cover in the littoral zone was made at eight survey stations along the shoreline and the overall abundance of slender pondweed was recorded based on an ordinal scale (*i.e.*, none, sparse, moderate, or abundant), and its relative abundance to other macrophytes was determined. The optional boat survey was not required because there was limited submerged aquatic vegetation present within the pond and the survey locations were readily accessible using chest waders. For the outlet tributaries, the visual survey was performed by walking along the west and east outlets, and outlet channel downstream to Sample Location 17 (Figure 8). A determination was made whether this species was present or if suitable substrate was available, following the same approach as used for the pond shoreline survey. GPS coordinates were collected for at each station using a Garmin 60CSx hand-held unit, and digital photographs were collected to document field observations (Appendix H). The survey locations are shown in Figure 9.

Field measurements of the following nine parameters were collected from each of the survey locations:

Depth	ORP
Temperature	Salinity
pH	Total Dissolved Solids
Conductivity	Turbidity
DO	

Field water quality was measured using a Horiba U-22 Series multi-parameter water quality meter. Field measurements of DO could not be obtained at one pond survey location and turbidity could not be measured at one of the outlet channel survey locations due to equipment failure.

This information was collected to allow comparisons to available comparable data for the slender pondweed. The second objective was to collect a similar set of water quality parameters relative to that collected from the 2008 sampling effort of Koppers Pond to determine whether there have been significant changes in these parameters with time. Each survey location was designated with the code "SP09-nnn" to distinguish this field investigation from other sampling events.

3.4.1.2 Survey Results

The results from the slender pondweed survey were provided to USEPA and NYSDEC in December 2009 as *Technical Memorandum No. 2: Results from the 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* (Integral, 2010b). As described in that document, the visual survey for the slender pondweed in Koppers Pond and its outlet channels showed that this species was not present in either of these areas. Field measurements collected from each of the survey locations and inspection of the substrate indicate that the habitat is not appropriate for this species. Slender pondweed prefers more alkaline waters (Maine Department of Conservation, 2004) than are present at either Koppers Pond or its outlet channels.

The slender pondweed was not observed at any of the eight pond locations or while walking between these locations. The only submerged aquatic vegetation present in the pond was small pockets of coontail (*Ceratophyllum demersum*). The lesser duckweed (*Lemna minor*), a common floating aquatic plant, was present at the pond and covered much of the water surface (greater than 50 percent) along the southern and southwestern shorelines (*i.e.*, backwater areas).

For the outlet channels, five survey point locations along the east (SP09-001, SP09-002), west (SP09-003, SP09-004), and main outlet channels (SP09-14), were examined (Figure 9). The latter extended as far downstream as sediment sample location SD017. The sample log sheet for the outlet channel survey is also included in Appendix H. The slender pondweed was not observed at any of these locations. There was also no apparent submerged aquatic vegetation at any of these locations. Many of the outlet channels had terrestrial vegetation overgrowing their surfaces.

Tables 4 and 5 present the field measurements collected from each of the survey points from Koppers Pond and the outlet channels, respectively. As discussed in *Technical Memorandum No. 2* (Integral, 2010b), there were some differences between the water quality parameter measurements that were collected from Koppers Pond and the outlet channels between the 2008 and 2009 sampling events. These may be attributable to seasonal factors (early spring for the 2008 samples and early fall for the 2009 samples), or precipitation differences between the two sample years. In addition, the 2009 DO readings were limited to near-shore areas of very shallow depth and were not representative of the entire pond. These DO concentrations may have been influenced by local aquatic macrophytes. In any case, the water quality parameter measurements from both years indicated that the surface water in the pond was well oxygenated at the time of sampling.

For the outlet channel, the water quality results were similar to those collected in May 2008, although the September 2009 samples were somewhat better oxygenated (*i.e.*, greater DO and ORP). These differences may be attributable to increased flows from the pond due to the higher water levels in 2009 compared to 2008.

3.4.2 Reconnaissance of Candidate Reference Ponds

The use of a reference area can facilitate the interpretation and evaluation of potential risks in an ecological risk assessment. Comparison of the Site to a comparable reference area is critical in the evaluation of the health of certain ecological communities that have been selected as measurement endpoints in the assessment. The selection and use of reference areas can also be critically important when ecologically significant chemicals may be present due to area-wide sources that are not attributable to Site-related releases. The SLERA and the prior CDM (1999) draft BERA did not include evaluation of a reference site.

The candidate reference pond selection methodology was included as part of *Technical Memorandum No. 1: 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* (AMEC, 2009b). In the fall of 2009, AMEC conducted a field reconnaissance of candidate reference ponds. The results of those investigations were provided to USEPA and NYSDEC in December 2009 as *Technical Memorandum No. 2: Results from the 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* (Integral, 2010b).

As described in *Technical Memorandum No. 2*, 15 distinct candidate ponds were evaluated as part of the 2009 field effort. These were compared using different hydrologic, land use, sediment lithology, and fish community metrics. Based on this evaluation, four potential reference ponds (or reference pond groups) were identified as candidates for further evaluation. These included the following:

- A group of ponds located behind the school west of Koppers Pond;
- The two Lowe Ponds, located in a county park near the county airport; and
- A group of ponds near the "Center at Horseheads" industrial park northeast of Koppers Pond.

Based on the evaluated metrics, *Technical Memorandum No. 2* recommended that one of the ponds from the group located at the "Center at Horseheads" be used as the reference pond, and, upon review, USEPA concurred with this selection. The surrounding areas of the other two candidate ponds are well-maintained lawns, while the area near the "Center at Horseheads" is less so, and the latter is associated with a mud flat/wetland complex that is more similar to that found at Koppers Pond.

3.5 October 2010 Sampling

In 2010, Integral completed the ERAGS Step 3 assessment, including a refined screening of COPECs, problem formulation, and a summary of the Scientific/Management

Decision Point (Integral, 2010a). From that assessment, and following USEPA review and concurrence, Integral developed the ERAGS Steps 4 and 5 plan for the proposed supplemental field work to fill data gaps. Table 6 summarizes the October 2010 data collection program. Analytical laboratory data reports are included in Appendix F, and data validation reports are included in Appendix G. A copy of the NYSDEC Division of Fish, Wildlife, and Marine Resources Scientific Collector's Permit License issued to Integral for this work is included in Appendix D.

The supplemental field program employed sample collection and handling procedures consistent with those provided in the FSP and described in Sections 3.1 and 3.2, respectively. Where additional procedures were needed (*e.g.*, plant sampling), these procedures were described in the *ERAGS Steps 3 through 5 Report* (Integral, 2010a). Laboratory analysis and data validation procedures followed those given in the QAPP and described in Section 3.3. Again, where additional procedures were needed (*e.g.*, sediment toxicity testing), these procedures were described in the *ERAGS Steps 3 through 5* (Integral, 2010a).

3.5.1 Additional Biota Samples

To support the preparation of the sBERA, Integral collected Site-specific data on key forage items for the proposed ecological receptors. These forage items included aquatic invertebrates (for the semi-aquatic invertivores/omnivores) and plant material (for the herbivorous receptors). The plant materials consisted primarily of submerged and emergent macrophytes.

3.5.1.1 Aquatic Invertebrates

The supplemental investigation targeted crayfish as a surrogate for aquatic invertebrates because of the difficulties often experienced in attempting to collect sufficient volumes of aquatic invertebrate species to support analytical sample mass requirements. The field sampling effort targeted one composite crayfish sample in the area bounded by the confluence of the Industrial Drainageway to SD08-02. After repeated attempts using electroshocking and crayfish traps, no crayfish could be collected. Sediment oligochaetes or polychaetes were also not available in sufficient quantity to analyze for chemical parameters in lieu of crayfish analysis from Koppers Pond.

3.5.1.2 Plant Materials

The plant materials sampling locations consisted of the following:

- Single composite sample of floating aquatic plants (common duckweed) from Koppers Pond;
- Grass or similar leafy material, including a combination of new and older leaves, from shrubs or small trees bordering Koppers Pond (near SD08-07) and the East Outlet Channel (near SD08-15), representing locations near the perimeter of the waterbodies that have elevated COPEC concentrations relative to the refined screening values; and
- Plant root or rhizomes from emergent vegetation (cattails) at the perimeter of Koppers Pond (near SD08-01).

Sample locations are shown in Figure 10.

The grass or leafy materials that were collected from herbaceous plants are likely to be used as forage for ecological receptors. Two vegetation composite samples were collected from the area bounding Koppers Pond. These included a mixture of honeysuckle (*Lonicera japonica*), bullrush (*Scirpus* spp), soft rush (*Juncus effusus*), and canary grass (*Phalaris* spp) from the shoreline near SD08-07, and a composite of wild parsley (or wild parsnip; *Pastinaca sativa*), wild lettuce (*Lactuca canadensis*), and clover (*Trifolium* spp) from the shoreline near SD08-15 (mud flat and outlet area).

The cattail root material was gently rinsed of sediment after collection and the outer "skin" of the root material was included with the root mass for chemical analyses. The root material was not peeled to be representative of the way in which an herbivore may forage on the cattail roots.

The vegetation samples were analyzed for PCBs, TAL metals, and lipid content. Total cyanides were not analyzed in these samples because the laboratory was unable to identify a suitable USEPA method to analyze this chemical in plants.

3.5.1.3 Forage Fish

A single forage fish composite sample was successfully collected from the outlet channels of Koppers Pond.

3.5.2 Koppers Pond Sediment

A review of the historical (pre-2008) and current (2008) sediment sample results indicated a data gap relative to the potential longer-term sediment toxicity. Therefore, the following two longer-term toxicity tests (USEPA, 2000b) were performed using five sediments from Koppers Pond collected in 2010:

- Test Method 100.4: *Hyalella azteca* 42-day (chronic) Test for Measuring the Effects of Sediment-associated Contaminants on Survival, Growth, and Reproduction; and

- Test Method 100.5: Life-cycle Test for Measuring the Effects of Sediment-associated Contaminants on *Chironomus tentans.*

Sediments were re-collected from the following five sample locations in Koppers Pond for toxicity testing in 2010: SD08-01, SD08-03, SD08-04, SD08-06, and SD08-08 (Figure 10). These were selected based upon review of the 1998 sediment toxicity results (CDM, 1999) and their associated chemical data. Sediment samples were collected from a small boat using a ponar dredge, which was the same sampling method used by CDM for the sediment samples submitted for toxicity testing in 1998. The five sediment samples (plus one duplicate) were analyzed for TCL SVOCs, PCBs, TAL, and TOC.

To supplement the initial benthic community assessment performed by CDM (1999), five sediments collected from Koppers Pond and a composite sediment sample collected from the Reference Pond (Section 3.5.5) were subsequently evaluated in a similar manner to the 1999 CDM study, as summarized below:

- Identify, to the lowest practical taxon, the benthic invertebrate organisms sorted (500 micron mesh size) from petite ponar grab samples collected from Koppers Pond and a separate Reference Pond; and

- Calculate benthic community metrics for each distinct sample and compare the results for the Koppers Pond samples with the results obtained from the Reference Pond composite sample.

The 2010 Koppers Pond sediment samples were collected from locations near those collected in 1998 to provide a comparison with the prior studies results. The rationale for selection of the 2010 sampling locations was presented in the *ERAGS Steps 3 through 5 Report* (Integral, 2010b).

3.5.3 Additional Sediment Samples from Mud Flat Areas

As part of the 2010 field study, three additional mud flat samples from the 0- to 6-inch depth interval were collected between the outlet channels (*i.e.*, area near SD08-30) to better characterize the potential exposure and ecological risk associated with this area. Samples were collected using a hand shovel. Because of the higher water levels during the October 2010 sampling, the mud flat samples were submerged by about 2 feet of water. Sample locations are shown in Figure 10. The collected mud flat samples were analyzed for TCL SVOCs, PCBs, TAL, and TOC.

3.5.4 Outlet Channel Sediment

Based on discussions with USEPA in October 2010, additional sampling of outlet channel sediments was conducted on October 20, 2010. These samples were collected to improve the downstream delineation of COPC concentrations in sediments and to characterize materials being evaluated for removal for purposes of flood control at the Hardinge facility.

Two sediment samples (SED10-18 and SED10-19) were collected from the upper three inches of substrate downstream of previous sediment sample SED08-17. At both sampling locations, but especially at SED10-19, the quantity of sediment was limited and the sampled material appeared to be a hard clay. The approximate locations of these samples are shown on Figure 10.

3.5.5 Sediment and Biota Samples from a Reference Pond

The selected Reference Pond was the larger western portion of a series of ponds near a former industrial complex that was converted to office/storage operations, called "Center at Horseheads." An abandoned rail line divides the western and eastern portion of the ponds, which are connected via a series of culverts. Visual inspection during the October 2010 field investigation indicated that water flows from the western side to the eastern side. The open water area of the western portion of the pond appears to be 6.5 acres, based on the 2006 aerial photograph that was used as a based map for Figure 11.

Like Koppers Pond, the Reference Pond is a shallow (2- to 4-foot deep) warm water pond, with characteristics consistent with a eutrophic waterbody (Reschke, 1990). Its sediment and adjoining soil substrates are similar to those in Koppers Pond and the adjoining wetland areas. The bottom surface substrate is silty (mucky) and soft over much of the pond. Detritus was commonly observed in the sampled sediments. The underlying substrate was not determined because the ponar grab samplers used for environmental sampling did not penetrate beyond the upper soft layers. Submerged aquatic vegetation is abundant, consisting predominantly of coontail; duckweed was also present as floating vegetation. Waterfowl (ducks and geese) were observed at the time of sampling (October 2010). Based on anecdotal information, this waterbody is commonly used for waterfowl hunting. Nearby marsh grassland is used for bird watching.

The Reference Pond sampling program consisted of the collection of the following:

- One composite sediment sample for chemical characterization and sediment toxicity testing. This composite consisted of six grab samples from throughout the reference pond.
- Five forage fish composites and five gamefish samples. The same target species collected from Koppers Pond were collected from the reference pond, to the extent possible.
- Three plant composite samples (one each for vegetated portions of aquatic plants, root material/tubers of semi-aquatic plants, and leafy portions of terrestrial plants).

Two crayfish composite samples were planned, but, as in Koppers Pond, no crayfish were captured in repeated attempts using electroshock and crayfish traps. Sediment oligochaetes or polychaetes were also not available in sufficient quantity to analyze for chemical parameters in lieu of crayfish analysis.

The Reference Pond sediment samples were analyzed for SVOCs, TAL metals, PCBs, and TOC. Sediment toxicity was evaluated using USEPA Test Methods 100.4 and 100.5. The sediment sample for chemical analysis was an aliquot of the well mixed composite sediment sample used for toxicity testing. Benthic community studies were also conducted using the Reference Pond composite sediment sample (Section 3.5.2).

The biota samples, including both fish and plant material, were analyzed for PCBs and total lipid (as appropriate).

The vegetation composite sample from the Reference Pond shoreline was a mixture of privet (*Ligustrum vulgare*), aster (*Aster* spp), and sedge (*Carex* spp).

4.0 SUMMARY OF RESULTS

This section presents the results of data collection and analytical testing of surface water, sediment, fish tissue, and other biota samples. These sampling and analysis data are used in the BHHRA and sBERA to identify COPCs and evaluate potential current and future human health and environmental risks posed by the observed concentrations of these constituents.

The presented data were developed using the sampling and analytical procedures defined by the *RI/FS Work Plan*, FSP, and QAPP. Supplemental procedures for the 2010 sampling were presented in the *ERAGS Steps 3 through 5 Report* (Integral, 2010a). Analytical laboratory data reports are included in Appendix F, and data validation reports are provided in Appendix G.

4.1 POND AND OUTLET CHANNEL SURFACE WATER

4.1.1 Pond Hydrology Assessment

Figure 12 provides a hydrograph of the monitoring well and staff gauge water level measurements for the pond hydrology study conducted over the three-month period of May though August 2008. This figure also shows daily precipitation recorded at the Elmira/Corning Regional Airport, approximately 3.5 miles west-northwest of Koppers Pond, as reported by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Examination of Figure 12 shows that the water levels in the pond and shallow groundwater do not respond to specific precipitation events, but appear to correlate with longer-term (seasonal) changes in the overall hydrologic water balance (*i.e.*, rainfall, runoff, evapotranspiration, and infiltration). The groundwater wells (especially wells CW-9S, CW-9D, CW-10S, and CW-10D) show a declining trend through the early into late spring, with decreases in water levels ranging from 1.6 feet (CW-10D) to 5.6 feet (CW-9S) feet. Over this same period, the pond water level decreased by less than one foot. The more-consistent water levels in the pond are likely due, at least in part, to the near-continuous discharge of approximately 1,400 gpm from the barrier well treatment facility at the former Westinghouse Horseheads plant site.

Following the spring decline, the groundwater and pond water levels appear to track at all five monitoring wells over the summer months. During this period, the water level in the pond (approximately 885 feet MSL) is maintained about five feet higher than the groundwater level at CW-9S, eight feet higher than at CW-10S, CW-10D and CW-9D, and two feet higher than at MW-112S.

A correlation between the difference in groundwater and pond water levels with the distance of the specific well from the pond is not apparent. Shallow wells CW-9S and CW-10S are nearer to the pond than MW-112S, but, as indicated on Figure 12, the correlation between water levels in the pond and shallow groundwater is much better at MW-112S than at CW-9S and CW-10S.

Based on these data, it appears that Koppers Pond does not significantly interact with local shallow groundwater. This finding is consistent with the low-permeability, hard clay layer beneath the sediments encountered throughout much of the pond and with the conclusion of the Operable Unit 2 RI that described Koppers Pond as "perched" above the groundwater because of the presence of low permeability materials at and below the pond bottom (Ebasco, 1990).

4.1.2 Summary of Operable Unit 4 Surface Water Quality Data

The pond and outlet channel surface water sample analytical results, collected as part of the May 2008 sampling effort, are summarized in Tables 7 through 11. These tables present data for VOCs, SVOCs, pesticides and PCBs, metals, and other analytes, respectively. Results of surface water samples collected from waters draining to Koppers Pond are summarized in Tables 12 through 16, which likewise present data for VOCs, SVOCs, pesticides and PCBs, metals, and other analytes, respectively, from samples collected as part of the May 2008 field sampling. Tables 7 through 16 also list the corresponding NYSDEC Surface Water Quality Standards for Class C freshwater (6 New

York Code, Rules, and Regulations [NYCRR] Part 703). The comparison of pond and outlet channel surface water quality data to the New York State 6 NYCRR 703 standards is provided in Section 4.1.4.

4.1.3 Operable Unit 3 RI and Other Historical Surface Water Data

In 1994 and 1995, the Operable Unit 3 RI included two rounds of surface water sampling from the Industrial Drainageway and Koppers Pond to characterize water quality and to identify sources of COPCs. Three of the sampling locations were in Koppers Pond, and three were located in the outlet channels. One sample (1995 sampling only) was located in the Industrial Drainageway near its discharge to Koppers Pond.

In addition to the Operable Unit 3 RI data, CDM collected surface water quality information in 1998 during the sediment sampling conducted in support of its ecological risk evaluation of Koppers Pond (CDM, 1999). Similarly, during the fish sampling conducted in July 2003, CEC collected water quality characterization data at four locations in Koppers Pond. All of the surface water data from these past investigations are summarized in Tables 2 and 3 of the PCSM (Koppers Pond RI/FS Group, 2007).

4.1.4 Comparison to Past Data and Data Assessment

All of the surface water characterization and quality data from prior studies were collected at a time when treated industrial wastewaters were being discharged from the former Westinghouse Horseheads plant site, and surface water sampling results showed the presence of several metals that were regulated constituents in past SPDES permits (*e.g.*, aluminum, chromium, lead, zinc), as well as fluoride. Except for cooling water from Cutler-Hammer operations, such discharges have now been eliminated, and the reported data from prior sampling are not representative of current conditions. Accordingly, only the Operable Unit 4 RI data have been incorporated into the database for evaluating surface water with respect to the New York State 6 NYCRR 703 water quality criteria or in use for human health or ecological risk assessment. Previously collected surface water data from Koppers Pond and the outlet channels were not included.

The 2008 surface water quality data presented in Table 7 through 16 show that TCL organic compounds, TAL metals and cyanide, and other constituents were not detected in surface water at Koppers Pond or the outlet channels at concentrations above the New York State surface water quality criteria. For waters draining to Koppers Pond, the following were detected above surface water quality criteria:

- Sample 08-23, former Westinghouse plant, Cutler-Hammer discharge – copper; and
- Sample 08-27, Junction Chamber #1 in underground discharge line (upstream of former Westinghouse plant) –cyanide.

No TCL organic compounds, other TAL metals, or other constituents were detected in any surface waters draining to Koppers Pond at concentrations above the New York State surface water quality criteria.

4.2 POND AND OUTLET CHANNEL SEDIMENTS

4.2.1 Pond Sediment Thickness Assessment

The sediment thickness measurement locations, along with the inferred thickness isopach, are shown on Figure 5. As shown on this figure, observed sediment thicknesses varied from 0 to 38 inches throughout the pond. 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 approximately 12 to 14 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. Based on the thickness measurements and the developed isopach map, the total estimated volume of sediments is 21,400 cy, as calculated using AutoCAD® software.

4.2.2 Summary of Operable Unit 4 Sediment Data

The pond sediment sample analytical results are summarized in Tables 17 through 23 which present data for VOCs, SVOCs, pesticides and PCBs, metals, AVS/SEM, other analytes, and grain-sized distribution, respectively. Results of sediment samples collected from the pond outlet channels are summarized in Tables 24 through 28, and results of sediment samples collected from flow paths draining to Koppers Pond are summarized in Tables 29 through 33. The sediment data for Koppers Pond and its outlet channels (Tables 17 through 28) include, as applicable, the results from the comprehensive sampling conducted in 2008 as well as the results from the limited sediment sampling conducted in 2010.

As described in Section 2.1.1 of the BHHRA and Section 4.1 of the sBERA, these analytical data were compared to appropriate screening values to determine COPCs and COPECs, respectively.

The screening for the BHHRA identified the following COPCs:

- PCB Arolcor 1254;[5]

- Metals:
  - Koppers Pond sediment: arsenic, cadmium, chromium, and lead;
  - Outlet cannel sediment: arsenic and cadmium; and

- SVOCs: benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(ghi)perylene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene.

No VOCs or pesticides were identified as COPCs for Koppers Pond or outlet channel sediments.

The supplemental screening of COPECs performed as part of the *ERAGS Steps 3 through 5 Report* (sBERA Section 4.1) identified the following COPCs:

- PCB Arolcor 1254;

- Metals: barium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc;

- Total Cyanide; and

- SVOCs: benzo(a)anthracene; benzo(a)pyrene; benzo(k)fluoranthene; benzo(ghi)perylene; dibenz(a,h)anthracene; indeno(1,2,3-cd)pyrene; 4-methylphenol; acenaphthylene; chrysene; pyrene; and total PAHs.

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[5] Aroclor 1254 was the only Aroclor detected in sediment; therefore, total PCBs is equivalent to Aroclor 1254 in sediment.

No VOCs or pesticides were identified as COPECs for Koppers Pond or outlet channel sediments.

4.2.2.1 Comparison of 2008 and 2010 Sediment Data

Table 34 compares the analytical data from the five sediment sampling locations in Koppers Pond that were sampled both in 2008 and in 2010 (all 0- to 6-inch depth increment). Table 34 lists the data from these two sampling events and shows the relative percent difference (RPD) between the 2008 and 2010 analytical results. This comparison is important in assessing whether the 2008 and 2010 data show distinct temporal trends or whether the data from these two sampling events can be combined into a single data set for evaluation in the BHHRA and sBERA. The data comparison is summarized as follows:

- <u>SVOCs:</u> There were several cases in the SVOC comparisons where RPDs of 200 percent were calculated, indicating that one of the pairs was a non-detect result while the other was detected. This was typically observed where the detected concentrations were low in one sample and the paired sample had a Reporting Limits (RLs) higher than the detected results. Excluding these situations, the average RPDs across all SVOCs and samples ranged from 35 to 54 percent.

- <u>PCBs</u>: Aroclor 1254 was the only PCB that was detected in both the 2008 and 2010 sediment samples. The RPD values ranged from 25 to 113 percent, with an average of 74 percent; only sample SD-08 had an RPD value less than 50 percent. The samples collected in 2008 generally exhibited higher PCB concentrations than the samples collected in 2010, except in Sample SD-06 where higher concentrations were detected in the 2010 sample. The variability in these results may be due to differences in the TOC in SD08-06 (2.3 percent) and SD10-06 (9.6 percent).

- <u>Metals:</u> There was good agreement in the paired comparisons for many of the metals (*i.e.*, the RPD values were less than 50 percent). The average RPDs across all metals and samples ranged from 16 to 41 percent.

- <u>TOC:</u> The TOC RPD values ranged from 2 to 123 percent, with an average of 45 percent. Four of the samples (SD-01, SD-03, SD-04, and SD-08) had RPD values less than 50 percent. The maximum RPD value was observed in Sample SD-06. Some variability between sampling events for TOC concentrations would be expected due to natural variation in organic carbon sources.

In summary, there is reasonably good agreement between the 2008 and 2010 sediment sample results collected from Koppers Pond, particularly for the metals results. PCB results appear overall to be lower in the 2010 than in the 2008 data from samples collected at similar locations. Metals results in the 2008 and 2010 data set are comparable.

4.2.2.2 Distribution of Metals and PCBs in Koppers Pond Sediments

Figures 13, 14, and 15 show the distribution of selected metals and PCB concentrations in sediments in Koppers Pond and the outlet channels. These figures present concentrations at three distinct depth increments within the sediment, *i.e.*, 0 to 6 inches, 6 to 18 inches, and greater than 18 inches, respectively. The specific metals shown in these figures are representative of those associated with past industrial discharges to the Industrial Drainageway and Koppers Pond.

Sampled sediments show the presence of metals and PCBs throughout Koppers Pond. Higher metals concentrations are associated with the 0- to 6-inch and the 6- to 18-inch depth sediments in the upper portion of the western leg of the pond (*i.e.*, Sample Locations 01, 02, and 03). Metals concentrations are consistently lower in the deeper (18- to 30-inch) sediment depth interval in the upper western leg and in sediments located further to the south and east. There is variability in the distribution of metals with depth. For example, the highest cadmium concentrations are consistently found in the 6- to 18-inch depth sediments, whereas highest lead levels are in the 0- to 6-inch sediment samples.

PCBs were found in sediment in all areas of Koppers Pond and at all depths of sampling. Like the metals, PCB concentrations are greater in sediments in the upper portion of the western leg of the pond (*i.e.*, Sample Locations 01, 02, and 03), but were also relatively high in sediments collected at Sample Location 13 at the upper eastern leg of the pond. Throughout most of the pond, PCB concentrations are higher in deeper sediments than in surficial (0- to 6-inch) samples. The maximum PCB concentration observed in any sediment sample collected during the RI (*i.e.*, 11 mg/kg) was detected at Sample

Location 03 at a depth of 25 to 29 inches into the sediment, whereas overlying sediments at Sample Location 03 exhibited PCB concentrations of 0.48 to 1.3 mg/kg in the 0- to 6-inch interval (both estimated values from the 2010 and 2008 sampling respectively), 4.9 mg/kg in the 6- to 18-inch depth interval, and 7.2 mg/kg in the 18- to 25-inch interval. This pattern of increasing PCB concentrations with depth is not evidenced in the south-central portion of the pond at Sample Locations 06, 08, and 09.

4.2.2.3 Distribution of Metals and PCBs in Outlet Channel Sediments

Figure 13 shows the RI analytical data for key constituents in sediment samples collected from the outlet channels, including those collected in May 2008 (*i.e.*, SD08-14, SD08-15, SD08-16, and SD08-17) and those collected further downstream in October 2010 (*i.e.*, SED10-18 and SED10-19).

As indicated by the data presented in Figure 13, as well as the full data sets presented in Tables 24 through 28, the outlet sediment samples show reduced COPC concentrations as compared to the sediments in Koppers Pond. At the locations of sediment samples collected in October 2010 downstream of previous sediment samples, COPC concentrations are much reduced. At both 2010 sampling locations, but especially at SED10-19, the quantity of sediment was limited and the sampled material appeared to be a hard clay. COPC concentrations, including cadmium, chromium, copper, lead, zinc, and PCBs, were 6 to more than 10 times lower at downstream location SED10-18 than at upstream location SED08-17. At SD10-19, located further downstream, these COPC concentrations were 8 to more than 100 times lower than the concentrations in the sediment at upstream location SED08-17. Based on both the physical and chemical data, Sample Location SD10-19 delineates the downstream extent of COPCs in the outlet channel sediment.

4.2.3 Operable Unit 3 RI and Other Historical Sediment Data

Past investigations of sediments in Koppers Pond were conducted in 1994 and 1995 as part of the Operable Unit 3 RI, and subsequently in 1998 in support of the draft baseline ecological risk assessment prepared by CDM. The sediment data from these past investigations are discussed below and are summarized in the PCSM (*i.e.*, Table 4 [TAL metals and cyanide], Table 5 [TCL VOCs and SVOCs], and Table 6 [TCL pesticides and PCBs]). These data tables are reproduced and included as Appendix I to this RI report.

4.2.3.1 Operable Unit 3 RI Data

The Operable Unit 3 RI included two rounds of sediment samples collected at the same time as the corresponding surface water samples. The initial round of samples was collected in 1994 and included six locations in Koppers Pond and its outlet channels (Figure I-1). These sediment samples were collected to a maximum depth of 24 inches and were composited throughout the depth of recovery. Collected samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and for TAL metals and total cyanides.

The second round of Operable Unit 3 RI sediment sampling was conducted in May and June 1995 to further characterize Site conditions. These second round sediment samples were analyzed for TCL SVOCs, PCBs, pesticides, certain TAL metals (*i.e.*, cadmium, chromium, lead, and mercury), and TOC. Unlike the earlier samples that were composites collected over depths ranging to 24 inches, the second round sediment samples were collected from the uppermost six inches of encountered material.

4.2.3.2 CDM Sampling Data

In support of its draft baseline ecological risk assessment, CDM collected sediment samples from 14 locations in Koppers Pond and adjacent waterways in August 1998. The sediment samples were typically collected from the uppermost six inches of the sediment surface, although vertical sediment profiles with multiple samples were collected at two locations. Collected sediment samples were analyzed for TAL metals and cyanide and for TCL pesticides and PCBs.

4.2.4 Comparison to Past Data and Data Assessment

This section examines Koppers Pond sediment data from 1995, 1998, 2008, and 2010. These comparisons were made to determine if there were differences in the metals and PCB concentrations observed previously (1995/1998 data set) from those observed from the Operable Unit 4 sampling (2008/2010 data set). Changes in concentrations provide insights into possible ongoing sources of COPCs and a basis for assessing potential future concentration trends.

4.2.4.1 Data Sets

The data from the first round of Operable Unit 3 sediment sampling (1994) are not comparable to later data sets, including the Operable Unit 4 data, because the 1994 data were collected as composites to depths of 24 inches. The second round of Operable

Unit 3 sediment sampling (1995) and much of the CDM sediment data (1998) are based on samples from the uppermost six inches of sediment, and these can be compared to the data from the uppermost interval sampled in the Operable Unit 4 RI. These 1995/1998 data points are the following:

SAMPLE LOCATION	SAMPLING DATE	SAMPLE LOCATION	SAMPLING DATE
SD-15B	06/06/95	SD-09 (0-6)	08/20/98
SD-17B	06/06/95	SD-10	08/19/98
SD-18B	06/06/95	SD-11	08/20/98
SD-05	08/18/98	SD-12 (0-6)	08/19/98
SD-06	08/19/98	SD-13	08/19/98
SD-07	08/19/98	SD-20	08/20/98

Not all constituents were analyzed in all samples, and some results were rejected in data validation.

No VOC data are available from prior studies of Koppers Pond that are comparable to the Operable Unit 4 data, *i.e.*, 0- to 6-inch sediments. Prior data for SVOCs are limited to three samples collected in June 1995 (SD-15B, SD-17B, and SD-18B), and the spatial distribution of these three sampling points within Koppers Pond (see Figure I-1) does not provide for a representative data set comparable to the 2008/2010 Operable Unit 4 sampling. Accordingly, no comparisons between prior and current VOC or SVOC data were conducted for Koppers Pond sediments.

4.2.4.2 Methodology

Selected metals and PCB data from the 1995/1998 data set were compared statistically to the data collected in the 2008 and 2010 Operable Unit 4 sampling. Descriptive statistics were developed for each of the evaluated metals and PCBs data set, including arithmetic mean, median, first quartile (25th percentile), third quartile (75th percentile), minimum, and maximum. Except for the arithmetic mean, these statistics are non-parametric; data sets were not evaluated for underlying distributions and were not log-transformed. In calculating means, values reported as "non detect" were replaced by a value of one-half of the corresponding RL.

Box plots, also called "box-and-whisker" plots, were then developed for the data sets using STATISTICA® software to show the distributional characteristics of the data. Each box plot consists of a box, whiskers, and outliers. A line is drawn across the box at the median. The bottom of the box is at the first quartile (Q1), and the top is at the third quartile (Q3) value. The whiskers are the lines that extend from the top and bottom of the box to the "adjacent values." The "adjacent values" are the lowest and highest observations that are still inside the region defined by the following limits:

Lower Limit: Q1 − 1.5 x (Q3 − Q1)
Upper Limit: Q3 + 1.5 x (Q3 − Q1)

The term (Q3-Q1) is also called the "inter-quartile range" (IQR). In this presentation, points outside of the lower and upper limits are considered outliers and are plotted with an open circle or filled triangle; the latter represents "extreme values" which are those that are greater than three times the IQR. This approach to identifying outliers is non-parametric as it does not assume a distribution type for the dataset. Figure 16 provides a diagram explaining the components of the box plots presented in this report.

4.2.4.3 Data Comparisons - Surface (0- to 6-Inch) Sediments in Koppers Pond
The following paragraphs summarize the statistical comparisons between the prior 0- to 6-inch depth sediment data from Koppers Pond and the Operable Unit 4 sediment data collected from the 0- to 6-inch depth increment. The inter-event comparisons were calculated as percent differences to show the changes over time. Figures 17 and 18 are box plots that provide graphical comparisons between the prior data and the Operable Unit 4 data for selected metals and PCB. Statistics of the individual data sets are summarized in Table 35.

Overall, metals concentrations found in the Operable Unit 4 (2008 and 2010) sampling of Koppers Pond surface sediments are similar to those observed in prior data sets. Average PCB concentrations in surface sediment appear to have been reduced from 1995/1998 through 2010.

Cadmium Results: Cadmium was detected in all 10 of the previously collected (*i.e.*, 1995 and 1998) 0- to 6-inch Koppers Pond sediment samples, in all 13 of the 2008 0- to 6-inch sediment samples and in all six of the 2010 0- to 6-inch sediment samples. The mean and median cadmium in the 2008 Operable Unit 4 data (261 mg/kg and 117 mg/kg, respectively) are comparable to the corresponding values from the 1995/1998 data (243 and 109 mg/kg, respectively). The median value for the 2010 dataset (288 mg/kg) was greater than those for the prior datasets, but the range of the 2010 results was within those from the prior datasets.

The box plot provided in Figure 17 shows the similarity of the distribution of data within these cadmium data sets. The 2008 cadmium values show a slightly larger range as the maximum cadmium value detected in the 2008 sampling (739 mg/kg) was greater than that observed in the 1995/1998 sampling (583 mg/kg). The 2010 maximum value (367 mg/kg) was lower than observed in the prior datasets.

Chromium Results: Chromium was detected in all 10 of the previously collected (*i.e.*, 1995/1998) 0- to 6-inch Koppers Pond sediment samples, in all 13 of the 2008 0- to 6-inch sediment samples, and in all six of the 2010 0- to 6-inch sediment samples. The mean and median chromium in the 2008 Operable Unit 4 data (245 mg/kg and 226 mg/kg, respectively) are similar to the corresponding values from the 1995/1998 data (223 mg/kg and 218 mg/kg, respectively). The median value for the 2010 dataset (327 mg/kg) was greater than those for the prior datasets, but the range of the 2010 results was within those from the prior datasets. The box plot provided in Figure 17 shows the similarity of the distribution of data within these chromium data sets. As with cadmium, the 2008 chromium values show a slightly larger range as the maximum chromium value detected in the 2008 sampling (462 mg/kg) was greater than that observed in the 1995/1998 sampling (357 mg/kg). The 2010 maximum value (370 mg/kg) was slightly higher than the maximum value for the 1995/1998 dataset.

Copper Results: Copper was detected in all seven of the 1995/1998, in all 13 of the 2008, and in all six 2010 sediments in the 0- to 6-inch interval. As is the case for cadmium and chromium, the mean values are similar for the two data sets (1995/1998 – 358 mg/kg; 2008 – 368 mg/kg), but was slightly larger in the 2010 dataset (403 mg/kg). The median of the 2008 Operable Unit 4 data (298 mg/kg) is lower than that of the 1995/1998 data (354 mg/kg), but was larger in the 2010 dataset (447 mg/kg). The box plot provided in Figure 17 shows the similarity of the distribution of data within these copper data sets. As with cadmium and chromium, the 2008 copper values show a slightly larger range as the maximum copper value detected in the 2008 sampling (820 mg/kg) was higher than that observed in the 1995/1998 sampling (694 mg/kg).

Lead Results: Lead was detected in all 10 of the 1995/1998 samples of sediments in the 0- to 6-inch interval, in all of the 2008 (13 samples) samples of sediments in the 0- to 6-inch interval, and in all six of the 0- to 6-inch sediment samples collected in 2010. The mean lead values in the two earlier data sets are comparable (1995/1998 – 632 mg/kg; 2008 – 648 mg/kg), but was larger in the 2010 dataset (869 mg/kg). The median and maximum of the 2008 Operable Unit 4 data (348 mg/kg and 1,620 mg/kg, respectively) are lower than the corresponding lead values from the 1995/1998 data (443 and 2,210 mg/kg, respectively). Although the median lead value for the 2010 samples was greater than the prior datasets (869 mg/kg), the maximum value was lower (1,270 mg/kg).

Mercury Results: Mercury was detected in three of eight sediment samples (0- to 6-inch interval) analyzed for mercury from the 1995/1998 sampling and, because of lower RLs, in all 18 of the 0- to 6-inch sediment samples collected in 2008, and in all six of the 0- to 6-inch sediment samples collected in 2010. The mean and median mercury in the 2008 Operable Unit 4 data (0.53 mg/kg and 0.40 mg/kg, respectively) are similar to the corresponding values from the 1995/1998 data (0.56 and 0.39 mg/kg, respectively), but were slightly higher in the 2010 Operable Unit 4 data (0.71 and 0.80 mg/kg, respectively) relative to the 1995/1998 data. The box plot provided in Figure 18 shows the similarity of the distribution of data within these two mercury data sets.

Nickel Results: Valid nickel data are only available from six sediment samples collected from the 0- to 6-inch interval in the 1995/1998 sampling. The mean and median nickel concentrations, which were detected in all 13 of the 2008 Operable Unit 4 data (103 mg/kg and 117 mg/kg, respectively), and all six of the 2010 Operable Unit 4 data (100 mg/kg and 103 mg/kg, respectively), are comparable to the corresponding values from the more limited 1995/1998 data (both 116 mg/kg). The box plot provided in Figure 18 shows the similarity of the distribution of data within these two nickel data sets.

Zinc Results: Zinc was detected in all of the 1995/1998 (7 samples), in all of the 2008 (13 samples), and in all of the 2010 (6 samples) samples of sediments in the 0- to 6-inch interval. For zinc, the mean and median concentrations for the 2008 data (4,290 and

1,720 mg/kg, respectively) were both lower than the corresponding values from the 1995/1998 data set (4,510 and 2,120 mg/kg). The mean and median concentrations for the 2010 data (4,753 and 4,940 mg/kg, respectively) were greater than observed in either of the earlier datasets. As shown in the box plot in Figure 18, however, the overall data sets are comparable and the maximum zinc concentration is 12,500 mg/kg in both the 1995/1998 and 2008 datasets.

PCB Results: The average 2008 and 2010 PCB concentrations in surface (0- to 6-inch) sediments of Koppers Pond were lower than comparable samples collected in 1995 and 1998. The mean, median, and maximum concentrations of total PCBs in the 2008 Operable Unit 4 data are lower than the corresponding values from the 1995/1998 data (concentrations in units of microgram per kilogram [µg/kg]):

COMPARISON OF 1995/1998 TO 2008 PCB DATA IN SURFACE (0- TO 6-INCH) SEDIMENTS IN KOPPERS POND

PARAMETER	1995/1998 DATASET	2008 DATASET	PERCENT DIFFERENCE
Mean	960	841	12
Median	665	580	13
Maximum	4,500	2,700	40

For the locations sampled in both 2010 and 2008, the 2010 PCB concentrations in surface (0 to 6-inch) sediment are lower.

COMPARISON OF 2008 TO 2010 PCB DATA IN SURFACE (0- TO 6-INCH) SEDIMENTS IN KOPPERS POND (COMMON SAMPLING LOCATIONS ONLY)

PARAMETER	2008 DATASET	2010 DATASET	PERCENT DIFFERENCE
Mean	988	512	48
Median	1,300	520	60
Maximum	1,500	750	50

Aroclor PCBs were evaluated in the laboratory analyses of the sediment samples used in these comparisons, and Aroclor 1254 was the only PCB that was detected. The apparent downward trend in PCB concentration in the upper (0- to 6-inch) sediments in Koppers Pond may reflect the ongoing effects of the Industrial Drainageway remediation completed in 2003. In that remediation, sediments exhibiting PCB concentrations greater than 1 mg/kg, including some sediments with total PCB concentrations exceeding 50 mg/kg (Cummings/Riter, 2001), were removed from the Industrial Drainageway. After sediment removal, clean soils were used to replace sediments and bank soils as needed to reshape the channel. This Operable Unit 3 remedial action reduced the most apparent migration route for PCBs to Koppers Pond. As a result of that remediation, recent deposits of sediments transported to Koppers Pond via the Industrial Drainageway should have lower concentrations of PCBs than historical levels.

4.2.4.4 Data Comparisons - Sediments in Outlet Channels

Seven samples of outlet channel sediments were collected as part of the Operable Unit 3 studies conducted in 1995 and in the CDM (1998) follow-up sampling. These samples are the following (See *Preliminary Conceptual Site Model*, Figure 3):

SAMPLE LOCATION	SAMPLING DATE	SAMPLE LOCATION	SAMPLING DATE
SD-16	06/06/95	SD-02	08/20/98
SD-19	06/06/95	SD-03	08/19/98
SD-20	06/06/95	SD-04	08/19/98
SD-01	08/20/98		

All of these samples were collected of surface sediment and are comparable to the four outlet channel sediment samples collected as part of the 2008 Operable Unit 4 investigations.

Table 35 includes summary statistics of the 1995/1998 and 2008 data sets for selected metals and PCBs in sediment. Figures 19 and 20 provide box plot comparisons of these data. In all cases, constituent concentrations in the outlet channel sediments are much lower than the corresponding constituent concentration in Koppers Pond.

Data comparisons with respect to the outlet channel sediment samples are complicated by differences in depositional environments in various reaches of these streams. In the

Operable Unit 4 sampling, care was taken to ensure the outlet channel sediments were collected from pool locations where sediments accumulate and constituent concentrations tend to be higher, rather than in faster-moving scour (riffle) sections where constituent concentrations tend to be lower. It is not known the degree to which depositional environmental was a criterion for sample location selection in the 1995 or 1998 data sets, and it appears that at least some of the earlier samples may represent scour sections. For this reason, the data comparison may be biased to suggesting higher concentrations in the 2008 data.

In addition, the two outlet channel sediment samples collected in October 2010 (*i.e.*, SD10-18 and SD10-19) are located downstream of the 2008 and prior sampling locations. These two samples were specifically collected to assess whether the COPCs from Koppers Pond affected the stream bottom downstream of the 2008 and prior sampling locations, and how to manage materials removed from this channel during maintenance for local flood control. At both SD10-18 and SD10-19 locations, the stream bottom was a hard clay, not the soft alluvial sediments found upstream in the outlet channel and the pond. Analyses of these samples indicated much lower COPC concentrations than found upstream. At SD10-19, the furthest downstream sample, concentrations of cadmium (0.7 mg/kg), chromium (18.7 mg/kg), copper (18.6 mg/kg), lead (19.2 mg/kg), zinc (95 mg/kg), and PCBs (0.0029 mg/kg) are reduced by 95 to 99 percent compared to these COPC concentrations at Sample Location SD08-17, situated approximately 340 feet upstream.

Based on both the physical and chemical data, Sample Location SD10-19 delineates the downstream extent of COPCs in the outlet channel sediment. Also, because of the marked difference in the substrate sampled at SD10-18 and SD10-19, as compared to the soft sediments sampled at upstream locations in 2008 and previously, the two 2010 sediment sample results were not included in the data sets used to assess temporal trends in metals or PCB concentrations in the outlet channel sediments.

Statistical summaries of the 1995/1998 and the Operable Unit 4 2008 data sets are included in Table 35 for selected metals and PCBs. Figures 19 and 20 are box plots that provide graphical comparisons between the prior data and the Operable Unit 4 data for these constituents.

Metals concentrations appear generally higher in the Operable Unit 4 2008 data set than in the 1995/1998 data, although peak concentrations of lead and nickel in prior data were not reproduced. The maximum lead and nickel concentrations in the Operable Unit 4 data are much lower. The maximum chromium, copper, and mercury concentrations in the Operable Unit 4 were comparable to the 1995/1998 data.

Comparisons were not made between PCB data sets because PCBs were not detected in the outlet channel samples collected in 1995 and 1998. RLs for these prior analyses ranged to 1,250 µg/kg, compared to the maximum of 182 µg/kg total PCBs in the 2008 data, so no meaningful comparisons can be made.

4.2.5 Sediment Toxicity

Short-term toxicity studies of 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 reduction in survival in any of these samples in the chironomid test, 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 test (average of 78 percent; the range was 50 to 100 percent for the eight individual replicates in this sample). Short-term toxicity studies were not conducted for the 2010 samples; however, based on the similarities in sediment chemical concentrations reported for the 1998 and more-current sampling events, it is unlikely that the Koppers Pond sediments currently exhibit short-term toxicity. However, the potential chronic toxicity of the Koppers Pond sediments represented a data gap.

As part of the sBERA, the following long-term toxicity tests were conducted using five sediment samples (plus one duplicate) from Koppers Pond to address this data gap:

- 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*[6]

One composite sediment sample from the Reference Pond was similarly tested to provide information on the potential sediment toxicity of ponds that are reflective of background conditions.

The sBERA (Integral, 2012b) provides a detailed discussion and statistical analysis of the results of the long-term sediment toxicity testing, which are summarized below.

- There was no apparent lethal toxicity for either species and their evaluated endpoints for the sediment composite collected from the Reference Pond.

- Five metrics were used to evaluate the potential toxicity for the *Hyalella* sediment toxicity test. There was no significant difference between the Koppers Pond sediments and the Reference Pond sample results based on the *Hyalella* tests for three of the five metrics. The endpoints that were significantly different from the reference sample include a survival endpoint (28-day survival) and 42-day mean weight (growth endpoint), which are summarized below:

  - There is a statistically significant decrease in *Hyalella* growth (based on average body weight) after 28 days relative to the Reference Pond results (but not the control sediment) for three Koppers Pond sediment samples (SD10-03, SD10-04, and SD10-08). However, survival was unaffected and growth rate was comparable across these (and other Koppers Pond) sediments after 42 days. Because the growth rate was greater than the control sediment after 28 days, this is believed to be a testing artifact.

  - There is no statistically significant difference in *Hyalella* reproduction (young per surviving female) between the Koppers Pond samples and the Reference Pond, except for Sample SD10-06. Although less than the other Koppers Pond samples (0.18 young compared to 0.66 to 3.0 young per female), the result for SD10-06 is greater than that observed for the control sediment (0.05 young per female).

- Ten metrics were used to evaluate the potential toxicity for the chironomid sediment toxicity test. There was no significant difference

[6] This species has recently been renamed as *C. dilutus*.

between the Koppers Pond sediments and the Reference Pond sample results based on the *Chrionomus* test for two of the ten metrics. These include 20-day mean weight (growth endpoint) and mean eggs per female (reproduction endpoint). Statistical analyses were not required for six of the ten metrics. The two metrics that showed potential effects are summarized below:

- Survival is unaffected relative to the reference sample after 20 days, except in the duplicate sample from Location SD-01 (*i.e.,* SD10-01Dup). The primary sample collected from Location SD-01 in Koppers Pond (*i.e.,* SD10-01) is statistically similar to the Reference Pond).

- There is no statistically significant difference between the total emergences of adult chironomids for the Koppers Pond samples relative to the Reference Pond, except in Sample SD10-01.

Based on these results, there is no evidence of potential lethal toxicity in any of the pond samples; however, there is some evidence of sublethal toxicity based on the *Hyalella* tests in the area of Sample SD10-06, and some evidence of sublethal toxicity based on the chironomid tests in the area of Sample SD10-01. The potential correlation of the toxicity results and sediment COPEC concentrations was evaluated in the sBERA. There were no clear correlations between these parameters, suggesting other factors may be causing the observed sublethal toxicity results in these samples.

4.2.6 Benthic Community Studies

An initial benthic community assessment was performed by CDM (1999), using sediments collected in 1998. Five sediments collected from Koppers Pond and a composite sediment sample collected from the Reference Pond in October 2010 were subsequently evaluated in a similar manner to the 1999 CDM study. The sBERA (Integral, 2012b) provides a detailed discussion of the results of the benthic community studies, and the key results are summarized below:

- A larger number of taxa and a larger number of organisms were reported in the October 2010 samples compared to the August 1998 samples. Chironomids were the dominant organisms reported for Koppers Pond for both sampling years, although these were more abundant in the 2010 samples. Aquatic worms (oligochaetes) were also reported in small numbers in all of the 2010 samples but were not reported in any of the 1998 samples from Koppers Pond. Fingernail clams (Family Sphaeriidae) were reported in one of the samples collected in 1998 but were not reported in any of the 2010 samples.

- A larger number of taxa and a larger number of organisms were reported in the Reference Pond composite sediment sample relative to the Koppers Pond samples collected in 2010. The benthic community in the Reference Pond was dominated by chironomids and midges. Fingernail clams (Family Sphaeriidae) and mayflies (*Caenis* spp) were also present in the Reference Pond sample. No aquatic worms were present in samples from either area.

- The Hilsenhoff Biotic Index (HBI) is a benthic community metric that relates macroinvertebrate assemblage tolerance toward nutrient enrichment. The HBI values for the 1998 samples ranged from 5.40 to 6.00 (average: 5.80). The 2010 Koppers Pond samples ranged from 6.11 to 6.50, with an average of 6.29, and the Reference Pond had a calculated HBI of 6.00. All of these values fall within the "Fair" water quality range (5.51 to 6.50) according to the HBI.

The benthic communities of both Koppers Pond and the Reference Pond are consistent with shallow, warm water bodies.

4.3 FISH TISSUE

4.3.1 Summary of Operable Unit 4 Fish Tissue Data

Tables 36 and 37 present the individual results of the Operable Unit 4 RI (2008 and 2010) fish tissue analyses. Table 38 summarizes the analytical results from game fish collected from Koppers Pond in May 2008, and Table 39 summarizes the analytical results from forage fish collected from Koppers Pond and the outlet channels in May 2008 and October 2010, respectively. These summaries only include the results for those constituents that were detected at least once in these samples.

4.3.1.1 2008 Fish Data from Koppers Pond

Tables 36 and 37 include the individual results of the 2008 fish tissue analyses. In these analyses, the TAL metals and TCL pesticide results reported by TestAmerica Pittsburgh, and the PCB and lipid results reported by TestAmerica Burlington, were used for the fish tissue. As described in Section 3.3.4, the initial PCB and lipid results reported for fish samples analyzed by TestAmerica Pittsburgh appeared biased low. A corrective measure was implemented, and the PCB and lipid results from a second laboratory (TestAmerica Burlington) were used in lieu of the original results. This reduced the uncertainty in the original reported results for these parameters in the fish samples. The metal results from TestAmerica Pittsburgh are appropriate to use because the extraction method (acid digestion) is less sensitive to the tissue matrix than the PCB analyses. Because of insufficient sample mass for additional sample re-analyses, the pesticide results reported by TestAmerica Pittsburgh could not be confirmed by TestAmerica Burlington. Consequently, there is some uncertainty in the fish pesticide results compared to the remaining parameters for these samples.

4.3.1.2 2010 Forage Fish Data from West Outlet Channel

Forage fish were not present in either the East or West Outlet Channels of Koppers Pond during the sampling conducted in May 2008. The west outlet was re-sampled during the October 2010 sampling event, and forage fish were successfully collected downstream of the beaver dam, between the SD08-14 and SD08-17 sediment locations (Figure 8).

The forage fish that were collected in October 2010 from the west outlet included young-of-year (YOY) largemouth bass, YOY white sucker, spotfin shiner, bluegill, pumpkinseed and brown bullhead. These fish were combined into a single composite sample for chemical analysis. The SLs of the fish included in that sample ranged from 35 to 131 mm (average of 78 mm), and body weights ranged from 0.5 to 19.1 g (average of 5.5 g). While one creek chub was also collected, it was not retained for chemical analysis because this species was not collected from Koppers Pond. None of the fish collected in the West Outlet Channel exhibited any external lesions or physical anomalies.

Table 39 includes the results from the testing of the forage fish sample collected from the West Outlet Channel in 2010.

4.3.2 Operable Unit 3 RI and Other Historical Data

4.3.2.1 Operable Unit 3 RI Data

After an initial (spring 1994) attempt to collect fish samples using normal fishing techniques was unsuccessful, fish sampling from Koppers Pond using electroshocking techniques was completed in June 1995 as part of the Operable Unit 3 RI. This sampling resulted in the collection and tissue analysis from 15 fish samples (*i.e.*, six white sucker and nine common carp). Of these, three of the carp samples (*i.e.*, CC-07, CC-08, and CC-09) were composited into one sample for analysis because of the limited sample size available from these discrete fish tissue samples. Skinless fish filets from collected specimens were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals, and cyanide, although limited sample size did not allow for analysis of all parameters in all samples. The developed analytical data are presented in Table 7 of the *Preliminary Site Conceptual Model* and included in Appendix J of this RI report.

4.3.2.2 July 2003 Sampling Data

In 2003, CEC, under contract to Viacom, conducted fish sampling in Koppers Pond to provide updated information on PCB and metals concentrations in fish tissue. Fish were collected using electroshocking techniques, resulting in a total of 24 fish samples for analysis. Collected species included both bottom-feeding (*i.e.*, common carp and white sucker) and pelagic species (*i.e.*, largemouth bass, pumpkinseed, black crappie, and green sunfish). The samples of fish for potential human consumption (*i.e.*, common carp, white sucker, and largemouth bass) were prepared as skin-on filets with the belly flap included, in accordance with NYSDEC (2002) procedures. Smaller fish species for ecological evaluation (*i.e.*, pumpkinseed, black crappie, and green sunfish) were analyzed as whole-body samples. Table 8 of the *Preliminary Site Conceptual Model* presents the results of these analyses; and these data are included in Appendix J of this RI report.

4.3.3 Comparison to Past Data

4.3.3.1 Comparison of 2003 and 2008 Collected Species and Morphometric Parameters

Table 40 compares the species and key morphometric parameters (*e.g.*, body weight) of the fish collected in 2003 and 2008 from Koppers Pond. The primary focus of the 2003 field effort was on the collection of game fish, which included six species (black crappie, common carp, green sunfish, largemouth bass, pumpkinseed, and white sucker). The 2008 game fish collections included five of these species (green sunfish were not collected) plus bluegill. Smaller bluegill and pumpkinseeds collected in 2008 were evaluated as forage fish.

Four of the species collected in 2008 (black crappie, common carp, largemouth bass, and white sucker) had larger average body weights compared to the 2003 collections, although the body weight ranges for these species were similar between the two sampling events. The range of body weights for the pumpkinseeds also were similar for the 2003

(18 to 84 g) and 2008 (5.7 to 83.7 g), but the mean body weight for this species was lower in 2008 compared to 2003. This lower mean body weight may be due to the one small fish included in this composite.

Body weight is related to fish length based on the following allometric equation (Froese, 1998):

$$\text{Log BW} = \text{Log } \alpha + \text{Log L}^*\beta$$

BW is the body weight (g), α and β are species-specific constants, and L is the length (in centimeters) measured as either TL (foremost point of the head to the tip of the tail) or SL (tip of the upper lip to end of the vertebral column). Values for α and β are available on-line (Froese and Pauly, eds., 2011). The values for α and β will differ for the same specifies depending upon whether SL or TL values are used for the length measurements.

TLs were measured in the fish collected in 2003 whereas SLs were measured in the fish collected in 2008 at the request of NYSDEC, so these are not directly comparable. However, there is a species-specific numeric relationship between SL and TL, as summarized in the table below for the species collecting during both sampling events.

Species	**SL as Decimal Fraction of TL**
Black crappie	0.832
Common carp	0.826
Largemouth bass	0.874
Pumpkinseed	0.808
White sucker	0.858

These values were used to calculate the estimated mean values for TL shown in Table 40.

Based on these results, the average sizes and weights of four of the game fish (common carp, largemouth bass, pumpkinseed, and white sucker) were comparable between the

2003 and 2008 sampling events. The one major exception are the black crappie results collected in 2008 (mean weight: 199 g), which were larger than the black crappies collected in 2003 (mean weight: 59 g). The causes of the differences in sizes of the black crappie between these sampling years are not known.

4.3.3.2 Comparison of 2003 and 2008 Fish Analytical Results

PCB and metal results were available for both the June 2003 (CEC, 2003) and May 2008 Koppers Pond fish samples. These results are summarized and compared for all game fish on Table 41. The June 2003 fish were assessed as game fish by CEC (2003), even though several of the fish samples were analyzed as whole body samples. Seven heavy metals were evaluated for these comparisons. Comparisons were not made to the one forage fish sample collected in 2010 because of the location of this sample (in outlet channels rather than in the pond) and the much smaller individual fish size comprising the composite forage fish sample.

A subset of these analytical results was evaluated further to assess whether there were any temporal differences between these sampling events. These included seven metals and total PCBs. This compilation was not based entirely on COPCs that were evaluated in either of the risk assessments *per se*, but rather specific metals were selected to include those associated with past discharges to the Industrial Drainageway, plus mercury. This comparison focused only on the gamefish, because forage fish were not collected in the 2003 fish survey.

Cadmium Results: Cadmium was detected in 19 of the 24 game fish samples collected in 2003, but was not detected in the 2008 samples. Table 41 shows that the mean cadmium in the 2003 samples (0.14 mg/kg) was less than the RLs (0.26 to 3 mg/kg) for these samples. The apparent difference between the 2003 and 2008 results was not attributable to analytical issues because a lower detection limit for cadmium (0.1 mg/kg) was reported in the 2008 samples. A box plot was not prepared for the cadmium results because the 2008 samples were all not detected.

Chromium Results: Chromium was detected in all of the 2003 and 2008 game fish samples. As shown in Table 41, the mean chromium concentration in the 2003 samples (0.40 mg/kg) was less than the 2008 samples (0.59 mg/kg). The ranges of the chromium results overlapped between the two sample years, as shown in the box plot for all game fish combined (Figure 21). This figure also shows the box plots for three individual species. Review of this figure shows that the 2008 mean results were all greater than the 2003 mean results for the common carp, white sucker, and largemouth bass.

Copper Results: Copper was detected in all of the 2003 and 2008 game fish samples. As shown in Table 41, the mean copper concentration in the 2003 samples (0.89 mg/kg) was about twice that of the 2008 samples (0.46 mg/kg). The ranges of the copper results overlapped between the two sample years, as shown in the box plot for all game fish combined (Figure 22), although the range was narrower for the 2008 samples. This figure also shows the box plots for three individual species. Review of this figure shows that the 2008 mean results were all lower than the 2003 mean results for the common carp, white sucker, and largemouth bass.

Lead Results: Lead was detected in all of the game fish samples collected in 2003 and in 2008. Table 41 shows that the mean lead concentration was lower in the 2008 samples (0.06 mg/kg) compared to the 2003 samples (0.84 mg/kg). The ranges of the lead results did not overlap between the two sample years, as shown in the box plot for all game fish combined (Figure 23). This figure also shows the box plots for three individual species. Review of this figure shows that the 2008 mean results were all lower than the 2003 mean results for the common carp, white sucker, and largemouth bass.

Mercury Results: Mercury was detected in all of the 2003 and 2008 game fish samples. As shown in Table 41, the mean mercury concentration in the 2003 samples (0.03 mg/kg) was lower than that observed in the 2008 samples (0.14 mg/kg). The ranges of the mercury results for all game fish combined slightly overlapped between the two sample years (Figure 24), although the observed concentrations were greater for the 2008 samples. This figure also shows the box plots for three individual species. The mercury concentrations in the carp overlapped between the two sample years, but the ranges differed for the white sucker and largemouth bass.

Nickel Results: Nickel exhibited a much lower detection frequency in the 2003 game fish samples (8/24) than in the 2008 game fish samples (20/20). Box plots comparing the 2003 and 2008 results were not prepared due to the low detection frequency in the 2003 samples. The mean concentration of nickel in the game fish collected in 2008 was 0.038 mg/kg. The mean concentration from the 2003 samples could not be approximated by replacing non-detect measurements with one-half of the RL, because the RLs from the 2003 sampling event (range: 0.83 to 0.99 mg/kg) were greater than the observed positive results from 2003 which were all estimated values above the minimum detection limit but below the RL (range: 0.2 to 0.38 mg/kg; Table 41), yielding a mean value that was greater than the observed concentrations. The highest nickel concentration detected in the 2008 samples was less than the lowest positive nickel detection from the 2003 samples.

Zinc Results: Zinc was detected in all of the game fish samples collected in 2003 and in 2008 (Table 41). The mean zinc concentration was lower in the 2008 samples (9.45 mg/kg) compared to the 2003 samples (21.57 mg/kg). The ranges of the zinc results overlapped between the two sample years, as shown in the box plot for all game fish combined (Figure 25). This figure also shows the box plots for three individual species. Review of this figure shows that the 2008 mean results were also lower than the 2003 mean results for the common carp, white sucker, and largemouth bass, although there was overlap in concentrations for the common carp and white sucker between the two sampling years.

PCB Results: As shown on Table 41, the June 2003 samples included three positively detected PCB Aroclors (*i.e.*, Aroclors 1248, 1254, and 1260) with total PCB concentrations ranging from 267 to 2,400 micrograms per kilogram (μg/kg) (mean of 791 μg/kg). PCB Aroclors 1254 and 1260 were detected in the 2008 game fish samples. Aroclor 1254 was the predominant PCB in the 2008 samples, and the total PCB concentrations ranged from 90 to 2,060 μg/kg (mean of 525 μg/kg) in the 2008 samples.

The mean PCB results, normalized by percentage of body lipids, were similar between the 2003 and 2008 sampling events (Figure 26) for white sucker and carp, but approximately four times higher in the 2008 sampling event for largemouth bass and black crappie, as shown below. It is noted that the lipid contents for the largemouth bass and black crappie were significantly lower in the 2008 data than in the 2003 data.

- Black Crappie: 4.2x increase in total PCBs (from 601 to 2,525 μg/kg);
- Common Carp: 12 percent reduction in total PCBs (from 517 to 453 μg/kg);
- Largemouth Bass: 3.7x increase in total PCBs (from 379 to 1,412 μg/kg); and
- White sucker: 11 percent reduction in total PCBs (from 254 to 227 μg/kg)

A comparison of the two remaining species collected in 2003 (green sunfish and pumpkinseed) was not performed since these species were not collected in 2008. A comparison between the 2003 and 2008 results for the forage fish could not be performed because forage fish were not collected during the 2003 sampling event. A more detailed analysis of these results was included in the BHHRA and sBERA.

4.4 KOPPERS POND VEGETATION SAMPLES

The vegetation samples were analyzed for PCBs, TAL metals, and lipid content. Total cyanides were not analyzed in these samples because the laboratory was unable to identify a suitable EPA method to analyze this chemical in plants. The analytical results are presented by sample in Table 42. The concentration units are on a wet weight basis.

4.4.1 Duckweed

The Koppers Pond duckweed sample (VG10-14, VG10-14RE) had no detectable PCBs (RL of 20 micrograms per kilogram wet-weight [$\mu g/kg_{ww}$]), but 12 metals were detected in this sample. Of the detected metals, five (*i.e.*, cadmium, chromium, iron, lead and zinc) were also sediment COPECs. The duckweed metals concentrations were lower than those detected in the sediment samples collected from Koppers Pond. The lipid content of the duckweed samples was 0.35 percent.

4.4.2 Cattails

Cattail roots were collected from one sample location (VG10-01) in Koppers Pond near SD08-01. PCBs (as Aroclor 1254) were detected in this sample at low levels (54 $\mu g/kg_{ww}$). Thirteen metals were also detected in this sample. Of the detected metals, eight (*i.e.*, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc) were sediment COPECs. The metal concentrations in the cattail roots were generally greater than were observed in the other vegetation samples collected from Koppers Pond. The observed metal results may have been due, in part, to residual sediments present in the outer skin of the cattail roots, which were not removed prior to processing by the laboratory. Lipids were not detected in this sample (detection limit of 0.25 percent).

4.4.3 Terrestrial Vegetation

The Koppers Pond terrestrial vegetation samples were collected from two locations (*i.e.*, near SD08-07 and in the mud flat area) and consisted of different types of vegetation (Table 42). Neither sample had detectable PCBs (detection limits of 20 and 21 $\mu g/kg_{ww}$). Nine metals were detected in sample VG10-07. Of the detected metals, four (*i.e.*, barium, iron, lead, and zinc) were sediment COPECs. The metals concentrations in these samples were less than those measured in other vegetation samples (including the duckweed and cattail roots) collected from Koppers Pond. The lipid concentration in this sample was 1 percent.

4.5 REFERENCE POND

The sBERA (Integral, 2012b) describes the sampling and testing performed on sediments, fish, and vegetation at the nearby Reference Pond in October 2010. The findings of this testing and comparisons with similar testing for Koppers Pond media are summarized below.

4.5.1 Sediment

4.5.1.1 COPC Concentrations

As described in Sections 3.1 and 3.3.1.2 of the sBERA, a Reference Pond sediment sample, composited from six sampling locations within the Reference Pond (Figure 11), was analyzed for TCL SVOCs, PCBs, TAL metals, and TOC. Both sieved (0.5 mm) and unsieved samples were analyzed from this location. The analytical results are presented in Table 43. The concentration units are reported on a dry-weight basis.

Eleven of the 19 SVOCs that were detected in the Koppers Pond sediment samples were also detected in the Reference Pond sample. These included seven of the sediment COPECs. The average concentrations for five of the seven sediment COPEC SVOCs were below the refined ecological screening values (ESVs) presented in the *ERAGS Steps 3 through 5 Report*. The exceptions were benzo(a)pyrene and indeno(1,2,3-cd)pyrene. There were no detectable PCBs in this sample. Twenty-one inorganics were detected in this sample, including eleven of the sediment COPECs. The average concentrations for nine of the 11 metals were below the refined ESVs from the *ERAGS Steps 3 through 5 Report*. The exceptions were barium and lead.

The Reference Pond sediment sample was sieved prior to sediment toxicity testing to remove indigenous chironomids that would interfere with the chironomid toxicity bioassay. Because the Koppers Pond samples were unsieved prior to toxicity testing, the analytical laboratory was requested to analyze both sieved and unsieved samples from Reference Pond sample to determine whether sieving caused any changes in the constituent concentrations.

Table 43 presents the results for those constituents detected in the sieved or unsieved analyses. The analytical results are very similar, showing a RPD value of less than 50 percent for most of the constituents[7]. For the metals, the RPDs ranged from 0 to 72 percent (average of 19 percent). Chromium was the only metal parameter for which the RPD exceeded 50 percent, with the sieved sampled having a greater concentration (18.9 mg/kg) than measured in the unsieved sample (8.9 mg/kg). For the SVOCs, two of the PAHs (*i.e.*, anthracene and benzo(k)fluoranthene) were not detected in the unsieved sample but were detected at low levels in the sieved sample. For the remaining SVOCs, the RPDs ranged from 8 to 48 percent (average of 26 percent). The percent solids were similar between the sieved and unsieved sample, but the TOC content was greater in the sieved sample compared with the unsieved sample. The cause of this difference is unclear. As noted previously, the sieved sample from the Reference Pond was used for toxicity testing.

4.5.1.2 Sediment Toxicity

Long-term chronic toxicity tests were performed on the composite sediment sample collected from the Reference Pond in 2010. For the *Hyalella* tests, the 28-day survival in the Reference Pond sediment was 97.5 percent with a mean survivor weight of 0.445 milligrams (mg), and the 42-day survival was 96.3 percent with a mean survivor weight of 0.627 mg. For the *Chironomus* tests, the 20-day Survival for the Reference Pond sediment was 91.7 percent with a mean survivor weight of 1.92 mg and a total emergence of 77.1 percent. As described in Section 5.1.1 of the sBERA, these results indicate that there was no apparent lethal toxicity for either species for the sediment composite collected from the Reference Pond.

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[7] An RPD value of 50 percent was used as the benchmark for comparison because this is the typical RPD value used during data validation to determine the suitability of replication of sample-duplicate pairs for sediments.

4.5.1.3 Benthic Communities

The composite sediment sample from the Reference Pond was evaluated for benthic invertebrate organisms, and benthic community metrics were calculated. The benthic community in the Reference Pond was dominated by chironomids and midges. Fingernail clams (Family *Sphaeriidae*) and mayflies (*Caenis* spp) were also present in this sample. The Reference Pond had a calculated HBI of 6.00, which falls within the "Fair" water quality range.

4.5.2 Fish Samples

4.5.2.1 Forage Fish

Forage fish were collected from multiple locations within the Reference Pond in October 2010, and were predominantly bluegills with one pumpkinseed. Five composite samples (representing a total of 11 fish) were analyzed from this area (Table 44). The SLs of the fish included in the samples ranged from 68 to 164 mm (average of 139 mm), and the BWs ranged from 5.3 to 83 g (average of 55 g). Lipid contents across the samples ranged from 1.8 to 3.2 percent (average of 2.6 percent). None of these fish exhibited any external lesions or physical anomalies. There were no significant differences between the Koppers Pond and the Reference Pond condition factor values (which are calculated based on body weight and specimen length).

Analytical results for the Reference Pond forage fish samples are presented in Table 45. As shown in this table, there were no detectable PCBs in the five forage fish composite samples collected from the Reference Pond (RL of 20 $\mu g/kg_{ww}$), compared to the Koppers Pond forage fish samples (average: 758 $\mu g/kg_{ww}$; range: 334 to 1,540 $\mu g/kg_{ww}$).

Seven to nine metals were detected at similar concentrations across the five samples collected from the Reference Pond. There were no significant differences between the mean concentrations in forage fish from the Reference Pond and Koppers Pond (plus the West Outlet) for the sediment COPEC metals that were detected from fish from all of these areas, except possibly for selenium, which had a higher average concentration, but was detected infrequently, in Koppers Pond. Six other sediment COPEC metals (*i.e.*, barium, cadmium, copper, lead, nickel, and zinc) were detected in the forage fish collected from Koppers Pond and the West Outlet but these were not detected in the Reference Pond fish.

4.5.2.2 Gamefish

The gamefish collections from the Reference Pond provided analytical data for the comparison to the Koppers Pond gamefish analytical results. These results were also used to support the assessment of regional or background risks that were performed for the BHHRA.

A total of 24 gamefish were collected from the Reference Pond in October 2010. These included 6 black crappie, 12 bluegill sunfish, 5 largemouth bass, and 1 pumpkinseed sunfish. No carp were present during the Reference Pond collections. Table 46 summarizes the species that were collected by location, their SLs and BWs, and their external physical conditions. Three of the black crappie and two of the largemouth bass were retained for chemical analysis. The fish that were not used for analysis were returned to the Reference Pond.

The three black crappie retained for analysis exhibited average SL and BW of 239 mm and 202 g, respectively. The two largemouth bass retained for analysis had an average SL of 250 mm and average BW of 196 g. In both cases, the samples retained for analysis were larger than the averages for these species. None of these fish exhibited any external lesions or physical anomalies.

The laboratory (TestAmerica, Burlington, Vermont) prepared fillets and the samples were analyzed for PCBs, TAL metals, and lipid content. One of the largemouth bass samples (RLB10-01) was also run as a field duplicate. The initial PCB analyses showed detection limits above the QAPP specifications. Consequently, these samples were re-analyzed at a lower detection limit. These results are shown with the "RE" suffix in the data tables. Table 47 presents the detailed analytical results by sample for the five fish samples (plus one duplicate) analyzed. All results are reported as concentrations on a wet-weight basis.

There were no detectable PCBs in the five gamefish samples collected from the Reference Pond. RLs ranged from 19 to 50 $\mu g/kg_{ww}$, compared to the Koppers Pond gamefish samples (average: 525 $\mu g/kg_{ww}$; range: 90 to 2,060 $\mu g/kg_{ww}$). Lipids concentrations ranged from 0.33 to 0.61 percent, with an average of 0.45 percent.

Eight metals were positively detected in the gamefish samples from the Reference Pond (*i.e.*, calcium, magnesium, manganese, mercury, potassium, selenium, sodium, and zinc). None of these metals was identified as a sediment COPC for Koppers Pond, and only mercury was identified as a fish COPC in Koppers Pond. In the Reference Pond samples, mercury was the only metal that exceeded the Human Health-based Regional Screening Levels (USEPA, 2010), but the observed concentrations were below the "background" concentrations reported for gamefish in Yates and Onondaga Counties (see USEPA, 2009). There was no significant difference between the mercury data sets for the Reference Pond and Koppers Pond.

A more detailed evaluation of the Reference Pond gamefish sample data is provided in Appendix I of the sBERA.

4.5.3 Vegetation

The vegetation samples collected in October 2010 from the Reference Pond consisted of the following:

- Composite samples of floating aquatic plants (duckweed);
- Grass or herbaceous material from shrubs or small trees bordering the pond; and
- Plant roots or rhizomes from emergent vegetation (cattails) at the perimeter of the pond.

Analytical results for the Reference Pond vegetation samples are summarized in Table 48.

4.5.3.1 Duckweed

The Reference Pond duckweed sample (RVG10-01) had no detectable PCBs (RL of 20 $\mu g/kg_{ww}$). Twelve metals were detected in duckweed samples from the Reference Pond. Of the detected metals, four (*i.e.*, barium, iron, lead, and zinc) were sediment COPECs in Koppers Pond. The duckweed metals concentrations were lower than those detected in the composite sediment sample collected from the Reference Pond (Table 43). Lipids were not analyzed in these samples due to insufficient sample mass.

4.5.3.2 Cattails

The Reference Pond cattail sample was run in duplicate for the metals, and was also run at a lower detection limit for PCBs. The Reference Pond cattail sample (RVG10-02RE) had no detectable PCBs (RL of 20 $\mu g/kg_{ww}$). Eight metals were detected in the initial sample analysis (RVG10-02); two of these (iron and zinc) were sediment COPECs in Koppers Pond. Ten metals were detected in the duplicate analysis (RVG10-02DU), and three of these were also sediment COPECs in Koppers Pond (iron, lead, and zinc). Lipids were analyzed in one of these samples but were not detected (detection limit of 0.25 percent).

4.5.3.3 Terrestrial Vegetation

The Reference Pond terrestrial vegetation sample (RVG10-03RE) had no detectable PCBs (RL of 20 $\mu g/kg_{ww}$). Ten metals were detected in this sample. Of the detected metals, four (barium, iron, lead and zinc) were sediment COPECs in Koppers Pond. The terrestrial vegetation metals concentrations were lower than those detected in the composite sediment sample collected from the Reference Pond. Lipids were not analyzed in these samples due to insufficient sample mass.

4.5.3.4 Comparison to Koppers Pond Vegetation

Across the different vegetation types, there were several metals, including aluminum, calcium, iron, lead, silver and zinc, that were present at higher relative concentrations in Koppers Pond compared to the Reference Pond. PCBs were detected in only the cattail root sample from Koppers Pond and were not detected in any of the other vegetation samples from Koppers Pond, or from the Reference Pond. Additional discussion regarding the vegetation sample results is presented in Section 3.3.3 of the sBERA (Integral, 2012).

5.0 CONTAMINANT FATE AND TRANSPORT

Under the Scope of Work appended to the Settlement Agreement, a PCSM was prepared to aid in scoping the RI by identifying likely COPCs, potential sources, and transport pathways (Koppers Pond RI/FS Group 2007). The PSCM was based on data collected during and subsequent to the Operable Unit 3 RI. Although the Operable Unit 4 RI findings, including the BHHRA and sBERA evaluations, have modified the PCSM in some respects, the fundamental Site understanding is similar to that presented in the PCSM.

The following sections discuss the potential historic and ongoing sources of the COPCs identified in environmental media associated with Koppers Pond, the pathways by which such COPCs could enter or leave the pond, and the environmental persistence of these COPCs. Potential human health risks associated with these COPCs are evaluated in the BHHRA, and the sBERA evaluates the potential for direct contact exposure pathways and indirect pathways via consumption of prey that may potentially bioaccumulate COPCs.

5.1 OVERVIEW

As described in the PCSM, in its simplest terms, Koppers Pond acts as a sediment trap for surface water flow that enters the pond via the Industrial Drainageway and local surface water runoff. The pond collects suspended solids that settle out in the more-quiescent pond as well as scoured sediments that are transported along the bed of the drainageway. These solids accumulate as pond sediment, and COPCs associated with the pond inflow are concentrated in the sediments. COPCs include metals associated with past industrial discharges, arsenic, mercury, PAHs, and PCBs. Not all of these COPCs contribute significantly to risk for all potential receptors or exposure pathways. COPCs may be reintroduced to the water column from the sediments by re-dissolution or bioturbation.

Acting as a sedimentation pond, the supernatant decanted to the pond outlets contains much lower suspended solids. Although some carryover occurs, especially in times of high flow, COPCs are present in lower concentrations in the outlet channel sediments.

In addition to the flow from the Industrial Drainageway, local surface water runs off to the pond, but such flows are much less than those from the drainageway. No significant sources associated with such runoff were identified in RI sampling.

The pond elevation fluctuates in response to rainfall and runoff conditions in its contributory watershed. Pond hydraulics are also affected by beaver dams, which have been observed at various times in the pond outlet channel. Because of the flat-lying local topography, the area of the pond surface expands significantly when water elevations rise in the pond, forming areas referred to as mud flats. These mud flats primarily occur along the western and southern banks of the pond. Because the pond influent from the Industrial Drainageway traverses deeper portions of the pond to reach the shallower mud flats, sediment deposition is minimal in such shoreline fringe areas and COPC concentrations are much lower than those observed in pond sediments.

Some fish take in COPCs from sediment and surface water, and some of these COPCs, especially PCBs and mercury, bioaccumulate in fish tissue. As evaluated in the BHHRA, exposure to PCBs from fish consumption is the predominant pathway to potential human health risks. Figure 27, which is reproduced from the BHHRA, summarizes the CSM and potential exposure pathways for human receptors. Figure 28 is comprised of three parts (a, b, and c) that present the CSM and potential exposure pathways for ecological receptors for Koppers Pond under Average Water Level (AWL) and High Water Level (HWL) conditions (Figures 28a and 28b, respectively) and for the outlet channels and mud flat areas (Figure 28c).

5.2 POTENTIAL SOURCES

This section discusses the known and potential sources of the COPCs found in the surface water, sediments, and fish in Koppers Pond.

5.2.1 Historical Sources

5.2.1.1 Former Westinghouse Horseheads Plant

Westinghouse constructed the Horseheads facility on former farmland and began operations in 1952. This plant developed and manufactured television picture tubes, vacuum switches, and similar electrical products. The plant was expanded several times after its original construction.

In 1985, Westinghouse and the Toshiba Corporation formed an entity (Toshiba-Westinghouse Electric Corporation [TWEC]) to manufacture color television picture screens and related electronic components. After forming TWEC, Westinghouse, under what later became known as the Imaging and Sensing Technology Division (ISTD), continued separate operations in another portion of the plant.

Beginning in 1988, Westinghouse sold off its business operations at the Horseheads plant:

- In 1988, Westinghouse sold ISTD to the Imaging and Sensing Technology Corporation (ISTC), which continued operations (*e.g.*, manufacture of sensor and control products and spectral light sources) at the site until about 2000.

- In 1989, Westinghouse sold its interest in TWEC to Toshiba Corporation. Toshiba Display Devices, Inc. (TDD), and later MT Picture Display Corporation of America-New York, LLC (MTPDA), continued to occupy a portion of the Horseheads plant for manufacturing operations until 2004.

- In 1994, Westinghouse sold its remaining Horseheads operations (*i.e.*, manufacture of vacuum interrupters) to Cutler-Hammer, which continues manufacturing operations at the plant.

CBS sold the plant property to MS-York LLC in April 2007.

Discharges from the former Westinghouse Horseheads plant site, including discharges authorized under state and Federal permits, were historically a source of some of the COPCs observed in Koppers Pond. The history of operations at that plant site is complicated, and the history of wastewater treatment operations, treated discharges, and discharge permitting is more complex. The following paragraphs briefly summarize the wastewater discharge history of the former Westinghouse Horseheads plant site. The Operable Unit 3 RI provides an inventory (through early 1996) of the various discharge permits and the results of effluent monitoring associated with those permits.

With the initial construction of facilities in 1952, Westinghouse installed a wastewater treatment plant to control the pH of wastewaters, but there were no provisions at that time to collect the solids generated by this treatment. The plant wastewater treatment system was upgraded in the late 1950s to provide lime addition with separation of the precipitated calcium fluoride. Westinghouse again upgraded its wastewater treatment facilities in 1967 to improve metals precipitation and clarification processes. Until 1994, when it completed the sale of all manufacturing operations at the Horseheads plant, Westinghouse operations discharged treated wastewaters via designated Outfall 001W. From 1988 through 1996, wastewater discharges from ISTC were conveyed to the Westinghouse wastewater treatment plant and to the TWEC/TDD wastewater treatment plant and discharged at Outfall 001W and 001T, respectively.

When Westinghouse operations began in 1952, wastewater discharges were not regulated; however, in 1957, Westinghouse submitted a permit application to the NYSDOH to operate the wastewater treatment facilities at the site. With passage of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA), the National Pollutant Discharge Elimination System (NPDES) permitting process was initiated. Under the NPDES program, effluent limitations were established for specific types of wastewater discharges. NYSDEC was granted primacy for permitting and began issuing SPDES permits under FWPCA authority. Westinghouse applied for a SPDES permit, which was received in March 1973. This permit placed effluent limitations on pH, suspended solids, fluoride, chromium, copper, lead, and zinc. Subsequent permits, renewed through 1996, placed effluent limitations on heavy metals (*e.g.*, cadmium, chromium, copper, lead, nickel, silver, and zinc), cyanide, fluoride, TCE, and other parameters.

In 1986, TWEC was issued a separate permit for its process and cooling wastewater discharges through its Outfall 001T. This permit was subsequently revised in 1990 by TDD, and renewed at varying times until treated wastewater discharges were terminated in 2004. TDD, and later MTPDA, operated its own wastewater treatment system at the Horseheads plant site. Effluent limits for the treated wastewater from this system included those for aluminum, arsenic, chromium, copper, cyanide, fluoride, iron, lead, nickel, silver, zinc, and TCE.

From 1994 through 1996, Cutler-Hammer also conveyed wastewaters to the Westinghouse on-site wastewater treatment plant that discharged to Outfall 001W. In 1996, the following changes were made:

- Westinghouse closed its on-site wastewater treatment plant;
- Cutler-Hammer and ISTC plating wastewaters were rerouted to the Chemung County Sewer Authority;
- Other Cutler-Hammer discharges (*e.g.*, process and cooling waters) were routed to a new designated outfall (001CH) under a separate SPDES permit;
- ISTC process and cooling water discharges were routed to Outfall 001CH, although some ISTC wastewaters were also discharged via Outfall 001T;
- Outfall 001W received only overflow discharges from the barrier well treatment facility installed under Operable Unit 2 (*i.e.*, water not needed in plant site manufacturing operations); and
- Boiler blowdown, non-contact (compressor) cooling water, and deionized water tank backwash discharges were directed to designated Outfall 002W.

The Cutler-Hammer SPDES permit for Outfall 001CH, which is still active, provides effluent limitations on several metals, including copper, lead, nickel, and zinc.

Following MTPDA's cessation of operations at the former Westinghouse plant site, CBS terminated the discharges of non-contact (compressor) cooling water, and deionized water tank wash from Outfall 002W, and, with the reduced demand for water from manufacturing operations, the barrier well treatment facility effluent has been primarily discharged directly to Outfall 001W. Cutler-Hammer continues to use a small amount of the barrier well discharge water; usage rates for treated process water and cooling systems previously varied from approximately 1.8 million gallons per month (60,000 gallons per day) in the winter to 7.8 million gallons per month (160,000 gallons per day) in the summer. Over the last few years, water use has curtailed to approximately 0.7 million gallons per month (23,000 gallons per day) for cooling systems only. The barrier well effluent contains very low to non-detectable levels of metals and other monitored constituents. Outfall 002W now only receives storm water runoff from certain plant site roofs.

Beginning in early 1995, a whitish-brown floc was observed in the flow of the Industrial Drainageway, and this floc was carried to Koppers Pond. Subsequent investigations by NYSDEC and USEPA found that the floc entered the Industrial Drainageway at the Chemung Street Outfall. NYSDEC described the floc as a microbial material that formed under particular conditions of temperature and dissolved oxygen and the presence of phosphate compounds. Chemical analyses (NYSDOH, 1997) showed the presence of lead and other metals (*e.g.*, copper and zinc). The floc apparently served as a substrate for accumulating metals, and the metals associated with the floc were likely absorbed from metals already present in the permitted discharges. NYSDEC further postulated that the floc material had accreted on the inside of the underground piping that connected the TDD discharge to the Chemung Street Outfall.

TDD modified its wastewater treatment system in an effort to curtail the floc formation. These efforts, which were completed in 2001, appeared to reduce the quantity of floc observable in the Industrial Drainageway, but did not immediately end its occurrence. Analytical testing conducted at various times suggests that the lead and other metals levels originally associated with the floc did not persist. Floc was no longer observed during the May 2008 field sampling efforts or in subsequent field investigations conducted for Operable Unit 4.

Other than as associated with the plant power supply and as sealed components (*e.g.*, capacitors) incorporated into manufactured products, PCBs were not used at the former Westinghouse plant site. Data from the Operable Unit 3 RI (Philip Environmental Services Corporation, 1996) are consistent with this observation; the highest PCB concentrations found in soil sampling at the former Westinghouse plant site were lower than the PCB concentrations found in sediment and bank soils in the downstream Industrial Drainageway.

5.2.1.2 Old Horseheads Landfill

From review of historical topographic maps and aerial photographs, it is apparent that the Old Horseheads Landfill filled the northern portion of the open-water area of the pond that had formed in the early 1950s. Surface water runoff from the landfill could carry COPCs for subsequent deposition in Koppers Pond. Investigations conducted for the preparation of the 1991 closure investigation report (Fagan, 1991) indicated that only debris was placed as fill south of the overhead electric lines near the Village of Horseheads boundary and that no municipal or industrial waste was placed south of the electric lines in the lower lying wet areas.

The Supplemental RI completed in 1990 (Ebasco, 1990) included some soil sampling at the Old Horseheads Landfill. Pesticides, PCBs, and PAHs were all detected in at least one soil sample. PCB concentrations ranged to 300 mg/kg in a subsurface soil sample (*i.e.*, SB-9A, 10 to 12 feet below ground surface [bgs]); surficial concentrations were much lower. The PCBs detected at SB-9A were identified as Aroclor 1248. The pesticides β-BHC (benzene hexachloride, also known as hexachlorocyclohexane or lindane), heptachlor, Endosulfan I, Endosulfan II, and endosulfan sulfate were detected, with concentrations of individual compounds ranging to 3,800 µg/kg (*i.e.*, Endosulfan I at SB-8A, 15 to 17 feet bgs). At one boring, the total PAHs concentration in a subsurface sample was in excess of 360,100 µg/kg (*i.e.*, SB-6A, 5 to 7 feet bgs). Borings SB-6A, SB-8A, and SB-9A were all located north of the overhead electric lines near the Village of Horseheads boundary.

While these data indicate that Koppers Pond COPCs have been found at the Old Horseheads Landfill and surface water runoff and soil erosion may have transported such COPCs to the Industrial Drainageway and Koppers Pond, PCBs were found in the Industrial Drainageway upstream of the Old Horseheads Landfill. If the landfill were a source, it was not the sole source of PCBs in the Industrial Drainageway or Koppers Pond sediments. Inspection of the landfill during the Operable Unit 4 RI indicated no active or recent seepage or other indication of COPC transport to the lower Industrial Drainageway or Koppers Pond (*e.g.*, soil erosion channels).

5.2.1.3 Former KCI Horseheads Plant

Based on a review of historical maps, aerial photographs, plant plans, and other information, the KCI-Horseheads Plant was situated to the south and southeast of the present-day Koppers Pond. Former wood-treating operations appear to have occurred in the area immediately north of the terminus of Kentucky, Michigan, and Vermont Avenues.

Operations began in 1953 or 1954. The KCI-Horseheads Plant, which pressure-treated wood using creosote preservative, ceased operations in 1963 and was dismantled. The property was later acquired by the City of Elmira and Hardinge.

According to historical records, excess creosote from the plant's treatment process was recycled for reuse, aqueous wastes were evaporated in plant process tanks, non-recyclable creosote wastes were burned in the plant boiler, and the plant did not dispose of wastes on site (Ecology & Environment, Inc., 1991). The KCI Horseheads Plant was reportedly served by public water, and sanitary wastes from the plant may have been treated through an on-site septic system, as historical plant design plans note a "drain field" connected to the plant's "office" building near the southern end of the plant property.

None of the historical maps, plans, or documents reviewed in Beazer's files references "Koppers Pond." According to a property survey map dated August 7, 1953, there was an area referred to as a "swamp" that lay to the north and northwestern portions of the KCI Horseheads Plant property. Plant maps and plans do not reference any operational structures situated in these northern and northwestern portions of the plant property; instead, available maps and plans place all plant buildings, structures, and features in the southern and southeastern portions of the plant property. The only potential plant discharge point located during a review of historical files was one line marked on a 1954 plant plan as a "new ditch" that terminated at the southern tip of the plant property near the confluence of "Rockwell's Creek" and "Hartman Hollow Creek." This 1954 plant plan does not reference or explain the purpose or use of such "new ditch" by the KCI Horseheads Plant.

In 1989 and 1991, respectively, NYSDEC completed Phase I and Phase II assessments of the KCI Horseheads plant site and concluded that there was no evidence of past on-site hazardous waste disposal. In 1992, the site was deleted from the NYSDEC registry of known or suspected hazardous waste disposal sites.

Because of its location downstream of Koppers Pond, the lack of evidence of waste disposal at the pond, and lack of information regarding PCB usage, it does not appear that the former KCI Horseheads Plant was a significant contributor to COPCs in Koppers Pond.

5.2.1.4 Other Potential Historical Sources

In conjunction with the collection and evaluation of the Operable Unit 4 and other Site data, the Group investigated other potential historical sources of the COPCs previously found in the Industrial Drainageway and currently in Koppers Pond sediments. This investigation identified two sites that are possible sources of PCBs:

- Former Great Atlantic & Pacific Tea Company, Inc. (A&P) site (now the Southern Tier Crossing) – Environmental site assessments conducted in preparation for redevelopment found evidence of a release of PCBs associated with the powerhouse in the southwestern portion of the property. Reported PCBs concentrations in soil ranged to 370 mg/kg.

- New York State Electric and Gas Corporation (NYSEG) Elmira Service Center – This facility handled PCB transformers and is a generator of PCB waste.

These facilities are located just west of the former Westinghouse Horseheads plant site and are within the watershed that drains to Koppers Pond (Figure 2). Historical drainage pathways between these facilities and Koppers Pond have somewhat obscured by more-recent development, but it appears that surface water runoff from both of these facilities may have been routed to the Industrial Drainageway and then to Koppers Pond.

5.2.2 Ongoing Sources

Treated process discharges from the Cutler-Hammer operations at the former Westinghouse Horseheads plant site (*i.e.*, Outfall 001CH) have curtailed over the past few years and no longer appear to be a potential source of ongoing contributions of COPCs to Koppers Pond. Runoff from local industrial and commercial facilities, and local roadways, may contain COPCs, but such contributions have not been quantified. Based on the Operable Unit 4 field investigation results, seeps from the Old Horseheads Landfill do not appear to have the potential for affecting Koppers Pond on an ongoing basis.

5.3 Potential Routes of Contaminant Migration

Historical sources of COPCs 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. Due to their hydrophobic nature, PCBs and PAHs entering the aquatic environment exhibit a high affinity for suspended particulates in the water column. As PCBs and PAHs tend to sorb to these particles, they are eventually settled out of the water column onto the bottom sediments.

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 former Westinghouse facility and non-point source runoff from the upstream watershed. Also, because impacted sediments were removed from the Industrial Drainageway in 2002 and 2003, the sediment bed load in the drainageway no longer represents a source of COPCs to Koppers Pond. Based on the sediment depth assessment, 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).

Metals can also enter the pond in the dissolved phase and precipitate once in the pond. Although this mechanism may have been operative historically, more-recent water quality data indicate that this is no longer appears to be a significant contaminant transport mechanism.

The settled solids represent a potential on-going source of COPCs 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 whereby COPCs 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 COPC 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 above, the RI analytical data for sediment samples collected from the outlet channels show significantly reduced COPC concentrations compared to Koppers Pond sediments. Outlet sediment samples collected in October 2010 (*i.e.*, SED10-18 and SED10-19) downstream of previous sediment sample SED08-17 define the downstream extent of impacted sediment (Figure 10). At both sampling locations, but especially at SED10-19, the quantity of sediment was limited and the sampled material appeared to be a hard clay. COPC concentrations, including cadmium, chromium, copper, lead, zinc, and PCBs, were 6 to more than 10 times higher at upstream location SED08-17 than at the downstream location SED10-18. At upstream location SED08-17, these COPC concentrations were 8 to more than 100 times higher than the concentrations in the sediment at SD10-19, located further downstream.

Similarly, surface soils samples collected in the periodically inundated low-lying areas around the pond (*i.e.*, SD08-30, SD08-40, SD10-31, SD10-32, and SD10-33) all showed metals concentrations lower than corresponding average values for pond sediments. PCB concentrations in mud flat soil sampled ranged from non-detect (with an RL of 16 μg/kg) to 43 μg/kg.

5.4 CONTAMINANT PERSISTENCE

The PCBs and metals that comprise the COPCs associated with Koppers Pond are generally persistent and long-lived constituents in freshwater aquatic environments. PAHs are moderately persistent particularly in comparison to PCBs. The persistence of these COPCs in sediments, in terms of both total and bioavailable concentrations, has been a topic of considerable scientific research. By their very nature, these constituents in sediment are residual and relatively immobile due to their limited solubility. Although there can be significant variability for the half-lives of PAHs and PCBs in lake sediment depending on the specific chemical form of the contaminant and a wide variety of site-specific factors related to the physical characteristics of the sediment and overlying water column, under most circumstances, concentrations of PAHs and PCBs in lake sediments tend to be relatively stable with time. To varying degrees, PAHs are amenable to biodegradation processes. Total metals concentrations are affected only by physical processes that affect sediment distribution, although bioavailability can be affected by chemical and biological processes.

5.4.1 PAHs

Observations made at Koppers Pond (Section 4.2.4) suggest that PAH concentrations tend to be higher in the shallow (0- to 6-inch) sediments, but PAH concentrations are not markedly different in historical sediment data (1995 and 1998) from that developed in samples collected as part of Operable Unit 4 in 2008 and 2010. The occurrence of PAHs in both the 1995/1998 and 2008/2010 data sets may not be reflective of the persistence of these compounds, but rather the possible ongoing contribution from road runoff, fossil fuel combustion, or other common sources of PAHs (e.g., Burgess, et al., 2003). Ongoing contribution of the common sources of PAHs would likely offset that which could be lost during their degradation, resulting in interpretation that the PAHs are being persistent in the shallow sediments. For example, the RI data have shown that there are elevated PAH concentrations in the sediments upstream and there is likely ongoing loading from the Industrial Drainageway into Koppers Pond, as well as more localized sources (such as from trail-bike use near the pond). The total PAH concentrations in the upstream sediments ranged from 3.1 to 285 mg/kg (mean of 76.7 mg/kg), while the shallow surface sediments of Koppers Pond ranged from 1.0 to 16.5 (mean of 6.9 mg/kg).

PAHs are generally metabolized by fish and were not analyzed in the fish tissue samples collected for Operable Unit 4. As a result, PAHs were not considered in fish consumption pathways in the BHHRA.

5.4.2 PCBs

At Koppers Pond, PCB concentrations tend to be higher in deeper sediments, and between the 1995/1998 and 2008/2010 data sets, PCB concentrations in sediment appear to be decreasing slightly. The decrease in PCB concentrations is at least in part likely due to the reduction of PCBs in sediment in Industrial Drainageway by the remediation completed in 2003. To some degree, the PCBs could also be subject to biological degradation. Under anaerobic conditions, the primary metabolic pathway for PCBs is reductive dechlorination in which chlorine removal and substitution with hydrogen by bacteria result in a reduced organic compound with fewer chlorine molecules (USEPA, 2008). PCBs are bioaccumulative, and PCB concentrations in fish tissue samples did not reflect the apparent decreasing concentrations in sediment. On a lipids-normalized basis, PCB concentrations in the bottom-feeding species (*i.e.*, common carp and white sucker) decreased slightly from the 2003 to the 2008 data set, but lipids-normalized PCB concentrations increased in the pelagic species (*i.e.*, black crappie and largemouth bass). This increase may, however, be due to lower lipids contents measured in the 2008 fish samples relative to the 2003 samples.

5.4.3 Metals

Metals of potential concerns include arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc. For metals, solubility primarily depends on the specific metal complex (*e.g.*, metal hydroxide, metal sulfides) as well as the pH and ORP conditions in the water column. Observations at Koppers Pond Site show that metals concentrations in sediment are highly variable with depth and variable across sampling locations within the pond. Overall, metals concentrations in sediment have remained relatively consistent between the time of prior sampling (1995 and 1998) and the Operable Unit 4 sampling (2008 and 2010), although lead concentrations appear to be slightly lower.. The reduction of lead concentration could be associated with changes in treated industrial wastewater discharges from the former Westinghouse Horseheads plant site that occurred over this time frame (Section 5.1.1.1).

Observations of metals concentrations over time in fish tissue samples from Koppers Pond likewise indicate significant variability. Copper lead, nickel, and zinc concentrations appear to have decreased in fish tissue from the 2003 sample set to the 2008 samples, whereas the chromium concentrations appear to have increased. The corresponding fish tissue data are inclusive with respect to mercury, which is bioaccumulative, and the cadmium data similarly do not indicate a temporal pattern.

6.0 BASELINE RISK ASSESSMENT

The assessment of potential human health and environmental risk is a critical component of the RI/FS process. Comprehensive risk evaluations were completed for Koppers Pond in accordance with USEPA guidance, and a separate BHHRA (Integral, 2012a) and sBERA (Integral, 2012b) have been prepared. These documents, which detail the assumptions, procedures, and findings of the risk assessments, are companion documents to this RI report. This section summarizes the BHHRA and sBERA.

6.1 BASELINE HUMAN HEALTH RISK ASSESSMENT

The objective of the BHHRA is to assess potential risks to human health from exposure to constituents present in surface water, sediment, and fish tissue at Koppers Pond under both current and future Site conditions. The results of the BHHRA are to be used in evaluating whether Site-related risks are acceptable or whether remedial actions are needed to address identified unacceptable risks.

The Koppers Pond BHHRA relies on the analytical results from the 2008 Operable Unit 4 investigations as well as Operable Unit 4 data more recently collected in 2010. This combined data set includes samples of surface water and sediment collected from both Koppers Pond and its outlet channels and from several species of gamefish taken from Koppers Pond. The COPCs differ between the pond and outlet channels and among the affected media, but generally include PAHs, PCBs, and metals (*i.e.*, arsenic, cadmium, chromium, lead, and mercury).

The exposure scenarios selected in the USEPA-approved *Memorandum on Exposure Scenarios and Assumptions* (AMEC, 2009c) and the *Pathway Analysis Report* AMEC, 2009d), and evaluated in the Koppers Pond BHHRA, are the following:

- Dermal contact with and incidental ingestion of surface water from the pond during wading events related to teenage trespassing activities;
- Dermal contact with and incidental ingestion of pond sediment during wading events related to teenage trespassing activities;

- Dermal contact with and incidental ingestion of surface water from the outlet channels during wading events related to teenage trespassing activities;

- Dermal contact with and incidental ingestion of sediment in the outlet channels during wading events related to teenage trespassing activities; and

- Consumption of gamefish taken from Koppers Pond by an adult, adolescent, and young child.

The COPC concentrations and other values used as input for exposure calculations rely on multiple conservative assumptions that lead to reasonable maximum exposure (RME) scenarios.

The results of the BHHRA indicate that no adverse non-cancer or cancer effects are expected from direct contact with sediment and surface water for either Koppers Pond or the outlet channels (Table 49). A total receptor HI across all pathways, media, and exposure points for the teenage trespasser for these scenarios is 0.03. This HI is well below the USEPA's target value of 1.0, indicating there is no unacceptable non-cancer exposure. The total cancer risk for the teenage trespasser was similarly determined across all pathways, media, and exposure points associated with direct contact with sediment and surface water for Koppers Pond and the outlet channels; the calculated cancer risk is 9.6×10^{-7}. Again, this total cancer risk for all exposure points is lower than the low end of the acceptable cancer risk range established in the NCP (*i.e.*, 1×10^{-6} to 1×10^{-4} or a probability of developing cancer of one in a million to one in ten thousand), and no unacceptable cancer risk is indicated.

Ingestion of fish results in an RME cancer risk of 3.1×10^{-4} (or 3.1 in 10,000). This cancer risk represents the total risk by combining risks for a child (ages 1 to 6), adolescent (ages 7 to 13), and an adult (13 years and older). This RME cancer risk is above the 10^{-6} to 10^{-4} acceptable risk range established in the NCP. Non-cancer HI values are 21.1 for the young child; 20.3 for adolescent; and 15.6 for the adult. Both the cancer and non-cancer results are based primarily on exposures to PCBs. Exposure assumptions for the RME individual include an assumption of fish ingestion of 25 grams per day for the adult greater than 13 years of age; 8 grams per for the young child 1 to 6 years; and 16 grams per day for the 7 to 13 year old with an assumed total exposure period of 30 years based on the 90th percentile residence time. The calculated HIs are above the goal of protection of an HI=1.

The central tendency exposure (CTE) cancer risks and non-cancer health hazards are provided to more fully characterize the variability and uncertainty of the risk estimates among individuals within the potentially exposed population by describing the health effects associated with average exposure. The CTE cancer risk is 2.6×10^{-5} (or 2.6 in 100,000). The CTE non-cancer HIs are 5.7 for the young child; 5.5 for the adolescent; and 4.0 for the adult. Exposure assumptions for the CTE individual include fish ingestion rates of 8 grams per day for the adult; 3 grams per day for the young child; and 5 grams per day for the adolescent with an assumed total exposure period of 9 years based on the 50th percentile residence time. Assumptions also include a 20 percent loss of PCBs from cooking. The calculated CTE HIs exceed the goal of protection of 1 for all age groups.

The process of evaluating human health cancer risks and non-cancer health hazards involves multiple steps. Inherent in each step of the process are uncertainties that affect the final calculated cancer risks and non-cancer health hazard estimates. Uncertainties may exist in numerous areas, including environmental PCB concentration data, derivation of toxicity values, and estimation of potential site exposures.

Appendix C of the BHHRA provides an alternative risk analysis that developed both RME and CTE fish ingestion rates based on the sustainable yield of fish from Koppers Pond. These rates were used in place of the fish ingestion rates from USEPA's 1997 Exposure Factors Handbook (available at the time of the assessment). The alternative ingestion rates are lower than those used in the BHHRA, which are based on creel surveys. Using the ingestion rates provided in BHHRA Appendix C, the total alternate RME cancer risk is 7.5×10^{-5} (or 7.5 in 100,000). This RME cancer risk is within the 10^{-6} to 10^{-4} acceptable risk range established in the NCP. The non-cancer HI for the alternate RME young child (1 to 6 years) is 5.3. The HI for the adolescent (7 to 13 years) is 5.1, and for the adult (13 years and older), the HI is 3.7. Exposure assumptions include fish ingestion rates of 6 grams per day for the adult, 2 grams per day for the young child, and 4 per day grams for the adolescent with an assumed total exposure period of 30 years based on the 90th percentile residence time. The alternate RME HIs exceed USEPA's goal of protection of a HI = 1. The primary constituent is PCBs Aroclor 1254.

As reported in Appendix C of the BHHRA, for the CTE case, which reflects the average alternate fish ingestion rates and 20 percent loss of PCBs from cooking, the total cancer risk for the CTE individual is $1.2x10^{-5}$ (or 1.2 in 100,000). This CTE cancer risk is within the 10^{-6} to 10^{-4} acceptable risk range established in the NCP. The HI value for the alternate CTE young child (1 to 6 years) is 0.9, for the adolescent (7 to 13 years) is 0.8, and for the adult (13 years and older) is 0.6. Exposure assumptions for the CTE individual include fish ingestion rates of 1.2 grams per day for the adult; 0.4 grams per day for the young child; and 0.8 grams per day for the adolescent with an assumed total exposure period of 30 years based on the 90th percentile residence time. A 20 percent loss of PCBs due to cooking is also assumed. The non-cancer health hazards are less than USEPA's goal of protection of a HI = 1.

In summary, the results of the BHHRA indicate that exposures to COPCs in the sediment and surface water for both the outlet channels and Koppers Pond do not pose a significant health concern. Under the USEPA-requested default conditions, and highly conservative exposure assumptions, the potential risks from fish consumption exceed the target range of acceptable risks. The use of alternate assumptions based on Site-specific conditions results in potential risks that are within the acceptable risk range.

6.2 SUPPLEMENTAL BASELINE ECOLOGICAL RISK ASSESSMENT

The objective of the sBERA is to assess potential risks to ecological receptors from exposure to constituents present in environmental media at Koppers Pond. The results of the sBERA are used to evaluate whether potential Site-related risks are acceptable or whether remedial actions are needed to address identified unacceptable risks.

The Koppers Pond sBERA relies on the analytical results from the 2008 Operable Unit 4 investigations and the supplemental field investigation performed in 2010. This combined data set includes samples of surface water, sediment, aquatic and semi-aquatic vegetation, mud flat soils, and forage fish from Koppers Pond, its outlet channels, and a nearby Reference Pond. Empirical data for aquatic or terrestrial invertebrates are not available, so the constituent concentrations in these media have been estimated based on literature uptake factors from sediments or soils. COPECs selected for evaluation in the sBERA differ by media. No COPECS were retained for the surface water. The sediment COPECs included several SVOCs (*e.g.*, PAHs), PCBs, and several metals. The only COPECs retained for biota samples were PCBs.

The sBERA represents the final three steps of the eight-step process under ERAGS. It builds on two documents – the SLERA (AMEC, 2009a), which provided ERAGS Steps 1 and 2, and the *ERAGS Steps 3 through 5 Report* (Integral, 2010a), which presented the exposure scenarios, receptors, and exposure assumptions to be used in this analysis. An initial list of COPECs was identified in the SLERA using conservative screening benchmarks. A refined COPEC list, which was carried through to the sBERA, was developed in the *ERAGS Steps 3 through 5 Report* using refined screening benchmarks. All of the COPEC screening was based on the maximum observed chemical concentrations in the different media. In addition, the results from two interim technical memoranda (*Technical Memorandum No. 1: 2009 Field Sampling Program to Support the Ecological Risk Assessment of Koppers Pond* [AMEC, 2009b] and *Technical Memorandum No. 2: 2009 Field Sampling Results, Koppers Pond Ecological Risk Assessment* [Integral, 2010b]) have been incorporated into the sBERA.

The following assessment endpoints and receptors are evaluated in the sBERA:

- ***Benthic Invertebrates:*** An assessment of the potential effects on benthic macroinvertebrates as a potential prey base for higher trophic level species resulting from exposure to constituents in sediment and surface water. This includes an evaluation of factors that control bioavailability and toxicity (*e.g.*, AVS and SEM ratios), the benthic community structure, and benthic toxicity at several locations in Koppers Pond, and comparisons to similar analyses for the Reference Pond.

- ***Amphibians and Reptiles:*** An assessment of the potential effects on amphibians and reptiles from exposure to PCBs in sediment. This evaluation focuses on comparison of Koppers Pond PCB sediment concentrations with sediment concentrations evaluated in literature studies that considered potential population effects for these receptors.

- ***Forage Fish:*** An assessment of the potential effects of exposures to fish to PCBs in sediment. This evaluation focuses on comparison of forage fish PCB concentrations to studies from the literature that have evaluated potential effects to these receptors based on whole body tissue residues of PCBs.

- ***Herbivorous Birds:*** An assessment of the potential effects on mid-to-upper trophic level herbivorous bird populations resulting from consumption of forage exposed to constituents in surface sediment and/or surface water. The mallard duck has been selected as the representative receptor for this group.

- ***Piscivorous Birds:*** An assessment of the potential effects on mid-to-upper trophic level piscivorous bird populations resulting from consumption of prey (*e.g.*, fish) and forage exposed to constituents in surface sediment and/or surface water. The Great Blue Heron has been used to represent this group.

- ***Herbivorous Mammals:*** An assessment of the potential effects on mid-to-upper trophic level herbivorous mammal populations as a result of consumption of forage (*e.g.*, vegetation) exposed to constituents in surface sediment and/or surface water. The muskrat has been used as the representative receptor for this group.

- ***Piscivorous Mammals:*** An assessment of the potential effects on mid-to-upper trophic level piscivorous mammal populations resulting from consumption of prey and forage exposed to constituents in surface sediment and/or surface water. The mink is the receptor used to evaluate this group.

- ***Omnivorous Mammals:*** An assessment of the potential effects on mid-to-upper trophic level omnivorous mammal populations resulting from consumption of prey and forage exposed to constituents in surface sediment and/or surface water. The raccoon has been selected as the representative receptor for this group.

Between the 2008 and 2010 field investigations, the water elevation of Koppers Pond increased due the presence of a beaver dam in the West Outlet. The Mud Flat Area located between the outlet tributaries was dry in 2008 but submerged in 2010. Consequently, the potential ecological risks from Koppers Pond and its outlets have been evaluated both under AWL and HWL scenarios, believed to represent conditions observed in 2008 and 2010, respectively.

For all of the receptors except the benthic invertebrates, amphibians and reptiles, the HQ approach (i.e., ratio of average concentration to benchmark) has been used to assess the potential risks. For the benthic invertebrates, amphibians and reptiles, the approach taken is discussed below. HI, which represent the sums of HQs, are presented in Table 50. The results for each receptor are summarized as follows:

- ***Aquatic Receptor (Benthic Invertebrates)***: The risk characterization for the benthic invertebrates is based on four endpoints. These included: (1) comparison of observed sediment concentrations to benchmarks, (2) assessment of divalent metal bioavailability, (3) benthic community assessment, and (4) sediment toxicity testing.

  The simple analytical and benchmark screenings show that the metals in Koppers Pond exceed their relevant benchmarks. In addition, the Method II AVS/SEM/TOC evaluation shows that there is the potential for increased bioavailability in two of the samples (SD08-03 and SD08-4). However, the *Hyalella* and chironomid toxicity studies show no significant toxicity in either of these samples, relative to the Reference Pond sample. Therefore, despite the potential for increased bioavailability of some metals in this sample, no manifestation of toxicity is observed. Potential toxicity was observed in the chironomid bioassay at SD-01. However, none of the measured endpoints correlates with any of the COPEC sediment concentrations. In addition, there are no significant differences in the benthic communities at the evaluated locations (chironomids were the predominant invertebrate at both Koppers Pond and the Reference Pond) or in relation to sediment COPEC concentrations.

  Media concentrations are far lower in the Outlet Tributary sediment samples relative to Koppers Pond. Neither benthic community analysis nor benthic toxicity testing has been performed on these sediment samples. However, it is anticipated that the results from Koppers Pond, which show that there is no apparent correlation between the media concentrations and toxicity or benthic community metrics, are also relevant to the outlet area.

- ***Aquatic Receptor (Amphibians and Reptiles):*** The risk characterization for the amphibian and reptiles focuses on PCBs (because they are the only biota COPEC) and is based on a comparison to studies that evaluate the potential linkage(s) between sediment PCB concentrations and amphibian population effects. There is no conclusive linkage between sediment PCB concentrations and amphibian population effects. The sediment and mud flat PCB concentrations are well below those concentrations reported in the literature that are alleged to elicit toxicity to this receptor group. Based on this result, and in conjunction with the lack of a correlation between benthic toxicity (generally regarded as a more sensitive receptor than amphibians) and PCB levels in sediments, it is concluded that the amphibians and reptiles do not have a significant risk from PCBs present in the sediments at Koppers Pond and the Outlet/Mud Flat Area.

- ***Aquatic Receptor (Forage Fish):*** The risk characterization for the fish is based on a comparison of whole body fish tissue PCB concentrations to tissue benchmarks. PCBs were detected in the forage fish collected from Koppers Pond in 2008, and the forage fish collected from the West Outlet in 2010, but none of the individual forage fish PCB results exceeds the whole-body tissue-based toxicity reference value (TRV) for PCBs. Therefore, it is unlikely that there is a significant risk to fish populations at or near the Site due to their PCB body burdens.

- ***Herbivorous Bird (Mallard Duck):*** The assessment of exposures to COPECs is based on the ingestion of sediments or mud flat soils, terrestrial invertebrates, and vegetation. The evaluated exposure areas include Koppers Pond and the Outlet/Mud Flat Area, and the Reference Pond. The HI values are below one for all of the evaluated areas under the AWL and HWL scenarios. Based on these results, this receptor is unlikely to be at a significant risk based on exposure to the environmental media, prey, or forage items at Koppers Pond or the Outlet/Mud Flat Area.

- ***Piscivorous Birds (Great Blue Heron):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, and fish. The latter is the predominant dietary component. The evaluated exposure areas include Koppers Pond and the Outlet/Mud Flat Area, under the AWL and HWL scenarios, and the Reference Pond. The HI values for Koppers Pond under the AWL and HWL scenarios are greater than one, but none of the individual COPECs has HQ values that exceed one. When iron is excluded from the HI calculation, the HI value does not exceed one. This receptor is unlikely to have a potential risk based on exposure to the environmental media, prey, or forage items at Koppers Pond or the Outlet/Mud Flat Area.

- ***Herbivorous Mammals (Muskrat):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, and plants. The muskrat has the smallest home range of the evaluated receptors and the largest calculated risks. The evaluated exposure areas include Koppers Pond and the Outlet/Mud Flat Area, under the AWL and HWL scenarios, and the Reference Pond. The HI values exceed one for all evaluated areas, including the Reference Pond. Iron and cadmium contribute the greatest amount to the calculated HI values. When iron is excluded from the HI calculations, the HI value is reduced but still exceeds one for Koppers Pond and the Outlet/Mud Flat Areas under both the AWL and HWL scenarios. The sediment and biota iron concentrations in Koppers Pond and the Reference Pond are similar, suggesting that they are representative of regional levels and unrelated to any history of releases to the Site. Based on these results, this receptor has a potential risk as a result of exposure to the cadmium levels in the environmental media, prey, or forage items at Koppers Pond and the Outlet/Mud Flat Area.

- ***Piscivorous Mammals (Mink):*** The assessment of exposures to COPECs is based on the ingestion of sediments, aquatic invertebrates, vegetation, and fish. The latter is the predominant dietary component. The evaluated exposure areas include Koppers Pond the Outlet/Mud Flat Area, and the Reference Pond. The HI values are less than one for all of the evaluated areas under the AWL and HWL scenarios. Based on these results, this receptor is unlikely to be at a significant risk as a result of exposure to the environmental media, prey or forage items at Koppers Pond or the Outlet/Mud Flat Area.

- ***Omnivorous Mammals (Raccoon):*** The assessment of exposures to COPECs is based on the ingestion of sediments or mud flat soils, terrestrial invertebrates, and vegetation. The evaluated exposure areas include Koppers Pond, the Outlet/Mud Flat Area, and the Reference Pond. The HI values are less than one for all of the evaluated areas under the AWL and HWL scenarios. Based on these results, this receptor is unlikely to be at a significant risk as a result of exposure to the environmental media, prey or forage items at Koppers Pond or the Outlet/Mud Flat Area.

The exposure assumptions and uptake factors used to estimate aquatic invertebrate COPEC concentrations, and the TRVs used to assess the potential ecological risks, include some degree of uncertainty. When all of the uncertainty is combined, it is likely that actual risks are overestimated.

In summary, the results of the sBERA indicate that exposures to COPECs in the environmental media of Koppers Pond, its outlet channels, and the Reference Pond do not pose a significant ecological concern for any of the evaluated receptors, except for cadmium in the muskrat. The muskrat risks may be not be accurate because the risks include exposure resulting from consumption of aquatic invertebrates, and the concentrations in these invertebrates have been modeled as there are no empirical data regarding concentrations in invertebrates to support this exposure pathway.

7.0 SUMMARY AND CONCLUSIONS

The objective of the RI was to characterize environmental media at Koppers Pond 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. Several pertinent studies related to the Site had previously been completed, and as a result, the scope of the RI was tailored to meet the specific circumstances for Koppers Pond. Data-gathering activities for the Koppers Pond RI were principally aimed at collecting current information regarding surface water, sediment, and fish tissue.

7.1 SUMMARY OF FINDINGS

The following sections succinctly summarize the data collected during the RI regarding the likely sources of COPCs, transport mechanisms, exposure pathways, and potential receptors. This summary addresses the physical setting, institutional elements, and chemical and biological characterization data. The conclusions of the baseline risk assessments are presented in Section 7.2.

7.1.1 Physical Setting

Hydrology

- Koppers Pond is a shallow, flow-through pond with typical water depths of approximately 2 to 4 feet and an open water area that, depending on the pond stage, covers approximately 9 to 12 acres.

- Koppers Pond is situated in a previously low-lying, wet area that apparently began to fill with water with the onset of discharges from the former Westinghouse Horseheads plant, which began operating in 1952. Portions of the pond area may have been excavated as a sand and gravel borrow pit.

- The Industrial Drainageway begins approximately 2,300 feet to the north-northwest of Koppers Pond at the outlet of the "Chemung Street Outfall" and discharges to Koppers Pond (Figure 2). This drainageway conveys surface water runoff from a 1,350-acre watershed comprised primarily of commercial and industrial properties as well as discharges from the former Westinghouse Horseheads plant site.

- The current base flow of the Industrial Drainageway (approximately 70 percent of the total flow on an annual average basis) is comprised of the discharge from the groundwater recovery and treatment system installed and operated as part of Operable Unit 2 at the Kentucky Avenue Wellfield Site. It is not known how much longer this groundwater recovery system will be required. The hydraulics of the pond will be significantly altered once this treatment system discharge is terminated.

- Two outlet streams flow from the southern end of Koppers Pond and merge about 500 feet downstream to a single outlet channel that flows past the Hardinge plant site and into Halderman Hollow Creek. From there, the creek flows through mixed industrial, commercial, and residential areas and discharges into Newtown Creek approximately 1.5 miles south of Koppers Pond.

- Due to a low-permeability, hard clay layer beneath the sediments throughout much of the pond (which would be expected from its origins as a low-lying swampy area), the surface water pond does not significantly interact with groundwater.

Sediments

- The pond bottom is comprised of soft, mucky (silty) sediments that range in thickness from 0 to 38 inches. Grain-size determination of three samples showed the silt and clay content of the sediment ranging from 85 to 97 percent.

- The total volume of sediments was determined to be approximately 21,400 cy; the solids content of the sediments ranged from 25 to 59 percent for the shallow (0- to 6-inch) sediment and from 34 to 67 percent for deeper sediments.

7.1.2 Institutional Elements

Land Ownership

- Koppers Pond is situated on property owned by EWB, Hardinge, and the Village of Horseheads.

Land Use

- The pond is situated in an area zoned for industrial use and currently surrounded by vacant and active industrial and governmental properties. To the north and northeast is the Old Horseheads Landfill, to the south is the Kentucky Avenue Well site, to the southeast is the

Hardinge facility, to the east is Fennell Spring Company, and to the west is a Norfolk Southern railroad right-of-way with active tracks.

- Access to Koppers Pond is impeded by the railroad tracks and by the adjacent industrial and governmental properties that are partially fenced. Nevertheless, the presence of litter and off-road vehicle tracks suggest that periodic trespassing occurs in the area. Individuals have been observed bank fishing in Koppers Pond.

- No recreational or other use of the pond is authorized by any of the property owners. "No Trespassing" signs are posted at the Hardinge property, and the Village and Town of Horseheads have periodically undertaken more aggressive efforts to discourage trespassing. Such measures include posting "No Trespassing" signs and increased police patrols.

7.1.3 Chemical and Biological Characterization

Sources of COPCs

- Historical sources of metals to the pond include industrial discharges from the former Westinghouse Horseheads plant site, as well as from urban and industrial runoff. Ongoing sources include runoff and, to some extent, industrial discharges, although these discharges have been reduced with many of the past operations no longer discharging to the Drainageway.

- The previously observed "floc" in the Industrial Drainageway, which was indentified as a potential source of metals in Koppers Pond, is no longer present and suspected accumulations of such floc in the aboveground piping leading to the Chemung Street Outfall was not observed.

- The source of the PCBs found in Koppers Pond sediment has not been determined. Fluid-filled electrical equipment was not manufactured at the former Westinghouse plant site, and sampling conducted as part of the Operable Unit 3 RI did not find high PCB concentrations in plant site soils. An investigation by the Group identified a past PCB release to soil at the nearby former A&P/Southern Tier Crossing site and PCB transformer handling at the NYSEG Elmira Service Center. The extent to which the PCBs at these facilities were transported to the Industrial Drainageway and Koppers Pond is not known.

COPCs in Surface Water

- Although historical data had indicated elevated concentrations of certain COPCs, surface water in Koppers Pond and its outlet channel is not degraded and meets ambient water quality criteria. Exposure to COPCs in surface water does not comprise a significant source of exposure in either the human health or ecological risk assessment.

COPCs in Sediment

- Metals, PCBs, and PAHs have been detected in pond sediments at concentrations above screening levels for both human health and ecological risk assessment. Metals of potential concerns include arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc. VOCs are not present in elevated concentrations in Koppers Pond sediment.

- Elevated concentrations of the various COPCs occur throughout the pond, although concentrations generally tend to be higher in the western leg of the pond as compared to the eastern leg.

- Vertical profiling sampling did not reveal consistent patterns of concentrations with the depth interval of the sediment. PAH concentrations tend to be higher in the shallow (0- to 6-inch) sediments, whereas PCB concentrations tend to be higher in deeper sediments. Metals concentrations are highly variable with depth with varying patterns depending on the specific metal and the location within the pond.

- Metals and PAH concentrations in the 2008 and 2010 surface sediment data collected for Operable Unit 4 are generally similar to the metals and PAH concentrations observed in prior (1995/1998) sampling.

- Average PCB concentrations in surface sediment appear to have decreased somewhat between the 1995/1998 data and the 2008 data, and the 2010 PCB data suggest a continuing decreasing concentration trend.

- Metals, PCB, and PAH concentrations were shown to be generally lower in the outlet channel than in the pond sediment samples. Based on both the physical composition of the channel bottom (i.e., hard clay, not the soft alluvial sediments found upstream) and the chemical data, Sample Location SD10-19 delineates the downstream extent of impacted sediments in the outlet channel.

- Metals, PCB, and PAH concentrations were lower in samples taken in the periodically inundated mud flat areas than in the pond sediments.

Biota

- Metals and PCBs have been detected in fish tissue. Because of PCB levels in fish found in 1988 sampling, the NYSDOH issued a fish advisory for Koppers Pond. The NYSDOH advisory, which is still in effect, is for carp with a recommendation to eat no more than one meal per month and for infants, children under the age of 15, and women of childbearing age to eat no fish from Koppers Pond.

- Metals concentrations in fish samples collected in 2003 and 2008 show variable patterns with no overall trends in concentrations.

- On a lipid-normalized basis, PCB concentrations in fish samples collected in 2003 and 2008 showed decreasing concentrations in the bottom-feeding species, but increases in pelagic species. These increases may be the result of very low lipids concentrations measured in the 2008 samples.

7.2 CONCLUSIONS OF BASELINE RISK ASSESSMENTS

The results of the BHHRA indicate that exposures to COPCs in the sediment and surface water for both the outlet channels and Koppers Pond do not pose a significant health concern based on direct contact. Under the USEPA-requested default conditions to assess fish consumption from the Pond, and conservative exposure assumptions, the potential risks from fish consumption exceed the target range of acceptable cancer risk of 10^{-6} to 10^{-4} and exhibit an HI greater than 1.0. An alternative risk assessment (Appendix C to the BHHRA), based on Site-specific sustainable yields of fish from Koppers Pond, found reductions in the RME individual's cancer risks and non-cancer hazards; however, the non-cancer hazards remained above USEPA's goal of protection of a HI of 1. The cancer risks and non-cancer hazards to the CTE individual are below the NCP range of 10^{-6} to 10^{-4}, and the HI values for all receptors are less than the goal of protection of an HI = 1 (Appendix C to the BHHRA).

The results of the sBERA indicate that exposures to COPECs in the environmental media of Koppers Pond, its outlet channels, and the Reference Pond do not pose a significant ecological concern for any of the evaluated receptors, except for cadmium in the muskrat. The muskrat risks may be not be accurate because the risks include exposure resulting from consumption of aquatic invertebrates. Concentrations in these invertebrates have been modeled in the sBERA, as there are no empirical data regarding concentrations in invertebrates that would support this exposure pathway.

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TABLES

TABLE 1
DETAILS OF MONITORING WELLS AND STAFF GAUGE
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Location ID	Northing	Easting	Top of Riser Elevation (feet MSL)[a]
CW-9S	782631.31	433694.19	893.13
CW-9D	782615.65	433682.48	893.42
CW-10S	783055.52	434053.22	892.43
CW-10D	783070.57	434064.88	893.74
MW-112S	783843.22	434079.30	896.79
Staff Gage	782876.82	433008.57	890.11

Note:
(a) *Reference point for water level monitoring.*

TABLE 2
INVENTORY OF SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS, MAY 2008
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Sample Location ID[a]	Location Description
08-01 to 08-09	Western portion of Koppers Pond
08-10 to 08-13	Eastern portion of Koppers Pond
08-14 to 08-17	Outlet channels from Koppers Pond
08-20	At the outlet of a culvert under the railroad tracks west of Koppers Pond
08-21	Chemung Street Outfall
08-22	Former Westinghouse Plant – Barrier Well discharge
08-23	Former Westinghouse Plant – Cutler-Hammer discharge
08-24	Junction Chamber #4 in underground discharge line
08-25	Junction Chamber #3 – discarded – does not flow to Chemung Street Outfall
08-26	Junction Chamber #2 – discarded – does not flow to Chemung Street Outfall
08-27	Junction Chamber #1 in underground discharge line (upstream of former Westinghouse Plant)
08-28	Outlet of stormwater retention pond west of former Westinghouse Plant
08-29	Inlet of stormwater retention pond west of former Westinghouse Plant
08-30	Mud flat immediately south of Koppers Pond
08-40	Mud flat immediately west of Koppers Pond
08-41	Drainage channel from Chemung County Department of Public Works facility

(a) *Sampling locations are shown on Figures 6 and 7. In those figures, the "08-" prefix is omitted.*

TABLE 3
SUMMARY OF KEY MORPHOMETRICS AND CONDITIONS OF FISH COLLECTED FROM KOPPERS POND, MAY 2008
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Sample ID	Species	Group	Std Length (mm)[b]	Weight (g)[b]	Condition
CC08-01	Carp - *Cyprinus carpio*	Gamefish	560	2,569	Healthy, no physical anomalies
CC08-02	Carp - *Cyprinus carpio*	Gamefish	517	1,909	Healthy, no physical anomalies
CC08-03	Carp - *Cyprinus carpio*	Gamefish	573	2,816	Healthy, no physical anomalies
CC08-04	Carp - *Cyprinus carpio*	Gamefish	621	3,818	Healthy, no physical anomalies
CC08-05	Carp - *Cyprinus carpio*	Gamefish	553	2,188	Healthy, no physical anomalies
WS08-01	White sucker - *Catostomus commersoni*	Gamefish	407	612	Healthy, no physical anomalies
WS08-02	White sucker - *Catostomus commersoni*	Gamefish	390	666	Healthy, no physical anomalies
WS08-03	White sucker - *Catostomus commersoni*	Gamefish	342	373	Healthy, no physical anomalies
WS08-04	White sucker - *Catostomus commersoni*	Gamefish	383	523	Healthy, no physical anomalies
WS08-05	White sucker - *Catostomus commersoni*	Gamefish	412	633	Healthy, no physical anomalies
LB08-01	Largemouth bass - *Micropterus salmoides*	Gamefish	407	843	Healthy, no physical anomalies
LB08-02	Largemouth bass - *Micropterus salmoides*	Gamefish	377	783	Healthy, no physical anomalies
LB08-03	Largemouth bass - *Micropterus salmoides*	Gamefish	395	812	Healthy, no physical anomalies
LB08-04	Largemouth bass - *Micropterus salmoides*	Gamefish	382	759	Healthy, no physical anomalies
LB08-05	Largemouth bass - *Micropterus salmoides*	Gamefish	380	717	Healthy, no physical anomalies
LB08-06	Largemouth bass - *Micropterus salmoides*	Gamefish	381	651	Healthy, no physical anomalies
BC08-01	Black crappie - *Pomoxis nigromaculatus*	Gamefish	292	285	Healthy, no physical anomalies
BC08-02	Black crappie - *Pomoxis nigromaculatus*	Gamefish	268	188	Healthy, no physical anomalies
BC08-03	Black crappie - *Pomoxis nigromaculatus*	Gamefish	218	110	Healthy, no physical anomalies
BC08-04	Black crappie - *Pomoxis nigromaculatus*	Gamefish	275	213	Healthy, no physical anomalies
FF08-01	Bluegill - *Lepomis macrochirus*	Forage Fish	167	90	Healthy, no physical anomalies
FF08-02	Bluegill - *Lepomis macrochirus*	Forage Fish	148	65	Healthy, no physical anomalies
FF08-03	Bluegill - *Lepomis macrochirus*	Forage Fish	183	115	Healthy, no physical anomalies
FF08-04[a]	Bluegill - *Lepomis macrochirus*	Forage Fish	93	14	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	63	3.8	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	102	20	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	106	21.8	Healthy, no physical anomalies
FF08-05[a]	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	101	20.2	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	106	22.3	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	71	6.3	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	68	5.7	Healthy, no physical anomalies
FF08-06	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	157	83.7	Healthy, no physical anomalies

Notes :

[a] *Forage fish samples FF08-04 and FF08-05 are each composites of four individual fish in order to obtain the mass required for chemical analyses. The remaining forage fish samples yielded sufficient tissue mass with a single fish.*

[b] *Units: mm = millimiters; g = grams*

TABLE 4
FIELD DATA
SURFACE WATER QUALITY MEASUREMENTS IN KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Measurement	Sample I.D.[a]:	Units[b]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13
	Sample Date:		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
pH		s.u.	7.99	8.13	7.84	8.10	8.01	7.91
ORP		mV	70.1	69.4	69.7	66.3	53.7	17.9
Dissolved Oxygen		mg/L	10.49	10.54	9.17	10.75	10.33	8.73
Specific Conductance		µmho/cm	680	665	690	652	652	658
Temperature		° C	15.29	14.58	16.03	14.30	14.21	13.34

Measurement	Sample I.D.[a]:	Units[b]	SP09-005	SP09-006	SP09-007	SP09-009	SP09-010	SP09-011	SP09-012	SP09-013	SP09-008
	Sample Date:		9/16/09	9/16/09	9/16/09	9/16/09	9/16/09	9/16/09	9/16/09	9/16/09	9/16/09
pH		s.u.	8.10	8.41	8.19	8.05	8.14	8.33	8.33	8.46	8.20
ORP		mV	239	256	241	203	212	222	226	237	214
Dissolved Oxygen		mg/L	17.21	-	3.2	11.46	16.6	16.89	15.39	17.5	12.54
Specific Conductance		µmho/cm	920	900	1,510	950	900	880	900	630	1,040
Temperature		° C	17.91	18.06	15.2	16.46	18.87	19.55	19.37	19.93	15.04
Turbidity		NTU	160	52.2	631	158	26.3	5.7	18.6	4.9	13.4
Salinity		%	0.04	0.04	0.08	0.04	0.04	0.04	0.04	0.03	0.05
TDS		mg/L	587	581	1,090	606	579	566	575	401	670

Notes:

[a] *For sampling locations see Figure 8.*

[b] *Abbreviations are as follows:*

s.u. = standard units.

mV = millivolts.

mg/L = milligrams per liter.

µmho/cm = microohms per centimeter.

NTU = Nephelometric turbidity units

TABLE 5
FIELD DATA
SURFACE WATER QUALITY MEASUREMENTS IN KOPPERS POND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Measurement	Sample I.D.[a]:	Units[b]	SW08-14	SW08-15	SW08-16	SW08-17
	Sample Date:		5/12/08	5/12/08	5/12/08	5/12/08
pH		s.u.	7.91	8.14	7.99	7.76
ORP		mV	157	152	120	114
Dissolved Oxygen		mg/L	NA	NA	NA	NA
Specific Conductance		µmho/cm	970	949	961	971
Temperature		° C	15.8	15.7	14.9	14.9

Measurement	Sample I.D.[a]:	Units[b]	SP09-001	SP09-002	SP09-003	SP09-004	SP09-014
	Sample Date:		9/16/09	9/16/09	9/16/09	9/16/09	9/16/09
pH		s.u.	5.90	7.00	7.27	7.56	8.46
ORP		mV	363	313	301	233	229
Dissolved Oxygen		mg/L	12.57	8.26	15.73	5.26	12.1
Specific Conductance		µmho/cm	1,020	1,070	980	1,380	960
Temperature		° C	18.58	16.85	17.28	15.04	18.82
Turbidity		NTU	9.5	104	-	283	144
Salinity		%	0.05	0.05	0.04	0.08	0.04
TDS		mg/L	650	640	620	1,070	610

Notes:
(a) *For sampling locations see Figure 8.*
(b) *Abbreviations are as follows:*
s.u. = standard units.
mV = millivolts.
mg/L = milligrams per liter.
µmho/cm = microohms per centimeter.
NTU = Nephelometric turbidity units.

TABLE 6
SUMMARY OF 2010 DATA COLLECTION
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

MEDIUM	NUMBER OF SAMPLES	DESCRIPTION	LOCATION
KOPPERS POND			
Fish	1	Forage fish composite	Western outlet channel
Plant Material	1	Composite sample of floating aquatic plants (duckweed)	Throughout Koppers Pond
	1	Grass or similar leafy material from shrubs or small trees	Bordering Koppers Pond near SD08-07
	1		East Outlet Channel near SD08-15
	1	Plant (cattail) root or rhizomes from emergent vegetation	Perimeter of Koppers Pond near SD08-01
Sediment/Surface Soil	3	Sediments from mudflats, 0 to 6-inch depth	Between the outlet channels in area near SD08-30
Sediment	6	Pond sediments, 0- to 6-inch depth	SD08-01 (plus duplicate), SD08-03, SD08-04, SD08-06, and SD08-08
REFERENCE POND			
Fish	5	Forage fish composites	
	5	Individual game fish	
Plant Material	1	Composite sample of floating aquatic plants (duckweed)	
	1	Grass or similar leafy material from shrubs or small trees	
	1	Plant (cattail) root or rhizomes from emergent vegetation	
Sediment	1	Composite pond sediments, 0- to 6-inch depth	

TABLE 7
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Acetone	--	5 U[d]	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	10	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon disulfide	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	--	**0.083 J[e]**	1 U	1 U	1 U	1 U	1 U	**0.069 J**	1 U	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 7
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
	Surface Water Standard[c]	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Ethylbenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Isopropylbenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl acetate	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylcyclohexane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	200	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**0.22 J**	1 U
Toluene	6000	**0.28 J**	1 U	1 U	1 U	1 U	1 U	**0.21 J**	1 U	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	--	**0.36 J**	1 U	1 U	1 U	1 U	1 U	**0.29 J**	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	40	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-trifluoroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (total)	--	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

[a] *All concentrations reported in units of micrograms per liter (µg/L).*

[b] *Data provided by analytical laboratory report for SDG C8E140218.*

[c] *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

[d] *Data Legend:*
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.

[e] *For clarity, all detections are shown in **bold-face** type.*
For sampling locations see Figure 8.

TABLE 8
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[(a,b)]	NYSDEC Class C Surface Water Standard[(c)]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Acenaphthene	--	0.19 U[(d)]	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.16 J**	0.19 U	0.19 U
Acenaphthylene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Acetophenone	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Anthracene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Atrazine	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Benzaldehyde	--	0.94 UJ	**0.057 J**	0.95 UJ	0.95 UJ	0.97 UJ	0.96 UJ	0.95 UJ	**0.13 J**	0.95 UJ	0.95 UJ
Benzo(a)anthracene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.051 J**	0.19 U	0.19 U
Benzo(b)fluoranthene	--	**0.25**[(e)]	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.27**	0.19 U	0.19 U
Benzo(k)fluoranthene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(ghi)perylene	--	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Benzo(a)pyrene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
1,1'-Biphenyl	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
bis(2-Chloroethoxy)methane	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
bis(2-Chloroethyl) ether	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
bis(2-Ethylhexyl) phthalate	0.6	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	1.2 U	1.2 U	0.95 U	0.95 U
4-Bromophenyl phenyl ether	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Butyl benzyl phthalate	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	1.5 U	1.3 U	0.95 U	0.95 U
Caprolactam	--	1.8 U	1.8 U	2.6 U	1.6 U	1.7 U	1.7 U	3.6 U	3.4 U	1.6 U	1.7 U
Carbazole	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
4-Chloroaniline	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
4-Chloro-3-methylphenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2-Chloronaphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Chlorophenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
4-Chlorophenyl phenyl ether	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Chrysene	--	**0.05 J**	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.061 J**	0.19 U	0.19 U
Dibenz(a,h)anthracene	--	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Dibenzofuran	--	**0.17 J**	0.95 U	**0.17 J**	**0.17 J**	**0.17 J**	**0.17 J**	**0.16 J**	**0.17 J**	**0.16 J**	**0.17 J**

TABLE 8
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
	Surface Water Standard[c]	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Di-n-butyl phthalate	--	**0.34 J**	**0.35 J**	**0.41 J**	**0.32 J**	**0.43 J**	**0.39 J**	**0.58 J**	**0.61 J**	**0.37 J**	0.95 U
3,3'-Dichlorobenzidine	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2,4-Dichlorophenol	1	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Diethyl phthalate	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2,4-Dimethylphenol	5	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Dimethyl phthalate	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
4,6-Dinitro-2-methylphenol	--	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
2,4-Dinitrophenol	5	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
2,4-Dinitrotoluene	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2,6-Dinitrotoluene	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Di-n-octyl phthalate	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Fluoranthene	--	**0.51**	**0.44**	**0.45**	0.19 U	0.19 U	0.19 U	**0.45**	**0.51**	**0.43**	0.19 U
Fluorene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.47**	0.19 U	0.19 U
Hexachlorobenzene	0.00003	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorobutadiene	0.01	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorocyclopentadiene	0.45	0.94 UJ	0.95 UJ	0.95 UJ	0.95 UJ	0.97 UJ	0.96 UJ	0.95 UJ	0.95 UJ	0.95 UJ	0.95 UJ
Hexachloroethane	0.6	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Indeno(1,2,3-cd)pyrene	--	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Isophorone	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2-Methylnaphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Methylphenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
4-Methylphenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Naphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Nitroaniline	--	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
3-Nitroaniline	--	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
4-Nitroaniline	--	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
Nitrobenzene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U

TABLE 8
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[(a,b)]	NYSDEC Class C Surface Water Standard[(c)]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
2-Nitrophenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
4-Nitrophenol	--	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
N-Nitrosodiphenylamine	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
N-Nitrosodi-n-propylamine	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2,2'-oxybis(1-Chloropropane)	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Pentachlorophenol	e^(1.005pH-5.134) = ~18	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
Phenanthrene	--	**0.26**	**0.17 J**	**0.23**	**0.18 J**	**0.18 J**	0.19 U	**0.17 J**	**0.23**	**0.18 J**	**0.2**
Phenol	5	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.1 J**	0.19 U	0.19 U	0.19 U	0.19 U
Pyrene	--	**0.067 J**	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.069 J**	0.19 U	0.19 U
2,4,5-Trichlorophenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U
2,4,6-Trichlorophenol	--	0.94 U	0.95 U	0.95 U	0.95 U	0.97 U	0.96 U	0.95 U	0.95 U	0.95 U	0.95 U

Notes:

(a) *All concentrations reported in units of micrograms per liter (µg/L).*

(b) *Data provided by analytical laboratory report for SDG C8E140218.*

(c) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

(d) *Data Legend*:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.

(e) *For clarity, all detections are shown in* ***bold-face*** *type.*
For sampling locations see Figure 8.

TABLE 9
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		05/12/08	05/12/08	05/12/08	05/12/08	05/12/08	05/12/08	05/12/08	05/12/08	05/12/08	05/12/08
Pesticides:											
Aldrin	0.001	0.047 U[d]	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
alpha-BHC	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
beta-BHC	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
delta-BHC	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
gamma-BHC (Lindane)	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
alpha-Chlordane	0.00002	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
gamma-Chlordane	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
4,4'-DDD	0.00008	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
4,4'-DDE	0.000007	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
4,4'-DDT	0.00001	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Dieldrin	0.0000006	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endosulfan I	0.009	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endosulfan II	0.009	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endosulfan sulfate	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endrin	0.002	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endrin aldehyde	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Endrin ketone	--	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Heptachlor	0.0002	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Heptachlor epoxide	0.0003	0.047 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
Methoxychlor	0.03	0.094 U	0.095 U	0.095 U	0.095 U	0.096 U	0.095 U	0.095 U	0.095 U	0.095 U	0.096 U
Toxaphene	0.000006	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

TABLE 9
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-02 05/12/08	SW08-04 05/12/08	SW08-05 05/12/08	SW08-08 05/12/08	SW08-10 05/12/08	SW08-13 05/12/08	SW08-14 05/12/08	SW08-15 05/12/08	SW08-16 05/12/08	SW08-17 05/12/08
Polychlorinated Biphenyls:											
Aroclor 1016	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1221	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1232	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1242	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1248	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1254	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1260	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

Notes:

(a) *All concentrations reported in units of micrograms per liter (µg/L).*

(b) *Data provided by analytical laboratory report for SDG C8E140218.*

(c) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

(d) *Data Legend:*
U - analyte not detected at concentration listed.

For sampling locations see Figure 8.

TABLE 10
ANALYTICAL DATA SUMMARY - METALS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Total Metals:											
Aluminum	--	409[d]	305	446	246	178	215	417	126	180	298
Antimony	--	0.23 J[e]	0.38 J	0.43 J	0.47 J	0.72 J	0.63 J	0.34 J	0.27 J	0.49 J	0.41 J
Arsenic	--	0.26 J	1 U	0.33 J	0.21 J	1 U	0.17 J	0.21 J	0.79 J	1 U	1 U
Barium	--	122	123	104	118	119	111	129	118	125	123
Beryllium	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	--	7.1	3.9	3.4	2.2	0.59 J	0.77 J	2.1	1 U	0.52 J	0.97 J
Calcium	--	67,400	68,600	54,600	63,900	64,200	59,100	70,500	63,500	69,000	65,200
Chromium	--	9.3 J	7.4 J	7 J	5.9 J	4.9 J	5.2 J	6.7 J	3.8 J	5.2 J	6 J
Cobalt	--	0.38 J	0.33 J	0.36 J	0.29 J	0.25 J	0.28 J	0.38 J	0.24 J	0.27 J	0.41 J
Copper	--	9.9	6.9	7.2	5	3	3.6	5.5	2	3.8	6.6
Iron	--	529	411	550	340	260	297	559	267	291	490
Lead	--	25.7	16.1	11.8	12.3	9.1	9.8	11.6	6.2	11.5	16.9
Magnesium	--	13,400	13,700	10,700	13,200	13,600	12,300	14,200	13,600	14,000	13,000
Manganese	--	10	9.3	8.3	9.1	8.4	8.6	12.9	28.5	11.7	17.8
Nickel	--	2.8	2.4	2.6	2.2	1.9	2	2.4	1.5	2.2	2.8
Potassium	--	1,070	1,110	893	1,050	1,070	994	1,180	1,400	1,150	1,060
Selenium	--	5 U	5 U	5 U	5 U	0.44 J	0.28 J	0.34 J	5 U	5 U	5 U
Silver	--	0.72 J	0.38 J	0.33 J	0.19 J	1 U	0.087 J	0.22 J	1 U	1 U	1 U
Sodium	--	88,400	92,400	68,300	89,800	93,900	84,400	94,700	93,400	95,600	87,900
Thallium	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	--	0.66 J	0.98 J	1.2	0.77 J	0.43 J	0.57 J	0.75 J	0.5 J	1 U	0.69 J
Zinc	--	119 J	73.7 J	64.4 J	42.4 J	13.8 J	24.6 J	49.2 J	25.4 J	13.6 J	26.6 J
Mercury	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dissolved Metals[f]:											
Aluminum	100	24.1 J	22.2 J	20.5 J	22 J	19.3 J	20.6 J	17.3 J	16.5 J	18.3 J	19.1 J
Antimony	--	0.36 J	0.5 J	0.43 J	0.78 J	0.88 J	0.99 J	0.41 J	0.75 J	0.57 J	0.63 J
Arsenic	150	1 U	1 U	1 U	1 U	1 U	1 U	0.29 J	1 U	0.28 J	1 U
Barium	--	122	118	124	119	120	119	120	117	116	120

TABLE 10
ANALYTICAL DATA SUMMARY - METALS
SURFACE WATER IN KOPPERS POND AND OUTLET CHANNELS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
		5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Dissolved Metals (continued)[f]:											
Beryllium	1100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	0.85e^(0.7852lnH-2.715) = ~4.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Calcium	--	**72,600**	**71,300**	**71,900**	**66,300**	**65,800**	**65,400**	**69,300**	**66,100**	**65,400**	**70,500**
Chromium	0.86e^(0.819lnH+0.6848) = ~160	**3.3**	**3.4**	**3.1**	**2.9**	**2.7**	**2.8**	**3.1**	**3.3**	**3.1**	**3.4**
Cobalt	5	**0.19 J**	**0.19 J**	**0.17 J**	**0.16 J**	**0.18 J**	**0.17 J**	**0.21 J**	**0.2 J**	**0.19 J**	**0.21 J**
Copper	0.96e^(0.845lnH-1.702) = ~19	**1.3 J**	**0.82 J**	**0.57 J**	**0.79 J**	**0.97 J**	**0.85 J**	**0.66 J**	**0.87 J**	**0.72 J**	**0.74 J**
Iron	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U	54 U	50 U	50 U
Lead	[1.46203-(0.145712lnH)]e^(1.273lnH-4.297) = ~10	**3.2 J**	**2.4 J**	**1.4 J**	**2.4 J**	**2.4 J**	**2.4 J**	**1.7 J**	**1.9 J**	**2.1 J**	**2.1 J**
Magnesium	--	**14,400**	**14,400**	**14,100**	**13,800**	**13,800**	**13,800**	**14,200**	**14,200**	**13,400**	**14,000**
Manganese	--	**4.6**	**3.2**	**5.6**	**2.4**	**1.5**	**1.2**	**5.7**	**5.7**	**3.7**	**3.9**
Nickel	0.997e^(0.846lnH+0.0584) = ~110	**1.2**	**1.2**	**0.84 J**	**1.1**	**1.3**	**1.2**	**1.2**	**1.2**	**1.5**	**1.4**
Potassium	--	**1,100**	**1,100**	**1,120**	**1,050**	**1,070**	**1,050**	**1,070**	**1,120**	**1,050**	**1,140**
Selenium	4.6	5 U	5 U	**0.38 J**	**0.21 J**	5 U	5 U	**0.31 J**	5 U	**0.26 J**	**0.26 J**
Silver	0.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sodium	--	**100,000**	**101,000**	**97,800**	**97,300**	**99,100**	**97,400**	**94,600**	**98,500**	**93,100**	**100,000**
Thallium	8	1 U	1 U	1 U	**0.027 J**	**0.035 J**	**0.085 J**	1 U	1 U	1 U	1 U
Vanadium	14	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Zinc	e^(0.85lnH+0.5) = ~180	**3.5 J**	**3.1 J**	**2.6 J**	**2.6 J**	**3.2 J**	**2.7 J**	**2.7 J**	**5.2**	**3.4 J**	**4.1 J**
Mercury	0.0007	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Notes:

(a) *All concentrations reported in units of micrograms per liter (µg/L).*

(b) *Data provided by analytical laboratory report for SDG C8E140218.*

(c) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

(d) *For clarity, all detections are shown in* ***bold-face*** *type.*

(e) *Data Legend*:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.

(f) *Dissolved metal samples were field filtered.*
For sampling locations see Figure 8.

TABLE 11
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
SURFACE WATER QUALITY MEASUREMENTS IN KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a]	NYSDEC Class C Surface Water Standard[b]	Units	SW08-02	SW08-04	SW08-05	SW08-08	SW08-10	SW08-13	SW08-14	SW08-15	SW08-16	SW08-17
			5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08	5/12/08
Cyanide (total)	5.2	ug/L	10 U[c]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoride	0.02e^(0.907lnH+7.394) = ~4.8	mg/L	**0.43**	**0.45**	**0.39**	**0.49**	**0.5**	**0.5**	**0.44**	**0.49**	**0.5**	**0.5**
Hardness	--	mg/L $CaCO_3$	**254**	**248**	**260**	**246**	**238**	**262**	**254**	**234**	**244**	**254**
Nitrite	100	mg/L	0.05 U	0.05 U	0.05 U	**0.066**	0.05 UJ	0.05 U	**0.068**	**0.067**	0.05 U	**0.087**
Ammonia Nitrogen	2.0[d]	mg/L	**0.067 J**	**0.043 J**	**0.13**	**0.042 J**	**0.036 J**	**0.063 J**	**0.081 J**	**0.13**	**0.093 J**	**0.088 J**
Total Suspended Solids	--	mg/L	**16**	**15**	**29**	**14**	**12**	**17**	**16**	**22**	**12**	**45**

Notes:
[a] *Data for laboratory parameters provided by analytical laboratory report for SDG C8E140218.*
[b] *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.
[c] *Data Legend:*
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.
For clarity, all detections are shown in **bold-face** *type.*
For sampling locations see Figure 8.
[d] *The listed standard for total ammonia is from NYSDEC (1998) and corresponds to the concentration of un-unionized ammonia that meets the 6 NYCRR 703 water quality standard for non-trout waters at a water pH of 7.75 and a temperature of 15°C.*

TABLE 12
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21 5/6/08	SW08-22 5/6/08	SW08-22 (dup) 5/6/08	SW08-23 5/6/08	SW08-24 5/7/08	SW08-27 5/7/08	SW08-28 5/7/08	SW08-29 5/7/08
Acetone	--	5 U[d]	5 U	5 U	5 U	5 U	**4.1 J**	5 U	5 U
Benzene	10	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	--	1 U	1 U	1 U	1 U	**0.12 J**	1 U	1 U	1 U
Bromoform	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ
2-Butanone	--	5 U	5 U	5 U	5 U	5 U	**1.1 J**	5 U	5 U
Carbon disulfide	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U
Carbon tetrachloride	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U
Chlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	--	**0.19[e] J**	**0.24 J**	**0.24 J**	**0.31 J**	**0.23 J**	1 U	**0.15 J**	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U
1,2-Dibromoethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	--	1 U	1 U	1 U	1 U	**0.1 J**	1 U	1 U	1 U
trans-1,2-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U

TABLE 12
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Ethylbenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Isopropylbenzene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl acetate	--	1 U	1 U	1 U	1 U	1 U	**1.4**	1 U	1 U
Methylcyclohexane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	200	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-pentanone	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	6000	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	--	**0.76 J**	**1.2**	**1.2**	1 U	**1.2**	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	40	**0.52 J**	**0.49 J**	**0.46 J**	1 U	**0.56 J**	1 U	1 U	1 U
Trichlorofluoromethane	--	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (total)	--	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

(a) *All concentrations reported in units of micrograms per liter (µg/L).*

(b) *Data provided by analytical laboratory reports for SDGs C8E070123 and C8E080374.*

(c) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

(d) *Data Legend:*
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.

(e) *For clarity, all detections are shown in* ***bold-face*** *type.*
For sampling locations see Figure 7.

TABLE 13
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Acenaphthene	--	**0.15 J[d,e]**	**0.15 J**	0.19 U	0.19 U	0.19 U	0.19 U	**0.15 J**	0.19 U
Acenaphthylene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Acetophenone	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	**0.054 J**	0.95 U	0.94 U
Anthracene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.24**	0.19 U
Atrazine	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Benzaldehyde	--	0.94 UJ	0.95 UJ	0.94 UJ	0.94 UJ	0.95 UJ	**0.098 J**	0.95 UJ	**0.057 J**
Benzo(a)anthracene	--	0.19 U	**0.071 J**	0.19 U	0.19 U	0.19 U	**0.49**	**0.52**	0.19 U
Benzo(b)fluoranthene	--	0.19 U	**0.27**	0.19 U	0.19 U	0.19 U	**0.75**	**0.64**	0.19 U
Benzo(k)fluoranthene	--	0.19 U	**0.1 J**	0.19 U	0.19 U	0.19 U	**0.53**	**0.52**	0.19 U
Benzo(ghi)perylene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.6**	**0.55**	0.19 U
Benzo(a)pyrene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.47**	**0.45**	0.19 U
1,1'-Biphenyl	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	**0.19 J**	0.95 U	0.94 U
bis(2-Chloroethoxy)methane	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
bis(2-Chloroethyl) ether	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
bis(2-Ethylhexyl) phthalate	0.6	0.94 U	1.4 U	1.8 U	0.94 U	0.95 U	0.94 U	0.95 U	1.4 U
4-Bromophenyl phenyl ether	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Butyl benzyl phthalate	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Caprolactam	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Carbazole	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.38**	0.19 U	0.19 U
4-Chloroaniline	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	**1.7**
4-Chloro-3-methylphenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2-Chloronaphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Chlorophenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
4-Chlorophenyl phenyl ether	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Chrysene	--	0.19 U	**0.1 J**	0.19 U	0.19 U	0.19 U	**0.69**	**0.62**	0.19 U
Dibenz(a,h)anthracene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.62**	**0.7**	0.19 U

TABLE 13
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
	Surface Water Standard[c]	5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Dibenzofuran	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Di-n-butyl phthalate	--	**0.3 J**	**0.29 J**	0.94 U	0.94 U	0.95 U	**0.36 J**	**0.37 J**	0.94 U
3,3'-Dichlorobenzidine	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2,4-Dichlorophenol	1	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Diethyl phthalate	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2,4-Dimethylphenol	5	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Dimethyl phthalate	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
4,6-Dinitro-2-methylphenol	--	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U
2,4-Dinitrophenol	5	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U
2,4-Dinitrotoluene	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2,6-Dinitrotoluene	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Di-n-octyl phthalate	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	**0.29 J**	**0.26 J**	0.94 U
Fluoranthene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**1.1**	**0.56**	0.19 U
Fluorene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.48**	**0.47**	0.46 U
Hexachlorobenzene	0.00003	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorobutadiene	0.01	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorocyclopentadiene	0.45	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Hexachloroethane	0.6	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Indeno(1,2,3-cd)pyrene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.61**	**0.59**	0.19 U
Isophorone	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2-Methylnaphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Methylphenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
4-Methylphenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Naphthalene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Nitroaniline	--	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U
3-Nitroaniline	--	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U

TABLE 13
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
4-Nitroaniline	--	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U
Nitrobenzene	--	0.19 U	**0.67**	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.45**
2-Nitrophenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
4-Nitrophenol	--	4.7 U	4.8 U	4.7 U	4.7 U	4.8 U	4.7 U	4.8 U	4.7 U
N-Nitrosodiphenylamine	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
N-Nitrosodi-n-propylamine	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2,2'-oxybis(1-Chloropropane)	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Pentachlorophenol	e^(1.005pH-5.134) = ~8.2	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
Phenanthrene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.51 U	0.25 U	0.21 U
Phenol	5	**0.083 J**	0.19 U	0.19 U	**0.13 J**	0.19 U	**0.18 J**	**0.094 J**	0.19 U
Pyrene	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.55**	**0.19**	0.19 U
2,4,5-Trichlorophenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U
2,4,6-Trichlorophenol	--	0.94 U	0.95 U	0.94 U	0.94 U	0.95 U	0.94 U	0.95 U	0.94 U

Notes:

(a) *All concentrations reported in units of micrograms per liter (µg/L).*

(b) *Data provided by analytical laboratory reports for SDGs C8E070123 and C8E080374.*

(c) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August*
"--" indicates that a corresponding water quality standard does not exist.

(d) Data Legend:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.

(e) *For clarity, all detections are shown in **bold-face** type.*

TABLE 14
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Pesticides:									
Aldrin	0.001	0.047 U[d]	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
alpha-BHC	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
beta-BHC	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
delta-BHC	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
gamma-BHC (Lindane)	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
alpha-Chlordane	0.00002	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
gamma-Chlordane	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
4,4'-DDD	0.00008	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
4,4'-DDE	0.000007	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
4,4'-DDT	0.00001	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Dieldrin	0.0000006	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endosulfan I	0.009	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endosulfan II	0.009	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endosulfan sulfate	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endrin	0.002	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endrin aldehyde	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Endrin ketone	--	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Heptachlor	0.0002	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Heptachlor epoxide	0.0003	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.047 U	0.048 U
Methoxychlor	0.03	0.094 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.094 U	0.094 U
Toxaphene	0.000006	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

TABLE 14
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
<u>Polychlorinated Biphenyls</u>:									
Aroclor 1016	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1221	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1232	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1242	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1248	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1254	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Aroclor 1260	0.000001	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U

<u>*Notes*</u>:

[a] *All concentrations reported in units of micrograms per liter (µg/L).*

[b] *Data provided by analytical laboratory reports for SDGs C8E070123 and C8E080374.*

[c] *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

[d] <u>*Data Legend*</u>:
U - analyte not detected at concentration listed.
For sampling locations see Figure 7.

TABLE 15
ANALYTICAL DATA SUMMARY - METALS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Total Metals:									
Aluminum	--	9.6 J[d,e]	4.4 J	8.8 J	7.2 J	12.4 J	36	41.3	42.1
Antimony	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic	--	1 U	0.2 J	1 U	1 U	0.18 J	0.47 J	1 U	0.24 J
Barium	--	128	112	131	98.2	127	92.4	73.7	75.4
Beryllium	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	--	0.13 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Calcium	--	73,700	62,100	73,300	51,400	72,300	78,400	53,500	56,200
Chromium	--	2.9	2.8	3	2.7	2.9	2.5	2.5	2.5
Cobalt	--	0.12 J	0.12 J	0.5 U	0.5 U	0.11 J	0.83	0.11 J	0.12 J
Copper	--	2.4	5.9	4.7	25	2.1	3.2	1.2 J	1.2 J
Iron	--	9.1 J	17.5 J	50 U	20.2 J	18.7 J	817	87.7	202
Lead	--	0.42 J	0.22 J	0.2 J	0.64 J	0.1 J	2.1	0.15 J	0.14 J
Magnesium	--	14,100	12,300	14,500	9,970	14,100	9,920	11,200	9,060
Manganese	--	0.63	0.088 J	0.5 U	0.77	0.55	310	4.3	49
Nickel	--	0.14 J	0.16 J	0.13 J	0.12 J	0.17 J	0.69 J	0.2 J	0.32 J
Potassium	--	1,180 J	979 J	1,160 J	920 J	1,160	2,660	1,680	1,610
Selenium	--	0.46 J	5 U	0.37 J	0.34 J	0.37 J	0.79 J	0.62 J	0.41 J
Silver	--	1 U	1 U	1 U	0.36 J	1 U	1 U	1 U	1 U
Sodium	--	98,100	84,800	101,000	66,400	99,000	277,000	106,000	97,600
Thallium	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	--	1 U	0.69 J	1 U	0.52 J	1 U	1 U	1 U	1 U
Zinc	--	6.4	6.4	4 J	7.2	5.3	112	8.8	7.8
Mercury	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

TABLE 15
ANALYTICAL DATA SUMMARY - METALS
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	NYSDEC Class C Surface Water Standard[c]	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
		5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Dissolved Metals[f]:									
Aluminum	100	**7.3 J**	**6.9 J**	**5.4 J**	**6.6 J**	**7.1 J**	**4.3 J**	**7.1 J**	**3.7 J**
Antimony	--	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Arsenic	150	**0.19 J**	1 U	1 U	**0.33 J**	1 U	**0.3 J**	**0.21 J**	1 U
Barium	--	**129**	**130**	**127**	**97**	**128**	**90.6**	**72.5**	**71.9**
Beryllium	1100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	0.85e^(0.7852lnH-2.715) = ~3.9	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Calcium	--	**72,900**	**73,000**	**70,700**	**51,800**	**74,600**	**80,800**	**51,800**	**54,800**
Chromium	0.86e^(0.819lnH+0.6848) = ~142	**2.6**	**2.7**	**2.8**	**2.5**	**3**	**2.4**	**2.4**	**2.2**
Cobalt	5	**0.13 J**	**0.12 J**	**0.1 J**	**0.14 J**	**0.15 J**	**0.87**	**0.14 J**	**0.1 J**
Copper	0.96e^(0.845lnH-1.702) = ~17	**2**	**1.1 J**	**0.78 J**	**20**	**2**	**1.4 J**	**6.8**	**1.1 J**
Iron	--	50 U	50 U	50 U	50 U	50 U	**235**	**22 J**	**28.8 J**
Lead	[1.46203-(0.145712lnH)]e^(1.273lnH-4.297) = ~8.9	**0.25 J**	**0.18 J**	**0.12 J**	**0.35 J**	**0.097 J**	**0.07 J**	**0.29 J**	**0.14 J**
Magnesium	--	**13,800**	**13,800**	**13,500**	**9,780**	**14,000**	**9,840**	**10,800**	**8,720**
Manganese	--	**0.72**	0.5 U	0.5 U	**1.4**	**0.21 J**	**313**	**1.7**	**47.7**
Nickel	0.997e^(0.846lnH+0.0584) = ~102	**0.46 J**	**0.19 J**	**0.14 J**	**0.63 J**	**0.52 J**	**0.92 J**	**0.51 J**	**0.37 J**
Potassium	--	**1,210 J**	**1,180 J**	**1,140 J**	**948 J**	**1,230**	**2,560**	**1,660**	**1,590**
Selenium	4.6	**0.73 J**	**0.36 J**	5 U	**0.33 J**	5 U	**0.43 J**	5 U	**0.41 J**
Silver	0.1	1 U	1 U	1 U	**0.093 J**	1 U	1 U	1 U	1 U
Sodium	--	**99,700**	**100,000**	**96,800**	**67,400**	**101,000**	**285,000**	**104,000**	**95,300**
Thallium	8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	14	1 U	1 U	1 U	1 U	1 U	**0.18 J**	1 U	**0.24 J**
Zinc	e^(0.85lnH+0.5) = ~162	**10.2**	**14.8**	**5.8**	**10.6**	**5.2**	**41**	**11.6**	**7.5**
Mercury	0.0007	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Notes:

[a] *All concentrations reported in units of micrograms per liter (µg/L).*

[b] *Data provided by analytical laboratory reports for SDGs C8E070123 and C8E080374.*

[c] *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

[d] *Data Legend*:
U - analyte not detected at indicated reporting limit (RL).
J - estimated concentration of analyte detected above the Method Detection Limit (MDL), but below the RL.

[e] *For clarity, all detections are shown in* ***bold-face*** *type.*

[f] *Dissolved metal samples were field filtered.*
For sampling locations see Figure 7.

TABLE 16
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
SURFACE WATER DRAINING TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a]	NYSDEC Class C Surface Water Standard[b]	Units	SW08-21	SW08-22	SW08-22 (dup)	SW08-23	SW08-24	SW08-27	SW08-28	SW08-29
			5/6/08	5/6/08	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08
Field Parameters:										
pH		s.u.	6.73	6.99	NA[e]	7.45	7.22	7.51	7.41	7.11
ORP		mV	135	126	NA	129	108	-44	83	125
Specific Conductance		μmho/cm	970.8	977.3	NA	696.9	980.4	1,864	925.2	859.1
Temperature		°C	15.2	13.1	NA	15.9	15.1	13.9	17.1	13.4
Laboratory Parameters:										
Cyanide (total)	5.2	μg/L	10 U[c]	10 U	10 U	10 U	10 U	**7.2 J**	10 U	10 U
Fluoride	0.02e^(0.907lnH+7.394) = ~4.4	mg/L	**0.25**[d]	**0.24**	**0.24**	**0.25**	**0.26**	**0.1**	**0.09 J**	**0.09 J**
Hardness	--	mg/L $CaCO_3$	**250**	**246**	**246**	**174**	**244**	**244**	**182**	**178**
Nitrite	100	mg/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Ammonia Nitrogen	2.0[f]	mg/L	0.1 U	0.12 U	0.1 U	0.11 U	0.14 U	**0.74**	0.14 U	0.1 U
Total Suspended Solids	--	mg/L	4 U	4 U	4 U	**9**	**9**	**26**	**4**	4 U

<u>Notes</u>:

(a) *Data for laboratory parameters provided by analytical laboratory reports for SDGs C8E070123 and C8E080374.*

(b) *New York Code, Rules and Regulation (NYCRR) Title 6, Part 703: Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (August 1999).*
"--" indicates that a corresponding water quality standard does not exist.

(c) *Data Legend:*
- *U - analyte not detected at concentration listed.*
- *J - associated result is quantitatively uncertain.*
- *UJ - the reporting limit is estimated.*
- *For clarity, all detections are shown in* ***bold-face*** *type.*

For sampling locations see Figure 7.

(e) *NA indicates readings were not collected.*

(f) *The listed standard for total ammonia is from NYSDEC (1998) and corresponds to the concentration of un-unionized ammonia that meets the 6 NYCRR 703 water quality standard for non-trout waters at a water pH of 7.75 and a temperature of 15°C.*

TABLE 17
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Concentration (µg/kg) at Indicated Depth (inches)																		
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			SD08-03	SD08-04			SD08-05		
Sample Date:	5/14/08				5/14/08					5/14/08			5/14/08	5/14/08			5/13/08		
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13
Acetone	74 UJ[d]	58 U	47 UJ	43 UJ	58 U	51 U	46 UJ	49 UJ	42 U	76 UJ	52 U	51 U	58 U	72 UJ	36 U	51 U	54 U	63 U	38 U
Benzene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Bromodichloromethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Bromoform	18 UJ	15 UJ	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 UJ	19 UJ	13 U	13 UJ	15 UJ	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Bromomethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
2-Butanone	18 UJ	15 UJ	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 UJ	15 UJ	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Carbon disulfide	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Carbon tetrachloride	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Chlorobenzene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Dibromochloromethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Chloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Chloroform	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Chloromethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Cyclohexane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,2-Dibromo-3-chloropropane	18 UJ	15 UJ	12 UJ	11 UJ	14 UJ	13 UJ	12 UJ	12 UJ	10 UJ	19 UJ	13 UJ	13 UJ	15 UJ	18 UJ	9 UJ	13 UJ	14 UJ	16 UJ	9.5 UJ
1,2-Dibromoethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,2-Dichlorobenzene	18 UJ	**3.4[e] J**	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,3-Dichlorobenzene	18 UJ	**7.4 J**	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,4-Dichlorobenzene	18 UJ	**15**	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Dichlorodifluoromethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,1-Dichloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,2-Dichloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
cis-1,2-Dichloroethene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
trans-1,2-Dichloroethene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U

TABLE 17
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Concentration (µg/kg) at Indicated Depth (inches)																	
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			SD08-03	SD08-04			SD08-05		
Sample Date:	5/14/08				5/14/08					5/14/08			5/14/08	5/14/08			5/13/08		
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13
1,1-Dichloroethene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,2-Dichloropropane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
cis-1,3-Dichloropropene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
trans-1,3-Dichloropropene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Ethylbenzene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
2-Hexanone	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Isopropylbenzene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Methyl acetate	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Methylcyclohexane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Methylene chloride	18 U	15 U	12 U	11 U	14 U	13 UJ	12 UJ	12 U	12 U	19 UJ	13 U	13 U	15 U	18 U	9 U	13 U	14 U	16 U	9.5 U
4-Methyl-2-pentanone	18 UJ	15 UJ	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 UJ	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Methyl tert-butyl ether	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Styrene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,1,2,2-Tetrachloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Tetrachloroethene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Toluene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,2,4-Trichlorobenzene	18 UJ	**14 J**	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,1,1-Trichloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
1,1,2-Trichloroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Trichloroethene	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Trichlorofluoromethane	18 UJ	15 UJ	12 UJ	11 UJ	14 UJ	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 UJ	13 U	15 UJ	18 UJ	9 UJ	13 UJ	14 U	16 UJ	9.5J U
1,1,2-Trichloro-1,2,2-trifluoroethane	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Vinyl chloride	18 UJ	15 U	12 UJ	11 UJ	14 U	13 UJ	12 UJ	12 UJ	10 U	19 UJ	13 U	13 U	15 U	18 UJ	9 U	13 U	14 U	16 U	9.5 U
Xylenes (total)	55 UJ	44 U	35 UJ	32 UJ	43 U	39 UJ	35 UJ	37 UJ	31 U	57 UJ	39 U	38 U	44 U	54 UJ	27 U	38 U	41 U	47 U	28 U

TABLE 17
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Concentration (µg/kg) at Indicated Depth (inches)																			
Sample I.D.[c]:	SD08-06		SD08-07			SD08-08			SD08-09		SD08-10			SD08-11		SD08-12		SD08-13		
Sample Date:	5/14/08		5/14/08			5/13/08			5/13/08		5/13/08			5/13/08		5/13/08		5/13/08		
Sample Depth:	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5
Acetone	41 U	30 U	76 UJ	48 U	37 U	80 UJ	39 U	40 U	**36 J**	**18 J**	**31 J**	**100**	**360 J**	65 U	48 U	73 UJ	63 U	**73 J**	61 U	**200**
Benzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Bromodichloromethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Bromoform	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Bromomethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
2-Butanone	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	**25**	**71**	16 U	12 U	18 UJ	16 U	**14 J**	15 U	**39**
Carbon disulfide	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	**5.8 J**	16 U	12 U	18 UJ	16 U	19 UJ	15 U	**6.7 J**
Carbon tetrachloride	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Chlorobenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Dibromochloromethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Chloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Chloroform	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Chloromethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Cyclohexane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,2-Dibromo-3-chloropropane	10 UJ	7.5 UJ	19 UJ	12 U	9.2 UJ	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 UJ	12 UJ	18 UJ	16 U	19 UJ	15 U	12 U
1,2-Dibromoethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,2-Dichlorobenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,3-Dichlorobenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,4-Dichlorobenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Dichlorodifluoromethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,1-Dichloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,2-Dichloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
cis-1,2-Dichloroethene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
trans-1,2-Dichloroethene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U

TABLE 17
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Concentration (µg/kg) at Indicated Depth (inches)																			
Sample I.D.[c]:	SD08-06		SD08-07			SD08-08			SD08-09		SD08-10			SD08-11		SD08-12		SD08-13		
Sample Date:	5/14/08		5/14/08			5/13/08			5/13/08		5/13/08			5/13/08		5/13/08		5/13/08		
Sample Depth:	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5
1,1-Dichloroethene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,2-Dichloropropane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
cis-1,3-Dichloropropene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
trans-1,3-Dichloropropene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Ethylbenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
2-Hexanone	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Isopropylbenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Methyl acetate	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	**5.6 J**	7.7 U	**7.3 J**	13 U	11 U	16 U	12 U	18 UJ	16 U	**8.9 J**	15 U	12 U
Methylcyclohexane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Methylene chloride	10 U	7.5 U	19 U	12 U	9.2 U	20 U	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 U	15 U	12 U
4-Methyl-2-pentanone	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Methyl tert-butyl ether	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Styrene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,1,2,2-Tetrachloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Tetrachloroethene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Toluene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,2,4-Trichlorobenzene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,1,1-Trichloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
1,1,2-Trichloroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Trichloroethene	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Trichlorofluoromethane	10 UJ	7.5 UJ	19 UJ	12 U	9.2 UJ	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 UJ	12 UJ	18 UJ	16 U	19 UJ	15 U	12 U
1,1,2-Trichloro-1,2,2-trifluoroethane	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Vinyl chloride	10 U	7.5 U	19 UJ	12 U	9.2 U	20 UJ	9.8 U	10 U	8.4 U	7.7 U	14 U	13 U	11 U	16 U	12 U	18 UJ	16 U	19 UJ	15 U	12 U
Xylenes (total)	30 U	22 U	57 UJ	36 U	27 U	60 UJ	29 U	30 U	25 U	23 U	41 U	39 U	32 U	48 U	36 U	55 UJ	47 U	56 UJ	46 U	36 U

Notes:

(a) *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E140236 and C8E150368.*

(c) *For sampling locations see Figure 8.*

(d) *Data Legend:*

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting limit is estimated.

(e) *For clarity, all detections are shown in* ***bold-face*** *type.*

CUMMINGS RITER

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg)[a] at Indicated Depth (inches)												
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			
Sample Date:	5/14/08				5/14/08					5/14/08			
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29
1,1'-Biphenyl	1,200 UJ[d]	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2,2'-oxybis(1-Chloropropane)	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
2,4,5-Trichlorophenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2,4,6-Trichlorophenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2,4-Dichlorophenol	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
2,4-Dimethylphenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2,4-Dinitrophenol	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U
2,4-Dinitrotoluene	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2,6-Dinitrotoluene	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2-Chloronaphthalene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
2-Chlorophenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2-Methylnaphthalene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	**2.3[d] J**	250 UJ	170 U	85 U	190 U
2-Methylphenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
2-Nitroaniline	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U
2-Nitrophenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
3,3'-Dichlorobenzidine	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
3-Nitroaniline	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U
4,6-Dinitro-2-methylphenol	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U
4-Bromophenyl phenyl ether	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
4-Chloro-3-methylphenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
4-Chloroaniline	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
4-Chlorophenyl phenyl ether	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
4-Methylphenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	**2.3 J**	1,200 UJ	860 U	420 U	960 U
4-Nitroaniline	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U
4-Nitrophenol	6,300 UJ	5,000 U	4,000 U	1,800 U	4,900 U	4,400 U	3,900 U	2,100 U	180 U	6,400 UJ	4,400 U	2,200 U	4,900 U

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg)[a] at Indicated Depth (inches)												
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			
Sample Date:	5/14/08				5/14/08					5/14/08			
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29
Acenaphthene	250 UJ	**160 J**	160 U	72 U	**210**	**160 J**	150 U	82 U	**7.5**	**230 J**	**140 J**	85 U	190 U
Acenaphthylene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	**310 J**	**190**	85 U	190 U
Acetophenone	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Anthracene	**510 J**	**300**	160 U	72 U	**430**	**270**	**220**	82 U	**11**	**450 J**	**280**	85 U	190 U
Atrazine	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 UJ	420 UJ	960 UJ
Benzaldehyde	1,200 UJ	960 UJ	770 UJ	350 UJ	960 UJ	850 UJ	760 UJ	410 UJ	**10 J**	1,200 UJ	860 UJ	420 UJ	960 UJ
Benzo(a)anthracene	**1,200 J**	**340**	**80 J**	72 U	**1,200**	**430 J**	**210 J**	82 U	**15**	**1,000 J**	**340**	**44 J**	**110 J**
Benzo(a)pyrene	**1,300 J**	**490**	**140 J**	72 U	**1,300**	**540 J**	**270 J**	82 U	**24**	**1,400 J**	**450**	85 U	**230**
Benzo(b)fluoranthene	**1,800 J**	**690**	**250**	72 U	**1,700**	**710 J**	**420 J**	**110**	**29**	**2,000 J**	**630**	**130**	**360**
Benzo(ghi)perylene	**1,200 J**	**400**	**74 J**	72 U	**1,100**	**410 J**	**190 J**	82 U	**20**	**1,200 J**	**340**	85 U	**110 J**
Benzo(k)fluoranthene	**780 J**	**210**	**36 J**	72 U	**730**	**300 J**	**94 J**	**13 J**	**11**	**920 J**	**200**	85 U	**63 J**
bis(2-Chloroethoxy)methane	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
bis(2-Chloroethyl) ether	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
bis(2-Ethylhexyl) phthalate	**1,200 J**	**840 J**	770 U	350 U	**990**	**550 J**	**670 J**	410 U	**20 J**	**1,400 J**	**800 J**	**74 J**	**250 J**
Butyl benzyl phthalate	**130 J**	**110 J**	770 U	350 U	960 U	**78 J**	**62 J**	410 U	**6.5 J**	**110 J**	**84 J**	420 U	960 U
Caprolactam	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Carbazole	**490 J**	**300**	160 U	72 U	**390**	170 U	150 U	82 U	**12**	**440 J**	**270**	85 U	190 U
Chrysene	**1,500 J**	**520**	**120 J**	72 U	**1,500**	**650 J**	**290 J**	82 U	**20**	**1,600 J**	**480**	**38 J**	**120 J**
Dibenz(a,h)anthracene	**370 J**	200 U	160 U	72 U	**320**	170 U	150 U	82 U	7 U	**300 J**	**96 J**	85 U	190 U
Dibenzofuran	1,200 U	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 U	860 U	420 U	960 U
Diethyl phthalate	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Dimethyl phthalate	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Di-n-butyl phthalate	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Di-n-octyl phthalate	1,200 UJ	**140 J**	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (μg/kg)[a] at Indicated Depth (inches)												
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			
Sample Date:	5/14/08				5/14/08					5/14/08			
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29
Fluoranthene	**3,200 J**	**1,300**	**470**	72 U	**2,800**	**1,400 J**	**850 J**	82 U	**46**	**2,600 J**	**1,300**	**240**	**620**
Fluorene	**670 J**	**510**	160 U	72 U	**530**	170 U	150 U	82 U	**20**	250 UJ	**450**	85 U	190 U
Hexachlorobenzene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
Hexachlorobutadiene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
Hexachlorocyclopentadiene	1,200 UJ	960 UJ	770 UJ	350 UJ	960 UJ	850 UJ	760 UJ	410 UJ	34 UJ	1,200 UJ	860 UJ	420 UJ	960 UJ
Hexachloroethane	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Indeno(1,2,3-cd)pyrene	**970 J**	**310**	**88 J**	72 U	**880**	**330**	**180**	82 U	**16**	**1,100 J**	**320**	**40 J**	**120 J**
Isophorone	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Naphthalene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	**3.4 J**	250 UJ	170 U	85 U	190 U
Nitrobenzene	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
N-Nitrosodi-n-propylamine	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
N-Nitrosodiphenylamine	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
Pentachlorophenol	1,200 UJ	960 U	770 U	350 U	960 U	850 U	760 U	410 U	34 U	1,200 UJ	860 U	420 U	960 U
Phenanthrene	**1,200 J**	**440**	**180**	72 U	**1,200**	**580 J**	**270 J**	**56 J**	**21**	**970 J**	**440**	**85**	**200**
Phenol	250 UJ	200 U	160 U	72 U	190 U	170 U	150 U	82 U	7 U	250 UJ	170 U	85 U	190 U
Pyrene	**1,800 J**	**640**	**130 J**	72 U	**2,000**	**850 J**	**380 J**	82 U	**22**	**1,800 J**	**650**	**52 J**	**170 J**

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TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg) at Indicated Depth (inches)										
Sample I.D.[c]:	SD08-04			SD08-05			SD08-06		SD08-07		
Sample Date:	5/14/08			5/13/08			5/14/08		5/14/08		
Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22
1,1'-Biphenyl	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2,2'-oxybis(1-Chloropropane)	240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
2,4,5-Trichlorophenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2,4,6-Trichlorophenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2,4-Dichlorophenol	240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
2,4-Dimethylphenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2,4-Dinitrophenol	6,100 UJ	1,700 U	2,200 U	4,600 U	2,700 U	3,200 U	3,500 U	160 U	6,400 UJ	4,100 U	170 U
2,4-Dinitrotoluene	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2,6-Dinitrotoluene	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2-Chloronaphthalene	240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
2-Chlorophenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2-Methylnaphthalene	240 UJ	**32 J**	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
2-Methylphenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
2-Nitroaniline	6,100 UJ	1,700 U	2,200 U	4,600 U	2,700 U	3,200 U	3,500 U	160 U	6,400 UJ	4,100 U	170 U
2-Nitrophenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
3,3'-Dichlorobenzidine	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
3-Nitroaniline	6,100 UJ	1,700 U	2,200 U	4,600 U	2,700 U	3,200 U	3,500 U	160 U	6,400 UJ	4,100 U	170 U
4,6-Dinitro-2-methylphenol	6,100 UJ	1,700 U	2,200 U	4,600 U	2,700 U	3,200 U	3,500 U	160 U	6,400 UJ	4,100 U	170 U
4-Bromophenyl phenyl ether	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
4-Chloro-3-methylphenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
4-Chloroaniline	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
4-Chlorophenyl phenyl ether	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
4-Methylphenol	1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	**7.9 J**	1,200 UJ	800 U	**4.7 J**
4-Nitroaniline	6,100 UJ	1,700 U	2,200 U	4,600 U	2,700 U	3,200 U	3,500 U	160 U	6,400 UJ	4,100 U	170 U
4-Nitrophenol	6,100 UJ	1,700 U	2,200 U	4,600 UJ	2,700 UJ	3,200 UJ	3,500 UJ	160 UJ	6,400 UJ	4,100 UJ	170 UJ

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)										
	Sample I.D.[c]:	**SD08-04**			**SD08-05**			**SD08-06**		**SD08-07**		
	Sample Date:	**5/14/08**			**5/13/08**			**5/14/08**		**5/14/08**		
	Sample Depth:	**0 to 6**	**6 to 18**	**18 to 20**	**0 to 6**	**0 to 6 (dup)**	**6 to 13**	**0 to 6**	**6 to 9**	**0 to 6**	**6 to 18**	**18 to 22**
Acenaphthene		240 UJ	**57 J**	86 U	180 U	110 U	130 U	140 U	**4.9 J**	250 UJ	160 U	6.7 U
Acenaphthylene		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Acetophenone		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	**2.6 J**
Anthracene		**350 J**	**91**	86 U	**200 J**	110 U	130 U	140 U	6.5 U	**310 J**	160 U	6.7 U
Atrazine		1,200 UJ	330 UJ	420 UJ	890 UJ	520 UJ	630 UJ	670 UJ	32 UJ	1,200 UJ	800 UJ	33 UJ
Benzaldehyde		1,200 UJ	330 UJ	420 UJ	890 UJ	520 UJ	630 UJ	670 UJ	**7.2 J**	1,200 UJ	800 UJ	**19 J**
Benzo(a)anthracene		**430 J**	**61 J**	**50 J**	**130 J**	**71 J**	**75 J**	**110 J**	**1.7 J**	**240 J**	**180**	**3.3 J**
Benzo(a)pyrene		**760 J**	67 U	**80 J**	**280**	**160**	**130**	**170**	**5.3 J**	**450 J**	**300**	**6.7**
Benzo(b)fluoranthene		**1,000 J**	**140**	**150**	**410**	**260**	**220**	**340**	**11**	**630 J**	**430**	**14**
Benzo(ghi)perylene		**670 J**	**100**	**55 J**	**150 J**	**98 J**	130 U	**150**	**2.2 J**	**360 J**	**250**	**6.9**
Benzo(k)fluoranthene		**330 J**	**30 J**	**20 J**	**120 J**	**45 J**	**28 J**	140 U	**3.8 J**	**270 J**	**140 J**	6.7 U
bis(2-Chloroethoxy)methane		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
bis(2-Chloroethyl) ether		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
bis(2-Ethylhexyl) phthalate		**890 J**	**110 J**	420 U	890 U	520 U	630 U	670 U	**11 J**	**330 J**	800 U	**13 J**
Butyl benzyl phthalate		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	**14 J**	1,200 UJ	800 U	33 U
Caprolactam		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	**50**	1,200 UJ	800 U	**46**
Carbazole		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Chrysene		**800 J**	**90**	**60 J**	**220**	**150**	**78 J**	**130 J**	**4.4 J**	**420 J**	**280**	**7.8**
Dibenz(a,h)anthracene		**160 J**	67 U	**35 J**	180 U	110 U	130 U	140 U	6.5 U	**120 J**	160 U	**2.6 J**
Dibenzofuran		1,200 U	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Diethyl phthalate		1,200 UJ	330 U	420 U	890 UJ	520 UJ	630 UJ	670 UJ	32 UJ	1,200 UJ	800 UJ	**3.4 J**
Dimethyl phthalate		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Di-n-butyl phthalate		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	**18 J**	1,200 UJ	800 U	**11 J**
Di-n-octyl phthalate		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)										
	Sample I.D.[c]:	SD08-04			SD08-05			SD08-06		SD08-07		
	Sample Date:	5/14/08			5/13/08			5/14/08		5/14/08		
	Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22
Fluoranthene		**1,600 J**	**280**	**260**	**570 J**	**350 J**	**330**	**420**	**16**	**1,000 J**	**680**	**24**
Fluorene		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	**16**	250 UJ	160 U	**18**
Hexachlorobenzene		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Hexachlorobutadiene		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Hexachlorocyclopentadiene		1,200 UJ	330 UJ	420 UJ	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Hexachloroethane		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Indeno(1,2,3-cd)pyrene		**490 J**	**69**	**54 J**	**160 J**	**100 J**	**63 J**	**120 J**	**2.7 J**	**300 J**	**170**	**6.4 J**
Isophorone		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Naphthalene		240 UJ	**30 J**	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	**2.8 J**
Nitrobenzene		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
N-Nitrosodi-n-propylamine		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
N-Nitrosodiphenylamine		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Pentachlorophenol		1,200 UJ	330 U	420 U	890 U	520 U	630 U	670 U	32 U	1,200 UJ	800 U	33 U
Phenanthrene		**490 J**	**120**	**100**	**200**	**130**	**120 J**	**140**	**8.7**	**320 J**	**220**	**13**
Phenol		240 UJ	67 U	86 U	180 U	110 U	130 U	140 U	6.5 U	250 UJ	160 U	6.7 U
Pyrene		**850 J**	**110**	**65 J**	**210**	**120**	**72 J**	**130 J**	**2.2 J**	**460 J**	**350**	**5.1 J**

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (μg/kg) at Indicated Depth (inches)									
Sample I.D.[c]:	SD08-08			SD08-09		SD08-10			SD08-11	
Sample Date:	5/13/08			5/13/08		5/13/08			5/13/08	
Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9
1,1'-Biphenyl	1,300 UJ	650 U	660 U	150 U	150 U	230 U	**18 J**	180 U	270 U	200 U
2,2'-oxybis(1-Chloropropane)	270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
2,4,5-Trichlorophenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2,4,6-Trichlorophenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2,4-Dichlorophenol	270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
2,4-Dimethylphenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2,4-Dinitrophenol	6,800 UJ	3,300 U	3,400 U	780 UJ	790 UJ	1,200 UJ	1,100 UJ	920 UJ	1,400 UJ	1,000 UJ
2,4-Dinitrotoluene	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2,6-Dinitrotoluene	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2-Chloronaphthalene	270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
2-Chlorophenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2-Methylnaphthalene	270 UJ	130 U	130 U	**24 J**	31 U	**14 J**	**52**	**15 J**	54 U	**15 J**
2-Methylphenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
2-Nitroaniline	6,800 UJ	3,300 U	3,400 U	780 U	790 U	1,200 U	1,100 U	920 U	1,400 U	1,000 U
2-Nitrophenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
3,3'-Dichlorobenzidine	1,300 UJ	650 U	660 U	150 UJ	150 UJ	230 UJ	210 UJ	180 UJ	270 UJ	200 UJ
3-Nitroaniline	6,800 UJ	3,300 U	3,400 U	780 U	790 U	1,200 U	1,100 U	920 U	1,400 U	1,000 U
4,6-Dinitro-2-methylphenol	6,800 UJ	3,300 U	3,400 U	780 U	790 U	1,200 U	1,100 U	920 U	1,400 U	1,000 U
4-Bromophenyl phenyl ether	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
4-Chloro-3-methylphenol	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
4-Chloroaniline	1,300 UJ	650 U	660 U	150 UJ	150 UJ	230 UJ	210 UJ	180 UJ	270 UJ	200 UJ
4-Chlorophenyl phenyl ether	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
4-Methylphenol	1,300 UJ	650 U	660 U	**15 J**	150 U	**19 J**	**40 J**	**14 J**	270 U	200 U
4-Nitroaniline	6,800 UJ	3,300 U	3,400 U	780 U	790 U	1,200 U	1,100 U	920 U	1,400 U	1,000 U
4-Nitrophenol	6,800 UJ	3,300 UJ	3,400 UJ	780 U	790 U	1,200 U	1,100 U	920 U	1,400 U	1,000 U

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg) at Indicated Depth (inches)									
Sample I.D.[c]:	SD08-08			SD08-09		SD08-10			SD08-11	
Sample Date:	5/13/08			5/13/08		5/13/08			5/13/08	
Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9
Acenaphthene	270 UJ	130 U	130 U	31 U	31 U	**16 J**	**32 J**	**13 J**	**14 J**	**21 J**
Acenaphthylene	270 UJ	130 U	130 U	31 U	31 U	**51**	**110**	**150**	**56**	**45**
Acetophenone	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Anthracene	**320 J**	130 U	130 U	**12 J**	31 U	**60**	**180**	**160**	**58**	**59**
Atrazine	1,300 UJ	650 UJ	660 UJ	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Benzaldehyde	1,300 UJ	**69 J**	660 UJ	**28 J**	**18 J**	**48 J**	**85 J**	**25 J**	**41 J**	**28 J**
Benzo(a)anthracene	**290 J**	**82 J**	**49 J**	**37**	**14 J**	**200**	**300**	**260**	**200**	**140**
Benzo(a)pyrene	**520 J**	**160**	**120 J**	**440**	**700**	**220**	**300**	**290**	**190**	**140**
Benzo(b)fluoranthene	**790 J**	**210**	**200**	**72**	**25 J**	**370**	**180**	**610**	**370**	**240**
Benzo(ghi)perylene	**440 J**	**100 J**	130 U	**34**	**12 J**	**190**	**250**	**160**	**170**	**100**
Benzo(k)fluoranthene	**240 J**	**88 J**	130 U	31 U	31 U	46 U	**410**	36 U	54 U	40 U
bis(2-Chloroethoxy)methane	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
bis(2-Chloroethyl) ether	270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
bis(2-Ethylhexyl) phthalate	**390 J**	650 U	660 U	**20 J**	**25 J**	**160 J**	**160 J**	**45 J**	**120 J**	**73 J**
Butyl benzyl phthalate	1,300 UJ	650 U	660 U	150 U	150 U	**42 J**	**92 J**	**25 J**	270 U	200 U
Caprolactam	1,300 UJ	650 U	660 U	**55 J**	150 U	**120 J**	210 U	180 U	**100 J**	**70 J**
Carbazole	270 UJ	130 U	130 U	31 U	31 U	**30 J**	**70**	**36**	**29 J**	**29 J**
Chrysene	**500 J**	**120 J**	**55 J**	**70**	**27 J**	**290**	**430**	**350**	**250**	**200**
Dibenz(a,h)anthracene	**150 J**	130 U	130 U	**12 J**	31 U	**30 J**	**51**	**41**	**45 J**	**21 J**
Dibenzofuran	1,300 UJ	650 U	660 U	**12 J**	150 U	**17 J**	**67 J**	**34 J**	270 U	**18 J**
Diethyl phthalate	1,300 UJ	650 UJ	660 UJ	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Dimethyl phthalate	1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Di-n-butyl phthalate	1,300 UJ	650 U	660 U	150 U	150 U	230 U	**47 J**	180 U	270 U	200 U
Di-n-octyl phthalate	1,300 UJ	650 U	660 U	150 UJ	150 UJ	230 UJ	210 UJ	180 UJ	270 UJ	200 UJ

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)									
	Sample I.D.[c]:	SD08-08			SD08-09		SD08-10			SD08-11	
	Sample Date:	5/13/08			5/13/08		5/13/08			5/13/08	
	Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9
Fluoranthene		**1,100 J**	**400**	**330**	**97**	**40**	**550**	**880**	**430**	**460**	**420**
Fluorene		270 UJ	130 U	130 U	31 U	31 U	**33 J**	**90**	**44**	**20 J**	**48**
Hexachlorobenzene		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
Hexachlorobutadiene		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
Hexachlorocyclopentadiene		1,300 UJ	650 U	660 U	150 UJ	150 UJ	230 UJ	210 UJ	180 UJ	270 UJ	200 UJ
Hexachloroethane		1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Indeno(1,2,3-cd)pyrene		**360 J**	**86 J**	130 U	**29 J**	**9.4 J**	**150**	**170**	**160**	**150**	**87**
Isophorone		1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Naphthalene		270 UJ	130 U	130 U	**24 J**	31 U	**18 J**	**52**	**20 J**	54 U	**18 J**
Nitrobenzene		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
N-Nitrosodi-n-propylamine		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
N-Nitrosodiphenylamine		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
Pentachlorophenol		1,300 UJ	650 U	660 U	150 U	150 U	230 U	210 U	180 U	270 U	200 U
Phenanthrene		**390 J**	**140**	**110 J**	**70**	**27 J**	**130**	**290**	**110**	**95**	**77**
Phenol		270 UJ	130 U	130 U	31 U	31 U	46 U	43 U	36 U	54 U	40 U
Pyrene		**570 J**	**140**	**71 J**	**45**	**17 J**	**280**	**420**	**220**	**260**	**210**

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)										
	Sample I.D.[c]:	SD08-12		SD08-13			SD10-01		SD10-03	SD10-04	SD10-06	SD10-08
	Sample Date:	5/13/08		5/13/08			10/20/10		10/20/10	10/20/10	10/20/10	10/20/10
	Sample Depth:	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6 (dup)	0 to 6	0 to 6	0 to 6	0 to 6
1,1'-Biphenyl		300 UJ	260 U	310 UJ	250 U	**11 J**	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2,2'-oxybis(1-Chloropropane)		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
2,4,5-Trichlorophenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2,4,6-Trichlorophenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2,4-Dichlorophenol		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
2,4-Dimethylphenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2,4-Dinitrophenol		1,600 UJ	1,300 UJ	1,600 UJ	1,300 UJ	1,000 UJ	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ
2,4-Dinitrotoluene		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2,6-Dinitrotoluene		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2-Chloronaphthalene		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
2-Chlorophenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2-Methylnaphthalene		61 UJ	52 U	63 UJ	**18 J**	**20 J**	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
2-Methylphenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
2-Nitroaniline		1,600 UJ	1,300 U	1,600 UJ	1,300 U	1,000 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6200 UJ	5,700 UJ
2-Nitrophenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
3,3'-Dichlorobenzidine		300 UJ	260 UJ	310 UJ	250 UJ	200 UJ	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
3-Nitroaniline		1,600 UJ	1,300 U	1,600 UJ	1,300 U	1,000 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ
4,6-Dinitro-2-methylphenol		1,600 UJ	1,300 U	1,600 UJ	1,300 U	1,000 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ
4-Bromophenyl phenyl ether		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
4-Chloro-3-methylphenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
4-Chloroaniline		300 UJ	260 UJ	310 UJ	250 UJ	200 UJ	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
4-Chlorophenyl phenyl ether		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
4-Methylphenol		**19 J**	**16 J**	310 UJ	250 U	**26 J**	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
4-Nitroaniline		1,600 UJ	1,300 U	1,600 UJ	1,300 U	1,000 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ
4-Nitrophenol		1,600 UJ	1,300 U	1,600 UJ	1,300 U	1,000 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg) at Indicated Depth (inches)										
Sample I.D.[c]:	SD08-12		SD08-13			SD10-01		SD10-03	SD10-04	SD10-06	SD10-08
Sample Date:	5/13/08		5/13/08			10/20/10		10/20/10	10/20/10	10/20/10	10/20/10
Sample Depth:	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6 (dup)	0 to 6	0 to 6	0 to 6	0 to 6
Acenaphthene	61 UJ	52 U	63 UJ	18 J	20 J	36 J	53 J	15 J	17 J	67 J	28 J
Acenaphthylene	61 J	80	57 J	75	60	310 UJ	300 UJ	18 J	20 J	98 J	220 UJ
Acetophenone	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Anthracene	63 J	88	68 J	110	110	130 J	150 J	31 J	41 J	200 J	89 J
Atrazine	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Benzaldehyde	40 J	260 UJ	310 UJ	59 J	45 J	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Benzo(a)anthracene	210 J	280	190 J	260	140	590 J	670 J	140 J	190 J	970 J	470 J
Benzo(a)pyrene	230 J	260	190 J	200	130	1,400 J	1,500 J	300 J	380 J	1,700 J	1,100 J
Benzo(b)fluoranthene	470 J	400	300 J	390	250	1,000 J	1600 J	250 J	350 J	1,700 J	990 J
Benzo(ghi)perylene	210 J	200	180 J	180	85	930 J	1200 J	260 J	340 J	1,400 J	890 J
Benzo(k)fluoranthene	61 UJ	52 U	63 UJ	51 U	40 U	780 J	470 J	120 J	140 J	600 J	300 J
bis(2-Chloroethoxy)methane	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
bis(2-Chloroethyl) ether	61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
bis(2-Ethylhexyl) phthalate	120 J	95 J	110 J	120 J	86 J	790 J	960 J	200 J	350 J	1,300 J	800 J
Butyl benzyl phthalate	56 J	230 J	310 UJ	39 J	53 J	1,500 UJ	1,500 UJ	260 UJ	46 J	1,200 UJ	1,100 UJ
Caprolactam	110 J	260 U	310 UJ	250 U	200 U	7,800 UJ	7,700 UJ	1,300 UJ	1,500 UJ	6,200 UJ	5,700 UJ
Carbazole	54 J	45 J	34 J	39 J	48	97 J	120 J	26 J	33 J	160 J	78 J
Chrysene	330 J	440	250 J	260	240	1,000 J	1,100 J	230 J	290 J	1,400 J	770 J
Dibenz(a,h)anthracene	36 J	60	54 J	36 J	21 J	310 UJ	300 UJ	170 J	190 J	880 J	690 J
Dibenzofuran	300 UJ	260 U	310 UJ	25 J	53 J	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Diethyl phthalate	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Dimethyl phthalate	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Di-n-butyl phthalate	300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Di-n-octyl phthalate	300 UJ	260 UJ	310 UJ	250 UJ	200 UJ	1,700 J	1,500 UJ	260 UJ	360 J	1,500 J	1,100 UJ

TABLE 18
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)										
	Sample I.D.[c]:	SD08-12		SD08-13			SD10-01		SD10-03	SD10-04	SD10-06	SD10-08
	Sample Date:	5/13/08		5/13/08			10/20/10		10/20/10	10/20/10	10/20/10	10/20/10
	Sample Depth:	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6 (dup)	0 to 6	0 to 6	0 to 6	0 to 6
Fluoranthene		**610 J**	**730**	**520 J**	**690**	**570**	**1,600 J**	**1,900 J**	**370 J**	**510 J**	**2,600 J**	**1,300 J**
Fluorene		**22 J**	**26 J**	**27 J**	**39 J**	**61**	310 UJ	300 UJ	**15 J**	**19 J**	**64 J**	220 UJ
Hexachlorobenzene		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
Hexachlorobutadiene		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
Hexachlorocyclopentadiene		300 UJ	260 UJ	310 UJ	250 UJ	200 UJ	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Hexachloroethane		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Indeno(1,2,3-cd)pyrene		**180 J**	**180**	**160 J**	**160**	**83**	**1,300 J**	**1,400 J**	**250 J**	**320 J**	**1,500 J**	**980 J**
Isophorone		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Naphthalene		61 UJ	52 U	63 UJ	**19 J**	**25 J**	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
Nitrobenzene		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
N-Nitrosodi-n-propylamine		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
N-Nitrosodiphenylamine		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
Pentachlorophenol		300 UJ	260 U	310 UJ	250 U	200 U	1,500 UJ	1,500 UJ	260 UJ	290 UJ	1,200 UJ	1,100 UJ
Phenanthrene		**140 J**	**140**	**100 J**	**130**	**170**	**560 J**	**620 J**	**160 J**	**180 J**	**880 J**	**410 J**
Phenol		61 UJ	52 U	63 UJ	51 U	40 U	310 UJ	300 UJ	52 UJ	60 UJ	250 UJ	220 UJ
Pyrene		**330 J**	**430**	**250 J**	**320**	**280**	**1,200 J**	**1,400 J**	**270 J**	**360 J**	**1,800 J**	**920 J**

Notes:
[a] *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry weight basis.*
[b] *Data provided by analytical laboratory reports for SDGs C8E140236, C8E150368, and C0K030562.*
[c] *For sampling locations see Figure 8.*
[d] *Data Legend*:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.
[e] *For clarity, all detections are shown in* ***bold-face*** *type.*

TABLE 19
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg)[a] at Indicated Depth (inches)												
Sample I.D.[c]:	SD08-01				SD08-02					SD08-03			
Sample Date:	5/14/2008				5/14/2008					5/14/08			
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29
Pesticides:													
Aldrin	160 UJ[d]	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
alpha-BHC	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
beta-BHC	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
delta-BHC	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	0.21 U	160 UJ	110 U	43 U	49 U
gamma-BHC (Lindane)	160 UJ	120 U	100 U	**1.3[e] J**	120 U	110 U	98 U	3.3 U	0.34 U	160 UJ	110 U	43 U	6.5 U
alpha-Chlordane	160 UJ	120 U	110 U	9.1 U	120 U	**89 J**	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
gamma-Chlordane	23 U	59 U	170 U	4.9 U	21 U	140 U	51 U	11 U	1.7 U	28 U	140 U	65 U	49 U
4,4'-DDD	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	160 U	310 U
4,4'-DDE	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
4,4'-DDT	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
Dieldrin	160 UJ	120 U	100 U	9.1 U	120 U	110 U	30 U	8.1 U	0.6 U	160 UJ	110 U	43 U	49 U
Endosulfan I	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	78 U	110 U
Endosulfan II	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
Endosulfan sulfate	160 UJ	120 U	31 U	9.1 U	120 U	40 U	98 U	21 U	1.8 U	160 UJ	27 U	43 U	49 U
Endrin	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	19 U	28 U
Endrin aldehyde	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	49 U
Endrin ketone	160 UJ	20 U	35 U	9.1 U	120 U	39 U	16 U	4.5 U	0.42 U	160 UJ	43 U	25 U	38 U
Heptachlor	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	3.3 U	1.8 U	160 UJ	110 U	7.2 U	49 U
Heptachlor epoxide	160 UJ	120 U	100 U	9.1 U	120 U	110 U	98 U	21 U	1.8 U	160 UJ	110 U	43 U	23 U
Methoxychlor	310 UJ	240 U	190 U	18 U	240 U	210 U	190 U	41 U	3.4 U	310 UJ	220 U	84 U	96 U
Toxaphene	6,200 UJ	4,900 U	3,900 U	360 U	4,900 U	4,300 U	3,900 U	820 U	70 U	6,300 UJ	4,400 U	1,700 U	1,900 U
Polychlorinated Biphenyls:													
Aroclor 1016	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U
Aroclor 1221	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U
Aroclor 1232	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U
Aroclor 1242	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U
Aroclor 1248	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U
Aroclor 1254	**1,400 J**	**2,200**	**6,600**	**170**	**1,400**	**5,100 J**	**2,900 J**	**510**	**64**	**1,300 J**	**4,900**	**7,200**	**11,000**
Aroclor 1260	31 UJ	24 U	98 U	18 U	24 U	110 U	19 U	21 U	17 U	31 UJ	110 U	110 U	120 U

TABLE 19
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (µg/kg) at Indicated Depth (inches)													
	Sample I.D.[c]:	SD08-04			SD08-05			SD08-06		SD08-07			SD08-08		
	Sample Date:	5/14/08			5/13/08			5/14/08		5/14/08			5/13/08		
	Sample Depth:	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22	0 to 6	6 to 18	18 to 20
Pesticides:															
Aldrin		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	**0.72 J**	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
alpha-BHC		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
beta-BHC		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
delta-BHC		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
gamma-BHC (Lindane)		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
alpha-Chlordane		150 UJ	75 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	0.37 U	34 UJ	17 U	85 U
gamma-Chlordane		42 U	120 U	19 U	110 U	15 U	81 U	17 U	1.6 U	160 UJ	38 U	0.27 U	34 UJ	2.8 U	85 U
4,4'-DDD		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	51 U	1.7 U	34 UJ	9.7 U	85 U
4,4'-DDE		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
4,4'-DDT		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Dieldrin		150 UJ	26 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Endosulfan I		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	**1.4 J**	160 UJ	100 U	1.1 U	34 UJ	17 U	85 U
Endosulfan II		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Endosulfan sulfate		150 UJ	16 U	110 U	110 U	130 U	81 U	17 U	1.1 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Endrin		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Endrin aldehyde		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Endrin ketone		150 UJ	35 U	110 U	110 U	130 U	81 U	3 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Heptachlor		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	**38 J**	1.7 U	34 UJ	8.3 U	85 U
Heptachlor epoxide		150 UJ	85 U	110 U	110 U	130 U	81 U	17 U	1.6 U	160 UJ	100 U	1.7 U	34 UJ	17 U	85 U
Methoxychlor		290 UJ	160 U	210 U	220 U	260 U	160 U	33 U	3.2 U	310 UJ	200 U	1.7 U	34 UJ	17 U	85 U
Toxaphene		6,000 UJ	3,300 U	4,300 U	4,500 U	5,300 U	3,200 U	680 U	65 U	6,300 UJ	4,100 U	3.3 U	66 UJ	32 U	160 U
Polychlorinated Biphenyls:												67 U	1,300 UJ	660 U	3,300 U
Aroclor 1016		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U
Aroclor 1221		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U
Aroclor 1232		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U
Aroclor 1242		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U
Aroclor 1248		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U
Aroclor 1254		**1,500 J**	**4,300**	**680 J**	**410 J**	**450 J**	**150 J**	**72**	16 U	**580 J**	**1,300**	17 U	**670 J**	**200**	**44**
Aroclor 1260		30 UJ	17 U	21 U	23 U	26 U	16 U	17 U	16 U	31 UJ	20 U	17 U	33 UJ	16 U	17 U

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TABLE 19
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (µg/kg) at Indicated Depth (inches)																	
Sample I.D.[c]:	SD08-09		SD08-10			SD08-11		SD08-12		SD08-13			SD10-01		SD10-03	SD10-04	SD10-06	SD10-08
Sample Date:	5/13/08		5/13/08			5/13/08		5/13/08		5/13/08			10/20/10		10/20/10	10/20/10	10/20/10	10/20/10
Sample Depth:	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6 (dup	0 to 6	0 to 6	0 to 6	0 to 6
Pesticides:																		
Aldrin	2 U	**0.7 J**	6.4 U	11 U	3 U	6.3 U	4.7 U	16 UJ	3.6 U	8.3 U	5.7 U	10 U	NA	NA	NA	NA	NA	NA
alpha-BHC	1.6 U	1.6 U	12 U	1.7 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
beta-BHC	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
delta-BHC	1.6 U	1.6 U	**4.9 J**	14 U	9.2 U	4.7 U	3 U	16 UJ	13 U	7.9 U	2.6 U	5.4 U	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.93 U	0.55 U	2 U	**7.6 J**	2.1 U	14 U	1.9 U	16 UJ	13 U	**15 J**	2.1 J	4.1 U	NA	NA	NA	NA	NA	NA
alpha-Chlordane	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	6.2 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
gamma-Chlordane	0.75 U	1.6 U	15 U	160 U	17 U	4.7 U	18 U	4.7 U	13 U	49 U	10 U	46 U	NA	NA	NA	NA	NA	NA
4,4'-DDD	0.72 U	1.6 U	12 U	11 U	3.8 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	3 U	NA	NA	NA	NA	NA	NA
4,4'-DDE	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
4,4'-DDT	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
Dieldrin	0.8 U	0.56 U	3.4 U	79 U	4.9 U	14 U	9.9 U	16 UJ	13 U	32 UJ	13 U	34 U	NA	NA	NA	NA	NA	NA
Endosulfan I	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
Endosulfan II	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	1.6 U	1.6 U	3.2 U	65 U	**9.6 J**	14 U	7.2 U	16 UJ	13 U	24 U	3.7 U	52 U	NA	NA	NA	NA	NA	NA
Endrin	1.6 U	1.6 U	12 U	11 U	9.2 U	14 U	10 U	16 UJ	13 U	32 UJ	13 U	10 U	NA	NA	NA	NA	NA	NA
Endrin aldehyde	1.6 U	0.7 U	12 U	11 U	9.2 U	14 U	3.9 U	16 UJ	13 U	32 UJ	**3.9 J**	10 U	NA	NA	NA	NA	NA	NA
Endrin ketone	0.75 U	1.6 U	8.2 U	72 U	35 U	5.2 U	8.8 U	8.3 U	2.4 U	26 U	6.4 U	53 U	NA	NA	NA	NA	NA	NA
Heptachlor	1.6 U	1.6 U	12 U	9.4 U	9.2 U	14 U	10 U	3.2 U	**3 J**	32 UJ	13 U	3.1 U	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	1.6 U	1.6 U	4.1 U	22 U	9.2 U	4.3 U	10 U	16 UJ	13 U	6.8 U	13 U	4.2 U	NA	NA	NA	NA	NA	NA
Methoxychlor	3.1 U	3.1 U	23 U	21 U	18 U	27 U	20 U	30 UJ	26 U	62 UJ	25 U	20 U	NA	NA	NA	NA	NA	NA
Toxaphene	62 U	62 U	460 U	430 U	360 U	540 U	400 U	610 UJ	520 U	1,300 UJ	510 U	400 U	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls:																		
Aroclor 1016	15 U	15 U	23 U	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ
Aroclor 1221	15 U	15 U	23 U	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ
Aroclor 1232	15 U	15 U	23 U	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ
Aroclor 1242	15 U	15 U	23 U	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ
Aroclor 1248	15 U	15 U	23 U	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ
Aroclor 1254	**20**	15 U	**460**	**6,500**	**760**	**220**	**690**	**180 J**	**180**	**2,700 J**	**410**	**3,100**	**700 J**	**800 J**	**480 J**	**550 J**	**260 J**	**520 J**
Aroclor 1260	15 U	15 U	234	21 U	18 U	27 U	20 U	31 UJ	26 U	31 UJ	26 U	20 U	380 UJ	380 UJ	310 UJ	280 UJ	260 UJ	290 UJ

Notes:

(a) *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E140236, C8E150368, and C0K030562.*

(c) *For sampling locations see Figure 8.*

(d) *Data Legend:*

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting imit is estimated.

(e) *For clarity, all detections are shown in **bold-face** type*

TABLE 20
ANALYTICAL DATA SUMMARY - TOTAL METALS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (mg/kg)[a] at Indicated Depth (inches)								
Sample I.D.[c]:	SD08-01				SD08-02				
Sample Date:	5/14/08				5/14/08				
Sample Depth:	0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38
Aluminum	10,900[d] J[e]	9,090	15,300	17,500	10,800	7,080	8,640	14,800	24,400
Antimony	5.2 J	2.3	0.52	0.32	3.3 J	1.4 J	1.2 J	1.2 J	0.23 J
Arsenic	3.7 J	3.6	4.4	2	3.6	3.7	4.2	3.3	1.1
Barium	552 J	485	402	433	563	404	424	423	537
Beryllium	0.45 J	0.42	0.9	0.95	0.4 J	0.4 J	0.48 J	0.72 J	1.1 J
Cadmium	739 J	759	261	15.5	544	931	987	45.6	16.8
Calcium	161,000 J	146,000	37,200	13,800	124,000	180,000	166,000	22,500	9,680
Chromium	462 J	329	246	34.6	379	454	371	76.6	43.3
Cobalt	13.3 J	15.2	16.4	5.4	10	17.6	19.8	7	10.2
Copper	820 J	752	358	76.6	669	961	1,000	112	43.6
Iron	14,200 J	13,000	20,100	13,600	12,300	11,800	13,200	14,100	25,500
Lead	1,480 J	829	149	30.8	1,620	645	582	81.9	36
Magnesium	5,710 J	4,800	4,900	3,970	5,260	5,310	4,960	3,880	6,840
Manganese	112 J	120	129	93.9	101	112	135	101	179
Mercury	1.1 J	1.3	1.7	0.13	1.4	3 J	1.5 J	0.31	0.11
Nickel	180 J	194	205	27.1	117	308	297	64	38.9
Potassium	1,010 J	737	921	1,190	956	448 J	729 J	1,040	1,530
Selenium	2.5 J	2.3	2.3	3.2	1.9	1.9	2.3	2.9	1.6
Silver	37.6 J	22.7	12.8	0.85	52.5	27.6	24	3.6	0.99
Sodium	727 J	616	358	354	588	556	570	407	266
Thallium	0.34 J	0.24	0.43	0.12	0.26	0.35	0.36	0.2	0.12
Vanadium	27.5 J	25.9	58	17.2	21.3	24.9 J	49.6 J	19.7	25.7
Zinc	12,500 J	12,100	1,090	222	9,830	11,500	9,630	469	244

TABLE 20
ANALYTICAL DATA SUMMARY - TOTAL METALS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (mg/kg) at Indicated Depth (inches)											
Sample I.D.[c]:	SD08-03				SD08-04			SD08-05			SD08-06	
Sample Date:	5/14/08				5/14/08			5/13/08			5/14/08	
Sample Depth:	0 to 6	6 to 18	18 to 25	25 to 29	0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13	0 to 6	6 to 9
Aluminum	11,200 J	9,780	14,000	11,900	10,100 J	7,600	10,400	14,300	16,700	16,600	17,000	20,600
Antimony	5.1 J	2.2	1.5	1.7	4.6 J	1.4	1.2	3.1 J	3.5 J	2.9 J	0.3	0.089 U
Arsenic	3.1 J	4.7	2.8	2.2	3.6 J	2.1	1.9	2.4 J	2.6 J	1.8 J	2.1	1.8
Barium	596 J	546	563	426	561 J	365	480	357	402	340	351	373
Beryllium	0.4 J	0.53	0.7	0.64	0.46 J	0.46	0.62	0.79	0.88	0.87	0.88	1.1
Cadmium	535 J	1,080	80.6	223	553 J	72.4	32.7	23.2 J	27.9 J	6 J	61	0.75
Calcium	163,000 J	192,000	26,500	57,300	189,000 J	24,500	18,500	27,400 J	31,100 J	9,630 J	30,100	4,840
Chromium	441 J	418	115	360	400 J	101	65	136 J	175 J	82.6	80.5	20.9
Cobalt	9.8 J	18.6	7.6	13.5	11.9 J	6.3	5.7	7.9	9	7.9	6.8	6.6
Copper	657 J	965	179	511	657 J	164	112	107 J	135 J	51.9 J	94.7	15.7
Iron	12,900 J	15,900	12,000	12,200	13,100 J	7,870	10,100	16,900	17,800	19,300	13,800	19,800
Lead	1,580 J	776	70.6	170	1,010 J	65	55.8	146	175	61.8	116	17.1
Magnesium	5,770 J	6,560	3,780	4,040	5,970 J	2,540	3,250	4,050	4,620	3,730	3,570	4,070
Manganese	105 J	132	86.5	99.7	126 J	54.1	68.6	96.5	106	109	77.8	102
Mercury	0.73 J	1.9	0.33	1.3	0.99 J	0.41	0.24	0.22 J	0.3 J	0.14	0.19	0.07
Nickel	122 J	274	96	340	157 J	106	65.3	76.3 J	98.6 J	55.9	52.1	21.3
Potassium	988 J	693	985	847	809 J	488	611	883 J	1,140 J	1,030	696	693
Selenium	1.9 J	2.5	2.8	2.5	2 J	1.7	2.3	1.4	1.5	1.4	1.3	1.3
Silver	44.5 J	29.3	4.4	13	34.6 J	4.2	2.3	4.2 J	5.2 J	1.3	3.8	0.12
Sodium	668 J	665	370	406	613 J	248	314	384	435	303	360	240
Thallium	0.42 J	0.37	0.24	0.43	0.42 J	0.17	0.16	0.23	0.27	0.25	0.21	0.15
Vanadium	21.4 J	35.8	18.4	18.1	23.5 J	13.7	15	15.8	17.8	16.5	19.9	22.1
Zinc	9,330 J	13,800	670	1,650	8,780 J	580	401	449 J	537 J	163 J	892	60.3

TABLE 20
ANALYTICAL DATA SUMMARY - TOTAL METALS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (mg/kg) at Indicated Depth (inches)										
	Sample I.D.[c]:	SD08-07			SD08-08			SD08-09		SD08-10		
	Sample Date:	5/14/08			5/13/08			5/13/08		5/13/08		
	Sample Depth:	0 to 6	6 to 18	18 to 22	0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23
Aluminum		10,400 J	18,700	19,400	11,400 J	15,200	18,800	13,700	19,500	8,910	11,500	13,100
Antimony		2.5 J	0.37 J	0.13 U	1.8 J	0.22	0.12 J	0.28 J	0.19 J	1.5 J	1.7 J	1.2 J
Arsenic		2.9 J	3.1 J	1.9 J	2.6 J	2.7	2.8	4.8 J	5.7 J	2.5 J	3.7 J	2.7 J
Barium		483 J	395	353	513 J	292	353	226	315	407	401	694
Beryllium		0.46 J	1	1	0.46 J	0.82	1	0.8	1.2	0.39	0.59	0.69
Cadmium		287 J	56.5	1.2	356 J	63.5	9.4	4.4	2	117	99.7	11.7
Calcium		184,000 J	20,500 J	7,830 J	171,000 J	21,400	9,580	6,290	4,450	152,000	101,000	36,300
Chromium		258 J	64.6	21.8	274 J	53.8	26.8	21.8	23.4	230	440	145
Cobalt		8.8 J	8.7	6.2	11.3 J	8	7.7	8.5	10	10	18.8	13.3
Copper		352 J	99.5 J	23.4 J	412 J	84.8	33.7	25.9	22.1	298	602	190
Iron		12,900 J	18,800	17,100	13,800 J	16,500	17,900	19,700	32,700	15,200	20,600	22,000
Lead		664 J	64.1	17.2	562 J	50.1	28.9	36.6	28.3	273	148	58.4
Magnesium		5,680 J	4,770	4,190	5,310 J	4,260	4,660	3,340	4,150	4,330	5,420	8,810
Manganese		105 J	116	103	107 J	104	118	125 J	175 J	116 J	154 J	187 J
Mercury		0.41 J	0.65	0.074	0.63 J	0.18	0.077	0.096	0.063	0.4	1.2	0.63
Nickel		88.5 J	56 J	20.2 J	133 J	47	27.5	23.8	27.7	119	372	115
Potassium		781 J	1,200	1,020	789 J	962	918	811	1,070	850	1,130	1,320
Selenium		1.6 J	2.2 J	1.8 J	1.7 J	1.6	1.9	0.79 J	1 J	0.56 J	0.92 J	0.72 J
Silver		22.7 J	2.4	0.14	21.2 J	2	0.57	0.53	0.29	9.4	13.6	3.3
Sodium		586 J	350	264	603 J	318	253	251	236	509	452	323
Thallium		0.39 J	0.22	0.17	0.4 J	0.15	0.16	0.21	0.2	0.23	0.43	0.22
Vanadium		16.4 J	23.5	20.9	17.6 J	17.4	18.5	18.6	25.3	18	25.4	20.6
Zinc		4,120 J	742 J	69.8 J	4,930 J	864	179	129	107	1,720	983	241

TABLE 20
ANALYTICAL DATA SUMMARY - TOTAL METALS
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration in (mg/kg) at Indicated Depth (inches)									
Sample I.D.[c]:	SD08-11		SD08-12		SD08-13			SD10-04	SD10-06	SD10-08
Sample Date:	5/13/08		5/13/08		5/13/08			10/20/10	10/20/10	10/20/10
Sample Depth:	0 to 6	6 to 9	0 to 6	6 to 12	0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6	0 to 6
Aluminum	**8,380**	**9,220**	**5,910 J**	**8,050**	**11,100 J**	**11,800**	**11,800**	**9,380 J**	**13,500 J**	**8,920 J**
Antimony	**3.7 J**	**1.7 J**	**3.2 J**	**7.9 J**	**2.7 J**	**1.9 J**	**2 J**	**1.4 J**	**0.41 J**	**0.96 J**
Arsenic	**2.1 J**	**3.2 J**	**1.9 J**	**2.6 J**	**2.7 J**	**3.8 J**	**3.9 J**	**2.8 J**	**2.7 J**	**2.1 J**
Barium	**397**	**382**	**330 J**	**453**	**485 J**	**470**	**478**	**425 J**	**365 J**	**412 J**
Beryllium	**0.35**	**0.43**	**0.26 J**	**0.34**	**0.46 J**	**0.56**	**0.6**	**0.42 J**	**0.7 J**	**0.38 J**
Cadmium	**57.1**	**49.2**	**46.5 J**	**58.3**	**72.1 J**	**94.4**	**41.1**	**367 J**	**115 J**	**292 J**
Calcium	**178,000**	**155,000**	**199,000 J**	**234,000**	**172,000 J**	**177,000**	**79,500**	**185,000 J**	**81,200 J**	**188,000 J**
Chromium	**154**	**211**	**130 J**	**191**	**195 J**	**432**	**285**	**320 J**	**151 J**	**232 J**
Cobalt	**8.7**	**12.7**	**5.8 J**	**8.8**	**11 J**	**16.4**	**16.5**	**9.5 J**	**8.7 J**	**9.2 J**
Copper	**164**	**233**	**133 J**	**188**	**246 J**	**517**	**399**	**495 J**	**185 J**	**370 J**
Iron	**14,700**	**20,500**	**11,800 J**	**15,500**	**19,300 J**	**21,100**	**21,200**	**13,000 J**	**15,400 J**	**12,800 J**
Lead	**348**	**140**	**312 J**	**493**	**267 J**	**227**	**99**	**989 J**	**339 J**	**654 J**
Magnesium	**4,720**	**6,090**	**5,900 J**	**11,300**	**5,620 J**	**6,410**	**7,950**	**4,580 J**	**3,610 J**	**4140 J**
Manganese	**117 J**	**184 J**	**112 J**	**156 J**	**141 J**	**166 J**	**157 J**	**110 J**	**94.2 J**	**102 J**
Mercury	**0.19**	**0.42**	**0.21 J**	**0.25**	**0.22 J**	**0.83**	**1.2**	**0.82 J**	**0.35 J**	**0.62 J**
Nickel	**84.3**	**157**	**46.3 J**	**93**	**124 J**	**254**	**226**	**107 J**	**75.4 J**	**99.1 J**
Potassium	**894**	**894**	**612 J**	**922**	**1,220 J**	**1,270**	**1,230**	**1,270 J**	**1,090 J**	**952 J**
Selenium	**0.32 J**	**0.27 J**	**0.35 J**	**0.39 J**	**0.56 J**	**0.61 J**	**0.9 J**	**1.9 J**	**1.6 J**	**1.7 J**
Silver	**7.8**	**5.2**	**9 J**	**8.5**	**8.1 J**	**11.3**	**9.9**	**29.3 J**	**9.4 J**	**20.8 J**
Sodium	**658**	**528**	**562 J**	**591**	**733 J**	**748**	**587**	**506 J**	**442 J**	**541 J**
Thallium	**0.19**	**0.25**	0.18 U	**0.18**	**0.23 J**	**0.34**	**0.27**	**0.42 J**	**0.36 J**	**0.39 J**
Vanadium	**13**	**18.7**	**9.8 J**	**13.3**	**19.2 J**	**26.4**	**20.3**	**18.2 J**	**18.4 J**	**12.6 J**
Zinc	**981**	**726**	**882 J**	**1,050**	**1,190 J**	**1,280**	**415**	**6,380 J**	**1,950 J**	**4,860 J**

Notes:

(a) *All concentrations reported in units of milligrams per kilogram (mg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E140236, C8E150368, and C0K030562.*

(c) *For sampling locations see Figure 8.*

(d) *For clarity, all detections are shown in **bold-face** type.*

(e) *Data Legend:*

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

TABLE 21
ANALYTICAL DATA SUMMARY - AVS/SEM
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Sample I.D.[c,d]:	SD08-01	SD08-02	SD08-03	SD08-04	SD08-06	SD08-10
		Concentration (µmoles/g)[a]					
	Sample Date:	5/14/08	5/14/08	5/14/08	5/14/08	5/14/08	5/13/08
Acid Volatile Sulfide		**26.3[e] J[f]**	**18.4**	**24.5 J**	**21.4 J**	**5.1**	**10.2**
Arsenic		**0.62 J**	0.48 U	1.3 UJ	0.6 UJ	0.068 U	0.23 U
Cadmium		**0.57 J**	**0.34**	**0.86 J**	**0.6 J**	**0.039**	**0.13**
Chromium		**5.8 J**	**3**	**6.1 J**	**5.3 J**	**0.36**	**2**
Copper		**5.6 J**	**3.4**	**7.9 J**	**6.7 J**	**0.66**	**3.4**
Lead		**4 J**	**3.6**	**7.8 J**	**5.5 J**	**0.26**	**0.91**
Nickel		**2.4 J**	**0.87 J**	**1.9 J**	**1.8 J**	**0.3 J**	**1.1 J**
Silver		**0.064 J**	**0.041 J**	**0.19 J**	**0.11 J**	**0.0092 J**	**0.045 J**
Zinc		**14.9 J**	**10.6**	**24.6 J**	**17 J**	**1.7**	**5**
Mercury		0.00023 UJ	0.00018 U	**0.000026 J**	0.00022 UJ	0.00013 U	0.00017 U

Notes :

(a) *All concentrations reported in units of micromoles per gram (µmoles/g) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E140236 and C8E150368.*

(c) *For sampling locations see Figure 8.*

(d) *All analyzed samples were collected from the 0- to 6-inch depth increment.*

(e) *For clarity, all detections are shown in* **bold-face** *type.*

(f) *Data Legend* :

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting limit is estimated.

TABLE 22
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Units	Concentration (units vary) at Indicated Depth (inches)												
	Sample I.D.[c]:		SD08-01				SD08-02					SD08-03			
	Sample Date:		5/14/08				5/14/08					5/14/08			
	Sample Depth:		0 to 6	6 to 18	18 to 30	30 to 35	0 to 6	6 to 18	6 to 18 (dup)	18 to 30	30 to 38	0 to 6	6 to 18	18 to 25	25 to 29
Field Parameters:															
pH		s.u.	7.27	NA	NA	NA	7.25	NA	NA	NA	NA	7.25	NA	NA	NA
ORP		mV	-108	NA	NA	NA	-100	NA	NA	NA	NA	-37	NA	NA	NA
Laboratory Parameters:															
Cyanide (total)		mg/kg	1.6 U[d]	1.2 U	0.68 U	0.63 U	2.1	0.79 U	0.93	0.59 U	0.3 U	0.9 U	0.78 U	0.77 U	0.42 U
Total Organic Carbon		mg/kg	**135,000[e] J**	**62,800**	**126,000**	**109,000**	**109,000**	**99,000 J**	**61,800 J**	**112,000**	**52,100 J**	**83,600 J**	**128,000**	**180,000**	**152,000**
Solids Content		Percent	**27**	**34.3**	**42.6**	**46.8**	**34.5**	**38.9**	**43.4**	**40.6**	**48.1**	**26.5**	**38.4**	**39.2**	**34.4**

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TABLE 22
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Units	Concentration (units vary) at Indicated Depth (inches)										
	Sample I.D.[c]:		SD08-04			SD08-05			SD08-06		SD08-07		
	Sample Date:		5/14/08			5/13/08			5/14/08		5/14/08		
	Sample Depth:		0 to 6	6 to 18	18 to 20	0 to 6	0 to 6 (dup)	6 to 13	0 to 6	6 to 9	0 to 6	6 to 18	18 to 22
Field Parameters:													
pH		s.u.	7.25	NA	NA	7.15	NA	NA	7.32	NA	7.04	NA	NA
ORP		mV	-33	NA	NA	-108	NA	NA	-99	NA	-42	NA	NA
Laboratory Parameters:													
Cyanide (total)		mg/kg	1.2 U	0.61 U	0.54 U	1 U	**1.6**	0.76 U	0.34 U	0.32 U	1.1 U	0.46 U	0.42 U
Total Organic Carbon		mg/kg	**36,000 J**	**38,800**	**115,000**	39,600 J	**126,000 J**	**111,000**	**22,900**	**24,600**	**36,600 J**	**104,000 J**	**37,300 J**
Solids Content		Percent	**28**	**55.3**	**39.2**	**37**	**31.8**	**52.7**	**49.3**	**67**	**26.5**	**41.3**	**54.6**

TABLE 22
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Units	Concentration (units vary) at Indicated Depth (inches)											
	Sample I.D.[c]:		SD08-08			SD08-09		SD08-10			SD08-11		SD08-12	
	Sample Date:		5/13/08			5/13/08		5/13/08			5/13/08		5/13/08	
	Sample Depth:		0 to 6	6 to 18	18 to 20	0 to 6	6 to 10	0 to 6	6 to 18	18 to 23	0 to 6	6 to 9	0 to 6	6 to 12
Field Parameters:														
pH		s.u.	7.20	NA	NA	6.90	NA	7.18	NA	NA	7.66	NA	7.49	NA
ORP		mV	6	NA	NA	-194	NA	-40	NA	NA	-45	NA	-55	NA
Laboratory Parameters:														
Cyanide (total)		mg/kg	0.78 U	0.38 U	0.8 U	**0.17 J**	0.77 U	**0.28 J**	1.3 U	1.1 U	1.6 U	1.2 U	**0.44 J**	1.6 U
Total Organic Carbon		mg/kg	**56,100 J**	**47,400**	**41,000**	**32,200**	**38,900**	**37,000**	**38,100**	**21,800**	**31,100**	**58,100**	**48,100 J**	**50,400**
Solids Content		Percent	**25.1**	**51.1**	**50.2**	**59.4**	**64.7**	**36.5**	**38.8**	**46.4**	**31**	**42**	**27.3**	**32**

TABLE 22
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Units	Concentration (units vary) at Indicated Depth (inches)									
	Sample I.D.[c]:		SD08-13			SD10-01		SD10-03	SD10-04	SD10-06	SD10-08
	Sample Date:		5/13/08			10/20/10		10/20/10	10/20/10	10/20/10	10/20/10
	Sample Depth:		0 to 6	6 to 18	18 to 27.5	0 to 6	0 to 6 (dup)	0 to 6	0 to 6	0 to 6	0 to 6
Field Parameters:											
pH		s.u.	6.59	NA	7.72	NA	NA	NA	NA	NA	NA
ORP		mV	-67	NA	-41	NA	NA	NA	NA	NA	NA
Laboratory Parameters:											
Cyanide (total)		mg/kg	**0.68 J**	1.5 UJ	**0.27 J**	2.3 U	2.3 UJ	1.8 UJ	1.7 UJ	1.6 UJ	1.8 UJ
Total Organic Carbon		mg/kg	**75,100 J**	**56,800**	**47,000**	**81,100 J**	**77,800 J**	**86,500 J**	**54,600 J**	**95,500 J**	**55,200 J**
Solids Content		Percent	**26.6**	**32.6**	**42**	**21.5**	**22**	**27.2**	**29.5**	**31.9**	**27.7**

Notes:
[a] *Cyanide and total organic content concentrations are reported on a dry-weight basis.*
[b] *Data for laboratory parameters provided by analytical laboratory reports for SDGs C8E140236, C8E150368, and C0K030562.*
[c] *For sampling locations see Figure 8.*
[d] *Data Legend:*
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
NA - paramter not analyzed for this sample.
[e] *For clarity, all detections are shown in* ***bold-face*** *type.*

TABLE 23
ANALYTICAL DATA SUMMARY - GRAIN SIZE DISTRIBUTION
KOPPERS POND SEDIMENTS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Soil Classification[b]		Units	Sample Location[a] and Depth (inches)		
	Sample I.D.:		SD08-03	SD08-06	SD08-10
	Sample Date:		5/14/08	5/14/08	5/13/08
	Sample Depth:		6 to 18	6 to 9	6 to 18
Gravel		Percent	0.0	0.0	0.0
Coarse Sand		Percent	0.0	0.0	0.0
Medium Sand		Percent	4.8	4.9	0.5
Fine Sand		Percent	10.7	2.2	1.8
Silt		Percent	68.4	35.8	81.2
Clay		Percent	16.1	57.1	16.5

Notes:
(a) *For sampling locations see Figure 8.*
(b) *Data provided by analytical laboratory reports for SDGs C8E140236 and C8E150368.*

TABLE 24
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)					
	Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40
	Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08
	Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6
Acetone		**11[d] J[e]**	**79 J**	**48 J**	52 U	26 U	28 U
Benzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Bromodichloromethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Bromoform		10 U	30 UJ	16 U	13 U	6.6 U	6.9 UJ
Bromomethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
2-Butanone		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Carbon disulfide		10 U	30 UJ	16 U	13 U	6.6 U	6.9J U
Carbon tetrachloride		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Chlorobenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Dibromochloromethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Chloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Chloroform		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Chloromethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Cyclohexane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,2-Dibromo-3-chloropropane		10 U	30 UJ	16 U	13 U	6.6 UJ	6.9 UJ
1,2-Dibromoethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,2-Dichlorobenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,3-Dichlorobenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,4-Dichlorobenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Dichlorodifluoromethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1-Dichloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,2-Dichloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
cis-1,2-Dichloroethene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
trans-1,2-Dichloroethene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1-Dichloroethene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,2-Dichloropropane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U

TABLE 24
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)					
	Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40
	Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08
	Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6
cis-1,3-Dichloropropene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
trans-1,3-Dichloropropene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Ethylbenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
2-Hexanone		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Isopropylbenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Methyl acetate		10 U	**23 J**	16 U	13 U	6.6 U	6.9 U
Methylcyclohexane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Methylene chloride		10 U	30 U	16 U	13 U	6.6 U	6.9 U
4-Methyl-2-pentanone		10 U	30 UJ	16 U	13 U	6.6 UJ	6.9 UJ
Methyl tert-butyl ether		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Styrene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1,2,2-Tetrachloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Tetrachloroethene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Toluene		10 U	30 UJ	**160**	13 U	6.6 U	6.9 U
1,2,4-Trichlorobenzene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1,1-Trichloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1,2-Trichloroethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Trichloroethene		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Trichlorofluoromethane		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
1,1,2-Trichloro-1,2,2-trifluoroethane		10 U	30 UJ	16 U	13 U	6.6 UJ	6.9 UJ
Vinyl chloride		10 U	30 UJ	16 U	13 U	6.6 U	6.9 U
Xylenes (total)		31 U	89 UJ	47 U	39 U	20 U	21 U

Notes:

(a) *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry weight basis.*
(b) *Data provided by analytical laboratory report for SDG C8E140236. Sediment samples collected in 2010 were not analyzed for VOCs.*
(c) *For sampling locations see Figure 8.*
(d) *For clarity, all detections are shown in* ***bold-face*** *type.*
(e) *Data Legend:*
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.

TABLE 25
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)								
	Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40	SD10-31	SD10-32	SD10-33
	Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08	11/8/10	11/8/10	11/8/10
	Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6
1,1'-Biphenyl		170 U[d]	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2,2'-oxybis(1-Chloropropane)		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
2,4,5-Trichlorophenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2,4,6-Trichlorophenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2,4-Dichlorophenol		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
2,4-Dimethylphenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2,4-Dinitrophenol		880 UJ	2,500 UJ	1,300 UJ	1,100 UJ	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
2,4-Dinitrotoluene		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2,6-Dinitrotoluene		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2-Chloronaphthalene		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
2-Chlorophenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2-Methylnaphthalene		35 U	**48 J**	**19 J**	**23 J**	66 U	**24 J**	35 UJ	45 U	**16 J**
2-Methylphenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
2-Nitroaniline		880 U	2,500 UJ	1,300 U	1,100 U	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
2-Nitrophenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
3,3'-Dichlorobenzidine		170 UJ	490 UJ	260 UJ	220 UJ	330 U	320 U	170 UJ	220 U	200 UJ
3-Nitroaniline		880 U	2,500 UJ	1,300 U	1,100 U	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
4,6-Dinitro-2-methylphenol		880 U	2,500 UJ	1,300 U	1,100 U	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
4-Bromophenyl phenyl ether		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
4-Chloro-3-methylphenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
4-Chloroaniline		170 UJ	490 UJ	260 UJ	220 UJ	330 U	320 U	170 UJ	220 U	200 UJ
4-Chlorophenyl phenyl ether		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
4-Methylphenol		**35[e] J**	**67 J**	**1,600**	**49 J**	330 U	**53 J**	170 UJ	220 U	**26 J**
4-Nitroaniline		880 U	2,500 UJ	1,300 U	1,100 U	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
4-Nitrophenol		880 U	2,500 UJ	1,300 U	1,100 U	1,700 U	1,600 U	890 UJ	1,100 U	1,000 UJ
Acenaphthene		35 U	**230 J**	**24 J**	**19 J**	66 U	65 U	35 UJ	45 U	89 UJ
Acenaphthylene		35 U	**190 J**	**24 J**	**30 J**	**88**	65 U	**12 J**	**37 J**	**600 J**

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TABLE 25
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (ug/kg)[a] at Indicated Depth (Inches)								
Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40	SD10-31	SD10-32	SD10-33
Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08	11/8/10	11/8/10	11/8/10
Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6
Acetophenone	**66 J**	490 UJ	260 U	**58 J**	330 U	320 U	170 UJ	220 U	200 UJ
Anthracene	**10 J**	**490 J**	**58**	**44**	**97**	65 U	**12 J**	**32 J**	**530 J**
Atrazine	170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Benzaldehyde	**52 J**	**170 J**	**73 J**	**56 J**	330 UJ	320 UJ	**90 J**	**110 J**	**100 J**
Benzo(a)anthracene	**46**	**2,200 J**	**230**	**190**	**89**	**84**	**42 J**	**100**	**1,600 J**
Benzo(a)pyrene	**48**	**940 J**	**260**	**300**	**110**	**100**	**58 J**	**120**	**1,500 J**
Benzo(b)fluoranthene	**89**	**2,600 J**	**460**	**500**	**210**	**160**	**95 J**	**220**	**2,600 J**
Benzo(ghi)perylene	**55**	**580 J**	**310**	**430**	**69**	**61 J**	**63 J**	**98**	**1,100 J**
Benzo(k)fluoranthene	35 U	100 UJ	52 U	44 U	**60 J**	**21 J**	35 UJ	45 U	40 UJ
bis(2-Chloroethoxy)methane	170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
bis(2-Chloroethyl) ether	35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
bis(2-Ethylhexyl) phthalate	**53 J**	**220 J**	**210 J**	**260**	330 U	320 U	170 UJ	220 U	**50 J**
Butyl benzyl phthalate	**38 J**	**75 J**	260 U	**36 J**	330 U	320 U	**24 J**	**31 J**	**37 J**
Caprolactam	**90 J**	**250 J**	260 U	220 U	330 U	320 U	890 UJ	1,100 U	1,000 UJ
Carbazole	**13 J**	**380 J**	52 U	**53**	66 U	65 U	**9.2 J**	45 U	240 UJ
Chrysene	**66**	**3,400 J**	**330**	**400**	**150**	**110**	**73 J**	**150**	**2,000 J**
Dibenz(a,h)anthracene	**14 J**	**64 J**	**68**	**85**	66 U	65 U	35 UJ	**19 J**	340 UJ
Dibenzofuran	170 U	**180 J**	**21 J**	**20 J**	330 U	320 U	170 UJ	220 U	**36 J**
Diethyl phthalate	170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Dimethyl phthalate	170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Di-n-butyl phthalate	170 U	490 UJ	**68 J**	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Di-n-octyl phthalate	170 UJ	490 UJ	260 UJ	220 UJ	330 U	320 U	170 UJ	220 U	200 UJ
Fluoranthene	**140**	**10,000 J**	**660**	**590**	**290**	**250**	**110 J**	**230**	**5,200 J**
Fluorene	35 U	**310 J**	**34 J**	**24 J**	66 U	65 U	35 UJ	45 U	120 UJ
Hexachlorobenzene	35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
Hexachlorobutadiene	35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
Hexachlorocyclopentadiene	170 UJ	490 UJ	260 UJ	220 UJ	330 UJ	320 UJ	170 UJ	220 U	200 UJ

TABLE 25
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (ug/kg)[a] at Indicated Depth (Inches)									
	Sample I.D.[c]:	**SD08-14**	**SD08-15**	**SD08-16**	**SD08-17**	**SD08-30**	**SD08-40**	**SD10-31**	**SD10-32**	**SD10-33**
	Sample Date:	**5/12/08**	**5/12/08**	**5/12/08**	**5/12/08**	**5/14/08**	**5/14/08**	**11/8/10**	**11/8/10**	**11/8/10**
	Sample Depth:	**0 to 5**	**0 to 3**	**0 to 4**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**
Hexachloroethane		170 U	490 UJ	260 U	220 UJ	330 U	320 U	170 UJ	220 U	200 UJ
Indeno(1,2,3-cd)pyrene		**48**	**580 J**	**250**	**310**	**77**	**61 J**	**47 J**	**83**	**950 J**
Isophorone		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Naphthalene		35 U	**28 J**	52 U	**22 J**	66 U	65 UJ	35 UJ	45 U	**21 J**
Nitrobenzene		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
N-Nitrosodi-n-propylamine		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
N-Nitrosodiphenylamine		35 U	100 UJ	52 U	44 U	66 U	65 U	35 UJ	45 U	40 UJ
Pentachlorophenol		170 U	490 UJ	260 U	220 U	330 U	320 U	170 UJ	220 U	200 UJ
Phenanthrene		**46**	**1,600 J**	**210**	**200**	**84**	**110**	**39 J**	**73**	**1,400 J**
Phenol		35 U	100 UJ	**29 J**	44 U	66 U	65 UJ	35 UJ	45 U	40 UJ
Pyrene		**67**	**4,600 J**	**340**	**370**	**160**	**98**	**72 J**	**170**	**2,900 J**

<u>Notes</u>:

(a) *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E140236 and C0J210496. Outlet channel sediment samples SD10-18 and SD10-19 were not analyzed for SVOCs.*

(c) *For sampling locations see Figure 8.*

(d) *<u>Data Legend</u>:*

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting limit is estimated.

(e) *For clarity, all detections are shown in* ***bold-face*** *type.*

TABLE 26
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]	Concentration (ug/kg)[a] at Indicated Depth (Inches)										
Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40	SD10-18	SD10-19	SD10-31	SD10-32	SD10-33
Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08	10/20/10	10/20/10	11/8/10	11/8/10	11/8/10
Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6
Pesticides:											
Aldrin	1.8 U[d]	25 UJ	13 U	11 U	230 U	17 U	NA[f]	NA	NA	NA	NA
alpha-BHC	0.53 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
beta-BHC	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
delta-BHC	1.8 U	9.9 U	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.36 U	5.5 U	13 U	2.4 U	84 U	17 U	NA	NA	NA	NA	NA
alpha-Chlordane	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
gamma-Chlordane	**1.5[e] J**	16 U	2.8 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
4,4'-DDD	1.8 U	25 UJ	13 U	11 U	29 U	17 U	NA	NA	NA	NA	NA
4,4'-DDE	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
4,4'-DDT	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
Dieldrin	1.8 U	7.9 U	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
Endosulfan I	1.8 U	25 UJ	13 U	11 U	13 U	17 U	NA	NA	NA	NA	NA
Endosulfan II	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
Endosulfan sulfate	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
Endrin	1.8 U	25 UJ	13 U	11 U	84 U	17 U	NA	NA	NA	NA	NA
Endrin aldehyde	1.8 U	25 UJ	13 U	2.9 U	84 U	17 U	NA	NA	NA	NA	NA
Endrin ketone	1.8 U	25 UJ	4.6 U	4.1 U	21 U	17 U	NA	NA	NA	NA	NA
Heptachlor	1.8 U	25 UJ	13 U	11 U	30 U	17 U	NA	NA	NA	NA	NA
Heptachlor epoxide	1.4 U	25 UJ	13 U	4.2 U	84 U	17 U	NA	NA	NA	NA	NA
Methoxychlor	3.4 U	49 UJ	26 U	22 U	75 U	32 U	NA	NA	NA	NA	NA
Toxaphene	70 U	1,000 UJ	520 U	440 U	3,300 U	650 U	NA	NA	NA	NA	NA

TABLE 26
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)										
	Sample I.D.[c]:	**SD08-14**	**SD08-15**	**SD08-16**	**SD08-17**	**SD08-30**	**SD08-40**	**SD10-18**	**SD10-19**	**SD10-31**	**SD10-32**	**SD10-33**
	Sample Date:	**5/12/08**	**5/12/08**	**5/12/08**	**5/12/08**	**5/14/08**	**5/14/08**	**10/20/10**	**10/20/10**	**11/8/10**	**11/8/10**	**11/8/10**
	Sample Depth:	**0 to 5**	**0 to 3**	**0 to 4**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**	**0 to 6**
Polychlorinated Biphenyls:												
Aroclor 1016		17 U	50 UJ	26 U	22 U	16 U	16 U	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1221		17 U	50 UJ	26 U	22 U	16 U	16 U	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1232		17 U	50 UJ	26 U	22 U	16 U	16 U	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1242		17 U	50 UJ	26 U	22 U	16 U	16 U	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1248		17 U	50 UJ	26 U	22 U	16 U	16 U	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1254		**20**	**190 J**	**130**	**280**	16 U	**43**	15 U	11 U	18 UJ	22 U	20 UJ
Aroclor 1260		17 U	50 UJ	26 U	22 U	16 U	16 U	**28**	**2.9 J**	**20 J**	**27 J**	**20 J**

Notes :

[a] *All concentrations reported in units of micrograms per kilogram (μg/kg) on a dry-weight basis.*

[b] *Data provided by analytical laboratory reports for SDGs C8E140236 and C0J210496.*

[c] *For sampling locations see Figure 8.*

[d] *Data Legend* :

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting limit is estimated.

[e] *For clarity, all detections are shown in* ***bold-face*** *type.*

[f] *"NA" indicates parameter was not analyzed.*

TABLE 27
ANALYTICAL DATA SUMMARY - TOTAL METALS
SEDIMENTS IN OUTLET CHANNELS AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (mg/kg)[a] at Indicated Depth (Inches)										
	Sample I.D.[c]:	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40	SD10-18	SD10-19	SD10-31	SD10-32	SD10-33
	Sample Date:	5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08	10/20/10	10/20/10	11/8/10	11/8/10	11/8/10
	Sample Depth:	0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6
Aluminum		**16,700**[d]	**8,100 J**	**12,000**	**12,900**	**11,700**	**8,550**	**12,600**	**14,200**	**13,500 J**	**12,300**	**10,700 J**
Antimony		**0.27 J**[e]	**6 J**	**0.83 J**	**0.91 J**	**0.95**	**0.96**	**0.46 J**	**0.16 J**	**0.99 J**	**0.94 J**	**0.0032 J**
Arsenic		**7.2 J**	**4.1 J**	**3.3 J**	**3 J**	**2.6**	**4.3**	**4.6**	**3.4**	**1.7 J**	**2.2**	**3.1 J**
Barium		**234**	**198 J**	**238**	**282**	**229**	**187**	**192**	**223**	**294 J**	**234**	**204 J**
Beryllium		**0.93**	**0.41 J**	**0.55**	**0.55**	**0.6**	**0.5**	**0.70**	**0.81**	**0.73 J**	**0.68**	**0.57 J**
Cadmium		**3**	**22.7 J**	**48.7**	**91.9**	**1.3**	**2**	**7.0**	**0.73**	**3.4 J**	**4.2**	**5.1 J**
Calcium		**7,440**	**55,600 J**	**70,100**	**69,500**	**3,630**	**3,670**	**20,700**	**5,400**	**7,470 J**	**9,500**	**11,800 J**
Chromium		**24.8**	**83.4 J**	**88.3**	**149**	**21.4**	**17.5**	**25.0**	**18.7**	**41.6 J**	**42.2**	**51.2 J**
Cobalt		**13.1**	**7.6 J**	**10.6**	**9.9**	**6.9**	**5**	**9.2**	**9.3**	**7.4 J**	**7.2**	**7.3 J**
Copper		**25.1**	**94.6 J**	**101**	**175**	**21.2**	**36.2**	**29.2**	**18.6**	**35.1 J**	**41.8**	**46.8 J**
Iron		**37,400**	**16,800 J**	**23,500**	**20,700**	**17,500**	**17,800**	**24,400 J**	**25,600 J**	**18,100 J**	**17,200 J**	**17,600 J**
Lead		**34.3**	**189 J**	**172**	**288**	**49.3**	**79.3**	**45.2**	**19.2**	**114 J**	**126**	**157 J**
Magnesium		**4,690**	**6,540 J**	**5,540**	**4,900**	**3,320**	**2,290**	**4,380**	**4,100**	**3,410 J**	**3,100**	**3,240 J**
Manganese		**415 J**	**216 J**	**254 J**	**231 J**	**170**	**101**	**235**	**205**	**107 J**	**98.5**	**118 J**
Mercury		**0.044**	**0.12 J**	**0.14**	**0.25**	**0.072**	**0.33 J**	**0.071**	**0.035**	**0.1 J**	**0.099**	**0.1 J**
Nickel		**29.9**	**41.1 J**	**49.6**	**55.5**	**21.4**	**16.3**	**27.2**	**25.4**	**35.4 J**	**34.7**	**40.1 J**
Potassium		**1,150**	**942 J**	**932**	**1,060**	**596**	**475**	**1,030 J**	**964 J**	**1,320 J**	**1,050 J**	**1,040 J**
Selenium		**0.63 J**	**1.3 J**	**0.47 J**	**0.72 J**	**0.79**	**0.74**	**0.80**	**0.67**	**1.1 J**	**0.98**	**1.2 J**
Silver		**0.42**	**4.6 J**	**5.6**	**14.5**	**0.53**	**0.34**	**1.0**	**0.10**	**1.3 J**	**1.5**	**2 J**
Sodium		**325**	**875 J**	**437**	**434**	**158**	**162**	**220**	**172**	**293 J**	**333**	**295 J**
Thallium		**0.15**	0.3 U	**0.21**	**0.22**	**0.13**	**0.15**	**0.13 J**	**0.11 J**	**0.19 J**	**0.21 J**	**0.15 J**
Vanadium		**24.7**	**15.7 J**	**18.8**	**20.2**	**15.2**	**15.2**	**18.2**	**18.6**	**17.8 J**	**18**	**15.8 J**
Zinc		**123**	**534 J**	**888**	**1,690**	**94.5**	**101**	**192**	**95.0**	**202 J**	**227**	**263 J**

Notes:

(a) *All concentrations reported in units of milligrams per kilogram (mg/kg) on a dry-weight basis.*
(b) *Data provided by analytical laboratory reports for SDGs C8E140236 and C0J21046.*
(c) *For sampling locations see Figure 8.*
(d) *For clarity, all detections are shown in* ***bold-face*** *type.*
(e) *Data Legend:*
J - associated result is quantitatively uncertain.

TABLE 28
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
SEDIMENTS IN OUTLET CHANNEL AND MUD FLATS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a]		Concentration at Indicated Depth (Inches)										
Sample I.D.[b]:	Units[c]	SD08-14	SD08-15	SD08-16	SD08-17	SD08-30	SD08-40	SD10-18	SD10-19	SD10-31	SD10-32	SD10-33
Sample Date:		5/12/08	5/12/08	5/12/08	5/12/08	5/14/08	5/14/08	10/20/10	10/20/10	11/8/10	11/8/10	11/8/10
Sample Depth:		0 to 5	0 to 3	0 to 4	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6
Laboratory Parameters:												
Cyanide (total)	mg/kg	1 U[d]	3 UJ	1.6 U	1.3 UJ	0.48 U	0.38 U	0.92 U	0.67 U	1 UJ	1.3 U	1.2 UJ
Total Organic Carbon	mg/kg	**17,900**[e]	**222,000 J**	**29,900**	**58,500 J**	**40,600**	**41,100**	NA	NA	**66,100**	**78,700**	**73,800**
Solids Content	Percent	**48.1**	**16.8**	**32.1**	**38.3**	**75.9**	**72**	**54.3**	**74.6**	**47.6**	**37.1**	**41.3**
Grain-Size Distribution:												
Gravel	Percent	**0.0**	**0.0**	**0.0**	NA[f]	NA	NA	NA	NA	NA	NA	NA
Sand	Percent	**15.2**	**33.3**	**17.7**	NA	NA	NA	NA	NA	NA	NA	NA
Coarse Sand	Percent	**3.1**	**10.5**	**2.1**	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand	Percent	**3.0**	**12.0**	**3.9**	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand	Percent	**9.1**	**10.8**	**11.7**	NA	NA	NA	NA	NA	NA	NA	NA
Silt	Percent	**61.0**	**61.3**	**70.5**	NA	NA	NA	NA	NA	NA	NA	NA
Clay	Percent	**23.8**	**5.4**	**11.7**	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] *Data for laboratory parameters provided by analytical laboratory reports for SDGs C8E140236 and C0J21046.*
[b] *For sampling locations see Figure 8.*
[c] *Cyanide and total organic content concentrations are reported on a dry-weight basis.*
[d] *Data Legend*:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.
[e] *For clarity, all detections are shown in **bold-face** type.*
[f] *NA - indicates sample not analyzed for this parameter.*

TABLE 29
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
Acetone		35 U[d]	29 U	**35[e] J**	24 U	35 U	**19 J**	**11 J**
Benzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Bromodichloromethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Bromoform		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Bromomethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
2-Butanone		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 UJ
Carbon disulfide		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Carbon tetrachloride		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Chlorobenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Dibromochloromethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Chloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Chloroform		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Chloromethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Cyclohexane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,2-Dibromo-3-chloropropane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,2-Dibromoethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,2-Dichlorobenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,3-Dichlorobenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,4-Dichlorobenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Dichlorodifluoromethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1-Dichloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,2-Dichloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
cis-1,2-Dichloroethene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
trans-1,2-Dichloroethene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1-Dichloroethene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,2-Dichloropropane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U

TABLE 29
ANALYTICAL DATA SUMMARY - VOLATILE ORGANIC COMPOUNDS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
cis-1,3-Dichloropropene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
trans-1,3-Dichloropropene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Ethylbenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
2-Hexanone		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Isopropylbenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Methyl acetate		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Methylcyclohexane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Methylene chloride		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	34 U
4-Methyl-2-pentanone		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Methyl tert-butyl ether		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Styrene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1,2,2-Tetrachloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Tetrachloroethene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Toluene		8.8 U	7.3 U	**12 J**	6.1 U	8.7 U	12 U	6.4 U
1,2,4-Trichlorobenzene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1,1-Trichloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1,2-Trichloroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Trichloroethene		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Trichlorofluoromethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
1,1,2-Trichloro-1,2,2-trifluoroethane		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Vinyl chloride		8.8 U	7.3 U	16 U	6.1 U	8.7 U	12 U	6.4 U
Xylenes (total)		26 U	22 U	47 U	18 U	26 U	35 U	19 U

Notes :

(a) *All concentrations reported in units of micrograms per kilogram (μg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E070123, C8E080374, and C8E170109.*

(c) *For sampling locations see Figure 7.*

(d) *Data Legend* :

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

(e) *For clarity, all detections are shown in* ***bold-face*** *type.*

CUMMINGS RITER

TABLE 30
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE,K OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
Acenaphthene		74 J[d,e]	2,300 J	440	23 J	120	36 J	130 U
Acenaphthylene		440	230	190	37	100	97	130 U
Acetophenone		630 U	490 J	51 J	160 U	160 U	190 U	630 U
Anthracene		430	4,900	1,400	63	380	100	170
Atrazine		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Benzaldehyde		630 UJ	940 J	150 J	160 UJ	27 J	43 J	630 UJ
Benzo(a)anthracene		2,100	12,000	17,000 D	390	1,300	400	140
Benzo(b)fluoranthene		4,700	15,000	42,000 *	740	1,000	700	350
Benzo(k)fluoranthene		1,500	7,600	520 UD*	510	1,200	39 U	55 J
Benzo(ghi)perylene		3,800	12,000	17,000 D	190	520	180	140
Benzo(a)pyrene		2,600	12,000	26,000 D	590	1,200	430	210
1,1'-Biphenyl		630 U	240 J	21 J	160 U	9.1 J	190 U	630 U
bis(2-Chloroethoxy)methane		630 U	620 U	260 U	160 U	160 U	190 U	630 U
bis(2-Chloroethyl) ether		130 U	130 U	52 U	33 U	32 U	39 U	130 U
bis(2-Ethylhexyl) phthalate		1,500	4,600	3,200	450	100 J	120 J	400 J
4-Bromophenyl phenyl ether		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Butyl benzyl phthalate		270 J	540 J	260 U	160 U	21 J	20 J	630 U
Caprolactam		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Carbazole		330	3,000	3,800	110	340	68	130 U
4-Chloroaniline		630 U	620 U	260 U	160 U	160 U	190 U	630 U
4-Chloro-3-methylphenol		630 U	620 UJ	260 U	160 U	160 U	190 U	630 U
2-Chloronaphthalene		130 U	130 U	52 U	33 U	32 U	39 U	130 U
2-Chlorophenol		630 U	620 U	260 U	160 U	160 U	190 U	630 U
4-Chlorophenyl phenyl ether		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Chrysene		3,300	15,000	41,000 D	910	1,400	480	200
Dibenz(a,h)anthracene		690	1,800	52 U	66	97	71	130 U

TABLE 30
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE,K OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	**SD08-20**	**SD08-21**	**SD08-24**	**SD08-27**	**SD08-28**	**SD08-29**	**SD08-41**
	Sample Date:	**5/6/08**	**5/6/08**	**5/7/08**	**5/7/08**	**5/7/08**	**5/7/08**	**5/15/08**
	Sample Depth:	**0 to 3**	**0 to 4**	**0 to 4**	**0 to 2**	**0 to 5**	**0 to 6**	**0 to 6**
Di-n-butyl phthalate		630 U	**1,900**	**63 J**	**28 J**	160 U	190 U	630 U
3,3'-Dichlorobenzidine		630 U	620 U	260 UJ	160 UJ	160 UJ	190 UJ	630 U
2,4-Dichlorophenol		130 U	130 U	52 U	33 U	32 U	39 U	130 U
Diethyl phthalate		630 U	620 U	260 U	160 U	160 U	190 U	630 U
2,4-Dimethylphenol		**150 J**	**390 J**	260 U	160 U	160 U	190 U	630 U
Dimethyl phthalate		630 U	1,500	260 U	160 U	160 U	190 U	630 U
4,6-Dinitro-2-methylphenol		3,300 UJ	3,200 UJ	1,300 U	830 U	810 U	980 U	3,200 U
2,4-Dinitrophenol		3,300 UJ	3,200 UJ	1,300 UJ	830 UJ	810 UJ	980 UJ	3,200 U
2,4-Dinitrotoluene		630 U	620 U	260 U	160 U	160 U	190 U	630 U
2,6-Dinitrotoluene		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Di-n-octyl phthalate		**490 J**	**310 J**	**370 J**	160 UJ	160 UJ	190 UJ	630 U
Fluoranthene		**3,900**	**38,000**	**71,000 D**	**1,800**	**4,300**	**1,000**	**550**
Fluorene		130 U	**2,800**	**690**	**32 J**	**150**	**35 J**	130 U
Hexachlorobenzene		130 U	130 U	52 U	33 U	32 U	39 U	130 U
Hexachlorobutadiene		130 U	130 U	52 U	33 U	32 U	39 U	130 U
Hexachlorocyclopentadiene		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Hexachloroethane		630 U	620 U	260 U	160 U	160 U	190 U	630 UJ
Indeno(1,2,3-cd)pyrene		**2,700**	**10,000**	**15,000 D**	**210**	**580**	**210**	**150**
Isophorone		630 U	620 U	260 U	160 U	160 U	190 U	630 U
2-Methylnaphthalene		**220**	**730**	**65**	33 U	**35**	**14 J**	130 U
2-Methylphenol		**130 J**	**310 J**	260 U	160 U	160 U	190 U	630 U
4-Methylphenol		**520 J**	**930**	**1,900**	**28 J**	**120 J**	**18 J**	630 U
Naphthalene		**350**	**2,800**	**88**	**7.8 J**	**42**	**16 J**	130 U
2-Nitroaniline		3,300 U	3,200 U	1,300 U	830 U	810 U	980 U	3,200 U
3-Nitroaniline		3,300 U	3,200 U	1,300 U	830 U	810 U	980 U	3,200 U
4-Nitroaniline		3,300 U	3,200 U	1,300 U	830 U	810 U	980 U	3,200 U
Nitrobenzene		130 U	130 U	52 U	33 U	32 U	39 U	130 U

TABLE 30
ANALYTICAL DATA SUMMARY - SEMIVOLATILE ORGANIC COMPOUNDS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE,K OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
2-Nitrophenol		630 U	620 U	260 U	160 U	160 U	190 U	630 U
4-Nitrophenol		3,300 U	3,200 U	1,300 U	830 U	810 U	980 U	3,200 U
N-Nitrosodiphenylamine		130 U	130 U	52 U	33 U	32 U	39 U	130 U
N-Nitrosodi-n-propylamine		130 U	130 U	52 U	33 U	**11 J**	39 U	130 U
2,2'-oxybis(1-Chloropropane)		130 U	130 U	52 U	33 U	32 U	39 U	130 U
Pentachlorophenol		630 U	620 U	260 U	160 U	160 U	190 U	630 U
Phenanthrene		**1,200**	**27,000**	**20,000 D**	**480**	**1,900**	**400**	**190**
Phenol		**270**	**450**	**250 E**	33 U	32 U	39 U	130 U
Pyrene		**3,400**	**23,000**	**36,000 D**	**710**	**2,000**	**500**	**250**
2,4,5-Trichlorophenol		630 U	620 U	260 U	160 U	160 U	190 U	630 U
2,4,6-Trichlorophenol		630 U	620 U	260 U	160 U	160 U	190 U	630 U

Notes:
(a) *All concentrations reported in units of micrograms per kilogram (μg/kg) on a dry-weight basis.*
(b) *Data provided by analytical laboratory reports for SDGs C8E070123, C8E080374, and C8E170109.*
(c) *For sampling locations see Figure 7.*
(d) Data Legend:
U - analyte not detected at concentration listed.
J - associated result is quantitatively uncertain.
UJ - the reporting limit is estimated.
D - result is from a diluted analysis.
** - In the professional opinion of the data validator, the benzo(b)fluoranthene concentration from the diluted analysis, as reported by the laboratory, is the sum of benzo(b)fluoranthene and benzo(k)fluoranthene.*
(e) *For clarity, all detections are shown in* ***bold-face*** *type*

TABLE 31
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
Pesticides:								
Aldrin		**3.9**[d]	8 U	13 U	8.3 U	1.2 U	0.32 U	16 U
alpha-BHC		1.6 U[e]	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
beta-BHC		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
delta-BHC		3.4 U	8 U	13 U	0.92 U	8.2 U	0.5 U	1.9 U
gamma-BHC (Lindane)		8.3 U	21 U	120 U	2.5 U	8.2 U	2 UJ	16 U
alpha-Chlordane		1.6 U	8 U	5.6 U	8.3 U	180 U	2 UJ	16 U
gamma-Chlordane		1.6 U	8 U	7.2 U	8.3 U	190 U	2 U	16 U
4,4'-DDD		1.6 U	8 U	37 U	8.3 U	8.2 U	0.81 U	16 U
4,4'-DDE		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
4,4'-DDT		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 UJ
Dieldrin		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
Endosulfan I		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
Endosulfan II		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
Endosulfan sulfate		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
Endrin		1.6 U	8 U	11 U	8.3 U	8.2 U	2 UJ	4.3 U
Endrin aldehyde		1.6 U	8 U	13 U	8.3 U	8.2 U	2 UJ	16 U
Endrin ketone		1.6 U	8 U	13 U	8.3 U	1.1 U	0.87 U	16 U
Heptachlor		**3.1**	8 U	15 U	8.3 U	8 U	2 UJ	16 U
Heptachlor epoxide		1.6 U	8 U	13 U	8.3 U	8 U	2 UJ	16 U
Methoxychlor		3.2 U	16 U	26 U	16 U	16 U	3.8 UJ	31 U
Toxaphene		65 U	320 U	520 U	330 U	320 U	77 UJ	640 U

TABLE 31
ANALYTICAL DATA SUMMARY - PESTICIDES AND PCBs
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (ug/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	**SD08-20**	**SD08-21**	**SD08-24**	**SD08-27**	**SD08-28**	**SD08-29**	**SD08-41**
	Sample Date:	**5/6/08**	**5/6/08**	**5/7/08**	**5/7/08**	**5/7/08**	**5/7/08**	**5/15/08**
	Sample Depth:	**0 to 3**	**0 to 4**	**0 to 4**	**0 to 2**	**0 to 5**	**0 to 6**	**0 to 6**
Polychlorinated Biphenyls:								
Aroclor 1016		16 U	16 U	26 U	16 U	16 U	19 U	16 U
Aroclor 1221		16 U	16 U	26 U	16 U	16 U	19 U	16 U
Aroclor 1232		16 U	16 U	26 U	16 U	16 U	19 U	16 U
Aroclor 1242		16 U	16 U	26 U	16 U	16 U	19 U	16 U
Aroclor 1248		16 U	16 U	26 U	16 U	16 U	19 U	16 U
Aroclor 1254		**41**	**86**	**61**	16 U	16 U	19 U	**26**
Aroclor 1260		**32**	**44**	26 U	**8.2 J**	**34**	**28**	**17**

Notes:

(a) *All concentrations reported in units of micrograms per kilogram (µg/kg) on a dry-weight basis.*

(b) *Data provided by analytical laboratory reports for SDGs C8E070123, C8E080374, and C8E170109.*

(c) *For sampling locations see Figure 7.*

(d) *For clarity, all detections are shown in* ***bold-face*** *type.*

(e) *Data Legend*:

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

UJ - the reporting limit is estimated.

TABLE 32
ANALYTICAL DATA SUMMARY - TOTAL METALS
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[b]		Concentration (mg/kg)[a] at Indicated Depth (Inches)						
	Sample I.D.[c]:	SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:	5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:	0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
Aluminum		**6,620**[d]	**3,910**	**8,310**	**4,730**	**12,000**	**7,590**	**5,820**
Antimony		**1.4 J**[e]	**1 J**	**1.4**	**0.43**	**0.23**	**0.14 J**	**0.13 J**
Arsenic		**9.1 J**	**2.5 J**	**6**	**3**	**6**	**3.5**	**2.8**
Barium		**102**	**70.7**	**101**	**42.6**	**165**	**108**	**40.4**
Beryllium		**0.52 J**	**0.15 J**	**0.41**	**0.18**	**0.64**	**0.38**	**0.21**
Cadmium		**1.3 J**	**20.3 J**	**1**	**0.81**	**0.42**	**0.29**	**0.86**
Calcium		**11,400 J**	**31,000 J**	**35,800**	**52,400**	**9,930**	**42,600**	**46,800**
Chromium		**24.1**	**32**	**69.4**	**32.2**	**17.2**	**12.2**	**9.5 J**
Cobalt		**7.7 J**	**4.4 J**	**9**	**5.5**	**8.3**	**6.7**	**5**
Copper		**63.6 J**	**148 J**	**87.2**	**60.9**	**22.7**	**22**	**20.1 J**
Iron		**25,300**	**13,000**	**23,700**	**29,400**	**23,600**	**15,100**	**13,900**
Lead		**90**	**104**	**148**	**39.5**	**29.6**	**32.1**	**9.2 J**
Magnesium		**3,880**	**3,620**	**8,340**	**4,980**	**3,780**	**4,910**	**5,420 J**
Manganese		**226**	**161**	**393**	**400**	**583**	**209**	**567**
Nickel		**21.7**	**18.4**	**30.9**	**20.3**	**20.9**	**16.8**	**13.3**
Potassium		**745**	**383**	**1,300**	**357**	**1,040**	**983**	**380**
Selenium		**0.63 J**	**0.23 J**	**0.56 J**	**0.072 J**	**0.58**	**0.37 J**	**0.19 J**
Silver		**0.21 J**	**7.2 J**	**0.13 J**	**0.95**	**0.089 J**	**0.05 J**	**0.22**
Sodium		**198 J**	**186 J**	**668**	**137**	**251**	**531**	**114**
Thallium		**0.11 J**	**0.037 J**	**0.14 J**	**0.028 J**	**0.15**	**0.15**	0.095 U
Vanadium		**18.4**	**10.8**	**25.3**	**13**	**20.4**	**13.1**	**13.1**
Zinc		**269**	**626**	**993**	**152**	**123**	**102**	**51.8 J**
Mercury		**0.18**	**0.45**	**0.088**	**0.017 J**	**0.06**	**0.052**	**0.015 J**

Notes:

[a] *All concentrations reported in units of milligrams per kilogram (mg/kg) on a dry-weight basis.*

[b] *Data provided by analytical laboratory reports for SDGs C8E070123, C8E080374, and C8E170109.*

[c] *For sampling locations see Figure 7.*

[d] *For clarity, all detections are shown in* **bold-face** *type.*

[e] *Data Legend:*

U - analyte not detected at concentration listed.

J - as associated result is quantitatively uncertain.

TABLE 33
ANALYTICAL DATA SUMMARY - OTHER ANALYTES
SEDIMENTS ASSOCIATED WITH DRAINAGE TO KOPPERS POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a]		Units[c]	Concentration at Indicated Depths (Inches)						
	Sample I.D.[b]:		SD08-20	SD08-21	SD08-24	SD08-27	SD08-28	SD08-29	SD08-41
	Sample Date:		5/6/08	5/6/08	5/7/08	5/7/08	5/7/08	5/7/08	5/15/08
	Sample Depth:		0 to 3	0 to 4	0 to 4	0 to 2	0 to 5	0 to 6	0 to 6
Cyanide (total)		mg/kg	**1.1**[d]	**3.6**	6.3 U[e]	0.61 U	**0.39 J**	1.2 U	**1.2 B**
Total Organic Carbon		mg/kg	**54,800**	**63,500**	**101,000**	**15,500**	**35,700**	**42,100**	**51,200**
Solids Content		Percent	**57.1**	**68.7**	**32.1**	**81.8**	**57.3**	**43.4**	**78.7**

<u>Notes</u>:

(a) *Data for laboratory parameters provided by analytical laboratory reports for SDGs C8E070123, C8E080374, and C8E170109.*

(b) *For sampling locations see Figure 7.*

(c) *Cyanide and total organic content concentrations are reported on a dry-weight basis.*

(d) *For clarity, all detections are shown in* **bold-face** *type.*

(e) *<u>Data Legend</u>:*

U - analyte not detected at concentration listed.

J - associated result is quantitatively uncertain.

TABLE 34
COMPARISON OF SURFACE SEDIMENT DATA
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

		SD-01 Location					SD-03 Location			SD-04 Location			SD-06 Location			SD-08 Location			
Sample ID:		SD08-01	SD10-01		SD10-DUP		SD08-03	SD10-03		SD08-04	SD10-04		SD08-06	SD10-06		SD08-08	SD10-08		
Date Collected:		5/14/08	10/20/10		10/20/10		5/14/08	10/20/10		5/14/08	10/20/10		5/14/08	10/20/10		5/14/08	10/20/10		
Depth Interval (in):		0-6	0-6	RPD	0-6	RPD	0-6	0-6	RPD	0-6	0-6	RPD	0-6	0-6	RPD	0-6	0-6	RPD	COPEC
	Units																		
SVOCs																			
Acenaphthene	µg/kg	250 UJ[a]	36 J	200%	53 J	130.0%	230 J	67 J	109.8%	240 UJ	28 J	200%	140 U	15 J	200%	270 UJ	17 J	200%	
Acenaphthylene	µg/kg	250 UJ	310 UJ	--[b]	300 UJ	--	310 J	98 J	103.9%	240 UJ	220 UJ	--	140 U	18 J	200%	270 UJ	20 J	200%	•
Anthracene	µg/kg	510 J	130 J	118.8%	150 J	109.1%	450 J	200 J	76.9%	350 J	89 J	118.9%	140 U	31 J	200%	320 J	41 J	154.6%	
Benzo(a)anthracene	µg/kg	1,200 J	590 J	68.2%	670 J	56.7%	1,000 J	970 J	3.0%	430 J	470 J	8.9%	110 J	140 J	24.0%	290 J	190 J	41.7%	•
Benzo(a)pyrene	µg/kg	1,300 J	1,400 J	7.4%	1,500 J	14.3%	1,200 UJ	1,700 J	200%	760 J	1,100 J	36.6%	170	300 J	55.3%	520 J	380 J	31.1%	•
Benzo(b)fluoranthene	µg/kg	1,800 J	1,000 J	57.1%	1600 J	11.8%	2,000 J	1,700 J	16.2%	1,000 J	990 J	1.0%	340	250 J	30.5%	790 J	350 J	77.2%	
Benzo(ghi)perylene	µg/kg	1,200 J	930 J	25.4%	1200 J	0.0%	1,200 J	1,400 J	15.4%	670 J	890 J	28.2%	150	260 J	53.7%	440 J	340 J	25.6%	•
Benzo(k)fluoranthene	µg/kg	780 J	780 J	0.0%	470 J	49.6%	920 J	600 J	42.1%	330 J	300 J	9.5%	140 U	120 J	200%	240 J	140 J	52.6%	•
bis(2-Ethylhexyl) phthalate	µg/kg	1,200 J	790 J	41.2%	960 J	22.2%	1,400 J	1,300 J	7.4%	890 J	800 J	10.7%	670 U	200 J	200%	390 J	350 J	10.8%	
Butyl benzyl phthalate	µg/kg	130 J	1,500 UJ	200%	1,500 UJ	168.1%	110 J	1,200 UJ	200%	1,200 UJ	1,100 UJ	--	670 U	260 UJ	--	1,300 UJ	46 J	200%	
Carbazole	µg/kg	490 J	97 J	133.9%	120 J	121.3%	440 J	160 J	93.3%	240 UJ	78 J	200%	140 U	26 J	200%	270 UJ	33 J	200%	
Chrysene	µg/kg	1,500 J	1,000 J	40.0%	1,100 J	30.8%	1,600 J	1,400 J	13.3%	800 J	770 J	3.8%	130 J	230 J	55.6%	500 J	290 J	53.2%	•
Dibenz(a,h)anthracene	µg/kg	370 J	310 UJ	200%	300 UJ	20.9%	300 J	880 J	98.3%	160 J	690 J	124.7%	140 U	170 J	200%	150 J	190 J	23.5%	•
Di-n-octyl phthalate	µg/kg	1,200 UJ	1,700 J	200%	1,500 UJ	--	1,200 UJ	1,500 J	200%	1,200 UJ	1,100 UJ	--	670 U	260 UJ	--	1300 UJ	360 J	200%	
Fluoranthene	µg/kg	3,200 J	1,600 J	66.7%	1,900 J	51.0%	2,600 J	2,600 J	0.0%	1,600 J	1,300 J	20.7%	420	370 J	12.7%	1100 J	510 J	73.3%	
Fluorene	µg/kg	670 J	310 UJ	200%	300 UJ	76.3%	250 UJ	64 J	200%	240 UJ	220 UJ	--	140 U	15 J	200%	270 UJ	19 J	200%	
Indeno(1,2,3-cd)pyrene	µg/kg	970 J	1,300 J	29.1%	1,400 J	36.3%	1,100 J	1,500 J	30.8%	490 J	980 J	66.7%	120 J	250 J	70.3%	360 J	320 J	11.8%	•
Phenanthrene	µg/kg	1,200 J	560 J	72.7%	620 J	63.7%	970 J	880 J	9.7%	490 J	410 J	17.8%	140	160 J	13.3%	390 J	180 J	73.7%	
Pyrene	µg/kg	1,800 J	1,200 J	40.0%	1,400 J	25.0%	1,200 UJ	1,800 J	200%	850 J	920 J	7.9%	130 J	270 J	70.0%	570 J	360 J	45.2%	•
Aroclor PCBs																			
Aroclor-1254	µg/kg	1,400 J	700 J	66.7%	800 J	54.5%	1,300 J	480 J	92.1%	1,500 J	550 J	92.7%	72	260 J	113.3%	670 J	520 J	25.2%	•
Total PCBs	µg/kg	1,400 J	700 J	66.7%	800 J	54.5%	1,300 J	480 J	92.1%	1,500 J	550 J	92.7%	72	260 J	113.3%	670 J	520 J	25.2%	•
Inorganics																			
Aluminum	mg/kg	10,900 J	12,300 J	12.1%	11,000 J	0.9%	11,200 J	10,000 J	11.3%	10,100 J	9,380 J	7.4%	17,000	13,500 J	23.0%	11,400 J	8,920 J	24.4%	
Antimony	mg/kg	5.2 J	3.2 J	47.6%	2.9 J	56.8%	5.1 J	1.7 J	100.0%	4.6 J	1.4 J	106.7%	0.3 J	0.41 J	31.0%	1.8 J	0.96 J	60.9%	
Arsenic	mg/kg	3.7 J	3.4 J	8.5%	3 J	20.9%	3.1 J	3.1 J	0.0%	3.6 J	2.8 J	25.0%	2.1	2.7 J	25.0%	2.6 J	2.1 J	21.3%	
Barium	mg/kg	552 J	376 J	37.9%	350 J	44.8%	596 J	402 J	38.9%	561 J	425 J	27.6%	351	365 J	3.9%	513 J	412 J	21.8%	•
Beryllium	mg/kg	0.45 J	0.52 J	14.4%	0.46 J	2.2%	0.4 J	0.43 J	7.2%	0.46 J	0.42 J	9.1%	0.88	0.7 J	22.8%	0.46 J	0.38 J	19.0%	
Cadmium	mg/kg	739 J	283 J	89.2%	253 J	98.0%	535 J	323 J	49.4%	553 J	367 J	40.4%	61	115 J	61.4%	356 J	292 J	19.8%	•
Calcium	mg/kg	161,000 J	137,000 J	16.1%	127,000 J	23.6%	163,000 J	164,000 J	0.6%	189,000 J	185,000 J	2.1%	30,100	81,200 J	91.8%	171,000 J	188,000 J	9.5%	
Chromium	mg/kg	462 J	370 J	22.1%	333 J	32.5%	441 J	357 J	21.1%	400 J	320 J	22.2%	80.5 J	151 J	60.9%	274 J	232 J	16.6%	•
Cobalt	mg/kg	13.3 J	11.3 J	16.3%	10.2 J	26.4%	9.8 J	8.6 J	13.0%	11.9 J	9.5 J	22.4%	6.8	8.7 J	24.5%	11.3 J	9.2 J	20.5%	
Copper	mg/kg	820 J	467 J	54.9%	426 J	63.2%	657 J	476 J	32.0%	657 J	495 J	28.1%	94.7	185 J	64.6%	412 J	370 J	10.7%	
Iron	mg/kg	14,200 J	16,700 J	16.2%	15,000 J	5.5%	12900 J	13,000 J	0.8%	13100 J	13,000 J	0.8%	13800 J	15,400 J	11.0%	13800 J	12,800 J	7.5%	•
Lead	mg/kg	1,480 J	1,030 J	35.9%	934 J	45.2%	1,580 J	1,270 J	21.8%	1,010 J	989 J	2.1%	116 J	339 J	98.0%	562 J	654 J	15.1%	•
Magnesium	mg/kg	5,710 J	5380 J	6.0%	4,890 J	15.5%	5,770 J	4,700 J	20.4%	5,970 J	4,580 J	26.4%	3,570	3,610 J	1.1%	5,310 J	4140 J	24.8%	
Manganese	mg/kg	112 J	128 J	13.3%	116 J	3.5%	105 J	106 J	0.9%	126 J	110 J	13.6%	77.8	94.2 J	19.1%	107 J	102 J	4.8%	
Mercury	mg/kg	1.1 J	0.85 J	25.6%	0.77 J	35.3%	0.73 J	0.87 J	17.5%	0.99 J	0.82 J	18.8%	0.19	0.35 J	59.3%	0.63 J	0.62 J	1.6%	•
Nickel	mg/kg	180 J	121 J	39.2%	110 J	48.3%	122 J	89.8 J	30.4%	157 J	107 J	37.9%	52.1	75.4 J	36.5%	133 J	99.1 J	29.2%	•
Potassium	mg/kg	1,010 J	1700 J	50.9%	1,480 J	37.8%	988 J	1,440 J	37.2%	809 J	1,270 J	44.3%	696	1,090 J	44.1%	789 J	952 J	18.7%	
Selenium	mg/kg	2.5 J	2.3 J	8.3%	2 J	22.2%	1.9 J	2 J	5.1%	2 J	1.9 J	5.1%	1.3	1.6 J	20.7%	1.7 J	1.7 J	0.0%	•
Silver	mg/kg	37.6 J	28.7 J	26.8%	25.8 J	37.2%	44.5 J	32 J	32.7%	34.6 J	29.3 J	16.6%	3.8	9.4 J	84.8%	21.2 J	20.8 J	1.9%	•
Sodium	mg/kg	727 J	629 J	14.5%	594 J	20.1%	668 J	536 J	21.9%	613 J	506 J	19.1%	360 J	442 J	20.4%	603 J	541 J	10.8%	
Thallium	mg/kg	0.34 J	0.44 J	25.6%	0.39 J	13.7%	0.42 J	0.44 J	4.7%	0.42 J	0.42 J	0.0%	0.21	0.36 J	52.6%	0.4 J	0.39 J	2.5%	
Vanadium	mg/kg	27.5 J	25 J	9.5%	21.4 J	24.9%	21.4 J	16.5 J	25.9%	23.5 J	18.2 J	25.4%	19.9	18.4 J	7.8%	17.6 J	12.6 J	33.1%	
Zinc	mg/kg	12,500 J	5,020 J	85.4%	4390 J	96.0%	9,330 J	5,920 J	44.7%	8,780 J	6,380 J	31.7%	892 J	1,950 J	74.5%	4,930 J	4,860 J	1.4%	•
Miscellaneous Parameters																			
Percent Solids	%	27	21.5	20.4%	22	18.5%	26.5	27.2	2.6%	28	29.5	5.4%	49.3	31.9	35.3%	25.1	27.7	10.4%	
Total Organic Carbon	mg/kg	135,000	81,100 J	49.9%	77,800 J	53.8%	83,600	86,500 J	3.4%	36,000	54,600 J	41.1%	22,900	95,500 J	122.6%	56,100	55,200 J	1.6%	

Notes:

[a] *Qualifiers: U = not detected at value shown; UJ = not detected at estimated concentration shown; J = estimated value.*

[b] *A dash (--) indicates that the RPD was not calculated since both results were non-detects.*

CUMMINGS RITER

TABLE 35
STATISTICAL SUMMARY OF SURFACE SEDIMENT DATA FOR METALS AND PCBs
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Parameter[a]	Metals (concentrations in mg/kg)[b, c]							Aroclor 1254[d] (ug/kg)
	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	
1995 through 1998 Data								
Pond Sediments								
Number of Samples	10	10	7	10	8	6	7	12
Mean	243	223	368	632	0.56	116	4,510	960
Median	109	218	354	443	0.39	116	2,120	665
25th Percentile	52.7	131.0	135	136.5	0.12	82.7	1,130	183
75th Percentile	514	333	544	911	0.97	155	6,820	1,100
Minimum	2.2	35.4	130	31.5	0.12 U[e]	60.5	1,020	150 U
Maximum	583	357	694	2,210	1.53	156	12,500	4,500
Outlet Channel Sediments								
Number of Samples	7	7	4	7	7	6	4	7
Mean	20.5	64.3	65.8	148	0.10	36.0	393	
Median	13.2	40.7	33.8	101	0.12	24.8	230	None detected;
25th Percentile	7.0	34.9	22.8	91.6	0.040	21.7	130	RLs range from
75th Percentile	29.9	97.6	141	164	0.15	45.1	819	42 to 1,250
Minimum	1.3	22.7	19.5	31.2	0.035 UJ	18.5	101	ug/kg
Maximum	54.1	159	176	393	0.18	97.3	1,010	
2008 Operable Unit 4 Data[f]								
Pond Sediments								
Number of Samples	13	13	13	13	13	13	13	13
Mean	261	245	358	648	0.52	103	4,291	841
Median	117	230	298	348	0.40	117	1,720	580
25th Percentile	51.8	143	127	214	0.19	68.2	887	200
75th Percentile	540	390	657	1,245	0.86	129	9,055	1,400
Minimum	4.4	21.8	25.9	36.6	0.10	23.8	129	20.0
Maximum	739	462	820	1,620	1.40	180	12,500	2,700
Outlet Channel Sediments								
Number of Samples	4	4	4	4	4	4	4	4
Mean	41.6	86.4	98.9	171	0.1	44.0	809	155
Median	35.7	85.9	97.8	181	0.13	45.4	711	160
25th Percentile	7.9	39.5	42.5	68.7	0.063	32.7	226	47.5
75th Percentile	81.1	134	157	263	0.22	54.0	1,490	258
Minimum	3.0	24.8	25.1	34.3	0.044	29.9	123	20.0
Maximum	91.9	149	175	288	0.25	55.5	1,690	280
2010 Operable Unit 4 Data								
Pond Sediments								
Number of Samples	6	6	6	6	6	6	6	6
Mean	272	294	403	869	0.71	100	4,753	552
Median	288	327	447	962	0.80	103	4,940	535
25th Percentile	219	212	324	575	0.55	86.2	3,780	425
75th Percentile	334	360	481	1,090	0.86	113	6,035	725
Minimum	115	151	185	339	0.35	75.4	1,950	260
Maximum	367	370	495	1,270	0.87	121	6,380	800

Notes:

(a) Data are for sediment data collected from uppermost 0 to 6 inches. See text Section 4.2.4 for listings of 1995 and 1998 pond and outlet channel sampling points included in this evaluation.
(b) Included parameters are those for which statistical comparisons were developed between the prior (1995/1998) data set, and the Operable Unit 4 (2008 and 2010) data sets.
(c) See Figures 12 through 15 for box plots of data comparisons.
(d) Aroclor 1254 was the only PCB Aroclor detected in the 1995/1998 and Operable Unit 4 sediment samples used in the statistical analyses.
(e) In statistical evaluations, non-detect values were taken as one-half of the corresponding reporting limit.
(f) The values for duplicate sample SED08-05 were taken as the average of the two results.

TABLE 36
ANALYTICAL DATA SUMMARY - PESTICIDES, PCBs, AND LIPIDS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Common Carp[c]					White Sucker		
	CC08-01[d]	CC08-02	CC08-03	CC08-04	CC08-05	WS08-01	WS08-02	WS08-03
Pesticides:								
Aldrin	0.42 U[e]	0.37 U	1.6 U	0.42 U	0.42 U	0.71 U	1.4 U	1.2 U
alpha-BHC	0.42 U	0.42 U	0.30 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
beta-BHC	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
delta-BHC	0.42 U	0.42 U	0.42 U	0.42 U	1.3 U	0.42 U	0.42 U	0.42 U
gamma-BHC (Lindane)	0.42 U	**0.76[f] U**	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	1.3 U
alpha-Chlordane	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
gamma-Chlordane	13 U	18 U	11 U	16 U	6.7 U	0.42 U	**7.9 J**	5.9 U
4,4'-DDD	0.64 U	1.1 U	0.42 U	0.71 U	4.8 U	0.42 U	0.42 U	0.42 U
4,4'-DDE	3.4 U	3.6 U	0.98 U	3.2 U	**10**	1.1 U	1.1 U	0.36 U
4,4'-DDT	0.42 U	0.42 U	0.42 U	0.42 R	0.42 U	0.42 U	0.42 U	0.42 U
Dieldrin	2.8 U	0.42 U	3.5 U	4.4 U	0.42 U	0.42 U	1.2 U	1.6 U
Endosulfan I	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan II	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan sulfate	2.3 U	4.1 U	**2.5**	**3.8 J**	**1.5**	**1.7 J**	**1.1 J**	1.1 U
Endrin	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endrin aldehyde	0.63 U	2.2 U	**1.4**	2.0 U	0.42 U	0.42 U	0.42 U	0.42 U
Endrin ketone	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Heptachlor	0.46 U	0.42 U	0.42 U	0.43 U	**3.3**	**1.2 J**	0.42 U	0.42 U
Heptachlor epoxide	1.0 U	1.4 U	0.16 U	1.7 U	0.42 U	0.64 U	0.61 U	0.52 U
Methoxychlor	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
Toxaphene	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U
Polychlorinated Biphenyls:								
Aroclor 1016	200 U	100 U	50 U	100 U	50 U	50 U	30 U	30 U
Aroclor 1221	200 U	100 U	50 U	100 U	50 U	50 U	30 U	30 U
Aroclor 1232	200 U	100 U	50 U	100 U	50 U	50 U	30 U	30 U
Aroclor 1242	200 U	100 U	50 U	100 U	50 U	50 U	30 U	**61**
Aroclor 1248	200 U	100 U	50 U	100 U	50 U	50 U	30 U	30 U
Aroclor 1254	**1,700**	**1,300**	**490**	**940**	**260**	**430**	**290**	**230**
Aroclor 1260	**360**	**210**	**90**	**180**	**85**	**66**	**38**	30 U
Lipids (percent)	**1.8**	**3.5**	**3.8**	**3.0**	**2.1**	**1.4**	**1.0**	**2.9**

TABLE 36
ANALYTICAL DATA SUMMARY - PESTICIDES, PCBs, AND LIPIDS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	White Sucker		Largemouth Bass					
	WS08-04	WS08-05	LB08-01	LB08-02	LB08-03	LB08-04	LB08-05	LB08-06
Pesticides:								
Aldrin	0.40 U	0.42 U	1.3 U	1.2 U	**1.6**	0.42 U	**1.2**	0.42 U
alpha-BHC	0.41 U	0.42 U	0.35 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
beta-BHC	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
delta-BHC	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
gamma-BHC (Lindane)	0.55 U	0.42 U	0.42 U	0.42 U	0.42 U	1.4 U	0.42 U	0.42 U
alpha-Chlordane	**1.3**	**1.4**	0.88 U	1.4 U	0.42 U	0.42 U	0.42 U	1.9 U
gamma-Chlordane	**5.8 J**	**4.8**	8.6 U	**7.2**	3.6 U	2.1 U	6.5 U	**12 J**
4,4'-DDD	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
4,4'-DDE	0.54 U	0.63 U	1.1 U	1.2 U	0.61 U	0.26 U	0.40 U	2.6 U
4,4'-DDT	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Dieldrin	0.98 U	0.42 U	1.3 U	2.3 U	0.42 U	0.80 U	1.6 U	2.0 U
Endosulfan I	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan II	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan sulfate	0.82 U	**0.72**	**1.2**	0.96 U	**0.77**	**0.45**	**1.1**	**2.1 J**
Endrin	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endrin aldehyde	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endrin ketone	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Heptachlor	**1.2 J**	0.66 U	0.42 U	**1.0**	0.42 U	0.42 U	**0.80**	0.31 U
Heptachlor epoxide	0.52 U	0.25 U	1.4 U	0.76 U	0.42 U	0.42 U	**0.13 J**	1.1 U
Methoxychlor	0.79 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
Toxaphene	16 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U
Polychlorinated Biphenyls:								
Aroclor 1016	20 U	20 U	30 U	20 U	20 U	10 U	20 U	50 U
Aroclor 1221	20 U	20 U	30 U	20 U	20 U	10 U	20 U	50 U
Aroclor 1232	20 U	20 U	30 U	20 U	20 U	10 U	20 U	50 U
Aroclor 1242	20 U	20 U	30 U	20 U	20 U	10 U	20 U	50 U
Aroclor 1248	20 U	20 U	30 U	20 U	20 U	10 U	20 U	50 U
Aroclor 1254	**130**	**170**	**200**	**120**	**170**	**73**	**140**	**380**
Aroclor 1260	20 U	**26**	**39**	20 U	**25**	**17**	20 U	**65**
Lipids (percent)	**0.80**	**0.70**	**0.30**	**0.10**	**0.60**	**0.30**	0.10 U	0.10 U

TABLE 36
ANALYTICAL DATA SUMMARY - PESTICIDES, PCBs, AND LIPIDS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Black Crappie				Forage Fish[h]					
	BC08-01	BC08-02	BC08-03	BC08-04	FF08-01	FF08-02	FF08-03	FF08-04	FF08-05	FF08-06
Pesticides:										
Aldrin	0.25 U	0.26 U	0.43 U	0.17 U	0.50 U	0.42 U	0.61 U	0.42 U	0.85 U	0.11 U
alpha-BHC	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.89 U	0.42 U	0.42 U	0.42 U
beta-BHC	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.78 U	0.42 U	0.58 U	0.42 U	0.42 U
delta-BHC	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
gamma-BHC (Lindane)	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
alpha-Chlordane	0.42 U	0.42 U	**2.1**	**2.5 J**	**2.6 J**	2.5 U	**2.0 J**	4.0 U	2.0 U	1.6 U
gamma-Chlordane	6.1 U	0.42 U	11 U	**13 J**	**11 J**	**13 J**	**9.9 J**	19 U	11 U	**5.8 J**
4,4'-DDD	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	3.9 U	0.42 U	0.42 U	0.42 U	0.42 U
4,4'-DDE	0.69 U	0.74 U	1.8 U	3.4 U	2.9 U	3.3 U	1.7 U	3.7 U	1.4 U	1.1 U
4,4'-DDT	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Dieldrin	1.7 U	1.4 U	2.5 U	3.4 U	2.6 U	2.2 U	2.0 U	4.2 U	3.3 U	1.2 U
Endosulfan I	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan II	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endosulfan sulfate	**0.84**	0.55 U	**2.7**	5.2 U	1.6 U	**2.5 J**	1.4 U	2.4 U	1.7 U	0.55 U
Endrin	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Endrin aldehyde	0.42 U	0.42 U	0.49 U	2.1 U	0.42 U	0.60 U	0.42 U	**3.0 J**	**1.7 J**	0.42 U
Endrin ketone	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Heptachlor	0.069 U	0.42 U	0.18 U	0.42 U	0.42 U	0.35 U	1.2 U	0.62 U	0.39 U	0.76 U
Heptachlor epoxide	0.42 U	0.42 U	0.59 U	0.42 U	1.1 U	2.3 U	1.1 U	2.7 U	0.75 U	1.4 U
Methoxychlor	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
Toxaphene	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U
Polychlorinated Biphenyls:										
Aroclor 1016	20 U	20 U	NA[g]	99 U	100 U	50 U	30 UJ	100 U	50 U	50 U
Aroclor 1221	20 U	20 U	NA	99 U	100 U	50 U	30 UJ	100 U	50 U	50 U
Aroclor 1232	20 U	20 U	NA	99 U	100 U	50 U	30 UJ	100 U	50 U	50 U
Aroclor 1242	20 U	20 U	NA	99 U	100 U	50 U	30 UJ	100 U	50 U	50 U
Aroclor 1248	20 U	20 U	NA	99 U	100 U	50 U	30 UJ	100 U	50 U	50 U
Aroclor 1254	**130**	**130**	NA	**960**	**1,300**	**640**	**290 J**	**890**	**570**	**400**
Aroclor 1260	20 U	**35**	NA	**260**	**240**	**99**	**44 J**	**140**	**75**	**91**
Lipids (percent)	**0.20**	**0.20**	**0.20**	**0.20**	**1.2**	**1.5**	**2.7**	**1.2**	**1.6**	**1.7**

TABLE 36
ANALYTICAL DATA SUMMARY - PESTICIDES, PCBs, AND LIPIDS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Notes :

[(a)] *Pesticide and PCB concentrations reported in units of micrograms per kilogram (μg/kg). Lipid content reported in percent.*

[(b)] *Data provided by analytical laboratory reports for SDGs C8E170109BIO and C0J220401.*

[(c)] *All samples except forage fish represent fillets (skin on with belly flap). Forage fish were analyzed as whole fish samples.*

[(d)] *Fish specimens collected on May 16, 2008; samples were prepared (e.g., filleting) at laboratory.*

[(e)] *Data Legend :*

U - analyte not detected at indicated reporting limit (RL).

J - estimated concentration of analyte detected above the Method Detection Limit (MDL), but below the RL.

R - data rejected based on validation results.

[(f)] *For clarity, all detections are shown in* ***bold-face*** *type.*

[(g)] *Sufficient tissue for sample BC08-03 was not available for analysis.*

[(h)] *Data for the forage fish sample collected from the West Outlet in October 2010 are included in Table 39.*

TABLE 37
ANALYTICAL DATA SUMMARY - TOTAL METALS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Common Carp[c]					White Sucker				
	CC08-01[d]	CC08-02	CC08-03	CC08-04	CC08-05	WS08-01	WS08-02	WS08-03	WS08-04	WS08-05
Aluminum	3.0 U[e]	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Antimony	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Arsenic	**0.036[f] J**	**0.081 J**	**0.068 J**	**0.070 J**	**0.030 J**	0.10 U	0.10 U	0.10 U	**0.018 J**	**0.036 J**
Barium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Beryllium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Cadmium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Calcium	**132 J**	**689 J**	**623 J**	**748 J**	**83.3 R**	**912**	**667 J**	**950**	**730 J**	**1,360**
Chromium	**0.39 R**	**1.1 J**	**0.75 R**	**0.32 R**	**0.81 J**	**0.40 R**	**0.40 R**	**0.34 R**	**0.39 R**	**1.2 J**
Cobalt	**0.0052 J**	**0.010 J**	**0.0076 J**	**0.0079 J**	**0.0059 J**	**0.0090 J**	**0.0095 J**	**0.0095 J**	**0.0054 J**	**0.014 J**
Copper	**0.79 J**	**0.95 J**	**0.55 J**	**0.55 J**	**1.0 J**	**0.39 J**	**0.50 J**	**0.38 J**	**0.39 J**	**0.55 J**
Iron	**9.9 J**	**14.3**	**11.0**	**12.1 J**	**15.2**	**4.2 J**	**7.1**	**4.4 J**	**3.4 J**	**6.1**
Lead	0.10 U	**0.14 J**	**0.15 J**	**0.17 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Magnesium	**244**	**252**	**267**	**276**	**237**	**315**	**307**	**297**	**307**	**292**
Manganese	**0.11**	**0.25**	**0.18**	**0.25**	**0.14**	**0.23**	**0.24**	**0.19**	**0.14**	**0.26**
Nickel	**0.022 J**	**0.039 J**	**0.030 J**	**0.034 J**	**0.013 J**	**0.055 J**	**0.054 J**	**0.079 J**	**0.042 J**	**0.10**
Potassium	**2,700**	**2,660 J**	**3,060 J**	**2,830**	**2,940 J**	**3,250 J**	**3,340 J**	**3,000 J**	**3,480 J**	**2,950 J**
Selenium	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Silver	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	**0.0049 J**
Sodium	**495 J**	**421**	**511**	**483 J**	**355**	**522**	**560**	**501**	**499**	**592**
Thallium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Vanadium	**0.18 J**	**0.24 J**	0.10 U	0.10 U	**0.14 R**	**0.23 J**	0.10 U	0.10 U	**0.15 R**	0.10 U
Zinc	**26.1 J**	**10.6 J**	**20.2 J**	**10.5 J**	**15.4 J**	**6.4 J**	**6.8 J**	**7.0 J**	**8.0 J**	**9.5 J**
Mercury	**0.068**	**0.045**	**0.088**	**0.025 J**	**0.15**	**0.018 J**	**0.021 J**	**0.011 J**	**0.013 J**	**0.025 J**

TABLE 37
ANALYTICAL DATA SUMMARY - TOTAL METALS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Largemouth Bass						Black Crappie			
	LB08-01	LB08-02	LB08-03	LB08-04	LB08-05	LB08-06	BC08-01	BC08-02	BC08-03	BC08-04
Aluminum	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Antimony	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Arsenic	**0.049 J**	**0.068 J**	**0.067 J**	0.10 U	**0.081 J**	**0.028 J**	**0.10**	**0.083 J**	**0.072 J**	**0.15 J**
Barium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Beryllium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Cadmium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Calcium	**110 J**	**247 J**	**147 J**	**103 J**	**1,180**	**100 J**	**135 J**	**2,130**	**710 J**	**142 J**
Chromium	**0.41 R**	**0.45 R**	**1.1 J**	**1.1 J**	**0.32 R**	**0.44 R**	**0.51 R**	**0.50 R**	**0.47 R**	**0.46 R**
Cobalt	**0.0046 J**	**0.0039 J**	**0.0039 J**	**0.0042 J**	**0.0058 J**	**0.0028 J**	**0.0039 J**	**0.0089 J**	**0.0030 J**	0.050 U
Copper	**0.26 J**	**0.35 J**	**0.40 J**	**0.21 J**	**0.34 J**	**0.26 J**	**0.26 J**	**0.27 J**	**0.27 J**	**0.50 J**
Iron	**1.8 J**	**2.2 J**	**2.9 J**	**1.7 J**	**5.9**	**0.85 J**	**3.3 J**	**1.9 J**	**3.0 J**	**1.9 J**
Lead	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Magnesium	**280**	**286**	**296**	**232**	**308**	**231**	**220**	**269**	**240**	**232**
Manganese	**0.072**	**0.075**	**0.13**	**0.092**	**0.073**	**0.069**	**0.11**	**0.21**	**0.15**	**0.080**
Nickel	**0.012 J**	**0.021 J**	**0.036 J**	**0.052 J**	**0.027 J**	**0.017 J**	**0.038 J**	**0.043 J**	**0.024 J**	**0.022 J**
Potassium	**3,150 J**	**3,230 J**	**3,150 J**	**2,630 J**	**3,430 J**	**2,560**	**2,660 J**	**2,990 J**	**2,530 J**	**2,800 J**
Selenium	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Silver	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Sodium	**467**	**477**	**468**	**485**	**496**	**446 J**	**478**	**552**	**512**	**575**
Thallium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Vanadium	**0.12 R**	0.10 U	**0.28 J**	**0.19 J**	0.10 U	**0.10 R**	0.10 U	0.10 U	**0.11 R**	**0.15 R**
Zinc	**6.1 J**	**6.0 J**	**8.2 J**	**4.8 J**	**6.0 J**	**5.5 J**	**7.5 J**	**8.6 J**	**8.1 J**	**7.6 J**
Mercury	**0.26**	**0.31**	**0.23**	**0.37**	**0.20**	**0.30**	**0.30**	**0.10**	**0.051**	**0.18**

TABLE 37
ANALYTICAL DATA SUMMARY - TOTAL METALS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a,b]	Forage Fish[g]					
	FF08-01	FF08-02	FF08-03	FF08-04	FF08-05	FF08-06
Aluminum	**3.3 J**	**5.8**	**3.2 J**	**8.6**	**12.1**	**12.6**
Antimony	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Arsenic	**0.13**	**0.053 J**	**0.12**	**0.079 J**	**0.073 J**	**0.097 J**
Barium	**2.2**	**1.3**	1.0 U	**1.6**	**1.4**	**1.7**
Beryllium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Cadmium	**0.12**	**0.044 J**	**0.040 J**	**0.059 J**	**0.12**	**0.055 J**
Calcium	**12,900 J**	**9,630**	**5,300 J**	**8,140**	**8,160**	**13,700 J**
Chromium	**0.26 R**	**0.41 J**	**0.29 R**	**0.42 R**	**0.45 R**	**0.51 R**
Cobalt	**0.043 J**	**0.036 J**	**0.022 J**	**0.035 J**	**0.037 J**	**0.052**
Copper	**0.45 J**	**0.45 J**	**0.45 J**	**0.61 J**	**0.62 J**	**0.51 J**
Iron	**10.3 J**	**15.6**	**9.8 J**	**18.4**	**29.1**	**27.7 J**
Lead	**0.37 J**	**0.29 J**	**0.23 J**	**0.40 J**	**0.53 J**	**0.48 J**
Magnesium	**526**	**377**	**348**	**447**	**435**	**501**
Manganese	**1.7**	**1.6**	**0.81**	**1.1**	**0.87**	**0.78**
Nickel	**0.12**	**0.12**	**0.056 J**	**0.13**	**0.16**	**0.18**
Potassium	**2,610**	**2,180 J**	**2,160**	**2,480 J**	**2,750 J**	**2,190**
Selenium	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Silver	0.10 U	0.10 U	0.10 U	**0.0050 J**	**0.013 J**	**0.0028 J**
Sodium	**946 J**	**839**	**850 J**	**885**	**896**	**1,010 J**
Thallium	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Vanadium	**0.120 R**	0.10 U	0.10 U	0.10 U	0.10 U	**0.15 R**
Zinc	**14.9 J**	**13.0 J**	**15.7 J**	**18.6 J**	**19.7 J**	**17.3 J**
Mercury	**0.023 J**	**0.019 J**	**0.046**	**0.019 J**	**0.011 J**	**0.019 J**

TABLE 37
ANALYTICAL DATA SUMMARY - TOTAL METALS
FISH TISSUE SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Notes:

(a) *All concentrations reported in units of milligrams per kilogram (mg/kg).*

(b) *Data provided by analytical laboratory reports for SDGs C8E170109BIO and C0J220401.*

(c) *All samples except forage fish represent fillets (skin on with belly flap). Forage fish were analyzed as whole fish samples.*

(d) *Fish specimens collected on May 16, 2008; samples were prepared (e.g., filleting) at laboratory.*

(e) *Data Legend*:

U - analyte not detected at indicated reporting limit (RL).

J - estimated concentration of analyte detected above the Method Detection Limit (MDL), but below the RL.

R - data rejected based on validation results.

(f) *For clarity, all detections are shown in* ***bold-face*** *type.*

(g) *Data for the forage fish sample collected from the West Outlet in October 2010 are included in Table 39.*

TABLE 38
SUMMARY OF ANALYTICAL RESULTS FOR GAME FISH, MAY 2008
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEANDS, NEW YORK

Chemical[a,b]	Common Carp[c]				White Suckers				Largemouth Bass				Black Crappie				All Game Fish			
	Freq	Mean[d]	ND Range[e]	Pos Range[f]	Freq	Mean	ND Range	Pos Range	Freq	Mean	ND Range	Pos Range	Freq	Mean	ND Range	Pos Range	Freq	Mean	ND Range	Pos Range
PESTICIDES/PCBs (ug/kg)																				
Aldrin	2/5	0.52	4.2 - 4.2	0.37 -1.6	4/5	0.78	4.2 - 4.2	0.4 - 1.4	4/6	0.95	4.2 - 4.2	1.2 - 1.6	4/4	0.278	---	0.17 -0.43	14/20	0.668	4.2 - 4.2	0.17 -1.6
alpha-BHC	1/5	0.23	4.2 - 4.2	0.3 -0.3	1/5	0.25	4.2 - 4.2	0.41 -0.41	1/6	0.23	4.2 - 4.2	0.35 -0.35	0/4	ND	4.2 - 4.2	---	3/20	0.232	4.2 - 4.2	0.3 -0.41
beta-BHC	0/5	ND	4.2 - 4.2	---	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	1/20	0.220	4.2 - 4.2	0.41 -0.41
delta-BHC	1/5	0.43	4.2 - 4.2	1.3 -1.3	1/5	0.25	4.2 - 4.2	0.41 -0.41	1/6	0.19	4.2 - 4.2	0.11 -0.11	2/4	0.168	4.2 - 4.2	0.11 -0.14	5/20	0.261	4.2 - 4.2	0.11 -1.3
gamma-BHC (Lindane)	1/5	0.32	4.2 - 4.2	0.76 -0.76	2/5	0.50	4.2 - 4.2	0.55 -1.3	1/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	4/20	0.369	4.2 - 4.2	0.55 -1.4
alpha-Chlordane	0/5	ND	4.2 - 4.2	---	2/5	0.67	4.2 - 4.2	1.3 -1.4	3/6	0.80	4.2 - 4.2	0.88 -1.9	2/4	1.26	4.2 - 4.2	2.1 -2.5	7/20	0.711	---	0.88 -2.5
gamma-Chlordane	5/5	12.94	---	6.7 -18	4/5	4.92	4.2 - 4.2	4.8 -7.9	6/6	6.67	---	2.1 -12	3/4	7.58	4.2 - 4.2	6.1 -13	18/20	7.98	---	2.1 -18
4,4'-DDD	4/5	1.49	4.2 - 4.2	0.64 -4.8	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	5/20	0.541	4.2 - 4.2	0.41 -4.8
4,4'-DDE	5/5	4.24	---	0.98 -10	5/5	0.75	---	0.36 -1.1	6/6	1.03	---	0.26 -2.6	4/4	1.66	---	0.69 -3.4	20/20	1.89	---	0.26 -10
4,4'-DDT	0/5	ND	4.2 - 4.2	---	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	1/20	0.220	4.2 - 4.2	0.41 -0.41
Dieldrin	3/5	2.22	4.2 - 4.2	2.8 -4.4	3/5	0.84	4.2 - 4.2	0.98 -1.6	5/6	1.37	4.2 - 4.2	0.8 -2.3	4/4	2.25	---	1.4 -3.4	15/20	1.63	---	0.8 -4.4
Endosulfan I	0/5	ND	4.2 - 4.2	---	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	1/20	0.220	4.2 - 4.2	0.41 -0.41
Endosulfan II	0/5	ND	4.2 - 4.2	---	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	0/4	ND	4.2 - 4.2	---	1/20	0.220	4.2 - 4.2	0.41 -0.41
Endosulfan sulfate	5/5	2.84	---	1.5 -4.1	5/5	1.09	---	0.72 -1.7	6/6	1.10	---	0.45 -2.1	4/4	2.32	---	0.55 -5.2	20/20	1.78	---	0.45 -5.2
Endrin aldehyde	4/5	1.29	4.2 - 4.2	0.63 -2.2	1/5	0.25	4.2 - 4.2	0.41 -0.41	0/6	ND	4.2 - 4.2	---	2/4	0.753	4.2 - 4.2	0.49 -2.1	7/20	0.60	4.2 - 4.2	0.41 -2.2
Heptachlor	3/5	0.92	4.2 - 4.2	0.43 -3.3	3/5	0.70	4.2 - 4.2	0.66 -1.2	3/6	0.46	4.2 - 4.2	0.31 -1	2/4	0.167	4.2 - 4.2	0.06925 -0.18	11/20	0.57	4.2 - 4.2	0.06925 -3.3
Heptachlor epoxide	4/5	0.89	---	0.16 -1.7	5/5	0.51	---	0.25 -0.64	4/6	0.64	4.2 - 4.2	0.13 -1.4	1/4	0.305	4.2 - 4.2	0.59 -0.59	14/20	0.602	---	0.13 -1.7
Aroclor 1254	5/5	938	---	260 - 1,700	5/5	250	---	130 -430	6/6	180.5	---	73 - 380	3/3	406.7	---	130 - 960	19/19	434	---	73 - 1,700
Aroclor 1260	5/5	185	---	85 - 360	3/5	31	20 - 30	26 - 66	4/6	27.7	20 - 20	17 - 65	2/3	101.7	20 - 20	35 - 260	14/19	82	---	17 - 360
Total PCBs	5/5	1,123	---	345 - 2,060	5/5	281	---	130 - 496	6/6	204.8	---	90 - 445	3/3	505.0	---	130 - 1,220	19/19	516	---	90 - 2,060
METALS (mg/kg)																				
Aluminum	5/5	0.58	---	0.32 -1.1	5/5	1.01	---	0.55 -1.5	6/6	0.46	---	0.33 -0.63	4/4	0.48	---	0.36 -0.66	20/20	0.63	---	0.32 -1.5
Antimony	4/5	MNR[g]	0.1 - 0.1	0.01 -0.034	4/5	MNR	0.1 - 0.1	0.0034 -0.0094	6/6	0.013	---	0.0044 -0.032	2/4	MNR	0.1 - 0.1	0.0062 -0.0079	16/20	0.03	0.1 - 0.1	0.0034 -0.034
Arsenic	5/5	0.057	---	0.03 -0.081	2/5	0.041	0.1 - 0.1	0.018 -0.036	5/6	0.057	0.1 - 0.1	0.028 -0.081	3/4	0.09	0.1 - 0.1	0.072 -0.15	15/20	0.06	---	0.018 -0.15
Barium	5/5	0.27	---	0.07 -0.49	5/5	0.57	---	0.35 -0.93	6/6	0.08	---	0.057 -0.15	4/4	0.18	---	0.074 -0.37	20/20	0.27	---	0.057 -0.93
Cadmium	0/5	ND	0.1 - 0.1	---	0/5	ND	0.1 - 0.1	---	0/6	ND	0.1 - 0.1	---	0/4	ND	0.1 - 0.1	---	0/20	ND	0.1 - 0.1	---
Calcium	5/5	455	---	83.3 -748	5/5	924	---	667 -1360	6/6	315	---	100 -1180	4/4	779	---	135 -2130	20/20	595	---	83.3 -2130
Chromium	5/5	0.67	---	0.32 -1.1	5/5	0.55	---	0.34 -1.2	6/6	0.64	---	0.32 -1.1	4/4	0.49	---	0.46 -0.51	20/20	0.59	---	0.32 -1.2
Cobalt	5/5	0.007	---	0.0052 -0.01	5/5	0.009	---	0.0054 -0.014	6/6	0.004	---	0.0028 -0.0058	4/4	0.02	---	0.003 -0.05	20/20	0.01	---	0.0028 -0.05
Copper	5/5	0.77	---	0.55 -1	5/5	0.44	---	0.38 -0.55	6/6	0.30	---	0.21 -0.4	4/4	0.33	---	0.26 -0.5	20/20	0.46	---	0.21 -1
Iron	5/5	12.50	---	9.9 -15.2	5/5	5.04	---	3.4 -7.1	6/6	2.56	---	0.85 -5.9	4/4	2.53	---	1.9 -3.3	20/20	5.66	---	0.85 -15.2
Lead	5/5	0.104	---	0.028 -0.17	5/5	0.05	---	0.0065 -0.084	6/6	0.031	---	0.017 -0.042	4/4	0.03	---	0.022 -0.051	20/20	0.06	---	0.0065 -0.17
Magnesium	5/5	255	---	237 -276	5/5	304	---	292 -315	6/6	272	---	231 -308	4/4	240	---	220 -269	20/20	269	---	220 -315
Manganese	5/5	0.19	---	0.11 -0.25	5/5	0.21	---	0.14 -0.26	6/6	0.09	---	0.069 -0.13	4/4	0.14	---	0.08 -0.21	20/20	0.15	---	0.069 -0.26
Nickel	5/5	0.028	---	0.013 -0.039	5/5	0.066	---	0.042 -0.1	6/6	0.028	---	0.012 -0.052	4/4	0.03	---	0.022 -0.043	20/20	0.04	---	0.012 -0.1
Potassium	5/5	2,838	---	2,660 -3,060	5/5	3,204	---	2,950 -3,480	6/6	3,025	---	2,560 -3,430	4/4	2,745	---	2,530 -2,990	20/20	2,967	---	2,530 -3,480
Selenium	5/5	0.274	---	0.2 -0.44	5/5	0.24	---	0.2 -0.33	6/6	0.28	---	0.21 -0.36	4/4	0.25	---	0.23 -0.26	20/20	0.26	---	0.2 -0.44
Silver	0/5	ND	0.1 - 0.1	---	0/5	ND	0.1 - 0.1	---	0/6	ND	0.1 - 0.1	---	0/4	ND	0.1 - 0.1	---	0/20	ND	0.1 - 0.1	---
Sodium	5/5	453	---	355 -511	5/5	535	---	499 -592	6/6	473	---	446 -496	4/4	529	---	478 -575	20/20	495	---	355 -592
Thallium	5/5	0.014	---	0.0024 -0.031	0/5	ND	0.1 - 0.1	---	5/6	0.018	0.1 - 0.1	0.0023 -0.032	2/4	0.03	0.1 - 0.1	0.0034 -0.004	12/20	0.03	0.1 - 0.1	0.0023 -0.032
Vanadium	5/5	0.127	---	0.027 -0.24	2/5	0.106	0.1 - 0.1	0.15 -0.23	4/6	0.13	0.1 - 0.1	0.1 -0.28	4/4	0.10	---	0.045 -0.15	15/20	0.12	0.1 - 0.1	0.027 -0.28
Zinc	5/5	16.56	---	10.5 -26.1	5/5	7.54	---	6.4 -9.5	6/6	6.10	---	4.8 -8.2	4/4	7.95	---	7.5 -8.6	20/20	9.45	---	4.8 -26.1
Mercury	5/5	0.08	---	0.025 -0.15	5/5	0.02	---	0.011 -0.025	6/6	0.28	---	0.2 -0.37	4/4	0.16	---	0.051 -0.3	20/20	0.14	---	0.011 -0.37
MISCELLANEOUS																				
Percent Lipid	4/4	2.6	---	1.8 - 3.5	4/4	0.98	---	0.7 - 1.4	2/4	0.125	0.1 - 0.1	0.1 - 0.3	4/4	0.2	---	0.2 - 0.2	14/16	1.0	0.1 - 0.1	0.1 - 3.5
Corresponding Samples	CC08-01, CC08-02, CC08-03, CC08-04, and CC08-05				WS08-01, WS08-02, WS08-03, WS08-04, and WS08-05				LB08-01, LB08-02, LB08-03, LB08-04, LB08-05, and LB08-06				BC08-01, BC08-02, BC08-03, and BC08-04				CC08-01, CC08-02, CC08-03, CC08-04, CC08-05, WS08-01, WS08-02, WS08-03, WS08-04, WS08-05, LB08-01, LB08-02, LB08-03, LB08-04, LB08-05, LB08-06, BC08-01, BC08-02, BC08-03, and BC08-04			

Notes:

(a) *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.*

(b) *The 2008 results were summarized from the validated data.*

(c) *Gamefish results are for individual fish.*

(d) *Mean values calculated by setting non-detect results to one-half the reported detection limit.*

(e) *ND - not detected.*

(f) *Only the target analytes with at least one positive detection are summarized in this table. See Tables 36 and 37 for the detailed results by sample.*

(g) *MNR - Mean not reported since the calculated value exceeds the maximum positive result.*

TABLE 39
SUMMARY OF ANALYTICAL RESULTS FOR FORAGE FISH, 2008 AND 2010
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Chemical[a]	FF-Bluegill Sunfish (2008)				FF-Pumpkinseeds (2008)				All Forage Fish (2008)[b]				All Forage Fish (2010)[b]			
	Freq	Mean[c]	ND Range[d]	Pos Range[e]	Freq	Mean	ND Range	Pos Range	Freq	Mean	ND Range	Pos Range	Freq	Mean	ND Range	Pos Range
PESTICIDES/PCBs (ug/kg)																
Aldrin	2/4	0.38	4.2 - 4.2	0.5 -0.61	2/2	0.39	---	0.11 -0.85	4/6	0.42	4.2 - 4.2	0.11 -0.85	NA	NA	NA	NA
alpha-BHC	1/4	0.38	4.2 - 4.2	0.89 -0.89	0/2	ND	4.2 - 4.2	---	1/6	0.32	4.2 - 4.2	0.89 -0.89	NA	NA	NA	NA
beta-BHC	0/4	0.21	4.2 - 4.2	---	0/2	ND	4.2 - 4.2	---	0/6	ND	4.2 - 4.2	---	NA	NA	NA	NA
delta-BHC	1/4	0.25	4.2 - 4.2	0.36 -0.36	1/2	0.19	4.2 - 4.2	0.15 -0.15	2/6	0.23	4.2 - 4.2	0.15 -0.36	NA	NA	NA	NA
gamma-BHC (Lindane)	0/4	ND	4.2 - 4.2	---	0/2	ND	4.2 - 4.2	---	0/6	ND	4.2 - 4.2	---	NA	NA	NA	NA
alpha-Chlordane	4/4	2.78	---	2 -4	2/2	2.53	---	1.6 -4	6/6	2.45	---	1.6 -4	NA	NA	NA	NA
gamma-Chlordane	4/4	13.23	---	9.9 -19	2/2	11.93	---	5.8 -19	6/6	11.62	---	5.8 -19	NA	NA	NA	NA
4,4'-DDD	1/4	1.13	4.2 - 4.2	3.9 -3.9	0/2	ND	4.2 - 4.2	---	1/6	0.83	4.2 - 4.2	3.9 -3.9	NA	NA	NA	NA
4,4'-DDE	4/4	2.90	---	1.7 -3.7	2/2	2.07	---	1.1 -3.7	6/6	2.35	---	1.1 -3.7	NA	NA	NA	NA
4,4'-DDT	0/4	ND	4.2 - 4.2	---	0/2	ND	4.2 - 4.2	---	0/6	ND	4.2 - 4.2	---	NA	NA	NA	NA
Dieldrin	4/4	2.75	---	2 -4.2	2/2	2.9	---	1.2 -4.2	6/6	2.58	---	1.2 -4.2	NA	NA	NA	NA
Endosulfan I	0/4	ND	4.2 - 4.2	---	0/2	ND	4.2 - 4.2	---	0/6	ND	4.2 - 4.2	---	NA	NA	NA	NA
Endosulfan II	0/4	ND	4.2 - 4.2	---	0/2	ND	4.2 - 4.2	---	0/6	ND	4.2 - 4.2	---	NA	NA	NA	NA
Endosulfan sulfate	4/4	1.98	---	1.4 -2.5	2/2	1.55	---	0.55 -2.4	6/6	1.69	---	0.55 -2.5	NA	NA	NA	NA
Endrin aldehyde	2/4	1.01	4.2 - 4.2	0.6 -3	1/2	1.64	4.2 - 4.2	1.7 -3	3/6	0.99	4.2 - 4.2	0.6 -3	NA	NA	NA	NA
Heptachlor	3/4	0.60	4.2 - 4.2	0.35 -1.2	2/2	0.59	---	0.39 -0.76	5/6	0.59	4.2 - 4.2	0.35 -1.2	NA	NA	NA	NA
Heptachlor epoxide	4/4	1.80	---	1.1 -2.7	2/2	1.62	---	0.75 -2.7	6/6	1.56	---	0.75 -2.7	NA	NA	NA	NA
Aroclor 1254	3/3	943	---	640 - 1,300	2/2	485	---	400 - 570	5/5	760	---	400 - 1300	NA	NA	NA	NA
Aroclor 1260	3/3	160	---	99 - 240	2/2	83	---	75 - 91	5/5	129	---	75 - 240	NA	NA	NA	NA
Total PCBs	3/3	1103	---	739 - 1,540	2/2	568	---	491 - 645	5/5	889	---	491 - 1,540	NA	NA	NA	NA
METALS (mg/kg)																
Aluminum	4/4	5.23	---	3.2 -8.6	2/2	11.10	---	8.6 -12.6	6/6	7.60	---	3.2 -12.6	1/1	14.7	---	14.7
Antimony	2/4	0.053	0.1 - 0.1	0.0047 -0.0068	1/2	MNR[f]	0.1 - 0.1	0.021 -0.021	3/6	0.055	0.1 - 0.1	0.0047 -0.021	0/1	ND	1.7	ND
Arsenic	4/4	0.10	---	0.053 -0.13	2/2	0.083	---	0.073 -0.097	6/6	0.092	---	0.053 -0.13	0/1	ND	0.17	ND
Barium	4/4	1.49	---	0.85 -2.2	2/2	1.57	---	1.4 -1.7	6/6	1.51	---	0.85 -2.2	0/1	ND	8.6	ND
Cadmium	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	0/1	ND	0.17	ND
Calcium	4/4	8,993	---	5300 -12900	2/2	10,000	---	8140 -13700	6/6	9,638	---	5300 -13700	1/1	8,830	---	8,830
Chromium	4/4	0.35	---	0.26 -0.42	2/2	0.46	---	0.42 -0.51	6/6	0.39	---	0.26 -0.51	1/1	0.93	---	0.93
Cobalt	4/4	0.034	---	0.022 -0.043	2/2	0.041	---	0.035 -0.052	6/6	0.038	---	0.022 -0.052	0/1	ND	0.86	ND
Copper	4/4	0.49	---	0.45 -0.61	2/2	0.58	---	0.51 -0.62	6/6	0.52	---	0.45 -0.62	0/1	ND	1.7	ND
Iron	4/4	13.53	---	9.8 -18.4	2/2	25.07	---	18.4 -29.1	6/6	18.48	---	9.8 -29.1	1/1	36.8	---	36.8
Lead	4/4	0.32	---	0.23 -0.4	2/2	0.47	---	0.4 -0.53	6/6	0.38	---	0.23 -0.53	1/1	0.25	---	0.25
Magnesium	4/4	425	---	348 -526	2/2	461	---	435 -501	6/6	439	---	348 -526	1/1	377	---	377
Manganese	4/4	1.30	---	0.81 -1.7	2/2	0.92	---	0.78 -1.1	6/6	1.14	---	0.78 -1.7	1/1	2.4	---	2.4
Mercury	4/4	0.027	---	0.019 -0.046	2/2	0.016	---	0.011 -0.019	6/6	0.023	---	0.011 -0.046	1/1	0.04	---	0.04
Nickel	4/4	0.107	---	0.056 -0.13	2/2	0.157	---	0.13 -0.18	6/6	0.128	---	0.056 -0.18	0/1	ND	1.7	ND
Potassium	4/4	2,358	---	2,160 -2,610	2/2	2,473	---	2,190 -2,750	6/6	2,395	---	2,160 -2,750	1/1	2,830	---	2,830
Selenium	4/4	0.325	---	0.28 -0.35	2/2	0.25	---	0.18 -0.35	6/6	0.28	---	0.18 -0.35	1/1	0.33	---	0.33
Silver	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	0/1	ND	0.17	ND
Sodium	4/4	880	---	839 -946	2/2	930	---	885 -1010	6/6	904	---	839 -1010	1/1	872	---	872
Thallium	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	0/1	ND	0.17	ND
Vanadium	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	0/1	ND	0.34	ND
Zinc	4/4	15.55	---	13 -18.6	2/2	18.53	---	17.3 -19.7	6/6	16.53	---	13 -19.7	1/1	27.3	---	27.3
MISCELLANEOUS																
Percent Lipid	3/3	1.3	---	1.2 - 1.5	1/1	1.6	---	1.6 - 1.6	4/4	1.4	---	1.2 - 1.6	1/1	3.4	---	3.4
Corresponding Samples	FF08-01, FF08-02, FF08-03, and FF08-04				FF08-04, FF08-05, and FF08-06				FF08-01, FF08-02, FF08-03, FF08-04, FF08-05, and FF08-06				FF10-06			

Notes:

[a] *The Aroclor PCB and lipid results were from samples re-analyzed by TA-Burlington (insufficient mass was available for some samples - see text discussion). The remaining analyses were performed by TA-Pittsburgh.*

[b] *Forage fish results include some individual fish and also composites of smaller fish.*

[c] *Mean values calculated by setting non-detect results to one-half the reported detection limit.*

[d] *ND - not detected.*

[e] *Only the target analytes with at least one positive detection are summarized in this table. See Tables 36 and 37 for the detailed results by sample.*

[f] *MNR - Mean not reported since the calculated value exceeds the maximum positive result.*

TABLE 40
COMPARISON OF KEY MORPHOMETRIC PARAMETERS FOR THE 2003 AND 2008 FISH COLLECTIONS
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HOREHEADS, NEW YORK

Species	Parameter	2003 Results			2008 Results			Comments
		Range	Mean	N	Range	Mean	N	
Black Crappie	TL (mm)[a]	162 - 184	169	3	NC	316 (est)	NC	June 2003 Fish evaluated as whole-body gamefish; May 2008 Fish samples evaluated as gamefish fillets.
	SL (mm)	NC[b]	NC	NC	218 - 292	263	4	
	Weight (g)	50 - 72	58.7	3	110 - 285	199	4	
Common Carp	TL (mm)	441 - 700	546	5	NC	NC	NC	
	SL (mm)	NC	NC	NC	517 - 621	565	5	
	Weight (g)	1,130 - 4,360	2,400	5	1,909 - 3,818	2,660	5	
Bluegill	TL (mm)	NC	NC	NC	NC	141 (est)	NC	May 2008 Fish samples evaluated as forage fish (whole-body chemical analysis). Values shown are for individual fish in the composites.
	SL (mm)	NC	NC	NC	63 - 183	123	7	
	Weight (g)	NC	NC	NC	3.8 - 115	47.1	7	
Green Sunfish	TL (mm)	164 - 170	166	3	NC	NC	NC	Evaluated as whole body samples in June 2003. This species was not present during the May 2008 survey.
	SL (mm)	NC	NC	NC	NC	NC	NC	
	Weight (g)	60 - 88	74.0	3	NC	NC	NC	
Largemouth Bass	TL (mm)	353 - 363	358	2	NC	443 (est)	NC	
	SL (mm)	NC	NC	NC	377 - 407	387	6	
	Weight (g)	600 - 654	627	2	651 - 843	761	6	
Pumpkinseed	TL (mm)	96 - 162	129	6	NC	125 (est)	NC	2003 Fish evaluated as whole-body gamefish; 2008 Fish samples evaluated as forage fish (whole-body chemical analysis). Values shown are for individual fish in the composites.
	SL (mm)	NC	NC	NC	68 - 157	101	5	
	Weight (g)	18 - 84	49.3	6	5.7 - 83.7	27.6	5	
White Sucker	TL (mm)	312 - 365	342	5	NC	451 (est)	NC	
	SL (mm)	NC	NC	NC	342 - 412	387	5	
	Weight (g)	350 - 514	400	5	373 - 666	561	5	

Notes :

(a) *Mean total length (TL) values were estimated from the mean standard length (SL) values for the 2008 fish based on values reported for SL/TL ratios by species. These calculations were performed since TL data were reported for the 2003 samples. See text for discussion.*

(b) *NC: not collected.*

TABLE 41
COMPARISON OF JUNE 2003 AND MAY 2008 ANALYTICAL RESULTS FOR GAME FISH
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Chemical[a]	All Gamefish[b,c] - June 2003				All Gamefish[b,c] - May 2008			
	Freq	Mean[d]	ND Range[e]	Pos Range[f]	Freq	Mean	ND Range	Pos Range
PCBs (ug/kg)								
Aroclor 1248	10/24	110	50-250	29-1,100	0/17	ND	4.2 - 4.2	---
Aroclor 1254	23/24	581	200-200	160-2,000	17/17	443	---	73-1,700
Aroclor 1260	24/24	135	---	34-400	13/17	83	4.2 - 4.2	17-360
Total PCBs	24/24	791	---	267-2,400	17/17	525	---	90-2,060
METALS (mg/kg)								
Aluminum	19/24	11.0	17-20	3.1-70	20/20	0.63	---	0.32-1.5
Antimony	11/24	NR[g]	1.2-1.5	0.16-0.45	16/20	0.03	0.1 - 0.1	0.0034-0.034
Arsenic	1/24	NR	1.2-1.5	0.33-0.33	15/20	0.06	---	0.018-0.15
Barium	24/24	2.15	---	0.43-4	20/20	0.27	---	0.057-0.93
Cadmium	19/24	0.14	0.26-0.3	0.03-0.54	0/20	ND	0.1 - 0.1	---
Calcium	24/24	10,421	---	1,300-20,000	20/20	595	---	83.3-2,130
Chromium	24/24	0.40	---	0.13-1	20/20	0.59	---	0.32-1.2
Cobalt	4/24	NR	0.42-0.5	0.065-0.14	20/20	0.01	---	0.0028-0.05
Copper	24/24	0.89	---	0.45-2.2	20/20	0.46	---	0.21-1
Iron	24/24	22.7	---	2.3-220	20/20	5.66	---	0.85-15.2
Lead	24/24	0.84	---	0.17-2.1	20/20	0.06	---	0.0065-0.17
Magnesium	24/24	377	---	250-510	20/20	269	---	220-315
Manganese	24/24	1.15	---	0.11-5.8	20/20	0.15	---	0.069-0.26
Mercury	24/24	0.03	---	0.0041-0.1	20/20	0.14	---	0.011-0.37
Nickel	8/24	NR	0.83-0.99	0.2-0.38	20/20	0.04	---	0.012-0.1
Potassium	24/24	2,783	---	2,300-3,500	20/20	2,967	---	2,530-3,480
Selenium	23/24	0.59	1.3-1.3	0.34-0.96	20/20	0.26	---	0.2-0.44
Silver	3/24	NR	0.42-0.5	0.064-0.097	0/20	ND	0.1 - 0.1	---
Sodium	24/24	931	---	560-1,400	20/20	495	---	355-592
Thallium	0/24	ND	1.7-2	---	12/20	0.03	0.1 - 0.1	0.0023-0.032
Vanadium	1/24	NR	0.42-0.5	0.18-0.18	15/20	0.12	0.1 - 0.1	0.027-0.28
Zinc	24/24	21.57	---	8-33	20/20	9.45	---	4.8-26.1
MISCELLANEOUS								
Percent Lipids	24/24	2.14	---	0.7-8.1	14/16	1.0	0.1 - 0.1	0.1-3.5
Species	Black Crappie, Common Carp, Green Sunfish, Largemouth Bass, Pumpkinseed, and White Sucker				Black Crappie, Common Carp, Largemouth Bass, and White Suckers			

Notes:

(a) *The 2008 results were summarized from the validated data.*

(b) *All gamefish include all fish designated as gamefish in 2003 and 2008.*

(c) *The results are for individual fish, except for some of the samples (pumpkinseeds) collected in 2003.*

(d) *Mean values calculated by setting non-detect results to one-half the reported detection limit.*

(e) *ND = not detected.*

(f) *Only the target analytes with at least one positive detection are summarized in this table.*

(g) *NR = Mean not reported since calculated value exceeds maximum positive result.*

TABLE 42
SUMMARY OF ANALYTICAL RESULTS FOR KOPPERS POND VEGETATION SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent[a]	Sample ID:	VG10-01	VG10-01RE	VG10-07	VG10-07RE	VG10-14	VG10-14RE	VG10-15	VG10-15RE
	Date Collected:	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10
	Species:	Cattail roots	Cattail roots	[b]	[b]	Duckweed	Duckweed	[c]	[c]
	Units								
PCBs									
Aroclor-1016	µg/kg	---[d]	20 UJ[e]	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1221	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1232	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1242	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1248	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1254	µg/kg	---	54 J	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1260	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1262	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Aroclor-1268	µg/kg	---	20 UJ	---	21 UJ	---	20 UJ	---	21 UJ
Total PCBs	µg/kg	---	54 J	---	21 UJ	---	20 UJ	---	21 UJ
Inorganics									
Aluminum	mg/kg	213 J	---	15.1 J	---	102 J	---	220 J	---
Antimony	mg/kg	1.8 U	---	1.9 U	---	3.3 U	---	1.8 U	---
Arsenic	mg/kg	0.18 UJ	---	0.19 U	---	0.33 U	---	0.18 U	---
Barium	mg/kg	9 U	---	12.5	---	16.3 U	---	11	---
Beryllium	mg/kg	0.18 U	---	0.19 U	---	0.16 U	---	0.18 U	---
Cadmium	mg/kg	5.3	---	0.19 U	---	0.35	---	0.28	---
Calcium	mg/kg	2,210 J	---	3,250 J	---	7,400 J	---	3,890 J	---
Chromium	mg/kg	6.1	---	0.37 U	---	0.72	---	0.82	---
Cobalt	mg/kg	0.9 U	---	0.93 U	---	0.81 U	---	0.91 U	---
Copper	mg/kg	8.8	---	1.9 U	---	1.6 U	---	2.5	---
Iron	mg/kg	308 J	---	34.1 J	---	226 J	---	374 J	---
Lead	mg/kg	16.8 J	---	0.25 J	---	4.4 J	---	1.6 J	---
Magnesium	mg/kg	405 J	---	484 J	---	256 J	---	800 J	---
Manganese	mg/kg	5.8 J	---	20.4 J	---	28.6 J	---	23.8 J	---
Mercury	mg/kg	0.025 U	---	0.026 U	---	0.032 U	---	0.029 U	---
Nickel	mg/kg	3	---	1.9 U	---	3.3 U	---	1.8 U	---
Potassium	mg/kg	816 J	---	2,530 J	---	1,070 J	---	5,520 J	---
Selenium	mg/kg	0.18 UJ	---	0.2	---	0.33 U	---	0.27	---
Silver	mg/kg	0.39	---	0.19 U	---	0.33 U	---	0.18 U	---
Sodium	mg/kg	769 J	---	302 J	---	432 J	---	267 J	---
Thallium	mg/kg	0.18 U	---	0.19 U	---	0.16 U	---	0.18 U	---
Vanadium	mg/kg	0.36 U	---	0.37 U	---	0.33	---	0.36 U	---
Zinc	mg/kg	78.2 J	---	5.6 J	---	9 J	---	12.8 J	---
Miscellaneous Parameters [f]									
Percent Lipids	%	0.25 U	---	1	---	0.35	---	0.63	---

Notes:

[a] *Concentration units are reported on a wet weight basis. Data provided by analytical laboratory report for SDG C0J220401.*

[b] *Mixed terrestrial vegetation, including honeysuckle, bullrush, soft rush, canary grass.*

[c] *Mixed terrestrial vegetation, including wild parsley, wild lettuce and clover.*

[d] *Vegetation samples from the reference pond were re-analyzed for PCBs at a lower detection limit. These results are shown with the suffix "RE".*

[e] *Qualifiers: U = not detected at value shown; J = estimated value*

[f] *Total cyanides were not analyzed in these samples since the laboratory was unable to identify a suitable EPA method to analyze this chemical in plants.*

TABLE 43
ANALYTICAL RESULTS FOR REFERENCE POND SEDIMENT SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent	Sample ID:	RSD10-01	RSD10-01SV
	Date Collected:	10/20/2010	10/20/2010
	Depth Interval (in.):	0-6	0-6
		Unsieved	Sieved
	Units[a]		
SVOCs			
1,1'-Biphenyl	µg/kg	1,300 UJ[b]	710 UJ
2,2'-oxybis(1-Chloropropane)	µg/kg	270 UJ	140 UJ
2,4,5-Trichlorophenol	µg/kg	1,300 UJ	710 UJ
2,4,6-Trichlorophenol	µg/kg	1,300 UJ	710 UJ
2,4-Dichlorophenol	µg/kg	270 UJ	140 UJ
2,4-Dimethylphenol	µg/kg	1,300 UJ	710 UJ
2,4-Dinitrophenol	µg/kg	6,700 UJ	3,600 UJ
2,4-Dinitrotoluene	µg/kg	1,300 UJ	710 UJ
2,6-Dinitrotoluene	µg/kg	1,300 UJ	710 UJ
2-Chloronaphthalene	µg/kg	270 UJ	140 UJ
2-Chlorophenol	µg/kg	1,300 UJ	710 UJ
2-Methylnaphthalene	µg/kg	270 UJ	140 UJ
2-Methylphenol	µg/kg	1,300 UJ	710 UJ
2-Nitroaniline	µg/kg	6,700 UJ	3,600 UJ
2-Nitrophenol	µg/kg	1,300 UJ	710 UJ
3,3'-Dichlorobenzidine	µg/kg	1,300 UJ	710 UJ
3-Nitroaniline	µg/kg	6,700 UJ	3,600 UJ
4,6-Dinitro-2-methylphenol	µg/kg	6,700 UJ	3,600 UJ
4-Bromophenyl phenyl ether	µg/kg	1,300 UJ	710 UJ
4-Chloro-3-methylphenol	µg/kg	1,300 UJ	710 UJ
4-Chloroaniline	µg/kg	1,300 UJ	710 UJ
4-Chlorophenyl phenyl ether	µg/kg	1,300 UJ	710 UJ
4-Methylphenol	µg/kg	1,300 UJ	710 UJ
4-Nitroaniline	µg/kg	6,700 UJ	3,600 UJ
4-Nitrophenol	µg/kg	6,700 UJ	3,600 UJ
Acenaphthene	µg/kg	270 UJ	140 UJ
Acenaphthylene	µg/kg	270 UJ	140 UJ
Acetophenone	µg/kg	1,300 UJ	710 UJ
Anthracene	µg/kg	270 UJ	14 J
Atrazine	µg/kg	1,300 UJ	710 UJ
Benzaldehyde	µg/kg	1,300 UJ	710 UJ
Benzo(a)anthracene	µg/kg	63 J	68 J
Benzo(a)pyrene	µg/kg	600 J	380 J
Benzo(b)fluoranthene	µg/kg	110 J	92 J
Benzo(ghi)perylene	µg/kg	61 J	99 J
Benzo(k)fluoranthene	µg/kg	270 UJ	79 J
bis(2-Chloroethoxy)methane	µg/kg	1,300 UJ	710 UJ
bis(2-Chloroethyl) ether	µg/kg	270 UJ	140 UJ
bis(2-Ethylhexyl) phthalate	µg/kg	1,300 UJ	710 UJ
Butyl benzyl phthalate	µg/kg	1,300 UJ	710 UJ
Caprolactam	µg/kg	6,700 UJ	3,600 UJ
Carbazole	µg/kg	270 UJ	140 UJ
Chrysene	µg/kg	64 J	86 J
Dibenz(a,h)anthracene	µg/kg	270 UJ	140 UJ
Dibenzofuran	µg/kg	1,300 UJ	710 UJ
Diethyl phthalate	µg/kg	1,300 UJ	710 UJ
Dimethyl phthalate	µg/kg	1,300 UJ	710 UJ
Di-n-butyl phthalate	µg/kg	1,300 UJ	710 UJ
Di-n-octyl phthalate	µg/kg	1,300 UJ	710 UJ
Fluoranthene	µg/kg	95 J	110 J
Fluorene	µg/kg	270 UJ	140 UJ
Hexachlorobenzene	µg/kg	270 UJ	140 UJ
Hexachlorobutadiene	µg/kg	270 UJ	140 UJ
Hexachlorocyclopentadiene	µg/kg	1,300 UJ	710 UJ

TABLE 43
ANALYTICAL RESULTS FOR REFERENCE POND SEDIMENT SAMPLES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent	Sample ID:	RSD10-01	RSD10-01SV
	Date Collected:	10/20/2010	10/20/2010
	Depth Interval (in.):	0-6	0-6
		Unsieved	Sieved
	Units[a]		
SVOCs (continued)			
Hexachloroethane	µg/kg	1,300 UJ	710 UJ
Indeno(1,2,3-cd)pyrene	µg/kg	600 J	370 J
Isophorone	µg/kg	1,300 UJ	710 UJ
Naphthalene	µg/kg	270 UJ	140 UJ
Nitrobenzene	µg/kg	270 UJ	140 UJ
N-Nitrosodi-n-propylamine	µg/kg	270 UJ	140 UJ
N-Nitrosodiphenylamine	µg/kg	270 UJ	140 UJ
Pentachlorophenol	µg/kg	1,300 UJ	710 UJ
Phenanthrene	µg/kg	51 J	56 J
Phenol	µg/kg	270 UJ	140 UJ
Pyrene	µg/kg	72 J	87 J
Total PAHs[c]	µg/kg	1,716	1,441
Aroclor PCBs			
Aroclor-1016	µg/kg	660 UJ	710 UJ
Aroclor-1221	µg/kg	660 UJ	710 UJ
Aroclor-1232	µg/kg	660 UJ	710 UJ
Aroclor-1242	µg/kg	660 UJ	710 UJ
Aroclor-1248	µg/kg	660 UJ	710 UJ
Aroclor-1254	µg/kg	660 UJ	710 UJ
Aroclor-1260	µg/kg	660 UJ	710 UJ
Total PCBs	µg/kg	660 UJ	710 UJ
Inorganics			
Aluminum	mg/kg	5,490 J	5,620 J
Antimony	mg/kg	0.79 UJ	0.71 UJ
Arsenic	mg/kg	12.8 J	15.2 J
Barium	mg/kg	259 J	324 J
Beryllium	mg/kg	0.27 JB	0.34 J
Cadmium	mg/kg	0.42 J	0.63 J
Calcium	mg/kg	71,800 J	90,500 J
Chromium	mg/kg	8.9 J	18.9 J
Cobalt	mg/kg	4 J	4.4 J
Copper	mg/kg	16.1 J	18.3 J
Cyanide, Total	mg/kg	4 UJ	4.3 UJ
Iron	mg/kg	14,400 J	16,300 J
Lead	mg/kg	42 J	50.8 J
Magnesium	mg/kg	3,630 J	3,990 J
Manganese	mg/kg	179 J	204 J
Mercury	mg/kg	0.12 JB	0.16 J
Nickel	mg/kg	10.7 J	17.7 J
Potassium	mg/kg	653 J	629 J
Selenium	mg/kg	2 UJ	2 J
Silver	mg/kg	0.059 JB	0.071 J
Sodium	mg/kg	663 J	660 J
Thallium	mg/kg	0.4 UJ	0.35 UJ
Vanadium	mg/kg	10.5 J	11 J
Zinc	mg/kg	60.2 J	72.4 J
Miscellaneous Parameters			
Percent Solids	%	12.6	11.6
Total Organic Carbon	mg/kg	83,300 J	202,000 J

Notes:

[a] *Concentration units are reported on a wet weight basis. Data provided by analytical laboratory report for SDG C0K030562.*

[b] *Qualifiers: U = not detected at value shown;*

UJ = not detected at estimated concentration shown;

J = estimated value;

B = parameter also detected in associated method blank.

[c] *Total PAHs were calculated by setting individual PAH non-detect results to zero before summing.*

CUMMINGS RITER

TABLE 44
SUMMARY OF FORAGE FISH IN REFERENCE POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Sample ID	Dates Collelcted	Species	Std Length (mm)[a]	Weight (g)	Condition
RFF10-01	10/20/2010	Bluegill - *Lepomis macrochirus*	157	72.3	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	132	39.1	Healthy, no physical anomalies
RFF10-02	10/20/2010	Bluegill - *Lepomis macrochirus*	160	75.2	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	108	22.7	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	68	5.3	Healthy, no physical anomalies
RFF10-03	10/20/2010	Bluegill - *Lepomis macrochirus*	164	82.6	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	144	54.1	Healthy, no physical anomalies
RFF10-04	10/20/2010	Pumpkinseed - *Lepomis gibbosus*	142	59.3	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	151	59.5	Healthy, no physical anomalies
RFF10-05	10/20/2010	Bluegill - *Lepomis macrochirus*	152	72.4	Healthy, no physical anomalies
		Bluegill - *Lepomis macrochirus*	147	59.9	Healthy, no physical anomalies

<u>*Notes:*</u>

(a) *mm - millimeters; g - grams.*

TABLE 45
SUMMARY OF ANALYTICAL RESULTS FOR REFERENCE POND FORAGE FISH
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Chemical	Sample ID:	RFF10-01	RFF10-01RE	RFF10-02	RFF10-02RE	RFF10-03	RFF10-03RE	RFF10-04	RFF10-04RE	RFF10-05	RFF10-05RE
	Date Collected:	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10
	Species:	Bluegill	Bluegill	Bluegill	Bluegill	Bluegill	Bluegill	Bluegill & Pumpkinseed	Bluegill & Pumpkinseed	Bluegill	Bluegill
	Units										
PCBs											
Aroclor-1016	µg/kg	--- [a]	20 UJ [b]	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1221	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1232	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1242	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1248	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1254	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1260	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1262	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Aroclor-1268	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Total PCBs	µg/kg	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ	---	20 UJ
Inorganics											
Aluminum	mg/kg	6.7 U	---	6.5 U	---	7 U	---	7.3 U	---	6.7 U	---
Antimony	mg/kg	1.7 U	---	1.6 U	---	1.8 U	---	1.8 U	---	1.7 U	---
Arsenic	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Barium	mg/kg	8.4 U	---	8.1 U	---	8.8 U	---	9.1 U	---	8.3 U	---
Beryllium	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Cadmium	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Calcium	mg/kg	12,300 J	---	8,880 J	---	9,630 J	---	13,600 J	---	8,540 J	---
Chromium	mg/kg	0.6	---	0.46	---	0.47	---	0.86	---	0.33 U	---
Cobalt	mg/kg	0.84 U	---	0.81 U	---	0.88 U	---	0.91 U	---	0.83 U	---
Copper	mg/kg	1.7 U	---	1.6 U	---	1.8 U	---	1.8 U	---	1.7 U	---
Iron	mg/kg	16.8 U	---	16.2 J	---	17.5 U	---	18.2 U	---	18.2 J	---
Lead	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Magnesium	mg/kg	449 J	---	411 J	---	406 J	---	470 J	---	374 J	---
Manganese	mg/kg	2.3 J	---	2.2 J	---	1.9 J	---	2.1 J	---	1.6 J	---
Mercury	mg/kg	0.044	---	0.03	---	0.03 U	---	0.026 U	---	0.033 U	---
Nickel	mg/kg	1.7 U	---	1.6 U	---	1.8 U	---	1.8 U	---	1.7 U	---
Potassium	mg/kg	2,940 J	---	3,300 J	---	3,220 J	---	3,230 J	---	2,920 J	---
Selenium	mg/kg	0.17	---	0.16	---	0.18 U	---	0.19	---	0.23	---
Silver	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Sodium	mg/kg	1,180 J	---	1,060 J	---	1,090 J	---	1,370 J	---	1,130 J	---
Thallium	mg/kg	0.17 U	---	0.16 U	---	0.18 U	---	0.18 U	---	0.17 U	---
Vanadium	mg/kg	0.34 U	---	0.32 U	---	0.35 U	---	0.36 U	---	0.33 U	---
Zinc	mg/kg	22.2 J	---	21.8 J	---	16.6 J	---	22.3 J	---	15.3 J	---
Miscellaneous Parameters											
Percent Lipids	%	3.2	---	2.5	---	2.7	---	1.8	---	2.8	---

Notes:

[a] *Forage fish samples from the reference pond were re-analyzed for PCBs at a lower detection limit. These results are shown with the suffix "RE".*

[b] *Data provided by analytical laboratory report for SDG C0J220401. Qualifiers: U = not detected at value shown; J = estimated value.*

TABLE 46
SUMMARY OF GAME FISH IN REFERENCE POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Analytical Sample ID	Species	Waterbody	SL (mm)[b]	Weight (g)	CF[c]	Comments
RLB10-01	Largemouth Bass - *Micropterus salmoides*	Reference Pond	277	267.7	1.26	Healthy, no physical anomalies
RLB10-02	Largemouth Bass - *Micropterus salmoides*	Reference Pond	223	124.5	1.12	Healthy, no physical anomalies
RBC10-01	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	239	204.5	1.50	Healthy, no physical anomalies
RBC10-02	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	239	203.2	1.49	Healthy, no physical anomalies
RBC10-05	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	240	198.1	1.43	Healthy, no physical anomalies
---[a]	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	229	180.2	1.50	Healthy, no physical anomalies
---	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	226	174.5	1.51	Healthy, no physical anomalies
---	Black crappie - *Pomoxis nigromaculatus*	Reference Pond	225	161.0	1.41	Healthy, no physical anomalies
---	Largemouth Bass - *Micropterus salmoides*	Reference Pond	185	77.4	1.22	Healthy, no physical anomalies
---	Largemouth Bass - *Micropterus salmoides*	Reference Pond	206	107.1	1.23	Healthy, no physical anomalies
---	Largemouth Bass - *Micropterus salmoides*	Reference Pond	147	43.7	1.38	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	217	226	2.21	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	196	163.6	2.17	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	190	147.9	2.16	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	179	117.5	2.05	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	168	98.4	2.08	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	201	193.4	2.38	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	171	101.6	2.03	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	187	148.2	2.27	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	186	133.7	2.08	Healthy, no physical anomalies
---	Pumpkinseed - *Lepomis gibbosus*	Reference Pond	190	169.7	2.47	Healthy, but notch in back from possible snapping turtle bite
---	Bluegill - *Lepomis macrochirus*	Reference Pond	189	134.3	1.99	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	193	144.2	2.01	Healthy, no physical anomalies
---	Bluegill - *Lepomis macrochirus*	Reference Pond	142	54.7	1.91	Healthy, no physical anomalies

Notes:

[a] *A dash (---) indicates that the fish samples were not retained for chemical analyses.*

[b] *mm = millimeters; g = grams*

[c] *Condition factor (CF) is calculated using the following equation: CF = (100,000xBW)/SL3, where BW = body weight (in grams) and SL = standard length (in mm)*

TABLE 47
SUMMARY OF ANALYTICAL DATA FOR GAME FISH IN REFERENCE POND
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Parameter	Sample ID:	RBC10-01	RBC10-01RE[a]	RBC10-02	RBC10-02RE	RBC10-05	RBC10-05RE	RLB10-01	RLB10-01DU	RLB10-01RE	RLB-10-02	RLB-10-02RE
	Date Collected:	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010	10/19/2010
	Lab ID:	200-2079-8	200-2079-8RE	200-2079-7	200-2079-7RE	200-2079-2	200-2079-2RE	200-2079-12	200-2079-12DU	200-2079-12RE	200-2079-13	200-2079-13RE
	Species:	Black Crappie	Black Crappie	Black Crappie	Black Crappie	Black Crappie	Black Crappie	Largemouth Bass	Largemouth Bass	Largemouth Bass	Largemouth Bass	Largemouth Bass
	Units											
PCBs												
Aroclor-1016	μg/kg$_{ww}$	---[b]	20 UJ[c]	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1221	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1232	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1242	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1248	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1254	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1260	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1262	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Aroclor-1268	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Total PCBs	μg/kg$_{ww}$	---	20 UJ	---	20 UJ	---	20 UJ	---	50 U	21 UJ	---	19 UJ
Inorganics												
Aluminum	mg/kg$_{ww}$	6.8 U	---	7.6 U	---	7.1 U	---	7.2 U	7.3 U	---	7.8 U	---
Antimony	mg/kg$_{ww}$	1.7 U	---	1.9 U	---	1.8 U	---	1.8 U	1.8 U	---	2 U	---
Arsenic	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Barium	mg/kg$_{ww}$	8.5 U	---	9.5 U	---	8.8 U	---	9 U	9.2 U	---	9.8 U	---
Beryllium	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Cadmium	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Calcium	mg/kg$_{ww}$	984 J	---	162 J	---	387 J	---	1,180 J	120.9 J	---	634 J	---
Chromium	mg/kg$_{ww}$	0.34 U	---	0.38 U	---	0.35 U	---	0.36 U	0.37 U	---	0.39 U	---
Cobalt	mg/kg$_{ww}$	0.85 U	---	0.95 U	---	0.88 U	---	0.9 U	0.92 U	---	0.98 U	---
Copper	mg/kg$_{ww}$	1.7 U	---	1.9 U	---	1.8 U	---	1.8 U	1.8 U	---	2 U	---
Iron	mg/kg$_{ww}$	17.1 U	---	19 U	---	17.7 U	---	18 U	18.3 U	---	19.6 U	---
Lead	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Magnesium	mg/kg$_{ww}$	282 J	---	284 J	---	271 J	---	298 J	274.5 J	---	270 J	---
Manganese	mg/kg$_{ww}$	0.34 J	---	0.38 U	---	0.35 U	---	0.36 U	0.37 U	---	0.39 U	---
Mercury	mg/kg$_{ww}$	0.17	---	0.17	---	0.15	---	0.066	0.0702	---	0.2	---
Nickel	mg/kg$_{ww}$	1.7 U	---	1.9 U	---	1.8 U	---	1.8 U	1.8 U	---	2 U	---
Potassium	mg/kg$_{ww}$	4,070 J	---	3,890 J	---	4,130 J	---	3,730 J	3,708 J	---	3,500 J	---
Selenium	mg/kg$_{ww}$	0.2	---	0.21	---	0.18 U	---	0.18	0.18 U	---	0.23	---
Silver	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Sodium	mg/kg$_{ww}$	654 J	---	595 J	---	570 J	---	564 J	564.8 J	---	577 J	---
Thallium	mg/kg$_{ww}$	0.17 U	---	0.19 U	---	0.18 U	---	0.18 U	0.18 U	---	0.2 U	---
Vanadium	mg/kg$_{ww}$	0.34 U	---	0.38 U	---	0.35 U	---	0.36 U	0.37 U	---	0.39 U	---
Zinc	mg/kg$_{ww}$	12.8 J	---	12.5 J	---	12 J	---	6 J	8.25 J	---	13.1 J	---
General												
Percent Lipids	%	0.36	---	0.61	---	0.33	---	0.52	---	---	0.43	---

Notes:

[a] *RE: Re-extracted sample results. Samples for PCB analyses were re-extracted and re-analyzed at a lower detection limit to comply with QAPP requirements.*

[b] *"---" indicates that the PCBs were re-analyzed at a lower detection limit.*

[c] *Data provided by analytical laboratory report for SDG C0J220401. Qualifiers: U = not detected; UJ = not detected at estimated value shown; J = estimated value.*

TABLE 48
ANALYTICAL RESULTS FOR REFERENCE POND VEGETATION SAMPES
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Constituent	Sample ID:	RVG10-01	RVG10-01RE	RVG10-02	RVG10-02DU	RVG10-02RE	RVG10-03	RVG10-03RE	
	Date Collected:	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	10/19/10	
	Species:	Duckweed	Duckweed	Cattail roots	Cattail roots	Cattail roots	(b)	(b)	Sediment COPEC
	Units[a]								
PCBs									
Aroclor-1016	µg/kg	---[c]	20 UJ[d]	---	51 U	20 UJ	---	20 UJ	
Aroclor-1221	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1232	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1242	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1248	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1254	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	•
Aroclor-1260	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1262	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Aroclor-1268	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	
Total PCBs	µg/kg	---	20 UJ	---	51 U	20 UJ	---	20 UJ	•
Inorganics									
Aluminum	mg/kg	137 J	---	15.4 J	63.22 J	---	39.8 J	---	
Antimony	mg/kg	1.6 U	---	1.8 U	1.9 U	---	1.8 U	---	
Arsenic	mg/kg	0.35	---	0.18 U	0.268	---	0.18 U	---	
Barium	mg/kg	9.5	---	8.8 U	9.4 U	---	11.2	---	•
Beryllium	mg/kg	0.16 U	---	0.18 U	0.19 U	---	0.18 U	---	
Cadmium	mg/kg	0.16 U	---	0.18 U	0.19 U	---	0.18 U	---	•
Calcium	mg/kg	3,330 J	---	1,000 J	1,052 J	---	3,190 J	---	
Chromium	mg/kg	0.33 U	---	0.35 U	0.38 U	---	0.36 U	---	
Cobalt	mg/kg	0.82 U	---	0.88 U	0.94 U	---	0.91 U	---	
Copper	mg/kg	1.6 U	---	1.8 U	1.9 U	---	1.8 U	---	•
Iron	mg/kg	362 J	---	68.7 J	211.6 J	---	94.1 J	---	•
Lead	mg/kg	1.1 J	---	0.18 U	0.535 J	---	0.2 J	---	•
Magnesium	mg/kg	380 J	---	258 J	288.1 J	---	923 J	---	
Manganese	mg/kg	58.6 J	---	3.9 J	6.07 J	---	23.2 J	---	
Mercury	mg/kg	0.028 U	---	0.027 U	0.026 U	---	0.032 U	---	•
Nickel	mg/kg	1.6 U	---	1.8 U	1.9 U	---	1.8 U	---	•
Potassium	mg/kg	912 J	---	3,700 J	2,142 J	---	3,990 J	---	
Selenium	mg/kg	0.16 U	---	0.18	0.19 U	---	0.18 U	---	•
Silver	mg/kg	0.16 U	---	0.18 U	0.19 U	---	0.18 U	---	•
Sodium	mg/kg	354 J	---	684 J	762.4 J	---	461 J	---	
Thallium	mg/kg	0.16 U	---	0.18 U	0.19 U	---	0.18 U	---	
Vanadium	mg/kg	0.34	---	0.35 U	0.38 U	---	0.36 U	---	
Zinc	mg/kg	4 J	---	2.3 J	5.47 J	---	12.9 J	---	•
Miscellaneous Parameters [e]									
Percent Lipids	%	---	---	---	0.25 U	---	---	---	

Notes:

[a] *Concentration units are on a wet weight basis. Data provided by analytical laboratory report for SDG C0J220401.*

[b] *Mixed terrestrial vegetation, including privet, aster, and sedge.*

[c] *Vegetation samples from the reference pond were re-analyzed for PCBs at a lower detection limit. These results are shown with the suffix "RE".*

[d] *Qualifiers: U = not detected at value shown; J = estimated value*

[e] *Total cyanides were not analyzed in these samples since the laboratory was unable to identify a suitable EPA method to analyze this chemical in plants.*

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TABLE 49
SUMMARY OF BASELINE HUMAN HEALTH RISK ASSESSMENT
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Exposure Scenario	Receptor	Non-Cancer Hazard	Cancer Risk
Koppers Pond - Teenage Trespasser	Adolescent	0.03	4.3E-07
Outlet Channel - Teenage Trespasser	Adolescent	0.004	5.3E-07
Combined - Teenage Trespasser	Adolescent	0.03	9.6E-07
RME - Fish Consumption (baseline)	All	---	3.1E-04
	Child	21.1	---
	Adolescent	20.3	---
	Adult	15.6	---
CTE EPC - Fish Consumption (baseline)	All	---	2.6E-05
	Child	5.7	---
	Adolescent	5.5	---
	Adult	4.0	---
RME - Fish Consumption (alternative)	All	---	7.5E-05
	Child	5.3	---
	Adolescent	5.1	---
	Adult	3.7	---
CTE - Fish Consumption (alternative)	All	---	1.2E-05
	Child	0.9	---
	Adolescent	0.8	---
	Adult	0.6	---

Note:
Non-cancer hazards are calculated by age group; cancer risk is calculated across all groups (lifetime exposure).

TABLE 50
SUMMARY OF CALCULATED FOOD CHAIN RISKS
BASELINE ECOLOGICAL RISK ASSESSMENT
KENTUCKY AVENUE WELLFIELD SITE, OPERABLE UNIT 4, KOPPERS POND
HORSEHEADS, NEW YORK

Herbivorous Avian Receptor (Mallard Duck)			
Area	Scenario	HI_{NOAEL}[a]	HI_{LOAEL}
Koppers Pond	AWL[b]	0.13	0.06
	HWL	0.13	0.06
Outlets/Mudflat Area	AWL	0.08	0.04
	HWL	0.04	0.02
Reference Pond	All	0.04	0.02

Piscivorous Avian Receptor (Great Blue Heron)					
Area	Scenario	With Iron		Excluding Iron	
		HI_{NOAEL}	HI_{LOAEL}	HI_{NOAEL}	HI_{LOAEL}
Koppers Pond	AWL	**2.3**[c]	0.85	**1.6**	0.47
	HWL	**2.3**	0.88	0.88	0.19
Outlets/Mudflat Area	AWL	**1.9**	0.72	0.87	0.18
	HWL	0.86	0.31	0.42	0.09
Reference Pond	All	**1.0**	0.38	0.41	0.08

Herbivorous Mammalian Receptor (Muskrat)					
Area	Scenario	With Iron		Without Iron	
		HI_{NOAEL}	HI_{LOAEL}	HI_{NOAEL}	HI_{LOAEL}
Koppers Pond	AWL	**16**	**6.6**	**11**	**4.3**
	HWL	**14**	**5.9**	**8.3**	**3.3**
Outlets/Mudflat Area	AWL	**8.9**	**4.2**	**1.8**	0.8
	HWL	**11**	**5.1**	**3.5**	**1.4**
Reference Pond	All	**5.9**	**2.8**	1.0[d]	0.4

Piscivorous Mammalian Receptor (Mink)			
Area	Scenario	HI_{NOAEL}	HI_{LOAEL}
Koppers Pond	AWL	0.24	0.09
	HWL	0.35	0.14
Outlets/Mudflat Area	AWL	0.10	0.05
	HWL	0.06	0.02
Reference Pond	All	0.06	0.03

Omnivorous Mammalian Receptor (Raccoon)			
Area	Scenario	HI_{NOAEL}	HI_{LOAEL}
Koppers Pond	AWL	0.070	0.052
	HWL	0.080	0.077
Outlets/Mudflat Area	AWL	0.16	0.16
	HWL	0.022	0.021
Reference Pond	All	0.024	0.024

Notes:

(a) *HI values were summarized with and without iron since the iron concentrations in the sampled media were similar between Koppers Pond and the Reference Pond.*

(b) *AWL: average water level; HWL: high water level*

(c) *Values shown in bold are greater than one.*

(d) *The actual HI value was less than one (0.97).*

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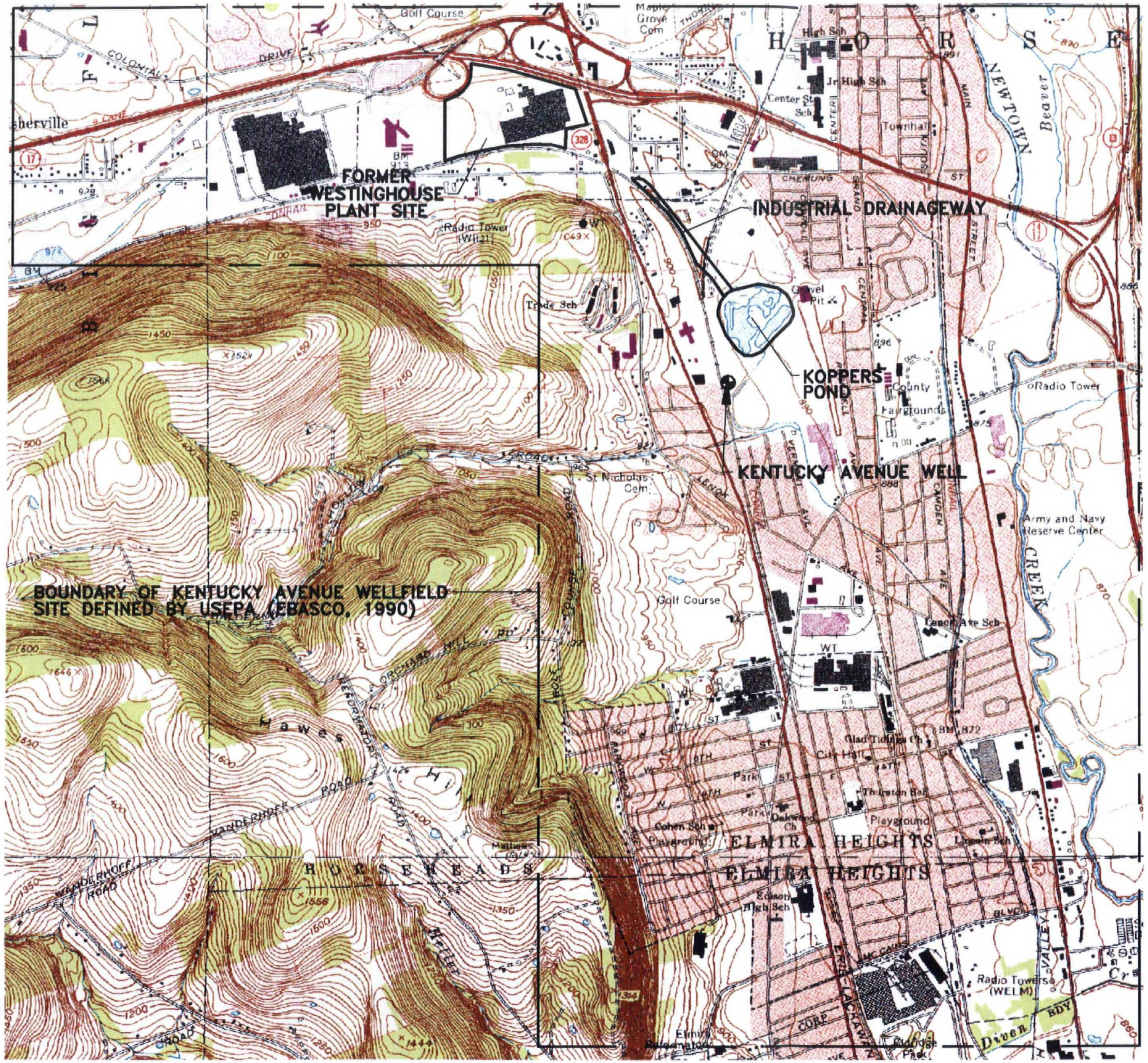
FIGURES



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 MAP

KENTUCKY AVENUE WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK

PREPARED FOR

KOPPERS POND RI/FS GROUP

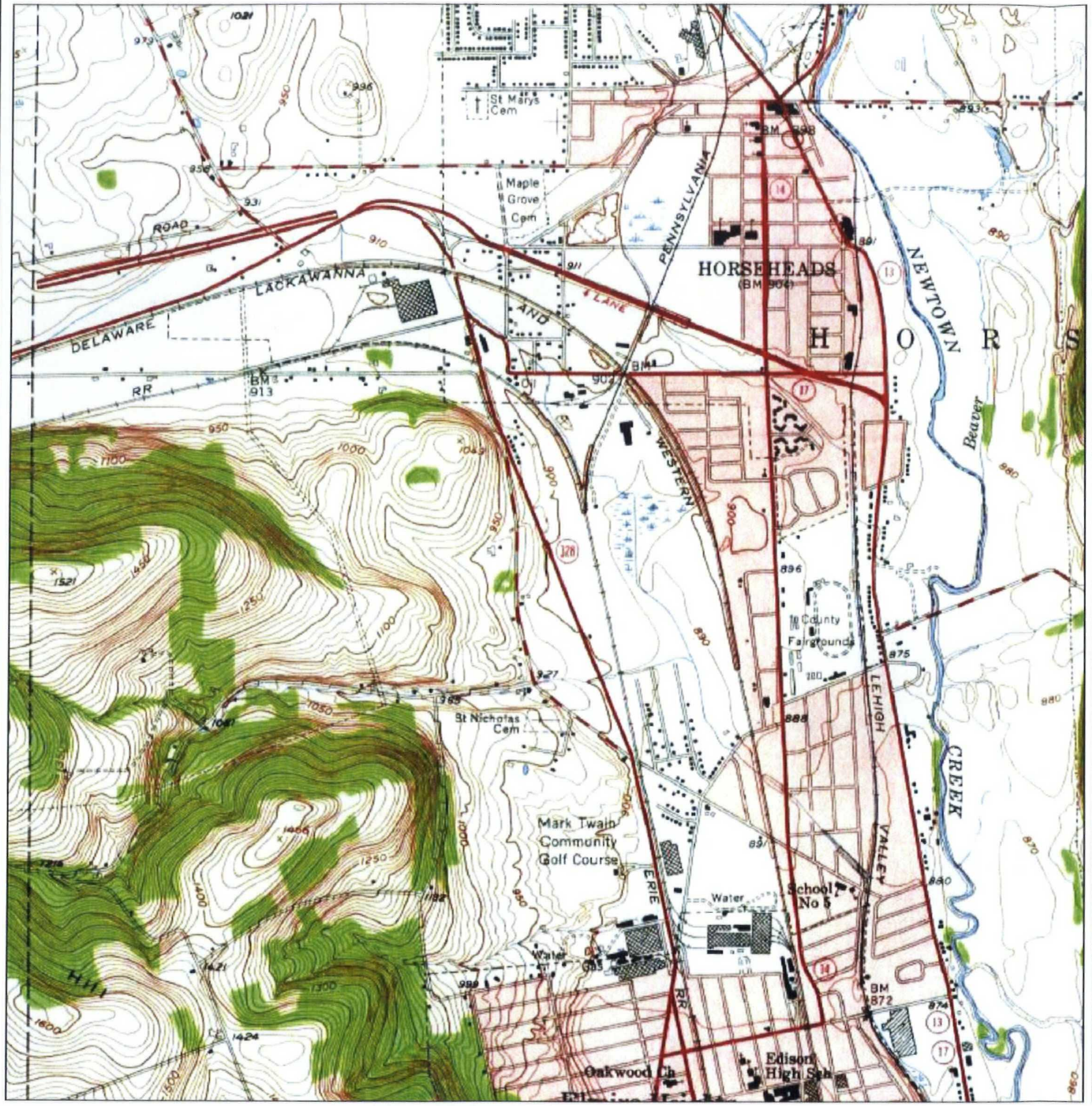
CUMMINGS RITER CONSULTANTS, INC.	DRAWING NUMBER 07502B1
DRAWN BY: T.E. McKee	DATE: 1-31-07
CHECKED BY: W.C. Smith	DATE: 2-19-07
APPROVED BY: W.C. Smith	DATE: 2-19-07

DRAWING NUMBER 07502B1

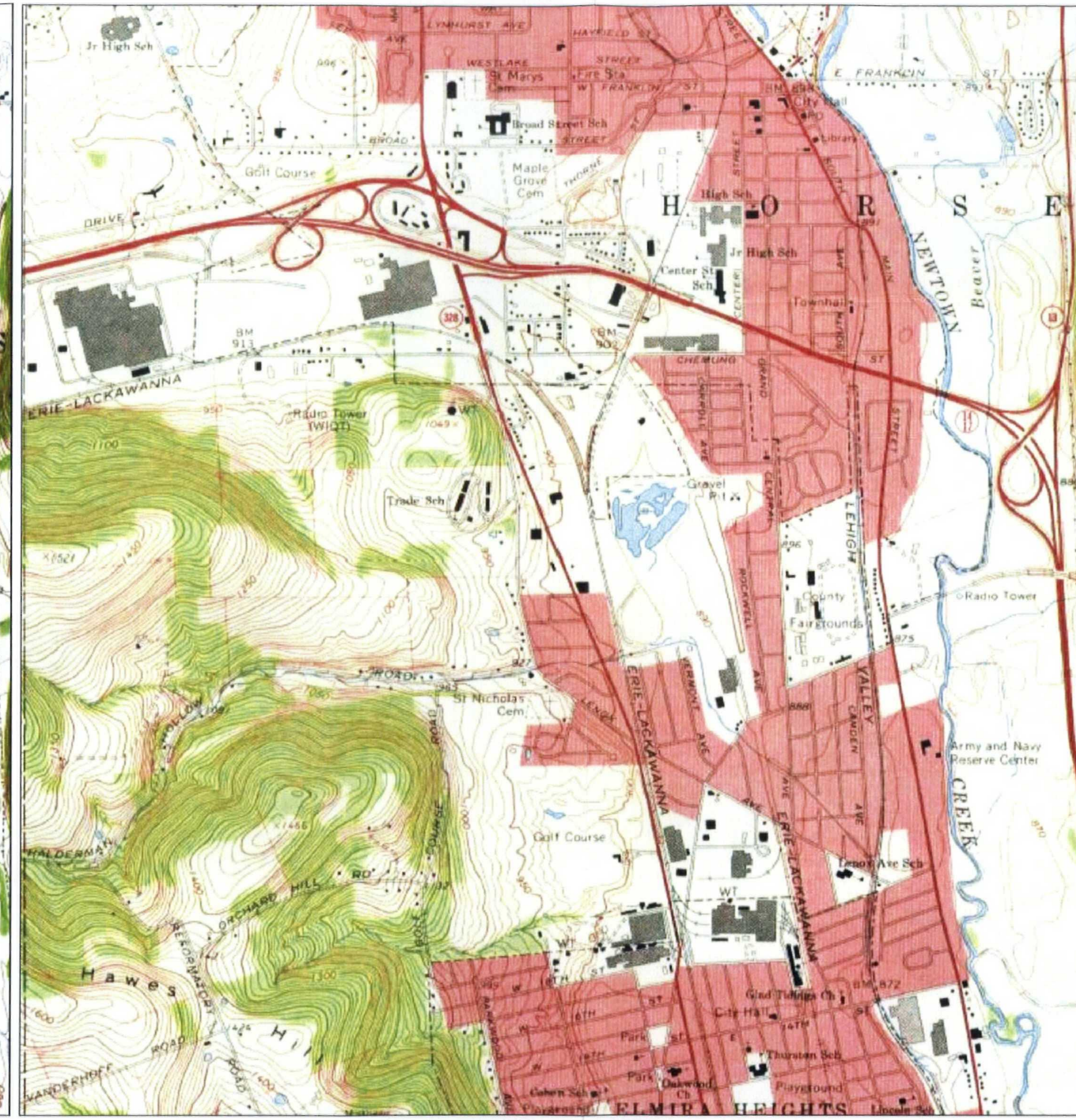
PLOT SCALE: 1=1

FIGURE 2
SITE PLAN
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK
Prepared For:
KOPPERS POND RI/FS GROUP

DRAWING NUMBER 98245B49



1953



1969

REFERENCE: U.S. GEOLOGICAL SURVEY, HORSEHEADS, NEW YORK QUADRANGLE, DATED AS INDICATED.

APPROXIMATE SCALE
0 2000 4000 FEET

PLOT SCALE: 1:1

CUMMINGS RITER CONSULTANTS, INC.
10 Duff Road
Suite 500
Pittsburgh, PA 15235
(412) 241-4500
Fax: (412) 241-7500

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

DRAWN BY:	B.MAURER	DATE: 2-2-07
CHECKED BY:	W.C. Smith	DATE: 2-19-07
APPROVED BY:	W.C. Smith	DATE: 2-19-07

FIGURE 3
HISTORICAL TOPOGRAPHIC MAPS
KENTUCKY AVENUE WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK

PREPARED FOR
KOPPERS POND RI/FS GROUP

SIZE B DRAWING NUMBER 98245B49 REV.
SCALE: SHOWN SHEET ____ OF ____

DRAWING NUMBER 07502E3

LEGEND

MW-112S	MONITORING WELL LOCATION
886	EXISTING ELEVATION CONTOUR
885.0	SEDIMENT ELEVATION CONTOUR
	UTILITY POLE
	EDGE OF WATER ELEVATION
12	SEDIMENT SAMPLE LOCATION
	STAFF GAUGE

NOTE

1. CONTOUR ELEVATIONS IN THE POND ARE BASED ON WATER ELEVATION OF 885.75', SURVEYED ON MAY 6, 2008.

REFERENCE:

1. MAPPING COMPLETED BY STEREOPHOTO GRAMMETRIC METHODS BY WEILER ASSOCIATES FROM 1:4800 SCALE AERIAL FLOWN 11-09-91

SCALE

60 0 60 120 FEET

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
300 Penn Center Blvd.
Suite 800
Pittsburgh, PA 15235
(412) 241-4500
Fax: (412) 241-7500

FIGURE 4

TOP OF SEDIMENT ELEVATION CONTOUR MAP MAY 6, 2008

KENTUCKY AVENUE WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK

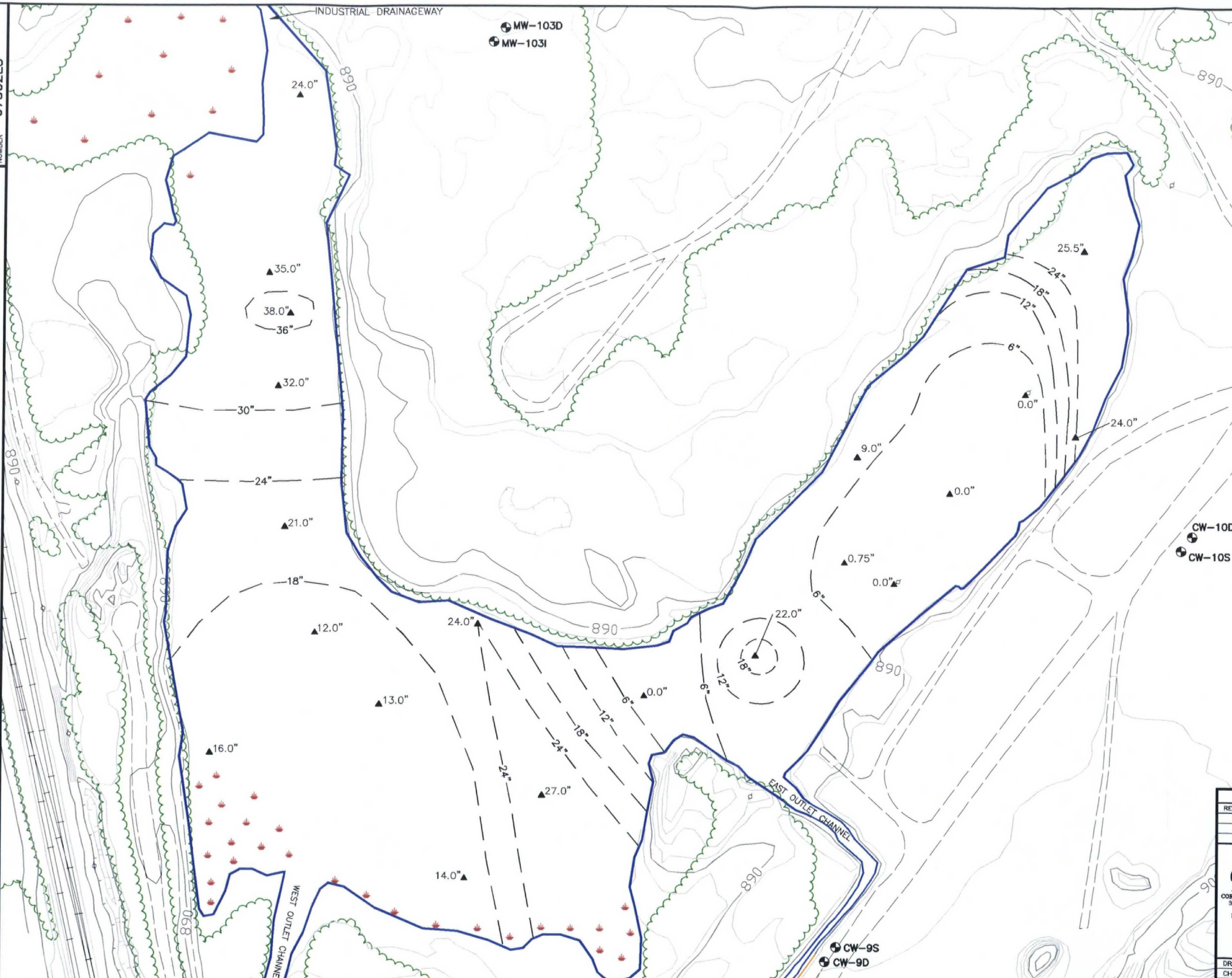
PREPARED FOR

KOPPERS POND RI/FS GROUP

SIZE	SCALE	REV.	DRAWING NUMBER
E	SCALE: 1" = 50'	—	07502E3

DRAWN BY:	T.N. Fitzroy	DATE: 07-15-08
CHECKED BY:	B.R. Maurer	DATE: 09-06-11
APPROVED BY:	B.R. Maurer	DATE: 09-06-11

PLOT SCALE: 1=1



LEGEND

MW-112S	MONITORING WELL LOCATION
886	EXISTING ELEVATION CONTOUR
12"	INFERRED SEDIMENT THICKNESS CONTOUR
ø	UTILITY POLE
	EDGE OF WATER ELEVATION
0.75"	SEDIMENT THICKNESS MEASUREMENT LOCATION

REFERENCE:

1. MAPPING COMPLETED BY STEREOPHOTO GRAMMETRIC METHODS BY WEILER ASSOCIATES FROM 1:4800 SCALE AERIAL FLOWN 11-09-91.

SCALE

50 0 50 100 FEET

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
300 Penn Center Blvd.
Suite 600
Pittsburgh, PA 15235
(412) 241-4500
Fax: (412) 241-7500

FIGURE 5

SEDIMENT THICKNESS MAP
MAY 6, 2008

KENTUCKY AVENUE WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK

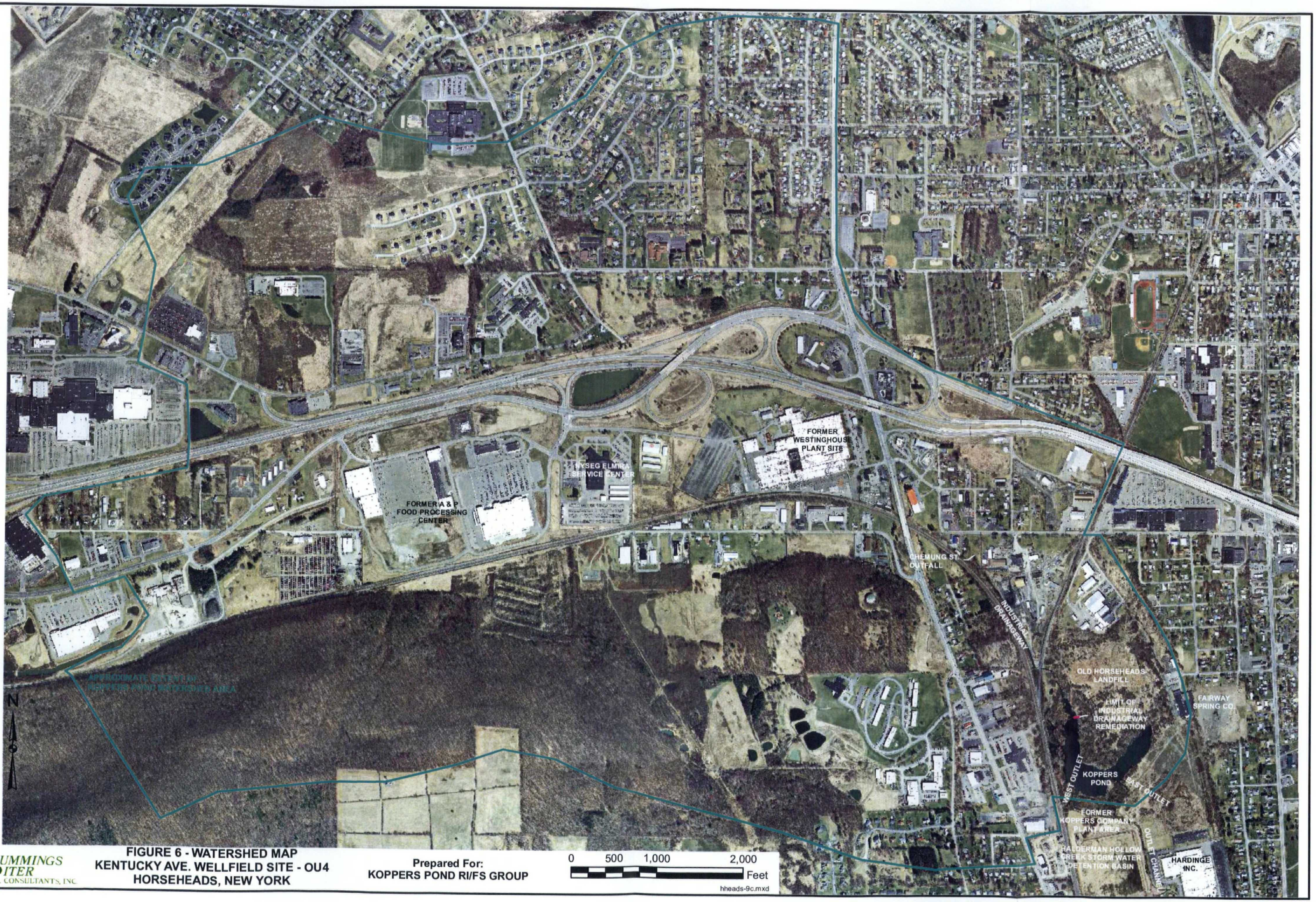
PREPARED FOR

KOPPERS POND RI/FS GROUP

SIZE E	SCALE: 1" = 50'	REV. —	DRAWING NUMBER 07502E3
DRAWN BY: T.N. Fitzroy	DATE: 07-15-08		
CHECKED BY: B.R. Maurer	DATE: 09-06-11		
APPROVED BY: B.R. Maurer	DATE: 09-06-11		

DRAWING NUMBER 07502E3

PLOT SCALE: 1=1



CUMMINGS RITER CONSULTANTS, INC.

FIGURE 6 - WATERSHED MAP
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

Prepared For:
KOPPERS POND RI/FS GROUP

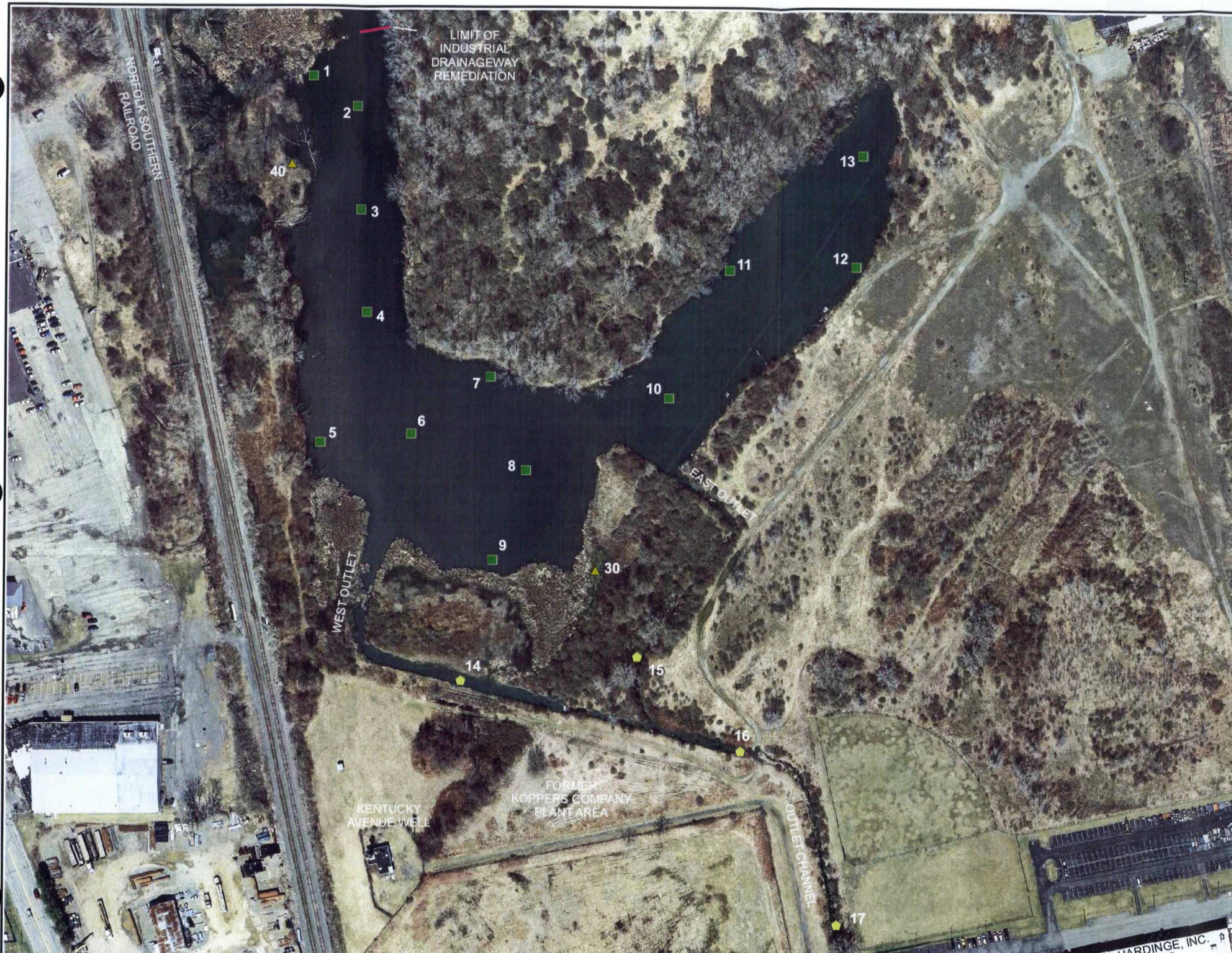
0 500 1,000 2,000
Feet

hheads-9c.mxd

FIGURE 7
DRAINAGE PATHWAYS AND SAMPLE LOCATIONS
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

CUMMINGS RITER CONSULTANTS, INC.

Prepared For:
KOPPERS POND RI/FS GROUP



Pond Sample Location
Outlet Channel Sample Location
Mud Flat Sample Location

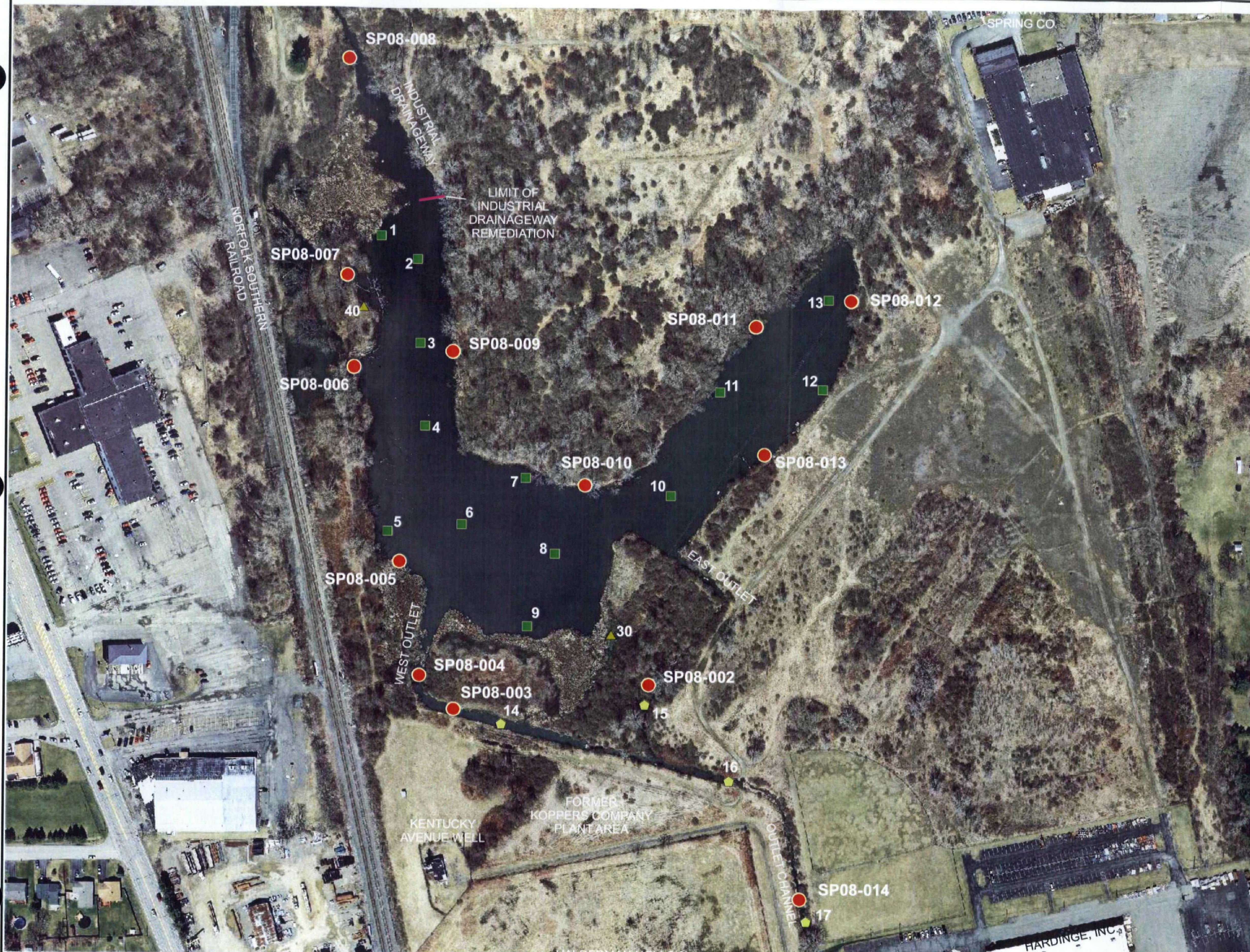
0 160 320 Feet

Prepared For:
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.

FIGURE 8
2008 POND AND OUTLET CHANNEL SAMPLE LOCATIONS
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

hheads-8.mxd



Slender Pondweed Sample Location

Pond Sample Location

Outlet Channel Sample Location

Mud Flat Sample Location

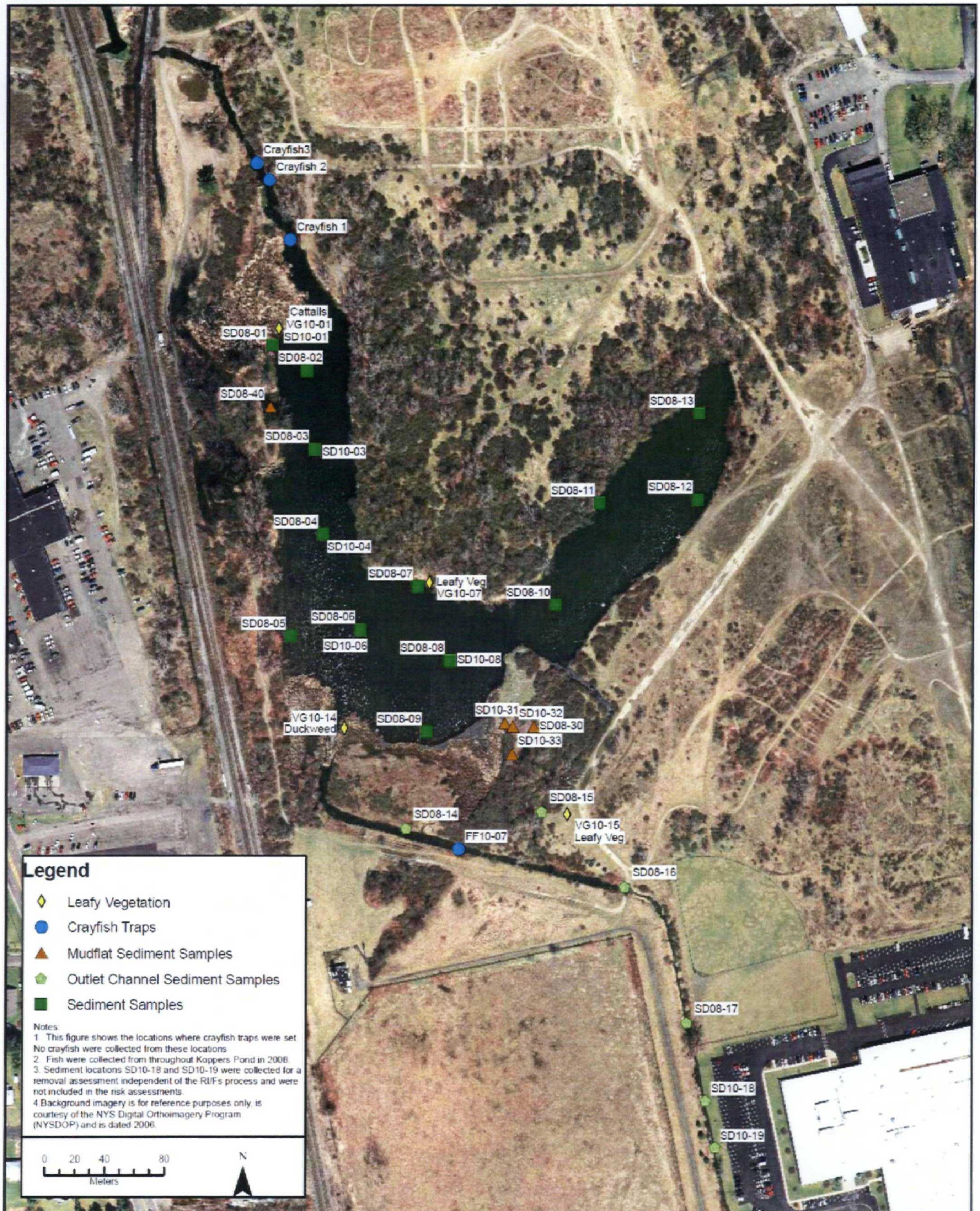
0 200 400 Feet

Prepared For:
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC

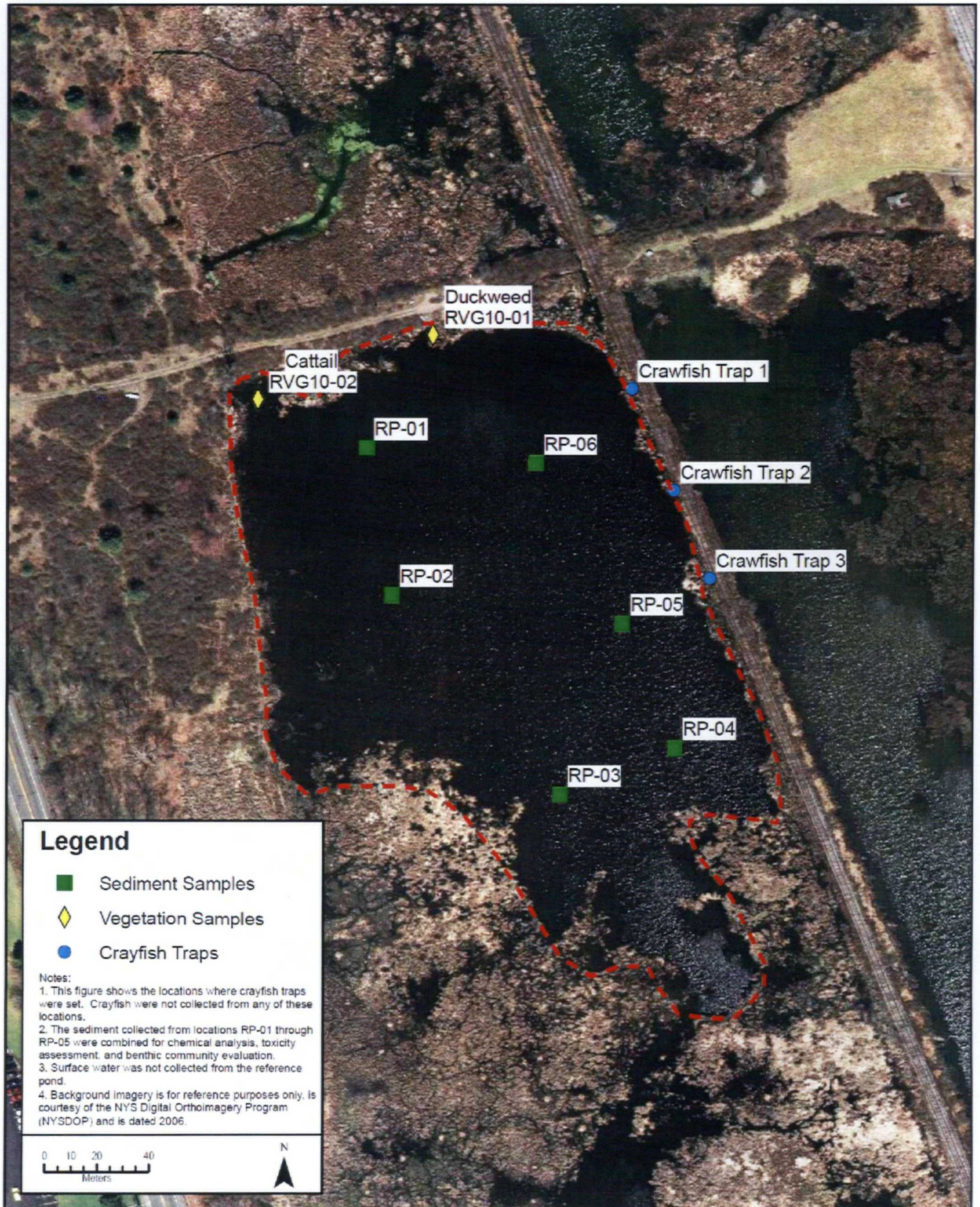
FIGURE 9
PONDWEED SURVEY LOCATIONS
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

hheads-8a.mxd



integral consulting inc.

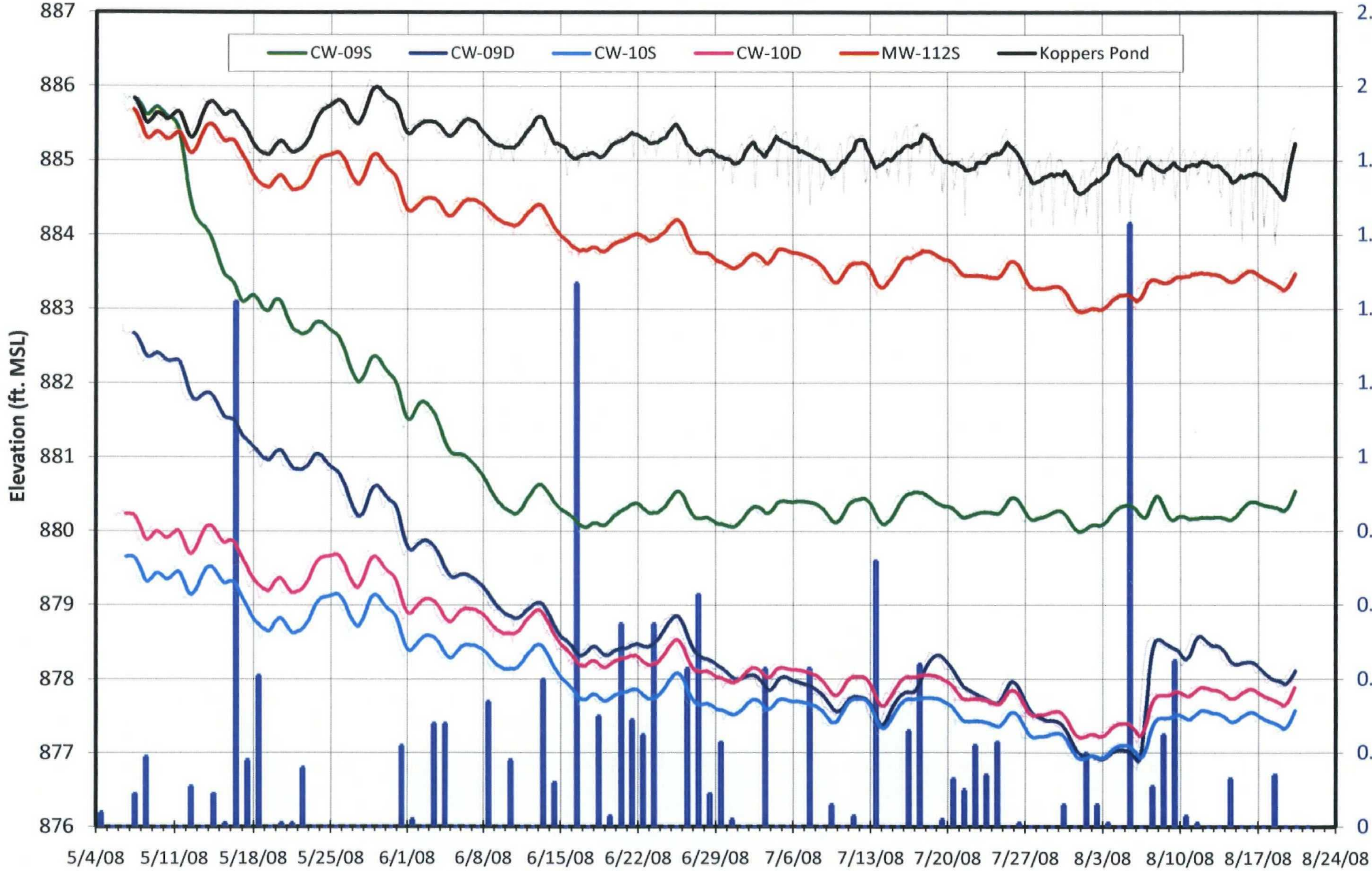
FIGURE 10
2010 SAMPLING LOCATIONS AT KOPPERS POND
KENTUCKY AVE. WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK



integral consulting inc.

FIGURE 11
REFERENCE POND SAMPLING LOCATIONS
KENTUCKY AVE. WELLFIELD SITE – OU4
HORSEHEADS, NEW YORK

FIGURE 12
Surface Water and Groundwater Hydrographs



Precipitation data from Elmira/Corning Regional Airport.

L:\users\BRM\502\07502.xls

SD08-01 (0-6)	
Cadmium	739 J
Chromium	462 J
Copper	820 J
Lead	1,480 J
Nickel	180 J
Zinc	12,500 J
Aroclor 1254	1.4 J

SD10-01 (0-6)	
Cadmium	283 J
Chromium	370 J
Copper	467 J
Lead	1,030 J
Nickel	121 J
Zinc	5,020 J
Aroclor-1254	0.70 J

SD08-02 (0-6)	
Cadmium	544
Chromium	379
Copper	669
Lead	1,620
Nickel	117
Zinc	9,830
Aroclor 1254	1.4

SD08-11 (0-6)	
Cadmium	57.1
Chromium	154
Copper	164
Lead	348
Nickel	84.3
Zinc	981
Aroclor 1254	0.22

SD08-13 (0-6)	
Cadmium	72.1 J
Chromium	195 J
Copper	246 J
Lead	267 J
Nickel	124 J
Zinc	1,190 J
Aroclor 1254	2.7 J

SD08-40 (0-6)	
Cadmium	2.0
Chromium	17.5
Copper	36.2
Lead	79.3
Nickel	16.3
Zinc	101
Aroclor 1254	0.043

SD08-03 (0-6)	
Cadmium	535 J
Chromium	441 J
Copper	657 J
Lead	1,580 J
Nickel	122 J
Zinc	9,330 J
Aroclor 1254	1.3 J

SD10-03 (0-6)	
Cadmium	323 J
Chromium	367 J
Copper	476 J
Lead	1,270 J
Nickel	89.8 J
Zinc	5,920 J
Aroclor-1254	0.48 J

SD08-12 (0-6)	
Cadmium	46.5 J
Chromium	130 J
Copper	133 J
Lead	312 J
Nickel	46.3 J
Zinc	882 J
Aroclor 1254	0.18 J

SD08-04 (0-6)	
Cadmium	553 J
Chromium	400 J
Copper	657 J
Lead	1,010 J
Nickel	157 J
Zinc	8,780 J
Aroclor 1254	1.5 J

SD10-04 (0-6)	
Cadmium	367 J
Chromium	320 J
Copper	495 J
Lead	989 J
Nickel	107 J
Zinc	6,380 J
Aroclor-1254	0.55 J

SD08-07 (0-6)	
Cadmium	287 J
Chromium	258 J
Copper	352 J
Lead	664 J
Nickel	88.5 J
Zinc	4,120 J
Aroclor 1254	0.58 J

SD08-10 (0-6)	
Cadmium	117
Chromium	230
Copper	298
Lead	273
Nickel	119
Zinc	1,720
Aroclor 1254	0.46

SD08-05 (0-6)	
Cadmium	23.2 J
Chromium	136 J
Copper	107 J
Lead	146
Nickel	76.3 J
Zinc	449 J
Aroclor 1254	0.41 J

SD08-08 (0-6)	
Cadmium	356 J
Chromium	274 J
Copper	412 J
Lead	562 J
Nickel	133 J
Zinc	4,930 J
Aroclor 1254	0.67 J

SD10-08 (0-6)	
Cadmium	292 J
Chromium	232 J
Copper	370 J
Lead	654 J
Nickel	99.1 J
Zinc	4,860 J
Aroclor-1254	0.52 J

	SD10-31 (0-6)	SD10-32 (0-6)	SD10-33 (0-6)
Cadmium	3.4 J	4.2	5.1 J
Chromium	41.6 J	42.2	51.2 J
Copper	35.1 J	41.8	46.8 J
Lead	114 J	126	157 J
Nickel	35.4 J	34.7	40.1 J
Zinc	202 J	227	263 J
Aroclor-1260	0.02 J	0.027 J	0.02 J

SD08-06 (0-6)	
Cadmium	61
Chromium	80.5
Copper	94.7
Lead	116
Nickel	52.1
Zinc	892
Aroclor 1254	0.072

SD10-06 (0-6)	
Cadmium	115 J
Chromium	151 J
Copper	185 J
Lead	339 J
Nickel	75.4 J
Zinc	1,950 J
Aroclor-1254	0.26 J

SD08-30 (0-6)	
Cadmium	1.3
Chromium	21.4
Copper	21.2
Lead	49.3
Nickel	21.4
Zinc	94.5
Aroclor 1254	ND

SD08-09 (0-6)	
Cadmium	4.4
Chromium	21.8
Copper	25.9
Lead	36.6
Nickel	23.8
Zinc	129
Aroclor 1254	0.020

SD08-15 (0-3)	
Cadmium	22.7 J
Chromium	83.4 J
Copper	94.6 J
Lead	189 J
Nickel	41.1 J
Zinc	534 J
Aroclor 1254	0.19 J

SD08-16 (0-4)	
Cadmium	48.7
Chromium	88.3
Copper	101
Lead	172
Nickel	49.6
Zinc	888
Aroclor 1254	0.13

SD08-14 (0-5)	
Cadmium	3.0
Chromium	24.8
Copper	25.1
Lead	34.3
Nickel	29.9
Zinc	123
Aroclor 1254	0.020

SD08-17 (0-6)	
Cadmium	91.9
Chromium	149
Copper	175
Lead	288
Nickel	55.5
Zinc	1,690
Aroclor 1254	0.280

SD10-18 (0-3)	
Cadmium	7.0
Chromium	25
Copper	29.2
Lead	45.2
Nickel	27.2
Zinc	192
Aroclor 1260	0.028

SD10-19 (0-3)	
Cadmium	0.7
Chromium	18.7
Copper	18.6
Lead	19.2
Nickel	25.4
Zinc	95
Aroclor 1260	0.0029

Note:
All PCBs were quantified as Aroclor 1254 or 1260. Thus, the Aroclor 1254/1260 concentrations shown on this figure are the total PCB concentrations.

- Pond Sample Location
- Outlet Channel Sample Location
- Mud Flat Sample Location

0 200 400 Feet

Prepared For:
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.

FIGURE 13
SEDIMENT SAMPLE RESULTS (mg/kg)
0 - 6 INCHES DEEP
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

hheads-10a.mxd

SD08-01 (6-18)	
Cadmium	759
Chromium	329
Copper	752
Lead	829
Nickel	194
Zinc	12,100
Aroclor 1254	2.2

SD08-02 (6-18)	
Cadmium	931
Chromium	454
Copper	961
Lead	645
Nickel	308
Zinc	11,500
Aroclor 1254	5.1 J

SD08-03 (6-18)	
Cadmium	1,080
Chromium	418
Copper	965
Lead	776
Nickel	274
Zinc	13,800
Aroclor 1254	4.9

SD08-04 (6-18)	
Cadmium	72.4
Chromium	101
Copper	164
Lead	65
Nickel	106
Zinc	580
Aroclor 1254	4.3

SD08-05 (6-13)	
Cadmium	6.0 J
Chromium	82.6
Copper	51.9 J
Lead	61.8
Nickel	55.9
Zinc	163 J
Aroclor 1254	0.15 J

SD08-06 (6-9)	
Cadmium	0.75
Chromium	20.9
Copper	15.7
Lead	17.1
Nickel	21.3
Zinc	60.3
Aroclor 1254	ND

SD08-07 (6-18)	
Cadmium	56.5
Chromium	64.6
Copper	99.5 J
Lead	64.1
Nickel	56 J
Zinc	742 J
Aroclor 1254	1.3

SD08-08 (6-18)	
Cadmium	63.5
Chromium	53.8
Copper	84.8
Lead	50.1
Nickel	47
Zinc	864
Aroclor 1254	0.20

SD08-09 (6-10)	
Cadmium	2.0
Chromium	23.4
Copper	22.1
Lead	28.3
Nickel	27.7
Zinc	107
Aroclor 1254	ND

SD08-10 (6-18)	
Cadmium	99.7
Chromium	440
Copper	602
Lead	148
Nickel	372
Zinc	983
Aroclor 1254	6.5

SD08-11 (6-9)	
Cadmium	49.2
Chromium	211
Copper	233
Lead	140
Nickel	157
Zinc	726
Aroclor 1254	0.69

SD08-12 (6-12)	
Cadmium	58.3
Chromium	191
Copper	188
Lead	493
Nickel	93
Zinc	1,050
Aroclor 1254	0.18

SD08-13 (6-18)	
Cadmium	94.4
Chromium	432
Copper	517
Lead	227
Nickel	254
Zinc	1,280
Aroclor 1254	0.41

N

Note:
All PCBs were quantified as Aroclor 1254. Thus, the Aroclor 1254 concentrations shown on this figure are the total PCB concentrations.

■ Pond Sample Location

0 100 200 Feet

Prepared For:
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.

FIGURE 14
SEDIMENT SAMPLE RESULTS (mg/kg)
6 - 18 INCHES DEEP
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

hheads-10b.mxd

SD08-01 (18-30)	
Cadmium	261
Chromium	246
Copper	358
Lead	149
Nickel	205
Zinc	1,090
Aroclor 1254	6.6

SD08-01 (30-35)	
Cadmium	15.5
Chromium	34.6
Copper	76.6
Lead	30.8
Nickel	27.1
Zinc	222
Aroclor 1254	0.17

SD08-02 (18-30)	
Cadmium	45.6
Chromium	76.6
Copper	112
Lead	81.9
Nickel	64
Zinc	469
Aroclor 1254	0.51

SD08-02 (30-38)	
Cadmium	16.8
Chromium	43.3
Copper	43.6
Lead	36
Nickel	38.9
Zinc	244
Aroclor 1254	0.064

SD08-03 (18-25)	
Cadmium	80.6
Chromium	115
Copper	179
Lead	70.6
Nickel	96
Zinc	670
Aroclor 1254	7.2

SD08-03 (25-29)	
Cadmium	223
Chromium	360
Copper	511
Lead	170
Nickel	340
Zinc	1,650
Aroclor 1254	11.0

SD08-04 (18-20)	
Cadmium	32.7
Chromium	65
Copper	112
Lead	55.8
Nickel	65.3
Zinc	401
Aroclor 1254	0.68 J

SD08-07 (18-22)	
Cadmium	1.2
Chromium	21.8
Copper	23.4 J
Lead	17.2
Nickel	20.2 J
Zinc	69.8 J
Aroclor 1254	ND

SD08-08 (18-20)	
Cadmium	9.4
Chromium	26.8
Copper	33.7
Lead	28.9
Nickel	27.5
Zinc	179
Aroclor 1254	0.044

SD08-10 (18-23)	
Cadmium	11.7
Chromium	145
Copper	190
Lead	58.4
Nickel	115
Zinc	241
Aroclor 1254	0.76

SD08-13 (18-27.5)	
Cadmium	41.1
Chromium	285
Copper	399
Lead	99
Nickel	226
Zinc	415
Aroclor 1254	3.1

N

Note:
All PCBs were quantified as Aroclor 1254. Thus, the Aroclor 1254 concentrations shown on this figure are the total PCB concentrations.

■ Pond Sample Location

0 100 200 Feet

Prepared For:
KOPPERS POND RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.

FIGURE 15
SEDIMENT SAMPLE RESULTS (mg/kg)
18 + INCHES DEEP
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

hheads-10c.mxd

Figure 16
Box Plot Key

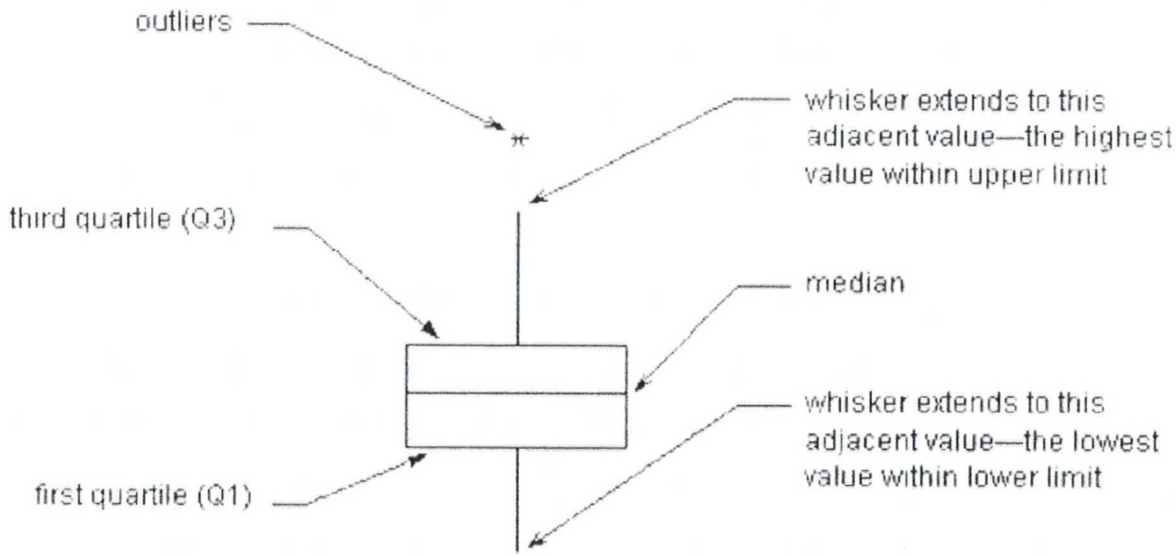
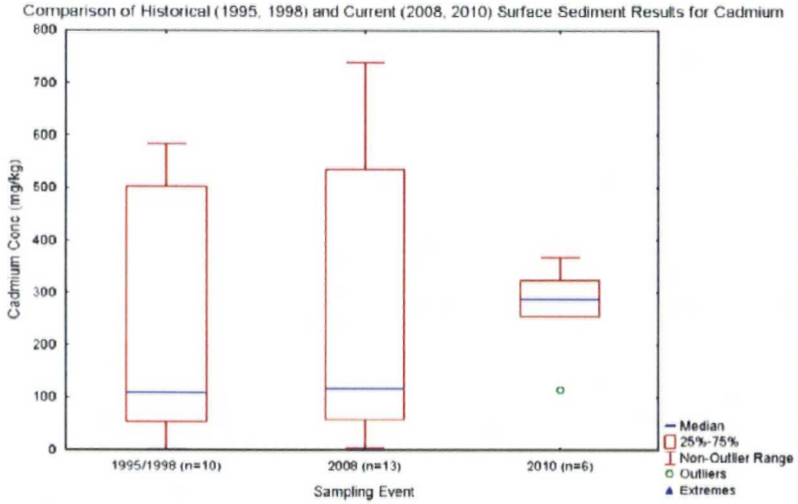
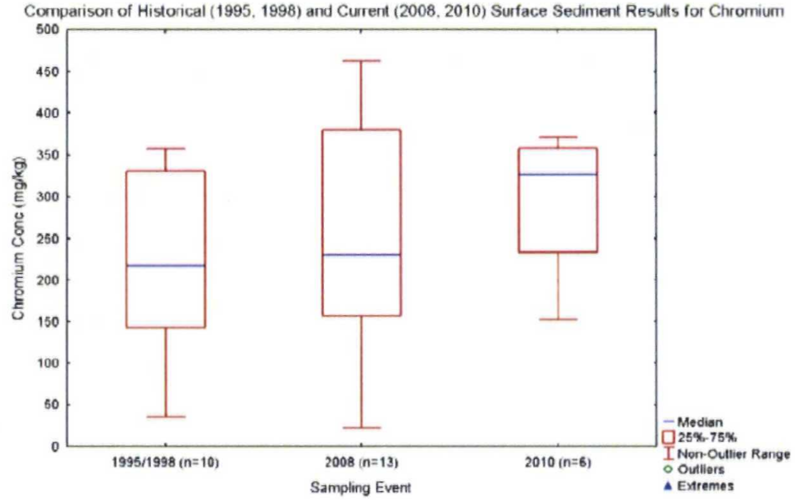
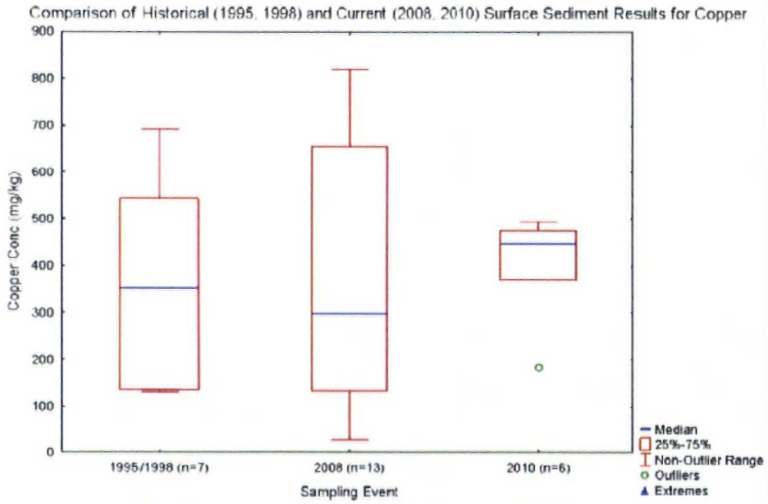


Figure 17
Box Plots of Cadmium, Chromium, Copper and Lead from Historical (1995/1998) and Current (2008, 2010) Surface (0-6") Sediment from Koppers Pond







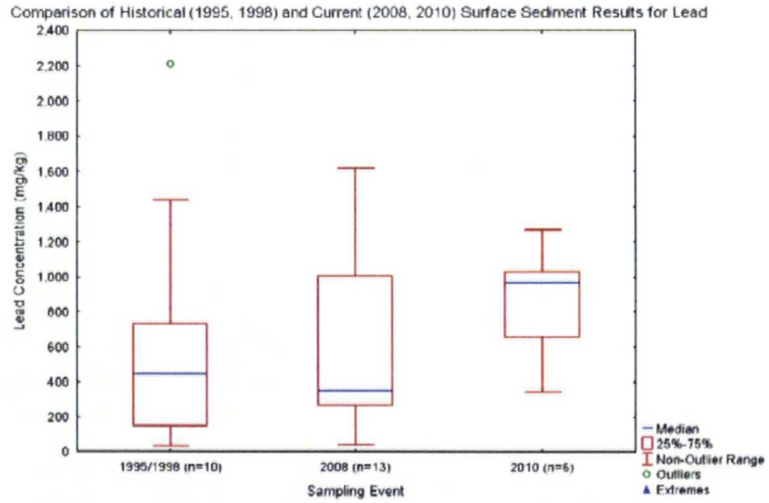


Figure 18
Box Plots of Mercury, Nickel, Zinc and Total PCBs from Historical (1995/1998) and Current (2008, 2010) Surface (0-6") Sediment from Koppers Pond

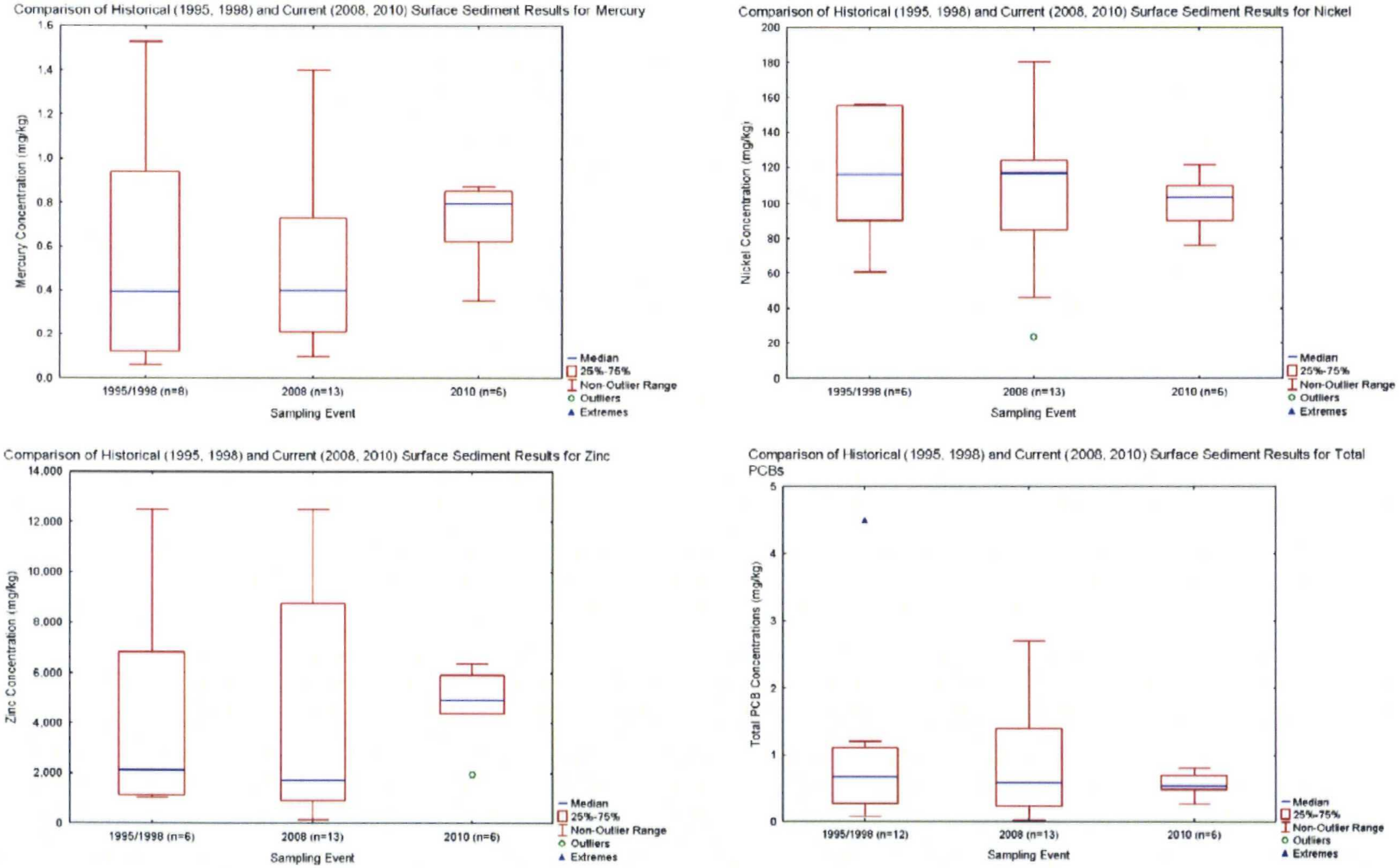


Figure 19
Box Plots of Cadmium, Chromium, Copper and Lead from Historical (1995/1998) and Current (2008) Outlet Channel Sediment

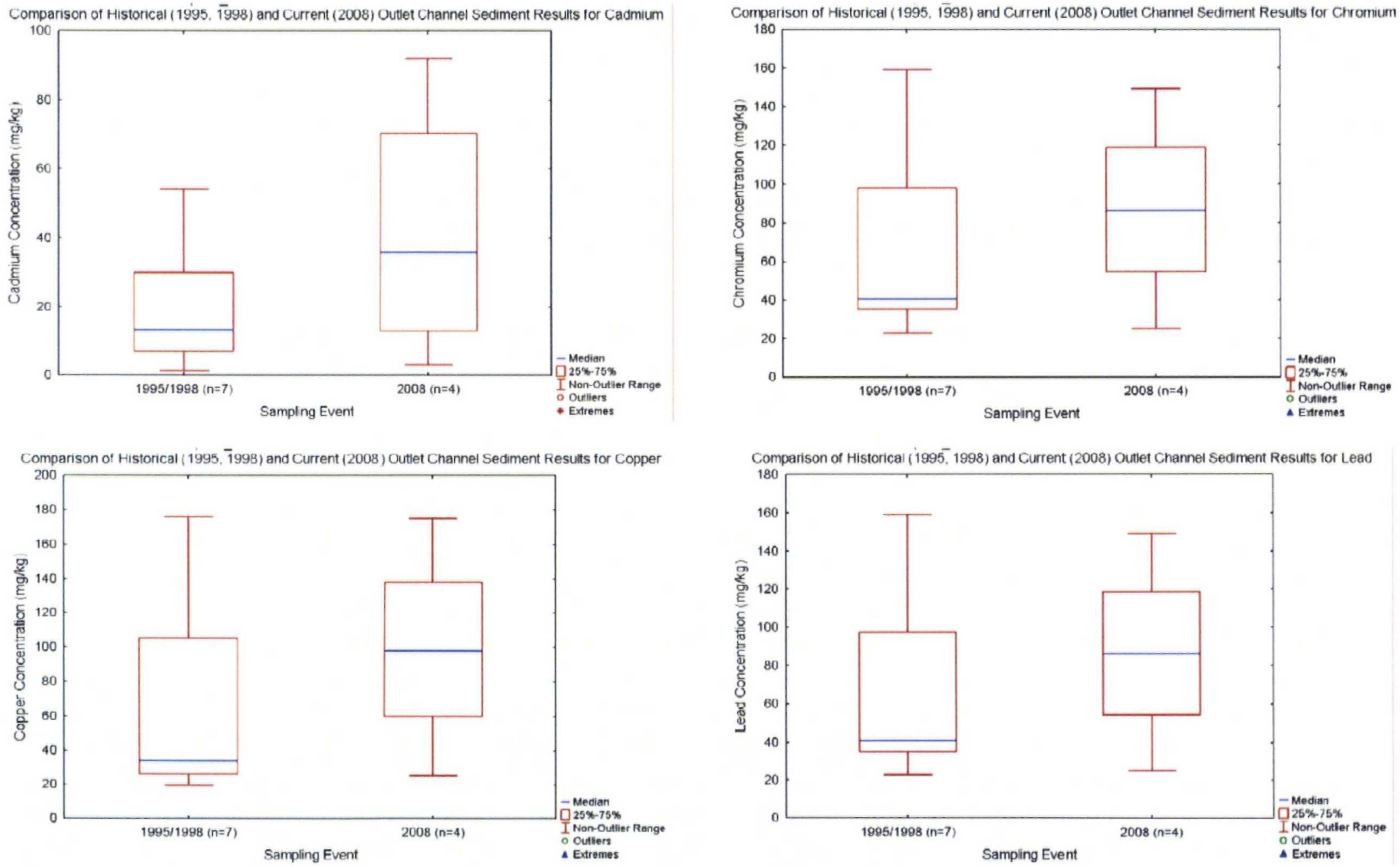
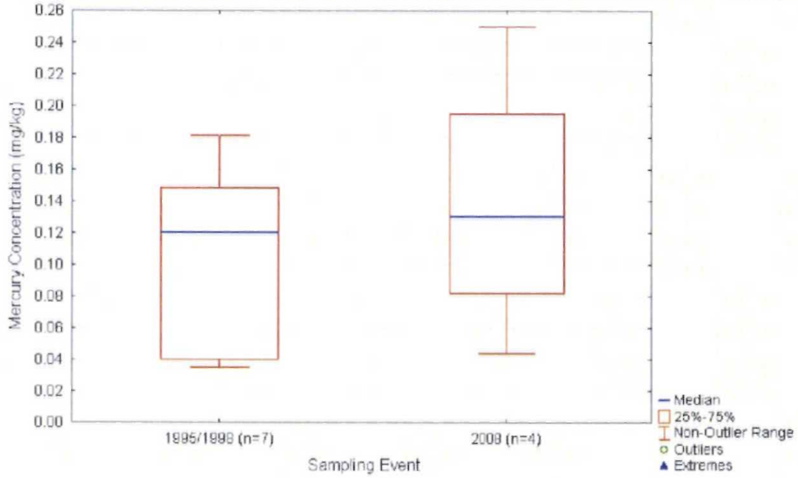
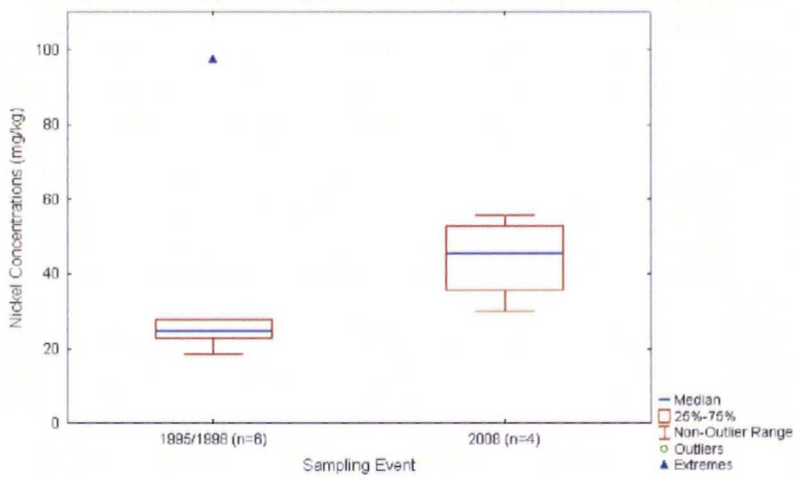
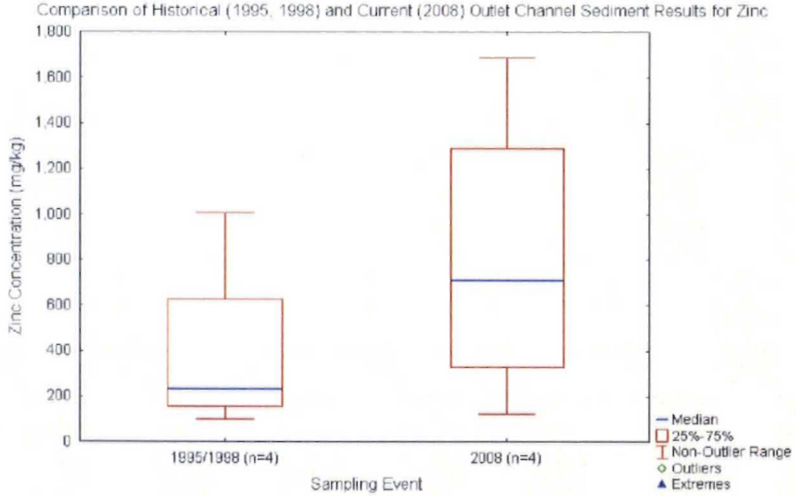


Figure 20
Box Plots of Mercury, Nickel, and Zinc from Historical (1995/1998) and Current (2008) Outlet Channel Sediment







Note:
A box plot of the total PCB results was not prepared because the 1995/1998 results were all non-detects.

Figure 21
Box Plots of Chromium Concentrations in All Game Fish and Individual Species from Koppers Pond

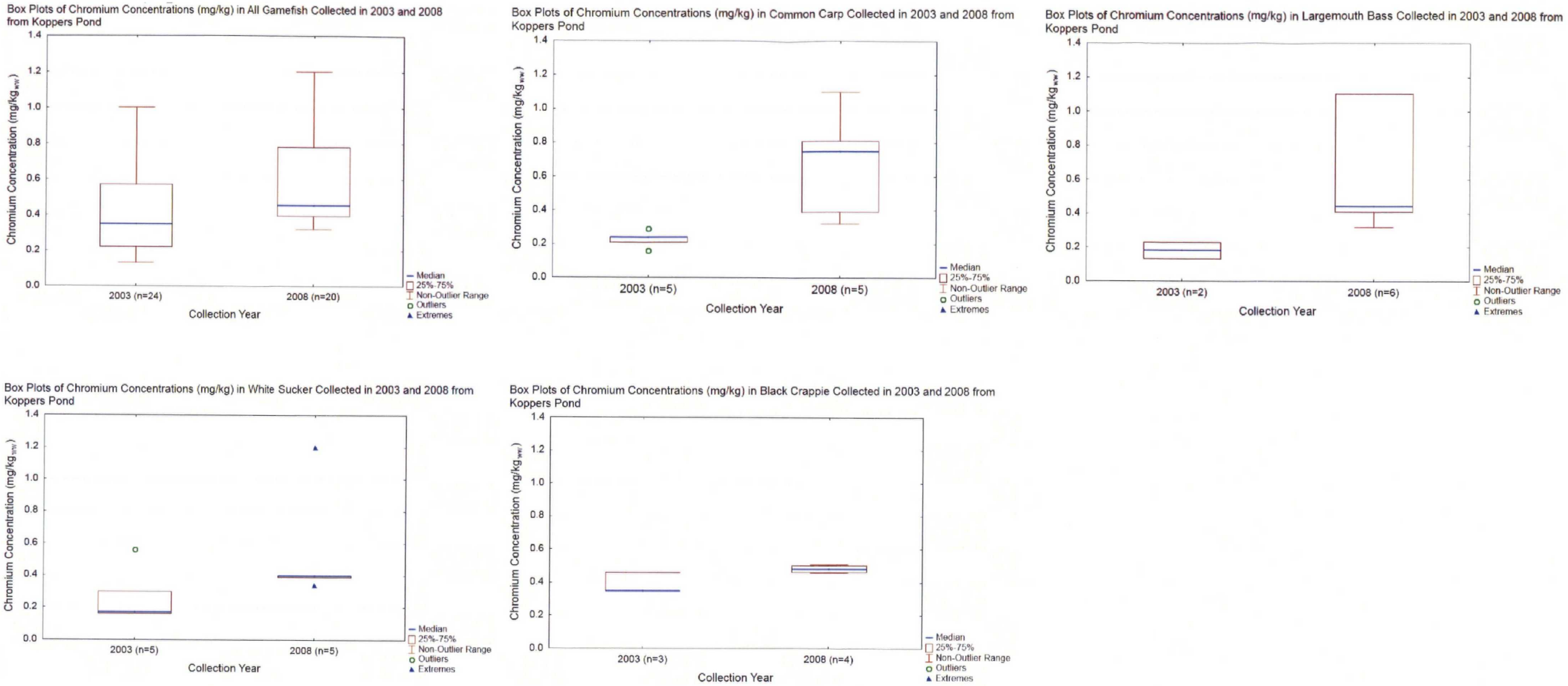
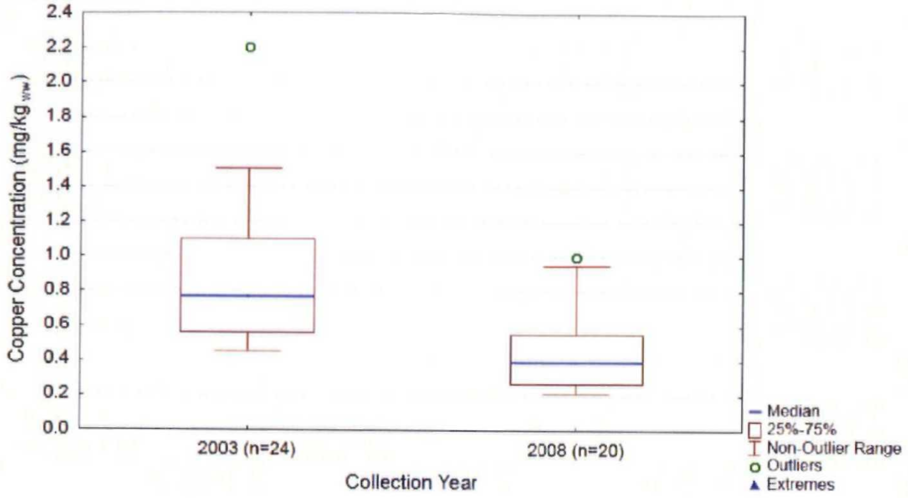
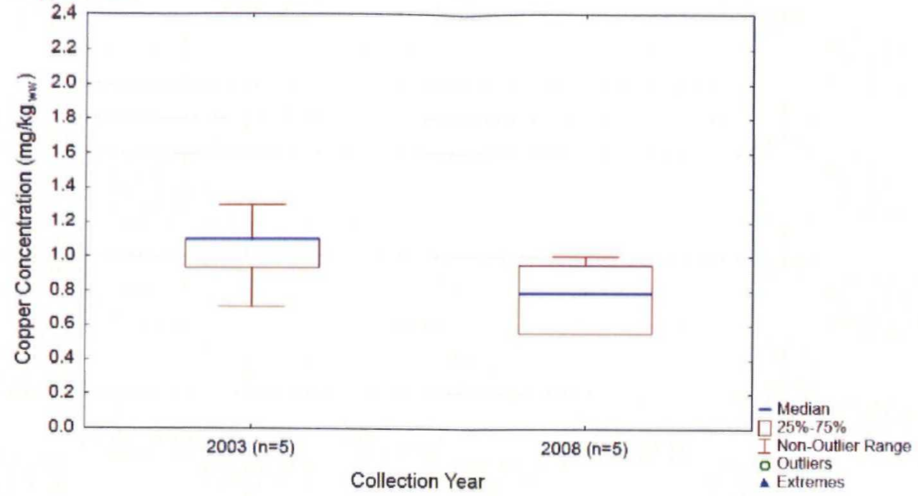


Figure 22
Box Plots of Copper Concentrations in All Game Fish and Individual Species from Koppers Pond

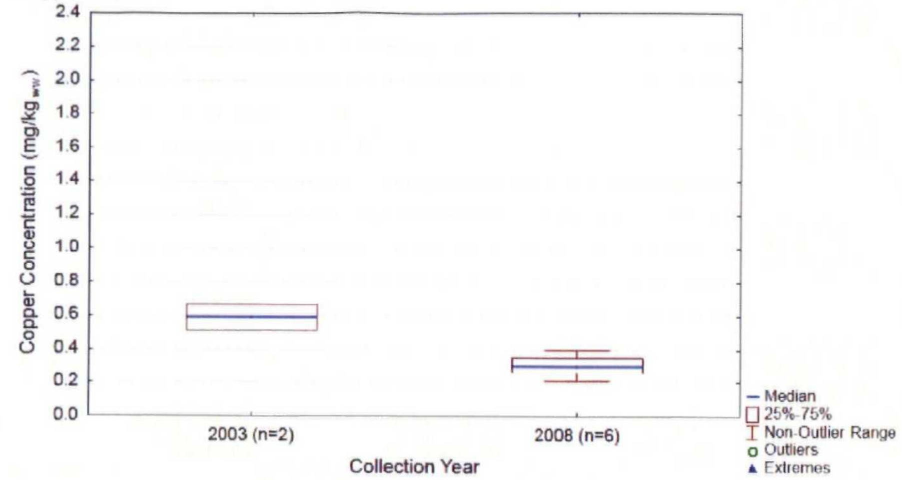
Box Plots of Copper Concentrations (mg/kg) in All Gamefish Collected in 2003 and 2008 from Koppers Pond



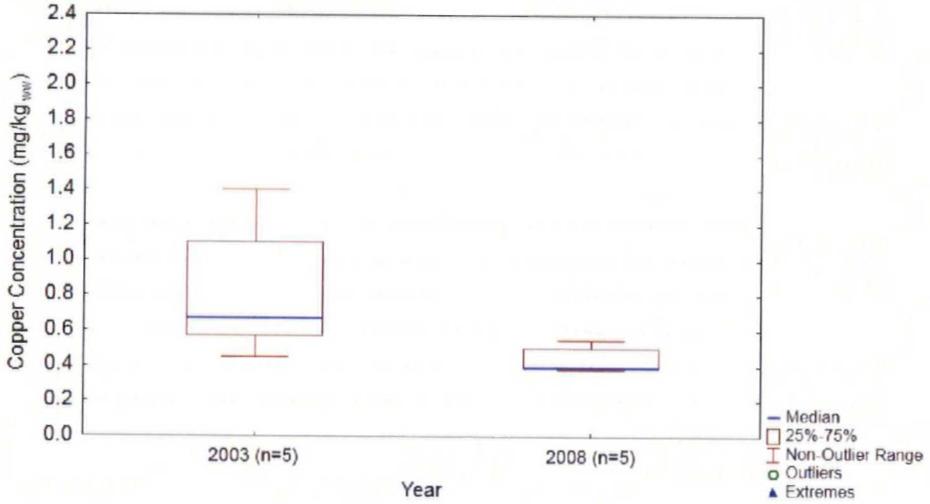
Box Plots of Copper Concentrations (mg/kg) in Common Carp Collected in 2003 and 2008 from Koppers Pond



Box Plots of Copper Concentrations (mg/kg) in Largemouth Bass Collected in 2003 and 2008 from Koppers Pond



Box Plots of Copper Concentrations (mg/kg) in White Sucker Collected in 2003 and 2008 from Koppers Pond



Box Plots of Copper Concentrations (mg/kg) in Black Crappie Collected in 2003 and 2008 from Koppers Pond

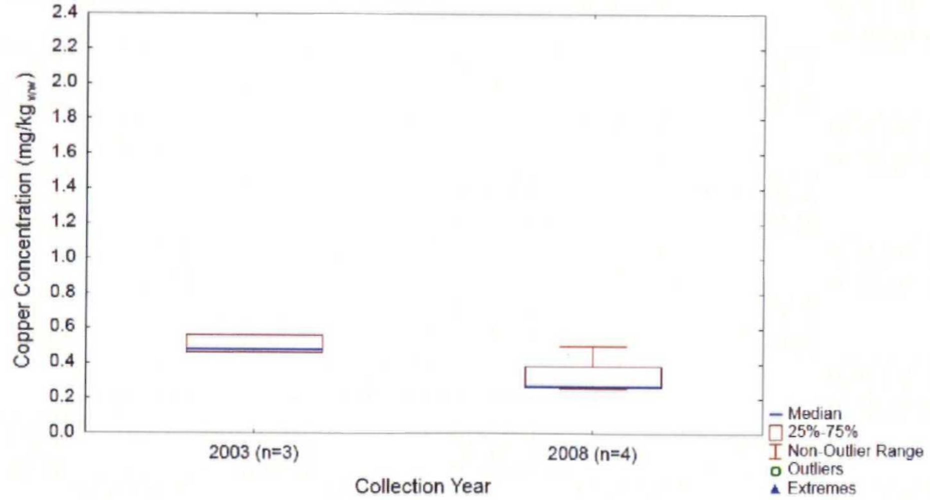
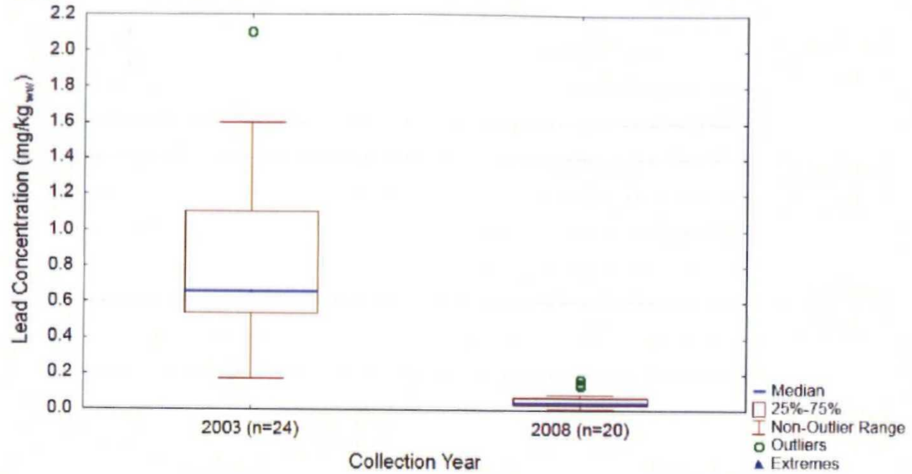
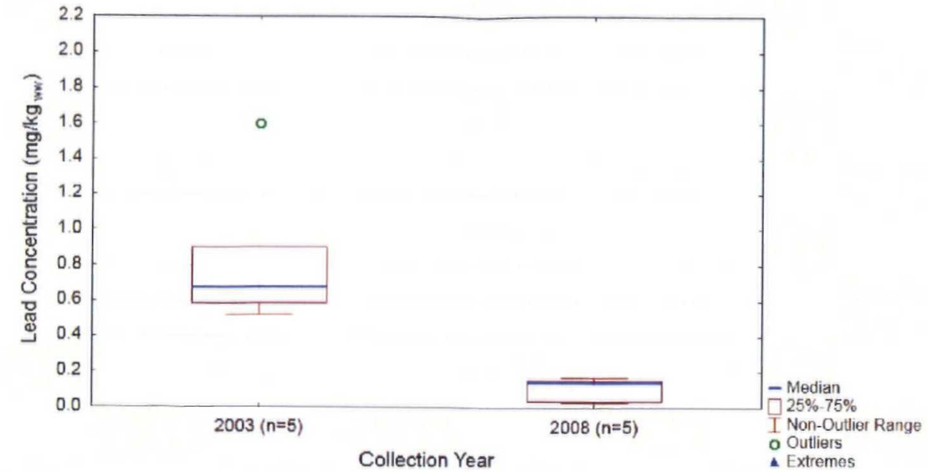


Figure 23
Box Plots of Lead Concentrations in All Game Fish and Individual Species from Koppers Pond

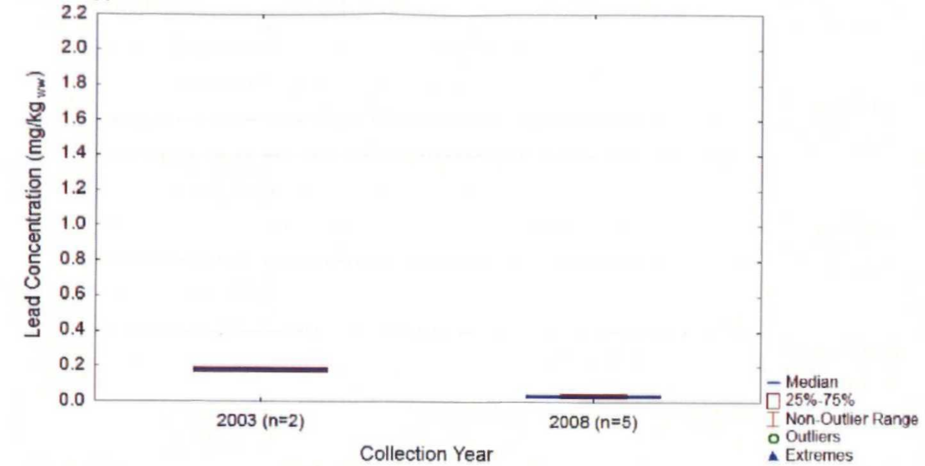
Box Plots of Lead Concentrations (mg/kg) in All Gamefish Collected in 2003 and 2008 from Koppers Pond



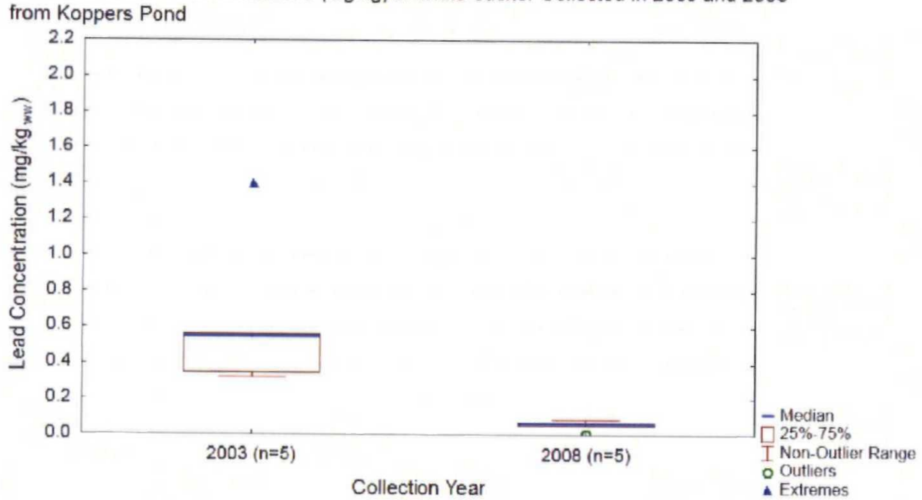
Box Plots of Lead Concentrations (mg/kg) in Common Carp Collected in 2003 and 2008 from Koppers Pond



Box Plots of Lead Concentrations (mg/kg) in Largemouth Bass Collected in 2003 and 2008 from Koppers Pond



Box Plots of Lead Concentrations (mg/kg) in White Sucker Collected in 2003 and 2008 from Koppers Pond



Box Plots of Lead Concentrations (mg/kg) in Common Carp Collected in 2003 and 2008 from Koppers Pond

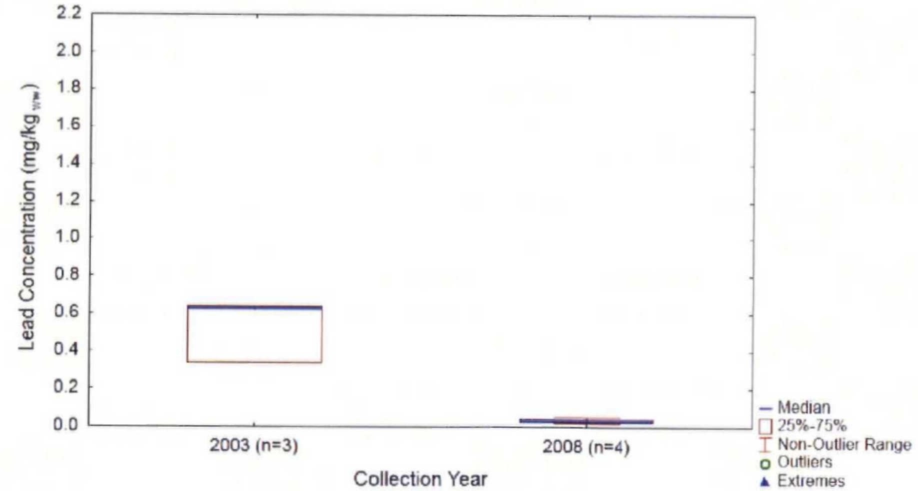


Figure 24
Box Plots of Mercury Concentrations in All Game Fish and Individual Species from Koppers Pond

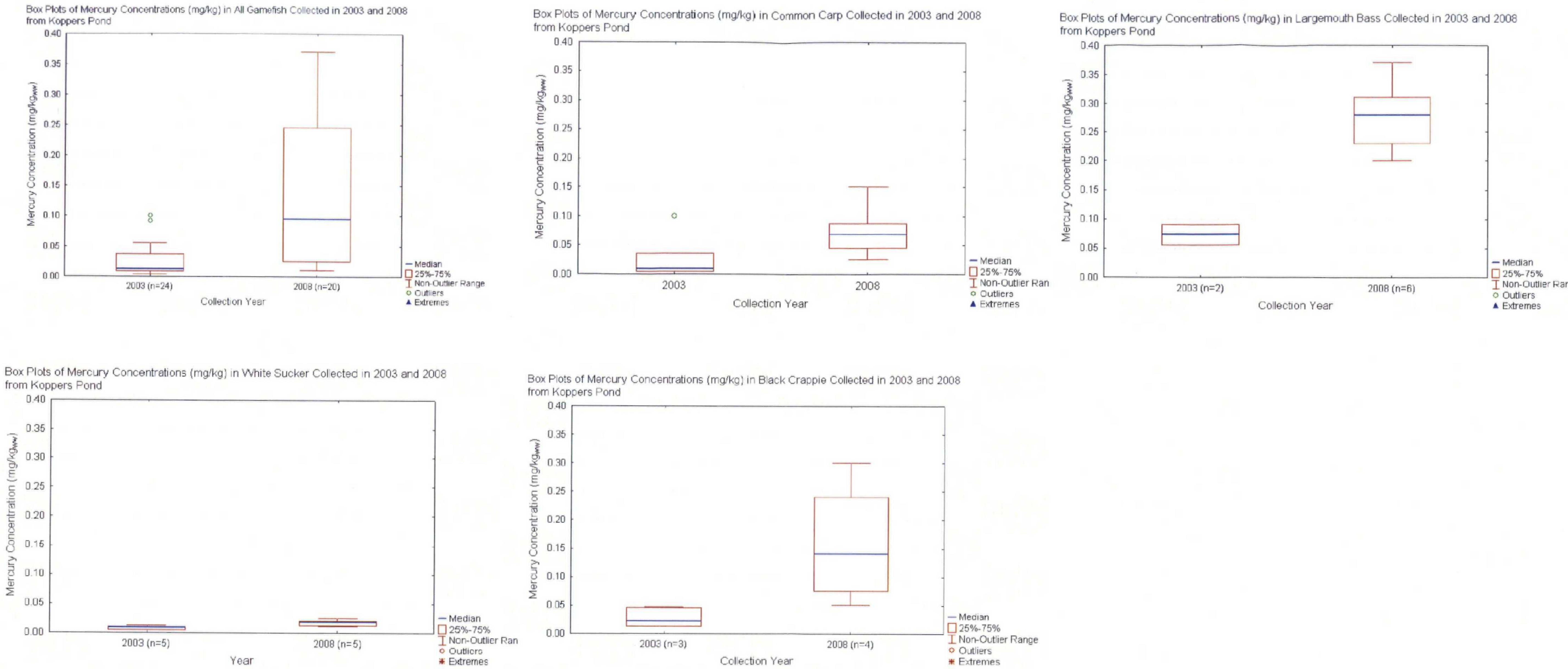
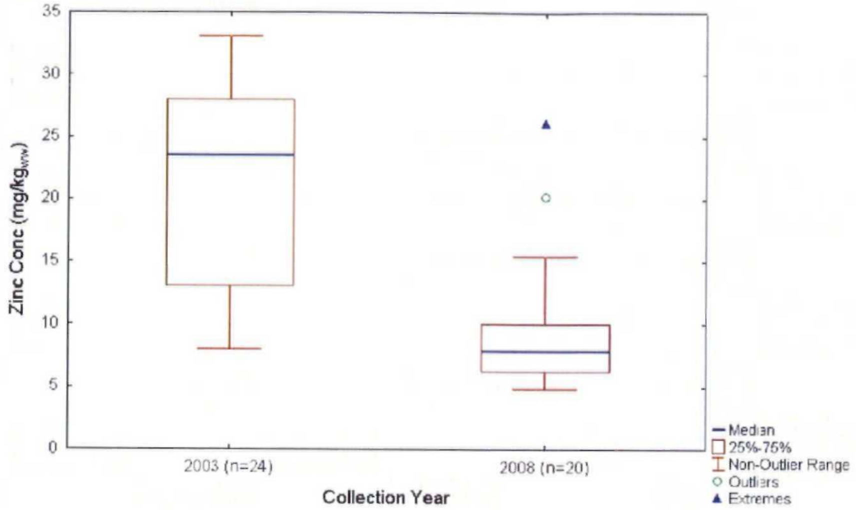
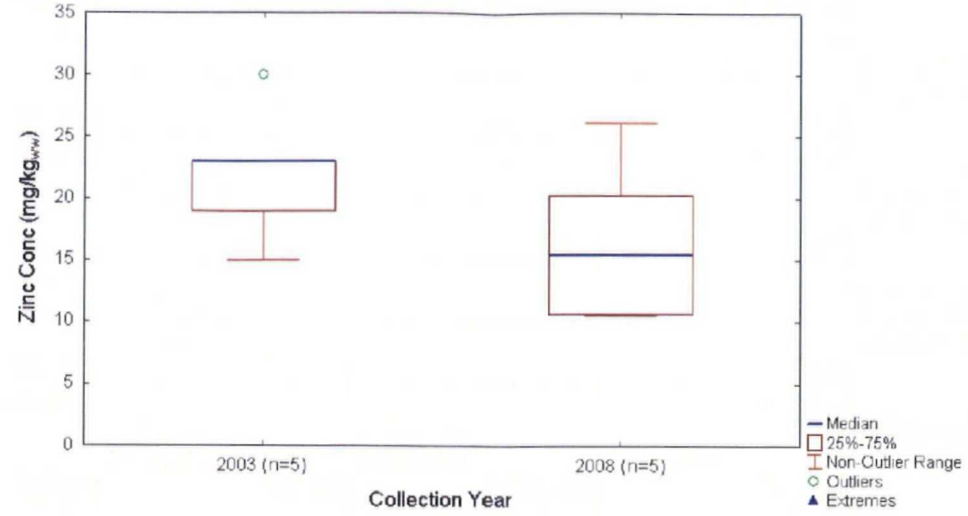


Figure 25
Box Plots of Zinc Concentrations in All Game Fish and Individual Species from Koppers Pond

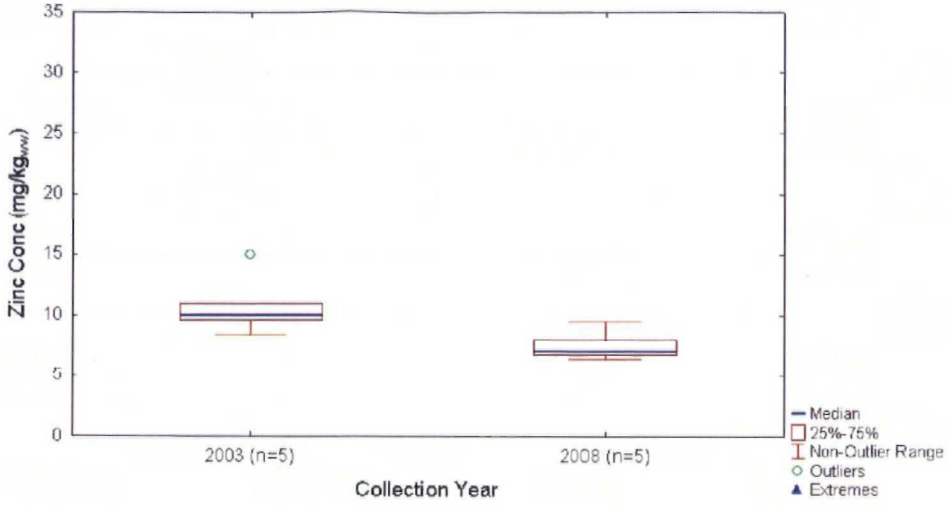
Box Plots of Zinc Concentrations (mg/kg) in All Gamefish Collected in 2003 and 2008 from Koppers Pond



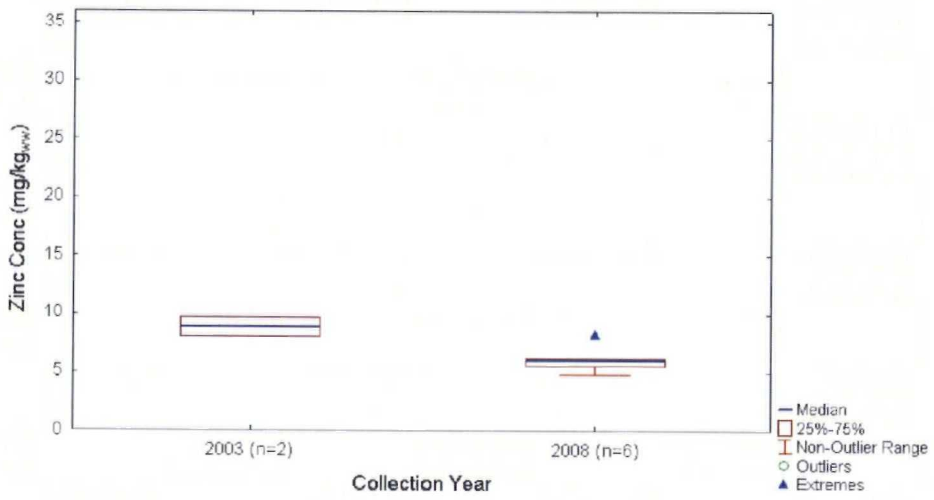
Box Plots of Zinc Concentrations (mg/kg) in Common Carp Collected in 2003 and 2008 from Koppers Pond



Box Plots of Zinc Concentrations (mg/kg) in White Sucker Collected in 2003 and 2008 from Koppers Pond



Box Plots of Zinc Concentrations (mg/kg) in Largemouth Bass Collected in 2003 and 2008 from Koppers Pond



Box Plots of Zinc Concentrations (mg/kg) in Black Crappie Collected in 2003 and 2008 from Koppers Pond

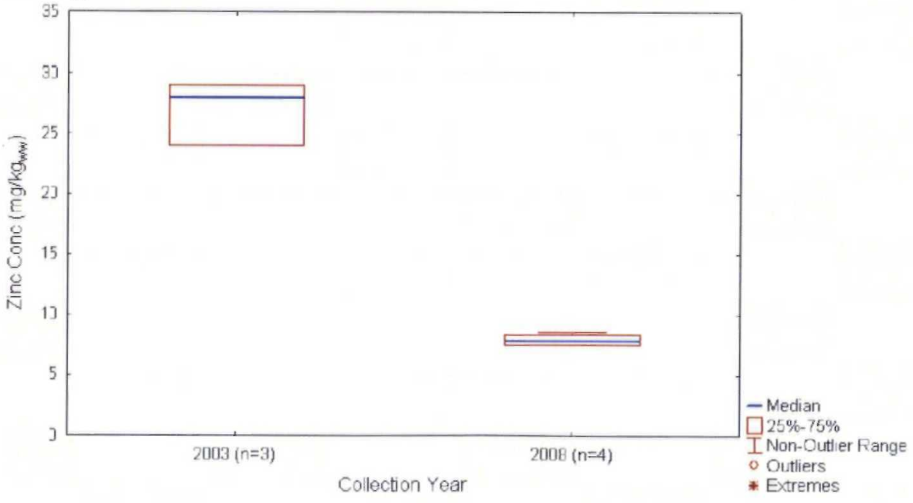
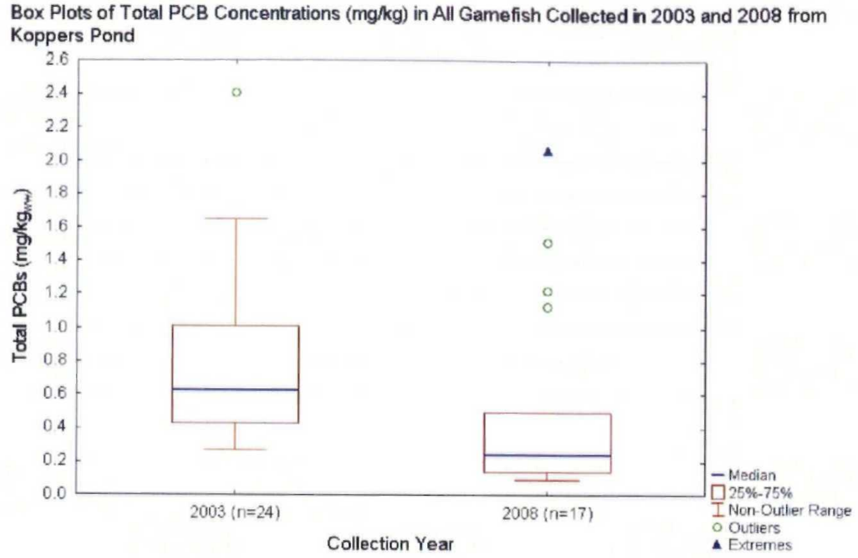
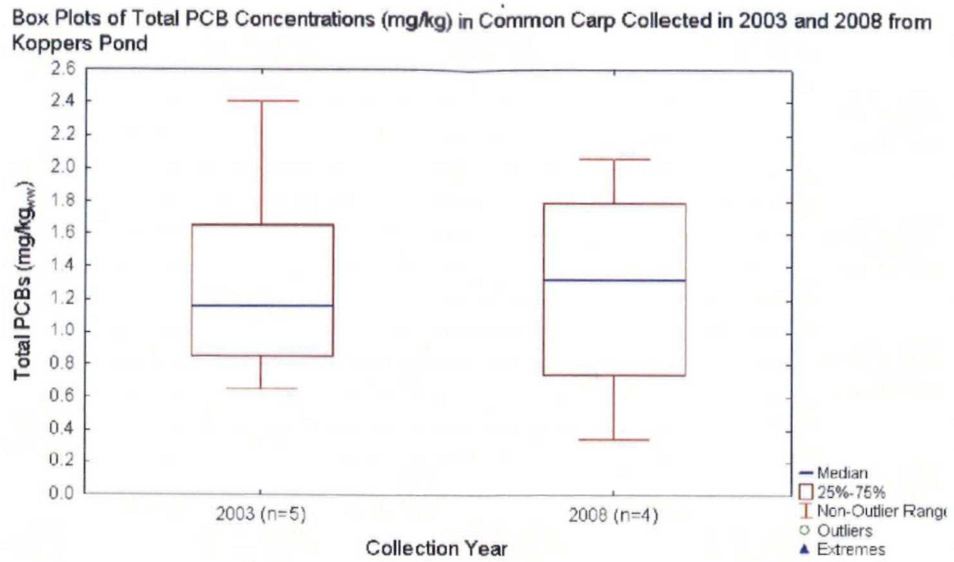
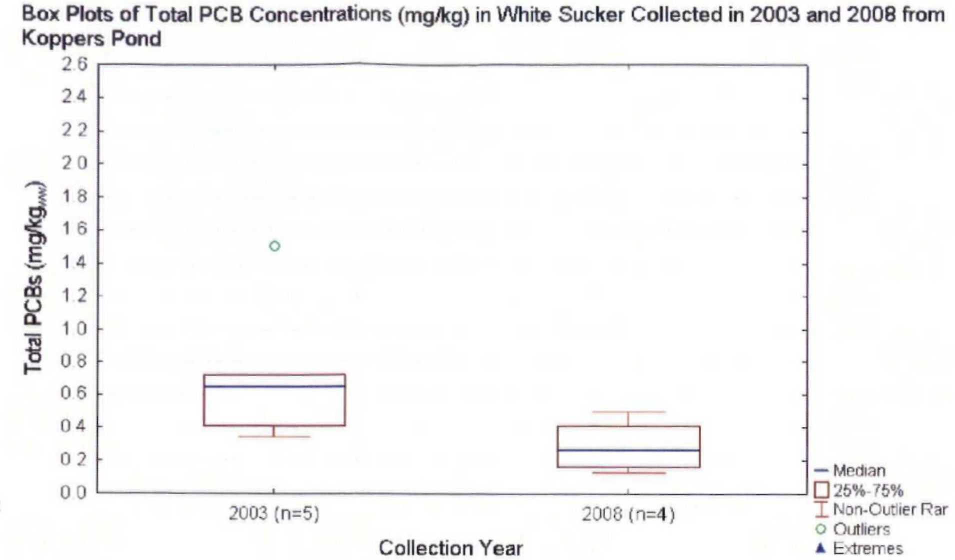
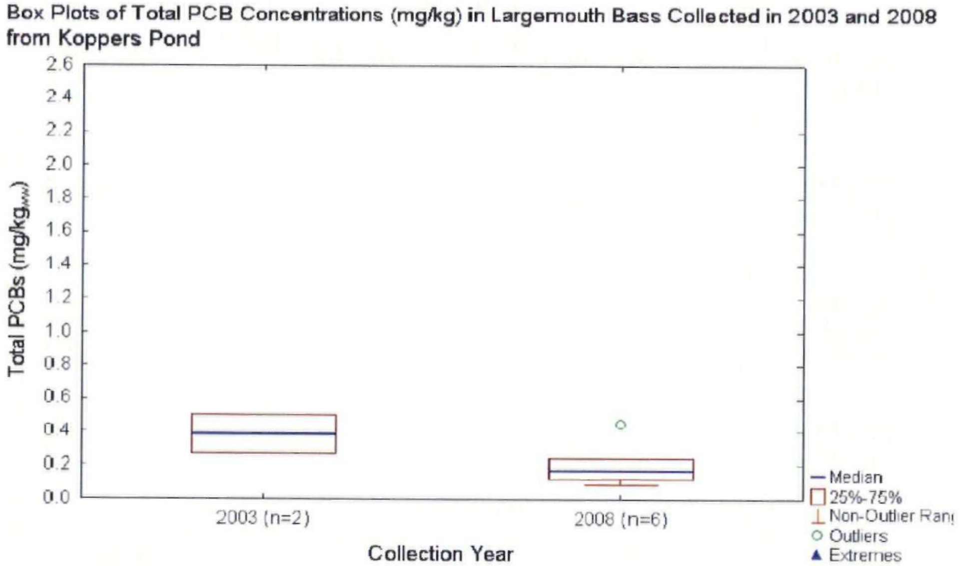


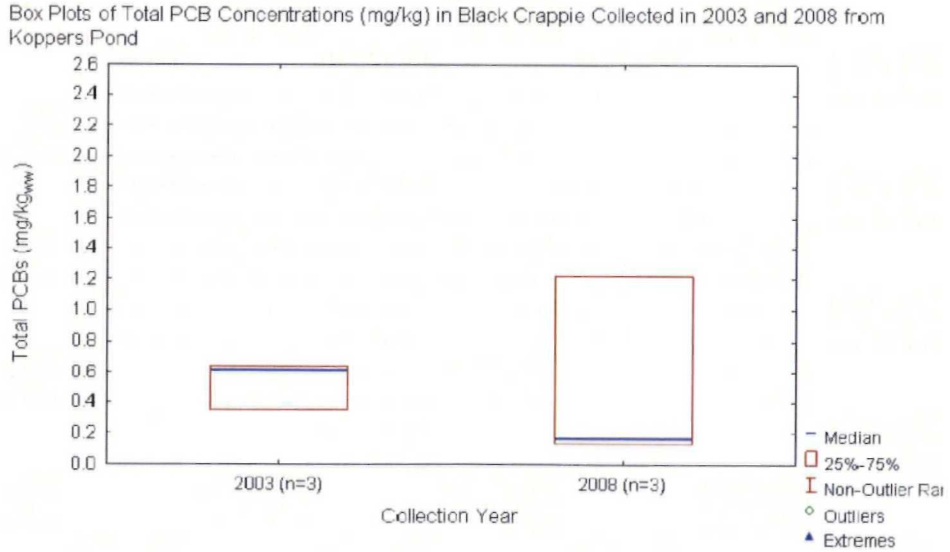
Figure 26
Box Plots of Total PCB Concentrations in All Game Fish and Individual Species from Koppers Pond

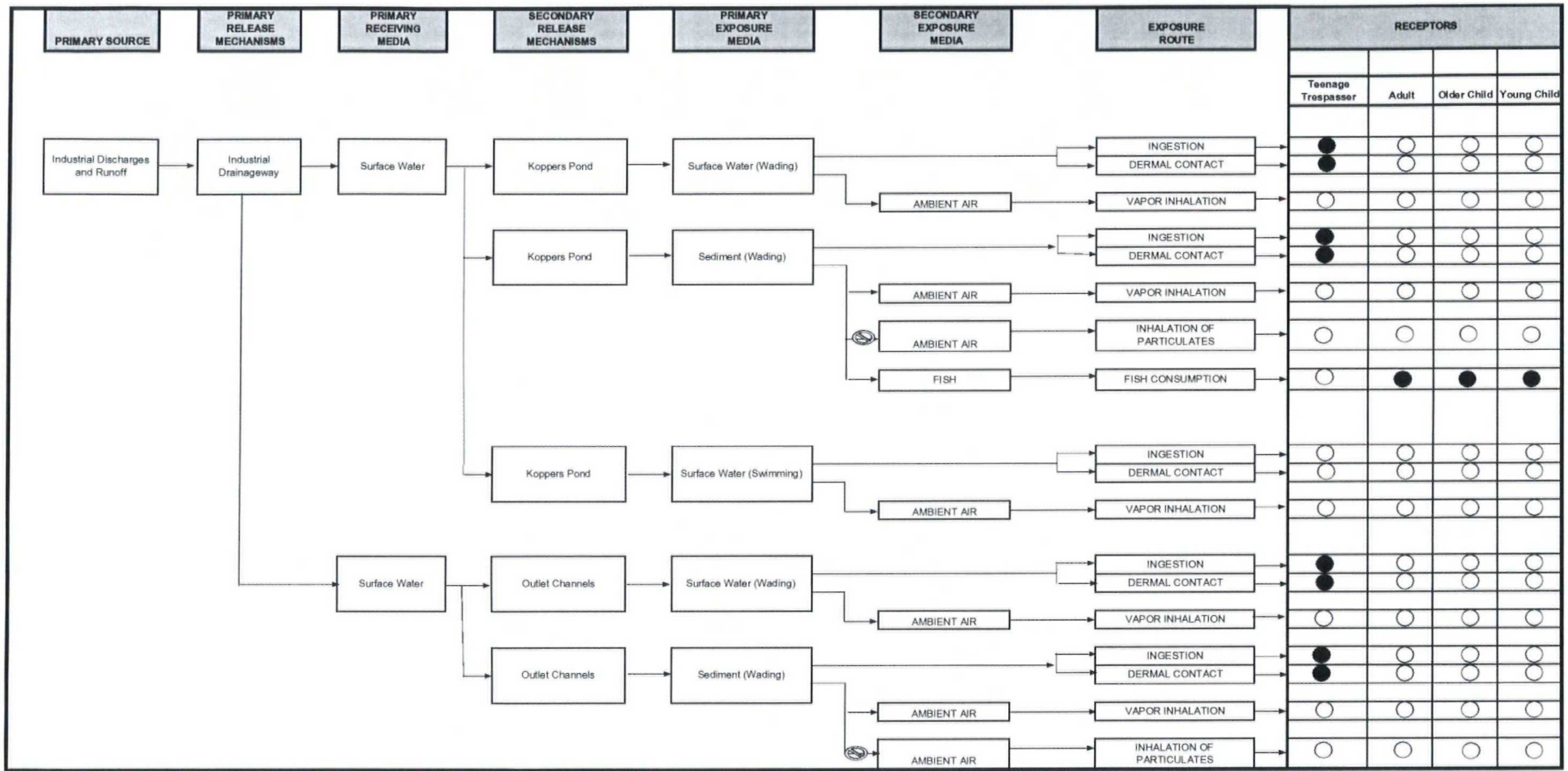










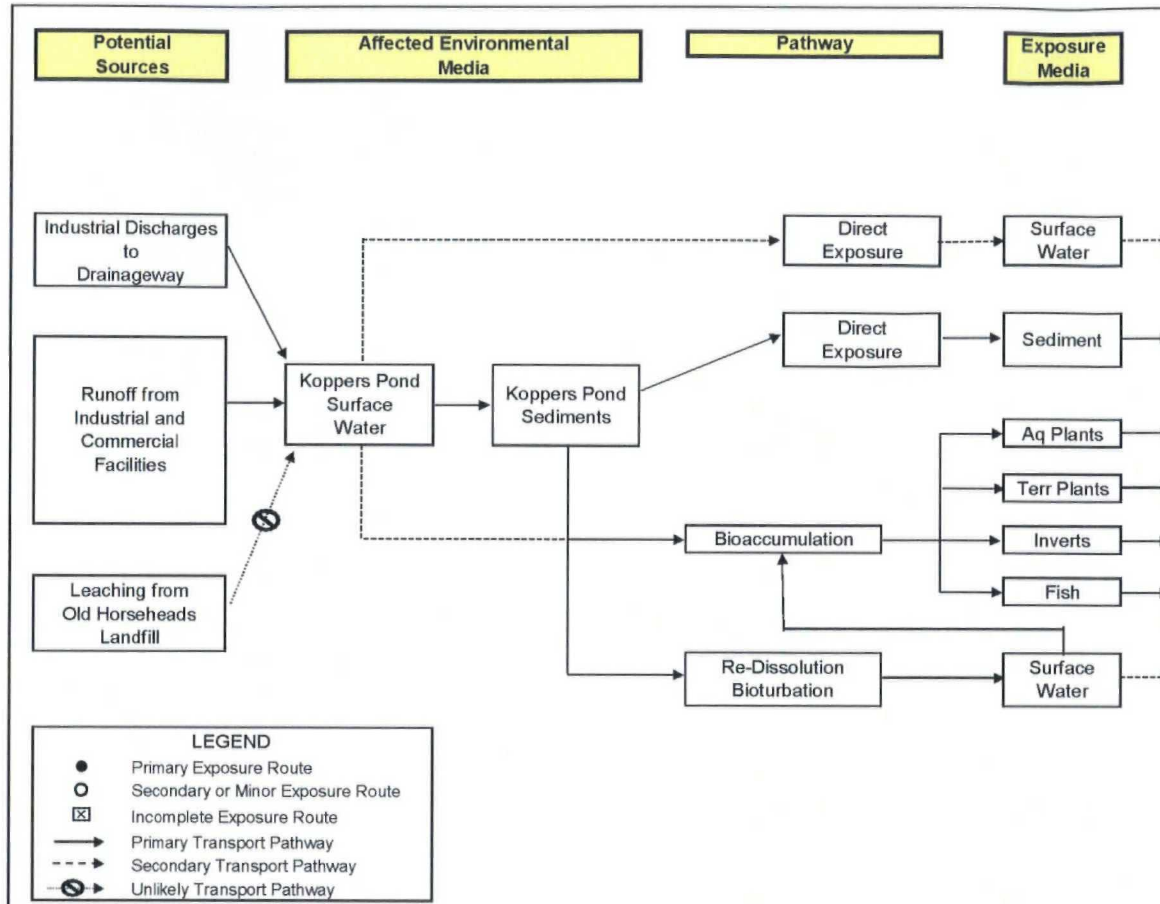


LEGEND

- Exposure Pathway Evaluated and Incomplete
- Exposure Pathway Evaluated and Complete
- Transport Pathway Incomplete

integral

Figure 27. Conceptual Site Model for the Baseline Human Health Risk Assessment
Koppers Pond Kentucky Avenue Wellfield Site
Operable Unit 4, Horseheads, New York



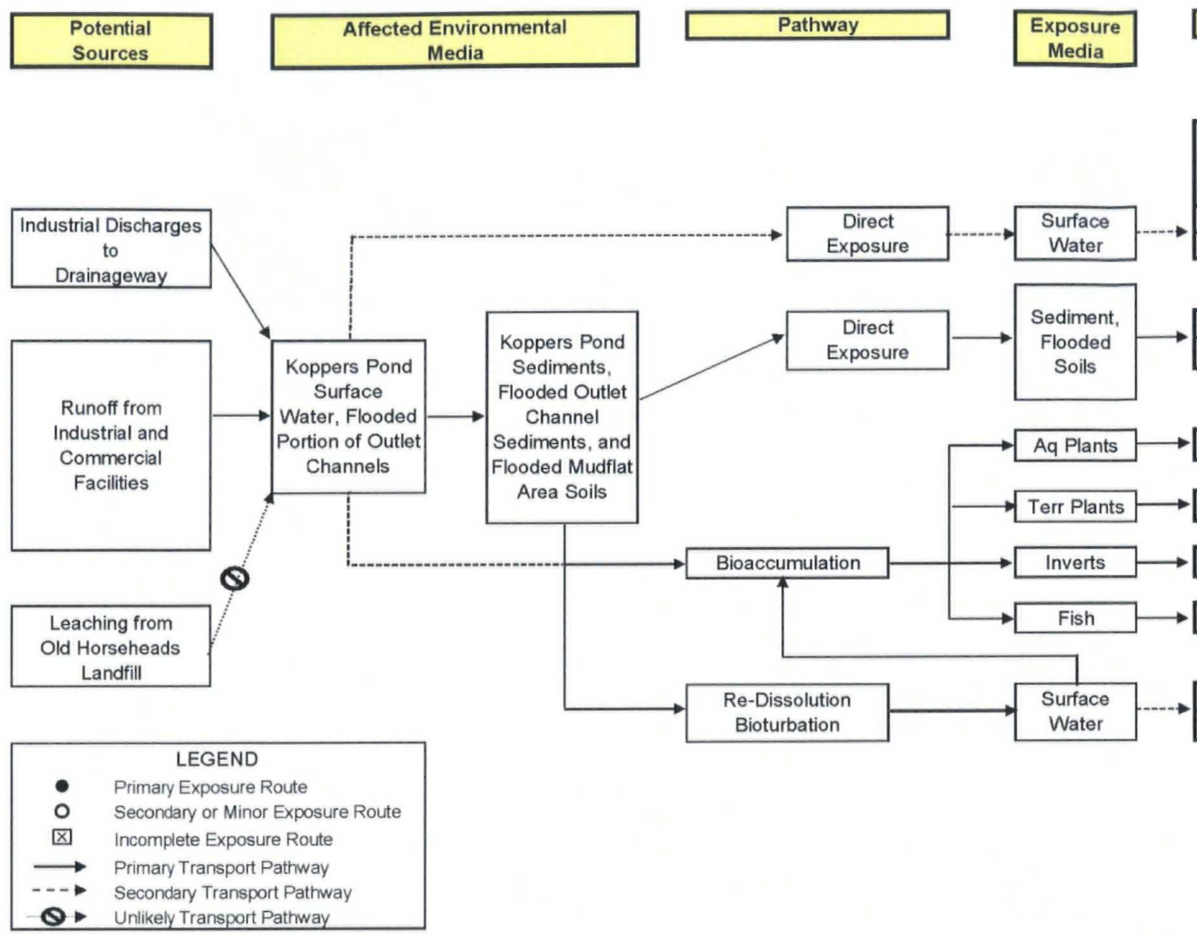
Exposure Route and Receptor Group

Exposure Media	Exposure Route	Aquatic Receptors: Benthic Inverts	Aquatic Receptors: Amphibians and Reptiles	Aquatic Receptors: Fish	Semi-Aquatic Receptors [a]: Aquatic Birds (Ducks)	Semi-Aquatic Receptors [a]: Semi-Aquatic Birds (Herons)	Semi-Aquatic Receptors [a]: Herbivorous Mammals (Muskrats)	Semi-Aquatic Receptors [a]: Omivorous Mammals (Raccoon)	Semi-Aquatic Receptors [a]: Piscivorous Mammals (Mink)
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	☒	☒	☒	☒	☒
Sediment	*Ingestion*	●	●	●	●	●	●	●	●
	Direct Contact	●	●	○	○	○	○	○	○
Aq Plants	*Ingestion*	●	●	●	●	●	●	●	●
Terr Plants	*Ingestion*	☒	☒	☒	○	○	●	●	○
Inverts	*Ingestion*	☒	●	●	●	●	○	○	○
Fish	*Ingestion*	☒	☒	○	●	●	○	○	●
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	○	○	○	○	○

Notes:
This CSM addresses Koppers Pond under the AWL scenario and is also relevant to the assessment of the reference pond.
A dashed line indicates that this is likely a *de minimis* transport or exposure pathway under current conditions.
Surface water may be minor direct exposure source based on measured chemical concentrations (no COPECs were retained for this medium).
Modified from Figure 3-1 of the ERAGS Steps 3 through 5 Report (Integral, 2010b)
[a] Semi-aquatic receptors are those species that spend part or all of thier lives near or foraging from a waterbody.

integral

Figure 28a. Conceptual Site Model for the Supplemental Baseline Risk Assessment of Koppers Pond under the AWL Scenario
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, New York



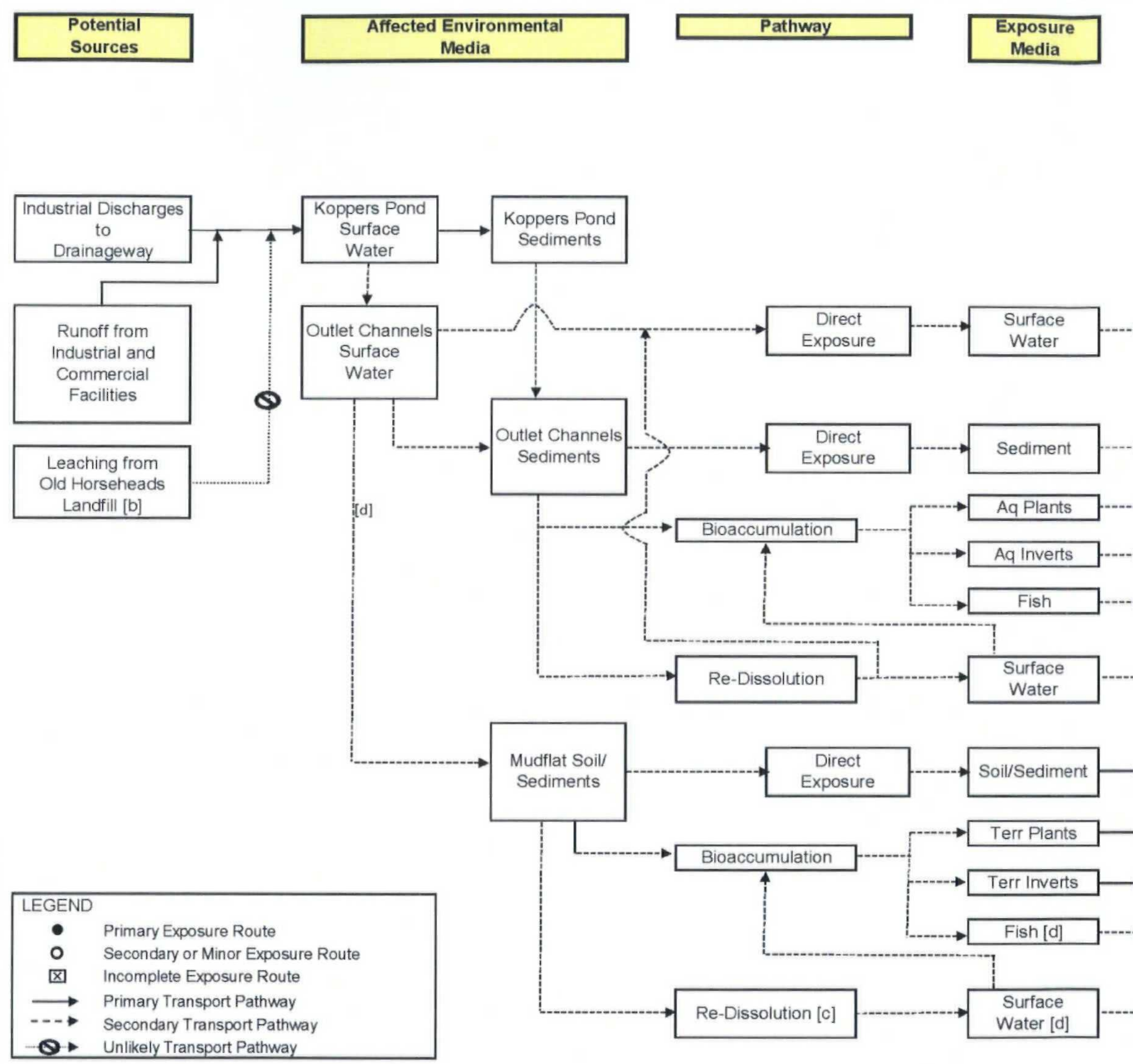
Exposure Route and Receptor Group

Exposure Media	Exposure Route	Aquatic Receptors: Benthic Inverts	Aquatic Receptors: Amphibians and Reptiles	Aquatic Receptors: Fish	Semi-Aquatic Receptors [a]: Aquatic Birds (Ducks)	Semi-Aquatic Receptors [a]: Semi-Aquatic Birds (Herons)	Semi-Aquatic Receptors [a]: Herbivorous Mammals (Muskrats)	Semi-Aquatic Receptors [a]: Omivorous Mammals (Raccoon)	Semi-Aquatic Receptors [a]: Piscivorous Mammals (Mink)
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	☒	☒	☒	☒	☒
Sediment, Flooded Soils	*Ingestion*	●	●	●	●	●	●	●	●
	Direct Contact	●	●	○	○	○	○	○	○
Aq Plants	*Ingestion*	●	●	●	●	●	○	○	●
Terr Plants	*Ingestion*	☒	☒	☒	○	○	●	●	○
Inverts	*Ingestion*	☒	●	●	●	●	○	○	○
Fish	*Ingestion*	☒	☒	○	●	●	○	○	●
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	○	○	○	○	○

Notes:
This CSM addresses Koppers Pond under the HWL scenario. Under these conditions a portion of the mudflat/outlet area is inundated and continuous with the Koppers Pond water column.
A dashed line indicates that this is likely a *de minimis* transport or exposure pathway under current conditions.
Surface water may be minor direct exposure source based on measured chemical concentrations (no COPECs were retained for this medium).
Modified from Figure 3-1 of the ERAGS Steps 3 through 5 Report (Integral, 2010b)
[a] Semi-aquatic receptors are those species that spend part or all of thier lives near or foraging from a waterbody.

integral

Figure 28b. Conceptual Site Model for the Supplemental Baseline Risk Assessment of Koppers Pond under the HWL Scenario
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, New York



Exposure Route and Receptor Group

Exposure Media	Exposure Route	Aquatic Receptors: Benthic Inverts	Aquatic Receptors: Amphibians and Reptiles	Aquatic Receptors: Fish	Semi-Aquatic Receptors [a]: Aquatic Birds (Ducks)	Semi-Aquatic Receptors [a]: Semi-Aquatic Birds (Herons)	Semi-Aquatic Receptors [a]: Herbivorous Mammals (Muskrats)	Semi-Aquatic Receptors [a]: Omivorous Mammals (Raccoon)	Semi-Aquatic Receptors [a]: Piscivorous Mammals (Mink)
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	○	○	○	○	○
Sediment	*Ingestion*	●	●	○	○	○	●	●	●
	Direct Contact	●	●	○	○	○	○	○	○
Aq Plants	*Ingestion*	●	●	○	○	●	●	●	●
Aq Inverts	*Ingestion*	☒	○	○	○	●	○	○	●
Fish	*Ingestion*	○	○	○	○	○	☒	☒	●
Surface Water	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	○	○	○	○	○
Soil/Sediment	*Ingestion*	☒	☒	☒	○	●	●	●	●
	Direct Contact	☒	☒	☒	○	○	○	○	○
Terr Plants	*Ingestion*	☒	☒	☒	○	○	●	●	●
Terr Inverts	*Ingestion*	☒	☒	☒	☒	☒	●	●	○
Fish [d]	*Ingestion*	☒	☒	☒	☒	☒	☒	☒	○
Surface Water [d]	*Ingestion*	○	○	○	○	○	○	○	○
	Direct Contact	○	○	○	○	○	○	○	○

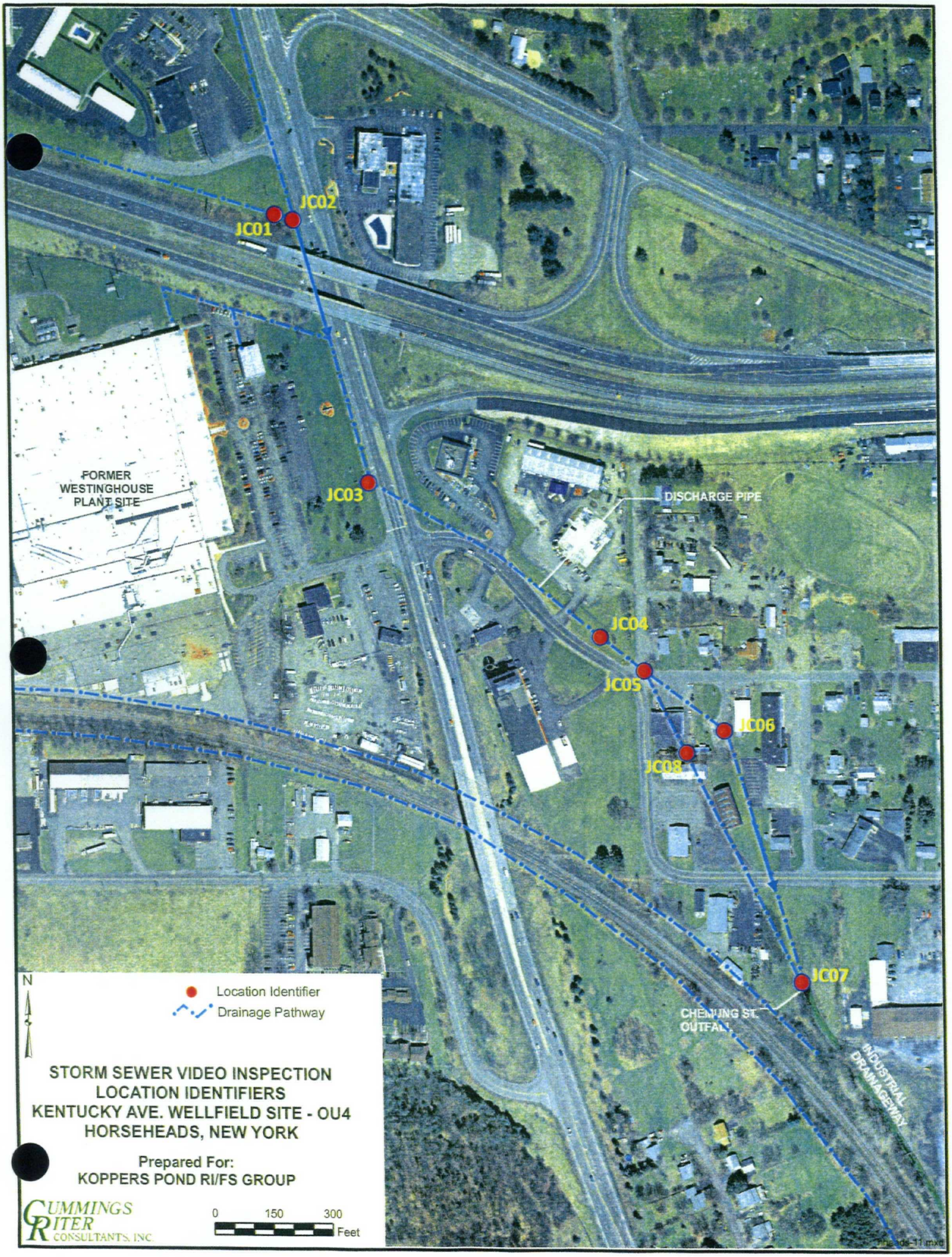
Notes:
Potential transport from Koppers Pond to the outlet channels (and mudflat area) was likely more significant in the past when the Industrial Drainageway was at peak use.
The areal extent of the outlet channels and mudflat soils/sediments is much less under the HWL scenario relative to the AWL scenario. Much of the mudflat area was inundated under the HWL scenario due to the presence of a beaver dam in the west outlet (Figure 3-5).
A dashed line indicates that this is likely a *de minimis* transport or exposure pathway under current conditions. Surface water may be minor direct exposure source based on measured chemical concentrations, although no COPECs were retained from this media.
Modified from Figure 3-1 of the ERAGS Steps 3 through 5 Report (Integral, 2010b).
[a] Semi-aquatic receptors are those species that spend part or all of thier lives near or foraging from a waterbody. They are unlikely to use the mudflat area except when it is inundated.
[b] Based on observations made during the 2008 field sampling effort there was no apparent leachate seeps near the Old Horseheads Landfill. Therefore this exposure pathway is considered to be incomplete.
[c] Re-dissolution of COPECs may occur only when the mudflat area is flooded (HWL scenario).
[d] Represents a potential transport pathway or exposure media only when mudflat area is flooded (HWL scenario).

integral

Figure 28c. Conceptual Site Model for the Outlet Channels and Mudflat Area under the AWL and HWL Scenarios
Kentucky Avenue Wellfield OU4 - Koppers Pond, Horseheads, New York

APPENDIX A

VIDEO INSPECTION REPORT AND DVD


JC01
JC02
JC03
JC04
JC05
JC06
JC07
JC08
FORMER WESTINGHOUSE PLANT SITE
DISCHARGE PIPE
CHEMUNG ST. OUTFALL
INDUSTRIAL DRAINAGEWAY
N
Location Identifier
Drainage Pathway
STORM SEWER VIDEO INSPECTION
LOCATION IDENTIFIERS
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK
Prepared For:
KOPPERS POND RI/FS GROUP
CUMMINGS RITER CONSULTANTS, INC.
0 150 300
Feet

NATIONAL VACUUM CORPORATION
860 Maple Street #200
ROCHESTER, NEW YORK
Tel: (585) 235-0330, Fax: (585) 464-0438

PROJ INFO

PROJ NAME:	PROJECT NUM:	RESPONSIBLE:	DATE:
Koppers Pond			06/17/2008

CLIENT	Leo Brausch
RESPONSIBLE:	
DEPARTMENT:	
PO BOX:	
STREET:	
CITY, ST ZIP:	
TELEPHONE:	
FAX:	
MOBILE:	
E-MAIL:	

PROJ MGR	
RESPONSIBLE:	
DEPARTMENT:	
PO BOX:	
STREET:	
CITY, ST ZIP:	
TELEPHONE:	
FAX:	
MOBILE:	
E-MAIL:	

CONTRACTOR	NATIONAL VACUUM CORPORATION
RESPONSIBLE:	Jon Monagan
DEPARTMENT:	NATIONAL VACUUM CORPORATION
PO BOX:	
STREET:	860 Maple Street #200
CITY, ST ZIP:	ROCHESTER, NEW YORK
TELEPHONE:	(585) 235-0330
FAX:	(585) 464-0438
MOBILE:	
E-MAIL:	JMONAGAN@NATIONALVACUUM.COM

NATIONAL VACUUM CORPORATION
860 Maple Street #200
ROCHESTER, NEW YORK
Tel: (585) 235-0330, Fax: (585) 464-0438

RATING LEGEND

PROJ NAME:	PROJECT NUM:	RESPONSIBLE:	DATE:
Koppers Pond			06/17/2008

1: Occurances without damage: for example, laterals, joints etc.

NO DEFECTS WERE DETECTED.

2: Constructional deficiencies or occurances with insignificant influence to tightness, hydraulic or static pressure of pipe: f.e. wide joints, badly torched intakes, minor deformation of plastic pipes, minor erosions etc.

REHABILITATION CAN BE SCHEDULED LONG-TERM.

3: Constructional deficiencies diminishing static, hydraulic and tightness: f.e. open joints, untorched intakes, cracks, minor drainage obstructions such as calcide build ups, protruding laterals, minor damages to pipe wall, individual root penetrations, corroded pipe walls etc.

REHABILITATION IS NECESSARY MEDIUM-TERM WITHIN 3 TO 5 YEARS.

4: Constructional damages with nonsufficient static safety, hydraulic or tightness: f.e. axial/radial pipebursts, pipe deformations, visually noticeable infiltration/exfiltration, cavities in pipe-wall, severe protruding, laterals severe root penetrations, severe corrosion of pipe wall etc.

REHABILITATION PROCEDURE IS URGENT AND HAS TO BE COMPLETED WITHIN 1 TO 2 YEARS. NECESSITY FOR EMERCENCY OPERATIONS HAS TO BE EXAMINED.

5: Pipe is already or will shortly be impermeable: f.e. collapsed pipe, deeply rooted pipe or other drainage obstructions. Pipe loses water or danger of backwater in basements etc.

REHABILITATION IS URGENT AND SHORT-TERM. IN ORDER TO PREVENT FURTHER DAMAGE, NECESSARY TEMPORARY SPOT REPAIR HAS TO BE CONDUCTED ON EMERGENCY LEVEL.

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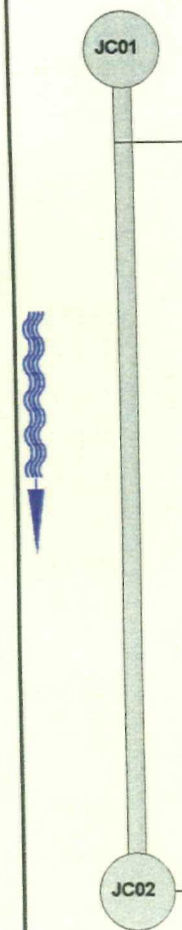
INSPECTION REPORT

DATE: 06/17/2008	WORK #:	WEATHER:	OPERATOR: JMONAGAN	SECTION NR: 1	SECTION NAME:
PRESENT:	VEHICLE: ROVER 900	CAMERA: PAN AND TILT	PRESET:	CLEANED:	RATE: 0

STREET:	MAP #1:	MH: JC01
CITY: Horseheads, NY	MAP #2:	MH: JC02
LOCALE: street area	TAPE #: 01	TV'D LGTH: 18.1 ft

INSPECT REASON: new inspection	PIPE SIZE: 56"
SECTION TYPE: storm water	MATERIAL: concrete JT LGTH:
AREA:	LINING:
	RSRVD:

REMARK:



1:50	POSITION	CODE	OBSERVATION	RATE
JC01	2.00	0	inspection begins at upstream manhole JC01	0
JC02	18.10	0	inspection ends at downstream manhole JC02	0

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ROCHESTER, NEW YORK
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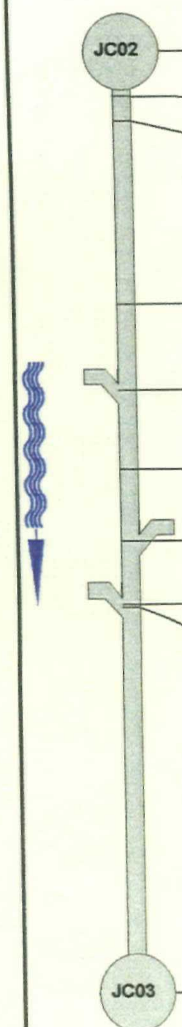
INSPECTION REPORT

DATE: 06/17/2008	WORK #:	WEATHER:	OPERATOR: JMONAGAN	SECTION NR: 2	SECTION NAME:
PRESENT:	VEHICLE: ROVER 900	CAMERA: PAN AND TILT	PRESET:	CLEANED:	RATE: 160

STREET:		MAP #1:		MH:	JC02
CITY:	Horseheads, NY	MAP #2:		MH:	JC03
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	595.15 ft

INSPECT REASON:	new inspection	PIPE SIZE:	56"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:



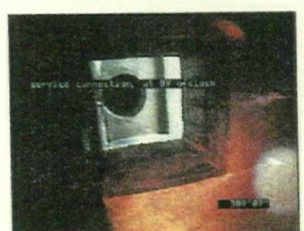
1:1475	POSITION	CODE	OBSERVATION	RATE
JC02	0.00	0	inspection begins at upstream manhole JC02	0
	28.50	0	Longitudinal Crack, at 12 o´clock	2
	43.95	0	Multiple Cracks, from 11 to 01 o´clock	2
	159.55	0	Multiple Cracks, from 10 to 02 o´clock	2
	214.20	160	break-in-connection, at 02 o´clock	1
	264.40	0	Multiple Cracks, from 08 to 04 o´clock	2
	309.75	0	service connection, at 09 o´clock	0
	349.50	0	service connection, at 03 o´clock	0
	352.05	0	Multiple Cracks, from 08 to 04 o´clock	2
JC03	595.15	0	inspection ends at downstream manhole JC03	0


28.5 FT // 00:00:00


43.95 FT // 00:00:00


214.2 FT // 00:00:00


264.4 FT // 00:00:00


309.75 FT // 00:00:00

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
Horseheads, NY		06/17/2008	2	

IMAGE: 3a, TAPE #: 01, 00:00:00
28.5FT, Longitudinal Crack, at 12 o´clock

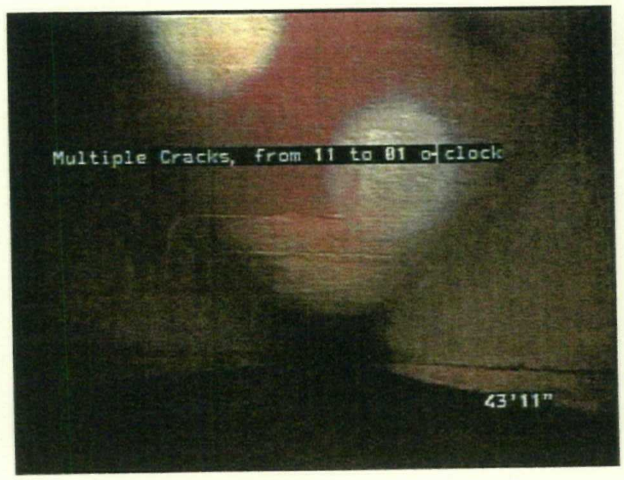

IMAGE: 4a, TAPE #: 01, 00:00:00
43.95FT, Multiple Cracks, from 11 to 01 o´clock

IMAGE: 6a, TAPE #: 01, 00:00:00
214.2FT, break-in-connection, at 02 o´clock

IMAGE: 7a, TAPE #: 01, 00:00:00
264.4FT, Multiple Cracks, from 08 to 04 o´clock

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
Horseheads, NY		06/17/2008	2	

IMAGE: 8a, TAPE #: 01, 00:00:00
309.75FT, service connection, at 09 o´clock

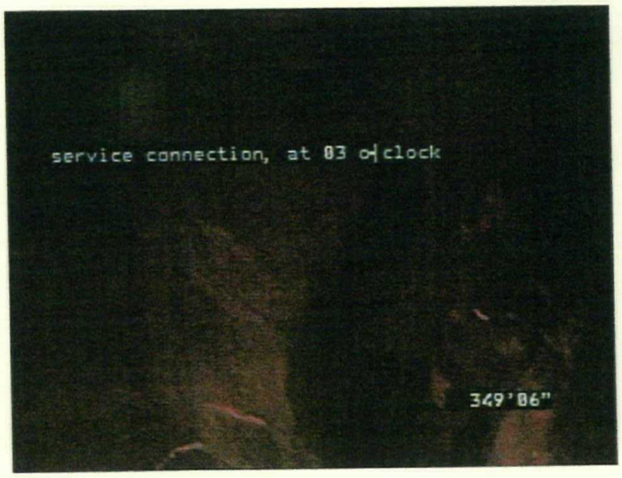

IMAGE: 9a, TAPE #: 01, 00:00:00
349.5FT, service connection, at 03 o´clock

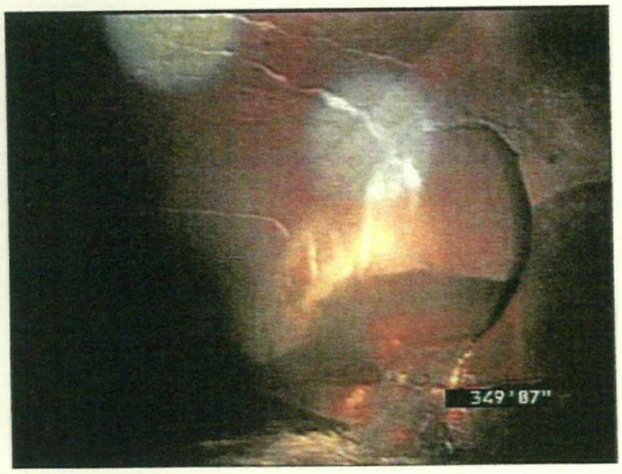

IMAGE: 9b, TAPE #: 01, 00:00:00
349.5FT, service connection, at 03 o´clock

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Tel: (585) 235-0330, Fax: (585) 464-0438

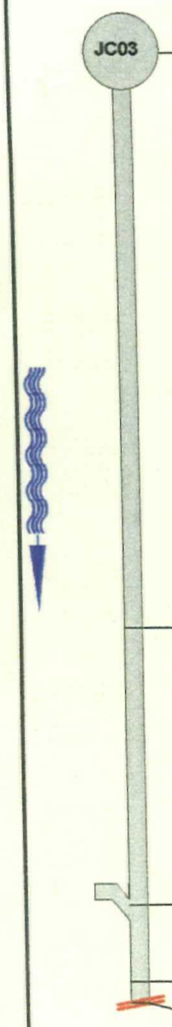
INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	3	
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
	ROVER 900	PAN AND TILT			470

STREET:		MAP #1:		MH:	JC03
CITY:	Horseheads, NY	MAP #2:		MH:	JC04
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	621.4 ft

INSPECT REASON:	new inspection	PIPE SIZE:	56"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:



1:1525	POSITION	CODE	OBSERVATION	RATE
JC03	2.00	0	inspection begins at upstream manhole JC03	0
	377.55	0	pipe	0
	559.10	160	break-in-connection, at 03 o´clock	1
	608.00	310	debris	3
	621.40	0	inspection abandoned END OF CABLE	0


377.55 FT // 00:00:00


377.55 FT // 00:00:00


559.1 FT // 00:00:00

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
Horseheads, NY		06/17/2008	3	

IMAGE: 14a, TAPE #: 01, 00:00:00
377.55FT, pipe

IMAGE: 14b, TAPE #: 01, 00:00:00
377.55FT, pipe

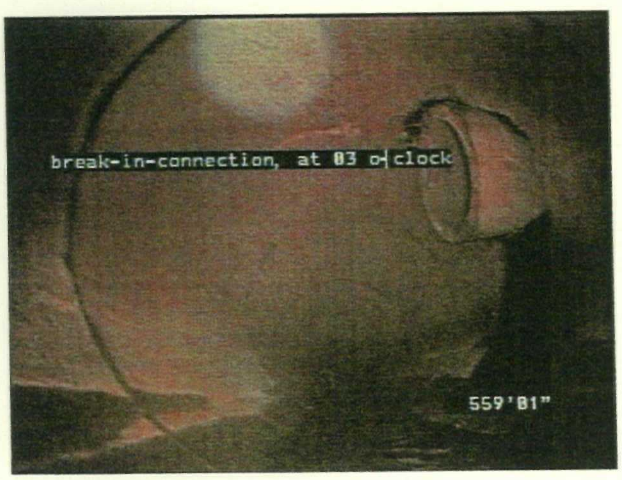

IMAGE: 15a, TAPE #: 01, 00:00:00
559.1FT, break-in-connection, at 03 o´clock

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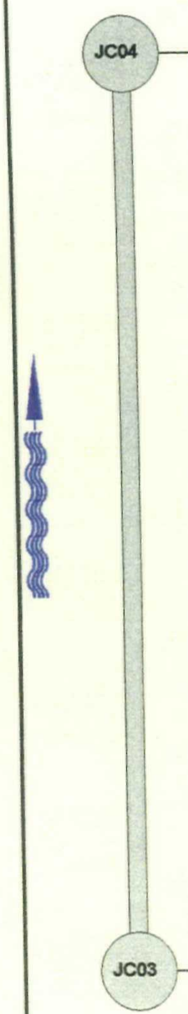
INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	4	
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
	ROVER 900	PAN AND TILT			0

STREET:		MAP #1:		MH:	JC04
CITY:	Horseheads, NY	MAP #2:		MH:	JC03
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	127.8 ft

INSPECT REASON:	new inspection	PIPE SIZE:	72"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:



1:325	POSITION	CODE	OBSERVATION	RATE
JC04	0.00	0	inspection begins at downstream manhole JC04	0
JC03	127.80	0	inspection ends at downstream POINT	0

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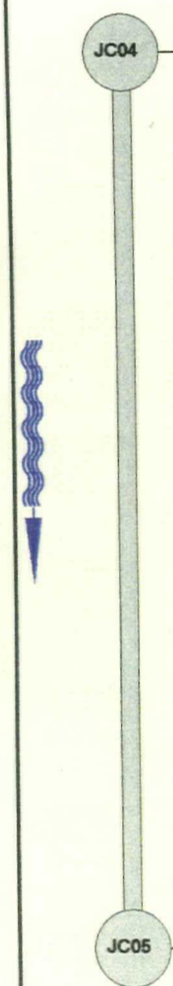
INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	5	
PRESENT:	VEHICLE:	CAMERA:	PRESET:	CLEANED:	RATE:
	ROVER 900	PAN AND TILT			0

STREET:		MAP #1:		MH:	JC04
CITY:	Horseheads, NY	MAP #2:		MH:	JC05
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	95.95 ft

INSPECT REASON:	new inspection	PIPE SIZE:	72"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:



1:250	POSITION	CODE	OBSERVATION	RATE
JC04	0.00	0	inspection begins at upstream manhole JC04	0
JC05	95.95	0	inspection ends at downstream manhole JC05	0

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INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	6	
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
	ROVER 900	PAN AND TILT			0

STREET:		MAP #1:		MH:	JC06
CITY:	Horseheads, NY	MAP #2:		MH:	JC05
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	258.2 ft

INSPECT REASON:	new inspection	PIPE SIZE:	72"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:

1:650	POSITION	CODE	OBSERVATION	RATE
JC06	0.00	0	inspection begins at downstream manhole JC06	0
JC05	258.20	0	inspection ends at upstream manhole JC05	0

Leo Brausch

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INSPECTION REPORT

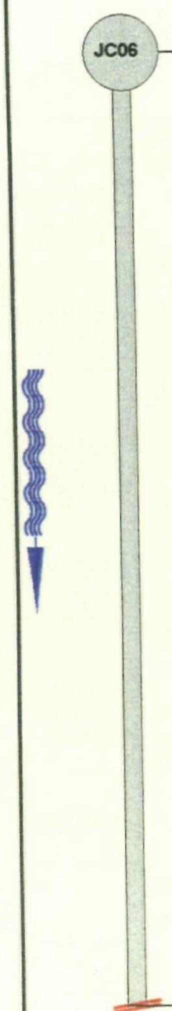
DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	7	
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
	ROVER 900	PAN AND TILT			0

STREET:		MAP #1:		MH:	JC06
CITY:	Horseheads, NY	MAP #2:		MH:	JC07
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	439.1 ft

INSPECT REASON:	new inspection	PIPE SIZE:	72"
SECTION TYPE:	storm water	MATERIAL:	concrete JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:

1:1075	POSITION	CODE	OBSERVATION	RATE
JC06	0.00	0	inspection begins at upstream manhole JC06	0
	439.10	0	inspection abandoned SEDIMENT TOO THICK	0



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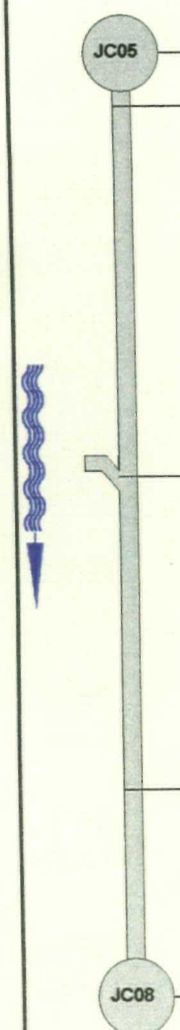
INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	8	
PRESENT:	VEHICLE:	CAMERA:	PRESET:	CLEANED:	RATE:
	ROVER 900	PAN AND TILT			470

STREET:		MAP #1:		MH:	JC05
CITY:	Horseheads, NY	MAP #2:		MH:	JC08
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	262.55 ft

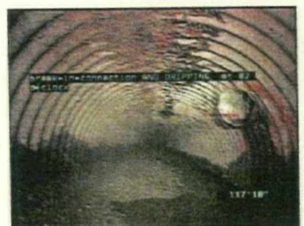
INSPECT REASON:	new inspection	PIPE SIZE:	36
SECTION TYPE:	storm water	MATERIAL:	CORRUGATED JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:



1:650	POSITION	CODE	OBSERVATION	RATE
	0.00	0	inspection begins at upstream manhole JC05	0
	15.00	310	debris	3
	117.80	160	break-in-connection AND DRIPPING, at 02 o´clock	1
	205.55	0	Hole in pipe at 08 o´clock	3
	262.55	0	inspection ends at downstream manhole JC08	0


15 FT // 00:00:00


117.8 FT // 00:00:00


205.55 FT // 00:00:00

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
Horseheads, NY		06/17/2008	8	

IMAGE: 27a, TAPE #: 01, 00:00:00
15FT, debris

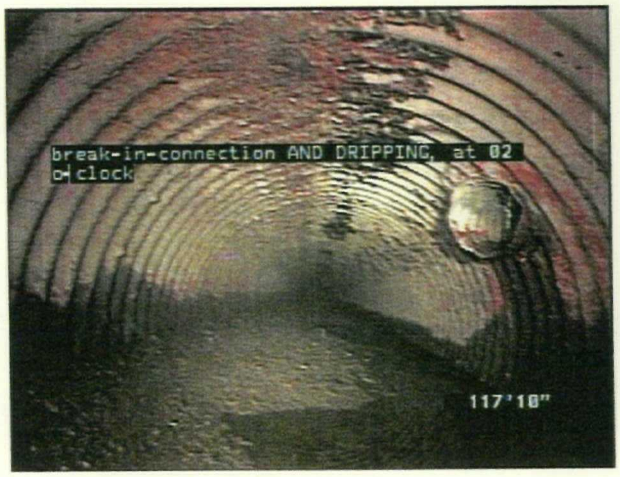

IMAGE: 28a, TAPE #: 01, 00:00:00
117.8FT, break-in-connection AND DRIPPING, at 02 o´clock

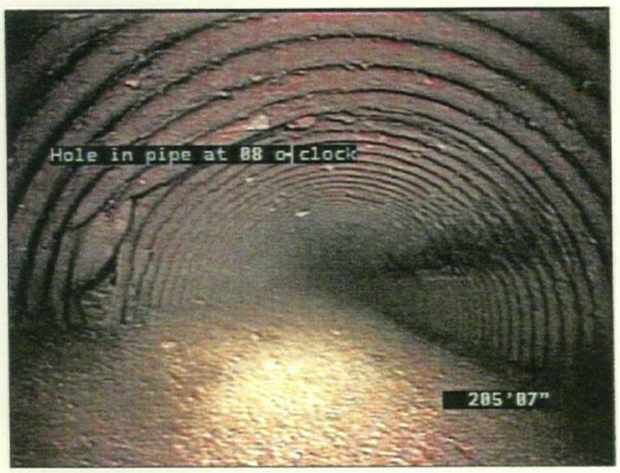

IMAGE: 29a, TAPE #: 01, 00:00:00
205.55FT, Hole in pipe at 08 o´clock

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INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
06/17/2008			JMONAGAN	9	
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
	ROVER 900	PAN AND TILT			0

STREET:		MAP #1:		MH:	JC08
CITY:	Horseheads, NY	MAP #2:		MH:	JC09
LOCALE:	street area	TAPE #:	01	TV'D LGTH:	157 ft

INSPECT REASON:	new inspection	PIPE SIZE:	36
SECTION TYPE:	storm water	MATERIAL:	CORRUGATED JT LGTH:
AREA:		LINING:	
		RSRVD:	

REMARK:

1:400	POSITION	CODE	OBSERVATION	RATE
JC08	0.00	0	inspection begins at upstream manhole JC08	0
	157.00	0	camera blocked, inspection abandoned	0

157 FT // 00:00:00

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
Horseheads, NY		06/17/2008	9	

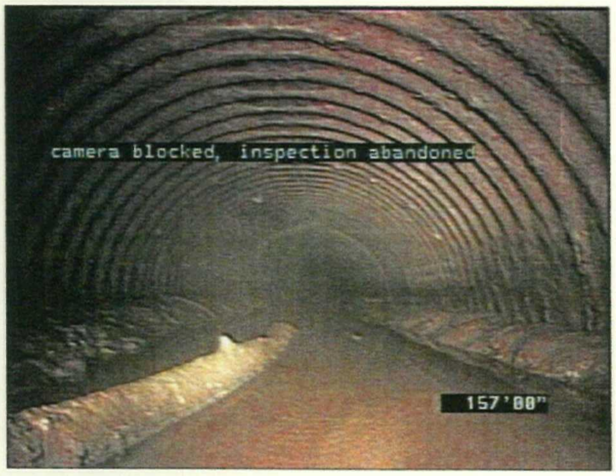


IMAGE: 32a, TAPE #: 01, 00:00:00
157FT, camera blocked, inspection abandoned

APPENDIX B

SURFACE WATER FIELD COLLECTION REPORTS

CUMMINGS RITER

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
PROJECT NO.: 502.10
SAMPLE DATE: 5 / 12 / 08
SAMPLE TIME (START/END): 17:05 /
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —

SAMPLE ID: SW08-02-5/12/08
WELL NO.: —
SAMPLED BY:
SAMPLE SEQUENCE NO.:

MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.99
Specific Conductance	umho/cm	0.680
Water Temperature	°C	15.29
Dissolved Oxygen	ppm	10.49
Redox	mV	70.1
Turbidity	NTU	—

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS:
SAMPLING FLOW RATE: 100 ml/min

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3x40mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2x1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
LABORATORY: Test America
WEATHER CONDITIONS: 60's. cloudy
COMMENTS:

FILTRATION METHOD: .45 Micron
DELIVERED VIA:
DATE:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
PROJECT NO.: 502.10
SAMPLE DATE: 5 / 12 / 08
SAMPLE TIME (START/END): 16:50 / 16:58
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —

SAMPLE ID: SW08-04-5/12/08
WELL NO.: —
SAMPLED BY:
SAMPLE SEQUENCE NO.:

MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	8.13
Specific Conductance	umho/cm	0.665
Water Temperature	°C	14.58
Dissolved Oxygen	ppm	10.54
Redox	mV	69.4
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS:
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
LABORATORY: test America
WEATHER CONDITIONS: 60's- cloudy
COMMENTS:

FILTRATION METHOD: 45 Micron
DELIVERED VIA:
DATE:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
PROJECT NO.: 502.10
SAMPLE DATE: 5 / 12 / 08
SAMPLE TIME (START/END): 16:00 / 16:10
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —

SAMPLE ID: SW08-05- 5/12/08
WELL NO.: —
SAMPLED BY:
SAMPLE SEQUENCE NO.:

MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	7.84
Specific Conductance	umho/cm	0.690
Water Temperature	°C	16.03
Dissolved Oxygen	ppm	9.17
Redox	mV	69.7
Turbidity	NTU	—

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS:
SAMPLING FLOW RATE: 100 ml/min

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3 x 40 mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2 x 1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250 mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
LABORATORY: Test America
WEATHER CONDITIONS: 60's - Cloudy
COMMENTS:

FILTRATION METHOD:
DELIVERED VIA: DATE:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT Koppers Pond
SAMPLE ID SW08-08-5/12/08
PROJECT NO. 502.10
WELL NO. —
SAMPLE DATE 5/12/08
SAMPLED BY
SAMPLE TIME (START/END) 15:20 / 15:47
SAMPLE SEQUENCE NO.
SAMPLE COLLECTION EQUIPMENT GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT) — / —
RECHARGE TIME —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	8.10
Specific Conductance	umho/cm	0.652
Water Temperature	°C	14.30
Dissolved Oxygen	ppm	10.75
Redox	mV	66.3
Turbidity	NTU	–

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: 100 ml/min
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH3	250 mL	1	Y ☐ N ☒	Y ☒ H2SO4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS 12
FILTRATION METHOD 45 micron
LABORATORY Test America
DELIVERED VIA
DATE
WEATHER CONDITIONS 60s - cloudy
COMMENTS

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
PROJECT NO.: 502.10
SAMPLE DATE: 5 / 12 / 08
SAMPLE TIME (START/END): 14:10 / 14:40
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —

SAMPLE ID: SW08-10-5/12/08
WELL NO.: —
SAMPLED BY:
SAMPLE SEQUENCE NO.:
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	8.01
Specific Conductance	umho/cm	0.652
Water Temperature	°C	14.21
Dissolved Oxygen	ppm	10.33
Redox	mV	53.7
Turbidity	NTU	—

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS:
SAMPLING FLOW RATE: 100 ml/min

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
LABORATORY: test America
WEATHER CONDITIONS: 60's Cloudy
COMMENTS:

FILTRATION METHOD: 45 micron
DELIVERED VIA:
DATE:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
PROJECT NO.: 502.10
SAMPLE DATE: 5 / 12 / 08
SAMPLE TIME (START/END): 13:20 / 14:00
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —

SAMPLE ID: SW08-13-5/12/08
WELL NO.: —
SAMPLED BY:
SAMPLE SEQUENCE NO.:

MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	7.91
Specific Conductance	umho/cm mS/cm	0.658
Water Temperature	°C	13.34
Dissolved Oxygen	ppm	8.73
Redox	mV	17.9
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/12/08

WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS:

SAMPLING FLOW RATE: 100 ml/min

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Cl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
LABORATORY: TestAmerica
WEATHER CONDITIONS: 60's - Cloudy
COMMENTS:

FILTRATION METHOD: .45 MICRON
DELIVERED VIA:
DATE:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-14/MS/MSD
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5/12/08
SAMPLED BY: BRM/CAC
SAMPLE TIME (START/END): 1405 / 1420
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.91
Specific Conductance	umho/cm	970.1
Water Temperature	°C	15.8
Dissolved Oxygen	ppm	-
Redox	mV	157
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: slightly turbid
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Cl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: Peristaltic Pump
LABORATORY: test America
DELIVERED VIA:
DATE:
WEATHER CONDITIONS:
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-15
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 12 / 08
SAMPLED BY: BLW/CAC
SAMPLE TIME (START/END): 1500 / 1510
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	8.14
Specific Conductance	umho/cm	949.3
Water Temperature	°C	15.7
Dissolved Oxygen	ppm	–
Redox	mV	152
Turbidity	NTU	–

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: slightly turbid - slight sheen
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3x40mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2x1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: Peristaltic Pump
LABORATORY: TestAmerica
DELIVERED VIA:
DATE:
WEATHER CONDITIONS:
COMMENTS: Stagnant

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-16
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5/12/08
SAMPLED BY: BNM/CAC
SAMPLE TIME (START/END): 1320 / 1330
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.99
Specific Conductance	umho/cm	960.5
Water Temperature	°C	14.9
Dissolved Oxygen	ppm	–
Redox	mV	120
Turbidity	NTU	–

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/12/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: slightly turbid
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: Peristaltic Pump
LABORATORY: test America
DELIVERED VIA: DATE:
WEATHER CONDITIONS:
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-17
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 12 / 08
SAMPLED BY: BAM/CAC
SAMPLE TIME (START/END): 1240 / 1250
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.76
Specific Conductance	umho/cm	970.5
Water Temperature	°C	14.9
Dissolved Oxygen	ppm	—
Redox	mV	114
Turbidity	NTU	—

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5-12-08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: slightly turbid
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
✓ total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
✓ Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
✓ VOC	3 x 40 mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
✓ BNA	2 x 1L	2	Y ☐	N ☒	Y ☐	N ☒
✓ CN	250 mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD:
LABORATORY: test America
DELIVERED VIA:
DATE:
WEATHER CONDITIONS:
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-21
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 6 / 08
SAMPLED BY: BRM / leo
SAMPLE TIME (START/END): 1420 / 1430
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	6.73
Specific Conductance	umho/cm	970.8
Water Temperature	°C	15.2
Dissolved Oxygen	ppm	
Redox	mV	135
Turbidity	NTU	

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/6/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE: —

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Cl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: P. pump
LABORATORY: test America
DELIVERED VIA: Fedex
DATE: 5/7/08
WEATHER CONDITIONS: Sunny 70°
COMMENTS: Chemung St. outfall (72")

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-22 | SW08-DUP1
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 6 / 08
SAMPLED BY: BRW
SAMPLE TIME (START/END): 1530 / 1555
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB from effluent sample port
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	6.99
Specific Conductance	umho/cm	~~976.~~ 977.3
Water Temperature	°C	13.1
Dissolved Oxygen	ppm	
Redox	mV	126
Turbidity	NTU	

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/6/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE: —

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1 x 2	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals / hardness	500 mL	1 x 2	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1 x 2	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2 x 2	Y ☐	N ☒	Y ☐	N ☒
VOC	3 x 40 mL	3 x 2	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2 x 1L	2 x 2	Y ☐	N ☒	Y ☐	N ☒
CN	250 mL	1 x 2	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1 x 2	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12 X 2
FILTRATION METHOD: P.Pump
LABORATORY: test America
DELIVERED VIA: fedex
DATE: 5/7/08
WEATHER CONDITIONS: Indoors
COMMENTS: Westinghouse Barrier well treatment system effluent

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-23
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 6 / 08
SAMPLED BY: BRW
SAMPLE TIME (START/END): 1640 / 1505
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.45
Specific Conductance	umho/cm	696.9
Water Temperature	°C	15.9
Dissolved Oxygen	ppm	
Redox	mV	129
Turbidity	NTU	

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/6/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: clear, some granular sediment at bottom of cup
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3 x 40 mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2 x 1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250 mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Cl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: p. pump
LABORATORY: Test America
DELIVERED VIA: Fedex
DATE: 5/7/08
WEATHER CONDITIONS: sunny 65°
COMMENTS: Cutler-Hammer effluent

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT Koppers Pond
SAMPLE ID SW08-24
PROJECT NO. 502.10
WELL NO. —
SAMPLE DATE 5 / 7 / 08
SAMPLED BY [illegible]
SAMPLE TIME (START/END) 1110 / 1125
SAMPLE SEQUENCE NO.
SAMPLE COLLECTION EQUIPMENT GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT) — / —
RECHARGE TIME —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.27
Specific Conductance	umho/cm	980.4
Water Temperature	°C	15.1
Dissolved Oxygen	ppm	-
Redox	mV	108
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3x40mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2x1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS 12
FILTRATION METHOD P. PUMP
LABORATORY test America
DELIVERED VIA dropoff
DATE 5/8/08
WEATHER CONDITIONS Sunny 60°
COMMENTS

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: Koppers Pond
SAMPLE ID: SW08-25
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 7 / 08
SAMPLED BY: BPM/MAL/LOO
SAMPLE TIME (START/END): 1155 / 1205
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS

pH	Standard Units	7.36
Specific Conductance	umho/cm	1351
Water Temperature	°C	12.6
Dissolved Oxygen	ppm	—
Redox	mV	59
Turbidity	NTU	—

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3 x 40 mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2 x 1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250 mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: p. pump
LABORATORY: Test America
DELIVERED VIA: drop off
DATE: 5/8/08
WEATHER CONDITIONS: sunny 60°
COMMENTS: flux observed at bottom of MH ~1500 gpm

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: KOPPERS POND
SAMPLE ID: SW08-26
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 7 / 08
SAMPLED BY: B.Ca / MAlleo
SAMPLE TIME (START/END): 1215 / 1230
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.44
Specific Conductance	umho/cm	1300
Water Temperature	°C	15.2
Dissolved Oxygen	ppm	–
Redox	mV	35
Turbidity	NTU	–

METER CALIBRATION PERFORMED? N ☐ Y ☑ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE:

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3 x 40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2 x 1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: p. pump
LABORATORY: test America
DELIVERED VIA: drop off
DATE: 5/8/08
WEATHER CONDITIONS: Sunny 70°
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: Koppers Pond
SAMPLE ID: SW08-27
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 7 / 08
SAMPLED BY: BRM/MAL/LO
SAMPLE TIME (START/END): 1250 / 1300
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.51
Specific Conductance	umho/cm	1864
Water Temperature	°C	13.9
Dissolved Oxygen	ppm	-
Redox	mV	-94
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: Clear
SAMPLING FLOW RATE: —

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?	PRESERVED?
N as NH_3	250 mL	1	Y ☐ N ☒	Y ☒ H_2SO_4 N ☐
total metals/hardness	500 mL	1	Y ☐ N ☒	Y ☒ HNO_3 N ☐
dissolved metals	500 mL	1	Y ☒ N ☐	Y ☒ HNO_3 N ☐
Pest/PCB	2x 1L	2	Y ☐ N ☒	Y ☐ N ☒
VOC	3x40mL	3	Y ☐ N ☒	Y ☒ HCl N ☐
BNA	2x1L	2	Y ☐ N ☒	Y ☐ N ☒
CN	250mL	1	Y ☐ N ☒	Y ☒ NaOH N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐ N ☒	Y ☐ N ☒
			Y ☐ N ☐	Y ☐ N ☐
			Y ☐ N ☐	Y ☐ N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: p. pump
LABORATORY: TestAmerica
DELIVERED VIA: drop off
DATE: 5/8/08
WEATHER CONDITIONS: ptly sunny 70°
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: Koppers Pond
SAMPLE ID: SW08-28
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 7 / 08
SAMPLED BY: BRM/leo
SAMPLE TIME (START/END): 910 / 925
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.41
Specific Conductance	umho/cm	925.2
Water Temperature	°C	17.1
Dissolved Oxygen	ppm	–
Redox	mV	83
Turbidity	NTU	–

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: clear
SAMPLING FLOW RATE: —

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?	
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒ H_2SO_4	N ☐
total metals/hardness	500 mL	1	Y ☐	N ☒	Y ☒ HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒ HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐	N ☒
VOC	3x40mL	3	Y ☐	N ☒	Y ☒ HCl	N ☐
BNA	2x1L	2	Y ☐	N ☒	Y ☐	N ☒
CN	250mL	1	Y ☐	N ☒	Y ☒ NaOH	N ☐
Cl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐	N ☒
			Y ☐	N ☐	Y ☐	N ☐
			Y ☐	N ☐	Y ☐	N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: P pump
LABORATORY: test America
DELIVERED VIA: dropoff
DATE: 5/8/08
WEATHER CONDITIONS: Sunny 50°
COMMENTS:

f21/corp

CUMMINGS RITER CONSULTANTS, INC.

WATER SAMPLE COLLECTION REPORT

PROJECT: Koppers Pond
SAMPLE ID: SW08-29
PROJECT NO.: 502.10
WELL NO.: —
SAMPLE DATE: 5 / 7 / 08
SAMPLED BY: BRW / LEO
SAMPLE TIME (START/END): 815 / 830
SAMPLE SEQUENCE NO.:
SAMPLE COLLECTION EQUIPMENT: GRAB
DEPTH TO WATER PRIOR TO PURGING/SAMPLING (FT): — / —
RECHARGE TIME: —
MEASURED FROM ☐ TOC ☐ TOR ☐ GS

FIELD MEASUREMENTS		
pH	Standard Units	7.11
Specific Conductance	umho/cm	859.1
Water Temperature	°C	13.4
Dissolved Oxygen	ppm	—
Redox	mV	125
Turbidity	NTU	-

METER CALIBRATION PERFORMED? N ☐ Y ☒ DATE 5/7/08
WATER APPEARANCE, IMMISCIBLE PHASES OR ODORS: clear
SAMPLING FLOW RATE: —

SAMPLE TYPES COLLECTED

PARAMETER	VOLUME	# CONTAINERS	FIELD FILTERED?		PRESERVED?		
N as NH_3	250 mL	1	Y ☐	N ☒	Y ☒	H_2SO_4	N ☐
total metals / hardness	500 mL	1	Y ☐	N ☒	Y ☒	HNO_3	N ☐
dissolved metals	500 mL	1	Y ☒	N ☐	Y ☒	HNO_3	N ☐
Pest/PCB	2x 1L	2	Y ☐	N ☒	Y ☐		N ☒
VOC	3x40mL	3	Y ☐	N ☒	Y ☒	HCl	N ☐
BNA	2x1L	2	Y ☐	N ☒	Y ☐		N ☒
CN	250mL	1	Y ☐	N ☒	Y ☒	NaOH	N ☐
Fl/Nitrite/TSS	250 mL	1	Y ☐	N ☒	Y ☐		N ☒
			Y ☐	N ☐	Y ☐		N ☐
			Y ☐	N ☐	Y ☐		N ☐

NUMBER OF CONTAINERS: 12
FILTRATION METHOD: p. pump
LABORATORY: test America
DELIVERED VIA: dropoff
DATE: 5/8/08
WEATHER CONDITIONS: Sunny 50°
COMMENTS:

f21/corp

APPENDIX C

SEDIMENT FIELD COLLECTION REPORTS

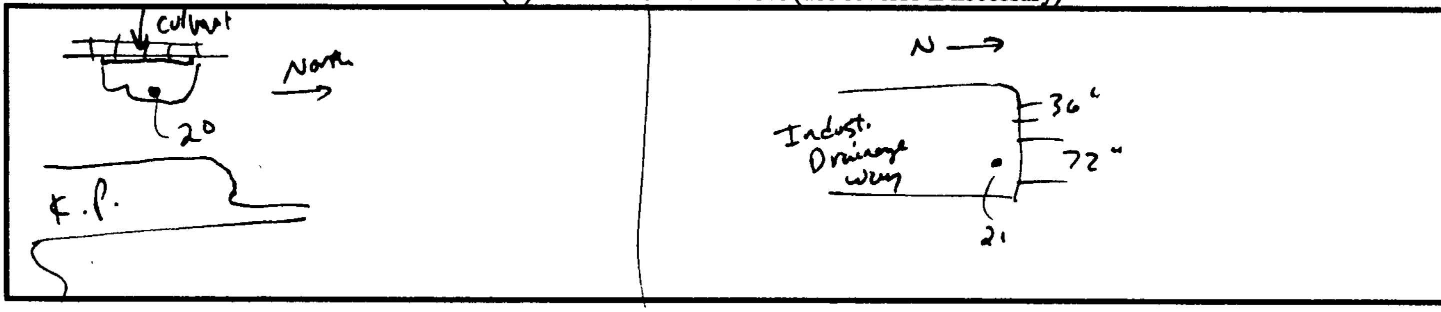
CUMMINGS RITER

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Bnd	Project No.	502.10
Date Collected	5/6/08	Time Collected	See Below
Collected By	BRM/GO Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
SD08-20 (11:25)	0"-3"	Dk Brown-Black silt/sand/gravel/org. matter
SD08-21 (1130)	0"-4"	Dk Brown-Black silt/sand/gravel/org matter/undissolved lime

Sampling Method: Grab w/ plastic scoop

Composite Sample? Y ☐ N ☑

Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers: 3 per sample

Date Received by Lab: 5/7/08

Laboratory: Test America

Weather Conditions: Sunny 70°

Remarks: ______

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

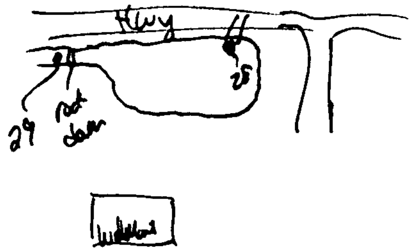
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers BND	Project No.	502.10
Date Collected	5/7/08	Time Collected	See Below
Collected By	BRM Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



24- Junction Chamber #4
27- Junction Chamber #1

Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
SD08-29 (8:45)	0"-6"	Brown to Dk Brown sand/silt/clay/cobbles/organic materials
SD08-28 (9:30)	0"-5"	Brown silty sand, org matter
SD08-24 (11:30)	0"-4"	Coarse sand & gravel, little silt, brown
SD08-27 (1310)	0"-2"	Dk. brown silt/organic matter (muck)

Sampling Method: 28/29 - grab w/ plastic scoop 24/27 - grab w/ plastic dipper cup

Composite Sample? Y ☐ N ☑ Composite Sample I.D. No. ____

Describe Compositing ____

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers: 3 per sample

Date Received by Lab: 5/8/08 Laboratory: Test America

Weather Conditions: Sunny 50°-70°

Remarks ____

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers BND	Project No.	502.10
Date Collected	5/12/08	Time Collected	See Below
Collected By	BEW/CAC Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)

Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
SD08-17 (1300) MS+MSD	0-6"	Brown sandy silt + clay, org. matter.
SD08-16 (1335)	0-4"	Brown sandy silt, muck, org. matter
SD08-14 (1430)	0-5"	Brown to gray sandy silt + clay, org. matter
SD08-15 (1515)	0-3"	Brown to dk brown sandy silt + gravel, org. matter

Sampling Method

Composite Sample? Y ☐ N ☐ Composite Sample I.D. No.

Describe Compositing

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers

Date Received by Lab / / Laboratory Test America

Weather Conditions

Remarks

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

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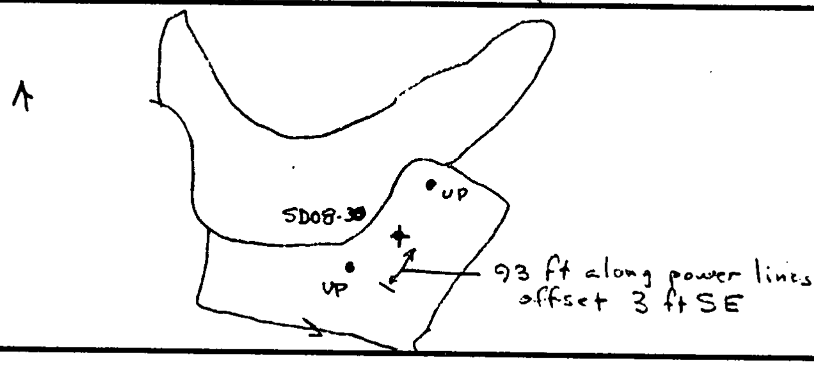
CUMMINGS RITER CONSULTANTS, INC.

SEDIMENT SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond -Horseheads, NY	Project No.	07502.10/03
Date Collected	5 /14/ 08	Time Collected	1350
Collected By	LMBRAUSCH Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Sediment Description (Color, Composition, Staining, Odor, Field Measurements(1))
SD08-30	0-6"	Dark brown silt

Sampling Method: Hand shovel; spatula

Composite Sample? Y ☐ N ☒ Composite Sample I.D. No. ______

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/PCB/Pest Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers: 3

Date Received by Lab: 5/15/08 Laboratory: TEST AMERICA

Weather Conditions: SUNNY, 70° F

Remarks:

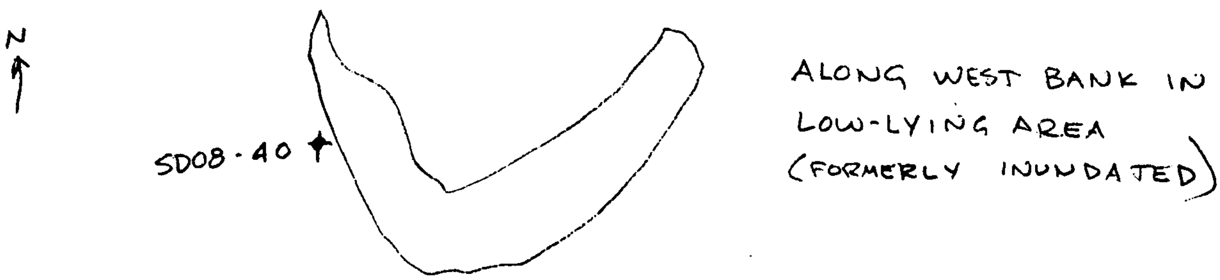
1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

CUMMINGS RITER CONSULTANTS, INC.

SEDIMENT SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond -Horseheads, NY	Project No.	07502.10/03
Date Collected	5/14/08	Time Collected	1440
Collected By	LEO BRAUSCH Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Sediment Description (Color, Composition, Staining, Odor, Field Measurements[1])
SD08-40	0-6"	DARK BROWN SILT WITH SOME GRAVEL

Sampling Method HAND SHOVEL AND SPATULA

Composite Sample? Y ☐ N ☒ Composite Sample I.D. No. ____

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/PCB/Pest/METAL	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 3

Date Received by Lab 5/15/08 Laboratory TESTAMERICA

Weather Conditions PARTLY CLOUDY; 70°F

Remarks ____

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

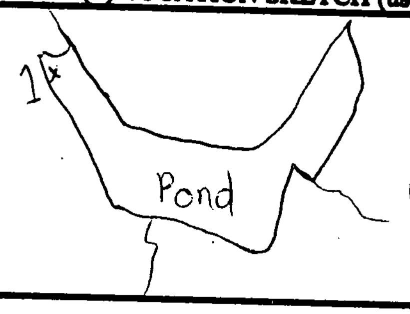
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers BND	Project No.	502.10
Date Collected	5/14/08	Time Collected	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
5:40	SD08-1(0-6)	0-6	dark brown sandy silt
5:40	SD08-1(6-18)	6-18	dark brown silty sand w/ light brown/grayish clay
5:40	SD08-1(18-30	18-30	dark brown sandy silt w/clay
15:40	SD08-1(30-35)	30-35	" "

Sampling Method

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No.

Describe Compositing Acetate sleeves; Russian peat sampler for 30-35"

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
AVS/SEM	4 oz.	Y ☐ (0-6") only	N ☐	Y ☐	N ☐

Number of Containers 13

Date Received by Lab 5/15/08 Laboratory Test America

Weather Conditions partly cloudy, 70°

Remarks (0-6") → pH = 7.27; ORP = -108 mV

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond	Project No.	502.10
Date Collected	5/14/08	Time Collected	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)

Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
14:20 SD08-2(0-6)	0-6	dark brown silt/muck
14:20 SD08-2(6-18)	6-18	dark brown silt + grayish clay
14:20 SD08-2(18-30)	18-30	grayish clay + dark brown silt
14:20 SD08-2(30-38)	30-38	grayish/light brown clay w/silt

Sampling Method

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No.

Describe Compositing 0-6 + 6-18 + half of 18-30 → acetate sleeves
24-30 + 30-38 → Russian peat sampler

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
AVS/SEM	4 oz	Y ☐ 0-6" only	N ☐	Y ☐	N ☐

Number of Containers 15

Date Received by Lab 5/15/08 Laboratory Test America

Weather Conditions sunny, 70°

Remarks (0-6) → ORP = -100mV, pH = 7.25
SD-Dup 2 collected here at 6-18 inches.

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

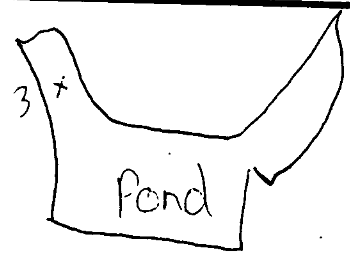
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond	**Project No.**	502.10
Date Collected	5/14/08	**Time Collected**	See Below
Collected By	MRK/MAC Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
2:30	SD08-3(0-6)	0-6	dark brown silt/muck
2:30	SD08-3(6-18)	6-18	dark brown sandy silt w/a little clay
2:30	SD08-3(18-25)	18-25	dark brown silty sand w/clay
3:10	SD08-3(25-29)	25-29	dark brown sandy silt

Sampling Method Acetate sleeves; Russian peat sampler for 25-29 inches.

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No.

Describe Compositing

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
AVS/SEM	4 oz	Y ☐ 0-6" only	N ☐	Y ☐	N ☐
Grain size	32 oz	6-18" only			

Number of Containers 14

Date Received by Lab 5/15/08 **Laboratory** Test America

Weather Conditions sunny 70°

Remarks (0-6") → pH = 7.25; ORP = -37 mV

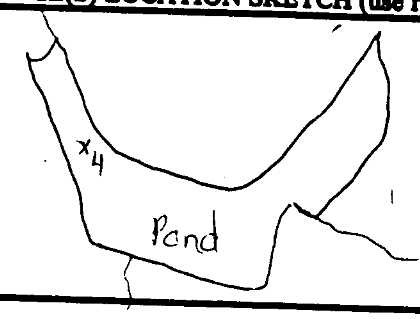
1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name: Koppers Bnd
Project No.: 502.10
Date Collected: 5/14/08
Time Collected: See Below
Collected By: MRK/MAL
Cummings/Riter Consultants

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
0:20	SD08-4(0-6)	0-6	dark brown silt/muck
10:20	SD08-4(6-18)	6-18	dark brown sandy silt w/clay
11:10	SD08-4(18-20)	18-20	dark brown sandy silt

Sampling Method: Acetate sleeves; Russian peat sampler for 18-20".

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No.

Describe Compositing

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
AVS/SEM	4 oz	Y ☐ (0-6") only	N ☐	Y ☐	N ☐

Number of Containers: 10

Date Received by Lab: 5/15/08

Laboratory: Test America

Weather Conditions: sunny, 50-60's

Remarks: (0-6) → ORP = -33 mV; pH = 7.25

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

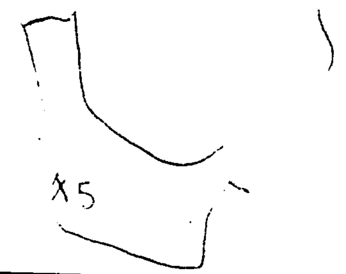
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name Koppers Bnd
Project No. 502.10
Date Collected 5/13/08
Time Collected See Below
Collected By MCK/MAL
Cummings/Riter Consultants

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
7:20	SD-08-5(0-6)	0-6	dark brown sandy silt/muck
7:20	SD-08-5(6-13)	6-13	dark brown sandy silty clay

Sampling Method Acetate sleeves

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 1

Date Received by Lab [illegible]

Laboratory Test America

Weather Conditions Sunny 70°

Remarks SD-DUP1 collected on 0-6 [illegible]
[illegible] → [illegible]

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

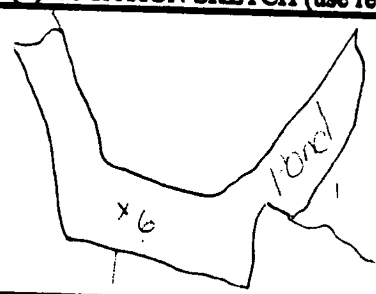
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond	Project No.	502.10
Date Collected	5/14/08	Time Collected	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
1:50	SD08-6(0-6)	0-6	dark brown silty sand/muck, some clay
9:50	SD08-6(6-9)	6-9	light brown/grayish very thick clay

Sampling Method: Acetate sleeves

Composite Sample? Y ☐ N ☒ Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

	Type[2]	Volume	Per Sample?		Per Composite?	
	VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
	SVA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
	CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
(0-6")	AVS/SEM	4 oz	Y ☑ 0-6" only	N ☐	Y ☐	N ☐
(6-9")	Grain size	32 oz	6-9" only			

Number of Containers: ~~7~~ 8

Date Received by Lab: 5/15/08 Laboratory: Test America

Weather Conditions: sunny, 50's

Remarks: (0-6) → pH = 7.32; ORP = -99mV

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

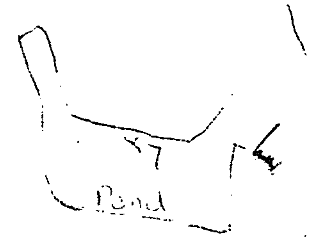
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Bnd	Project No.	502.10
Date Collected	5/14/08	Time Collected	See Below
Collected By	MRL/MAL		
	Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
8:30	SDCS-7(0-6)	0-6	dark brown silty muck
↓	SDC3-7 6-18	6-18	dark brown sandy silt
	SDC3-7 18-22	18-22	dark brown/grayish silty clay

Sampling Method: Acetate sleeves

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/toc/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers: 15

Date Received by Lab: [illegible]/15/[illegible]

Laboratory: Test America

Weather Conditions: [illegible]

Remarks: [illegible] (0-18)
(0-6) → -42mV = ORP; pH = 7.04

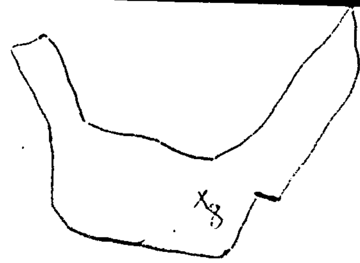
1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Bnd	**Project No.**	502.10
Date Collected	5/13/08	**Time Collected**	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
6:00	SD08-8(0-6)	0-6	dark brown sandy silt/muck
6:00	SD08-8(6-18)	6-18	dark brown silty clay
6:45	SD08-8(18-20)	18-20	dark brown silty clay

Sampling Method Acetate sleeves; Russian peat sampler for 18-20

Composite Sample? Y ☐ N ☒ **Composite Sample I.D. No.**

Describe Compositing

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 9

Date Received by Lab 5/15/08 **Laboratory** Test America

Weather Conditions Sunny, 70°

Remarks (0-6) → ORP = [illegible] mV; pH = 7.3[illegible]

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

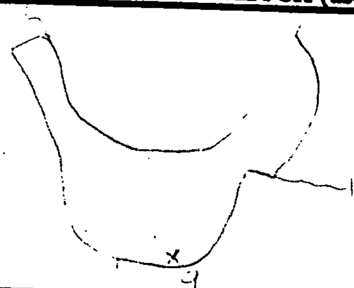
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Bnd	**Project No.**	502.10
Date Collected	5/13/08	**Time Collected**	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
14:45 SPRS-9(0-6)	0-6	dark brown clayey silt
14:45 SPRS-9(6-16)	6-16	dark brown silty clay, stiff

Sampling Method Acetate sleeves

Composite Sample? Y ☐ N ☑ **Composite Sample I.D. No.** ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 3

Date Received by Lab 5/13/08 **Laboratory** Test America

Weather Conditions [illegible]

Remarks [illegible] → pH = [illegible] ORP = -1[illegible] mV

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

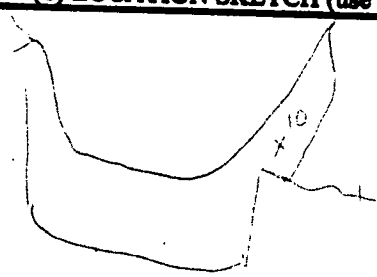
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond	Project No.	502.10
Date Collected	5/13/08	Time Collected	See Below
Collected By	MRK MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
4:05	SD08-10(0-6)	0-6	dark brown sandy silt/muck
4:05	SD08-10(6-18)	6-18	dark brown sandy/clayey silt
4:05	SD08-10(18-23)	18-23	
14:05	SD08-10(6-23)	6-23	*for grain size only

Sampling Method: Acetate sleeves

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
AVS/SEM	4 oz	Y ☒	N ☐	Y ☐	N ☐

(0-6 only) Grain size (6-23 only) 32 oz

Number of Containers: 11

Date Received by Lab: 5/13/08

Laboratory: Test America

Weather Conditions: [illegible]

Remarks: [illegible] → ORP = -4[illegible] mV pH = 7.18

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

f17/corp

CUMMINGS RITER CONSULTANTS, INC.

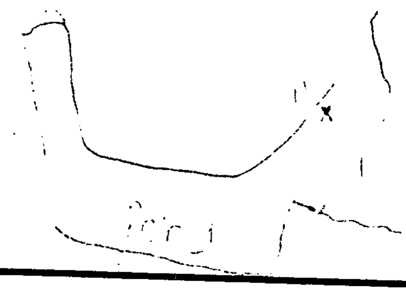
SOIL SAMPLE FIELD COLLECTION REPORT

Project Name Koppers Bnd **Project No.** 502.10

Date Collected 5/13/08 **Time Collected** See Below

Collected By MEK MHL
Cummings/Riter Consultants

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements(1))
3:25	SD-3-11(0-6)	0-6	dark brown sandy silt/muck
3:25	SD-3-11(6-9)	6-9	dark brown sandy silt

Sampling Method Acetate sleeves

Composite Sample? Y ☐ N ☐ **Composite Sample I.D. No.** ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type(2)	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☑	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☑	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☑	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 3

Date Received by Lab 5/14/08 **Laboratory** Test America

Weather Conditions [illegible]

Remarks (0-6) → [illegible] mV

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

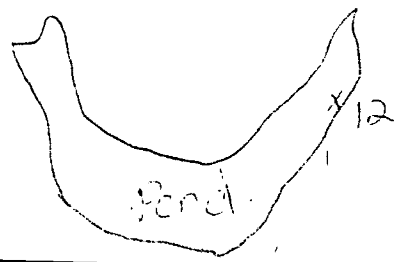
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Pond	**Project No.**	502.10
Date Collected	5/13/08	**Time Collected**	See Below
Collected By	MRK/MAL		
	Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Time	Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
2:45	SD03-12(0-6)	0-6	dark brown sandy silt/muck
2:45	SD03-12(6-12)	6-12	dark brown sandy silt
	~~SD03-12~~		

Sampling Method ~~[illegible]~~ Acetate sleeves

Composite Sample? Y ☐ N ☒ **Composite Sample I.D. No.** ____

Describe Compositing ____

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
SVOA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/toc/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers 6

Date Received by Lab 5/14/08 **Laboratory** Test America

Weather Conditions sunny 70's

Remarks (0-6) orp = -35mV, pH = 7.49
(6-12)

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

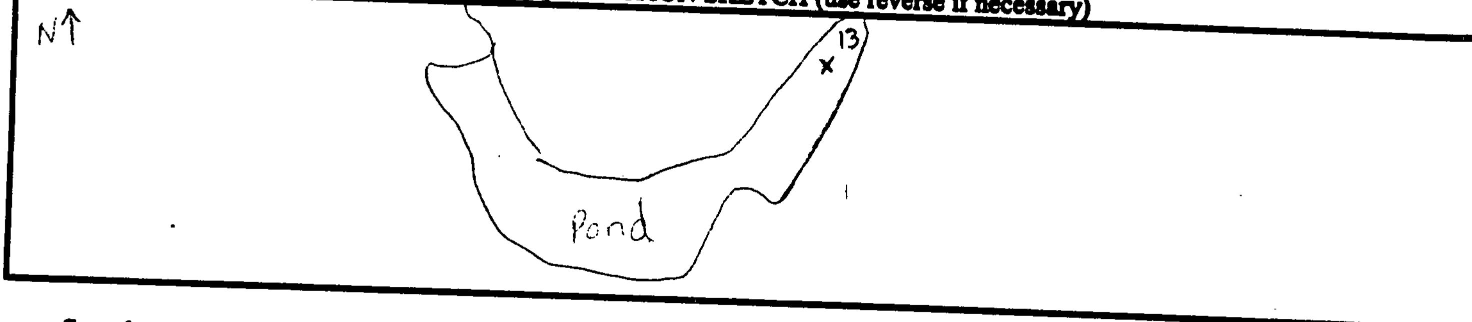
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers BND	**Project No.**	502.10
Date Collected	5/13/08	**Time Collected**	See Below
Collected By	MRK/MAL Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
SD08-13-~~5/13/08~~(0-6)	0-6	dark brown sandy silt
SD08-13-~~5/13/08~~(6-18)	6-18	dark brown sandy silt
SD08-13-~~5/13/08~~(18-27.5)	18-27.5	dark brown sandy silt

Sampling Method Russian peat sampler

Composite Sample? Y ☐ N ☒

Composite Sample I.D. No. ______

Describe Compositing ______

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/toc/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers ~~3~~ 9

Date Received by Lab 5/14/08 **Laboratory** Test America

Weather Conditions Sunny, 40s

Remarks pH = [illegible] ORP = -[illegible]7 mV for [illegible] inches
pH = 7.72 ORP -41 mV for 18-27.5 inches

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

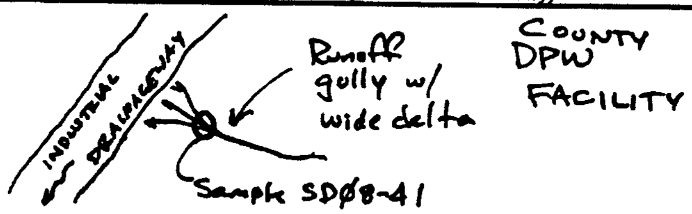
f17/corp

CUMMINGS RITER CONSULTANTS, INC.

SOIL SAMPLE FIELD COLLECTION REPORT

Project Name	Koppers Bno	Project No.	502.10
Date Collected	5/15/08	Time Collected	~~See Below~~ 1:00 p.m.
Collected By	L.M. BRAUSCH Cummings/Riter Consultants		

SAMPLE(S) LOCATION SKETCH (use reverse if necessary)



Sample I.D. No.	Depth of Sample	Soil Description (Color, Composition, Staining, Odor, Field Measurements[1])
SDØ8-41	0-6"	Brown to gray, wet sediment/soil

Sampling Method: HAND SHOVEL ; PLASTIC SCOOP

Composite Sample? Y ☐ N ☒ Composite Sample I.D. No. —

Describe Compositing: N/A

SAMPLE TYPES COLLECTED

Type[2]	Volume	Per Sample?		Per Composite?	
VOC	4 oz	Y ☒	N ☐	Y ☐	N ☐
BNA/Pest/PCB/Metals	8 oz	Y ☒	N ☐	Y ☐	N ☐
CN/TOC/TS	4 oz	Y ☒	N ☐	Y ☐	N ☐
		Y ☐	N ☐	Y ☐	N ☐

Number of Containers: 3

Date Received by Lab: 5/16/08 Laboratory: Test America

Weather Conditions: WARM, OVERCAST, 70°F

Remarks:

1. Organic vapor analysis, pocket penetrometer, etc.
2. Metals, VOA, organics, etc.

f17/corp

APPENDIX D

NEW YORK SCIENTIFIC COLLECTOR'S REPORT

New York State Department of Environmental Conservation
Division of Fish, Wildlife and Marine Resources - Special Licenses Unit
625 Broadway
Albany, NY 12233-4752
Phone Number (518) 402-8985
Fax Number: (518) 402-8925

NEW YORK STATE FISH AND WILDLIFE LICENSE

License Type: Collect or Possess

License Number: 1270

Licensee:

DANIEL W COOKE
AMEC EARTH & ENVIRONMENTAL
285 DAVIDSON AVE, SUITE 285
SOMERSET, NJ 08873

Fee Amount: $10.00
Effective Date: 05/02/2008
Expiration Date: 05/31/2009
Region: 0 County: SOMERSET
Home Phone Number: (908) 581-4568
Business Phone Number: (908) 581-4568

DOB: 10/4/1961

Statutory Authority:

ECL 11-0515 6NYCRR Part 175

Conditions:

1. A. Please read all license conditions BEFORE conducting any activity pursuant to this license.

   B. The licensee assumes all liability and responsibility for any activities conducted under the authority of this license or any actions resulting from activities authorized by the license.

   C. This license may be revoked for any of the following reasons:
   i. licensee provided materially false or inaccurate statements in his or her application, supporting documentation or on required reports;
   ii. failure by the licensee to comply with any terms or conditions of this license;
   iii. licensee exceeds the scope of the purpose or activities described in his or her application for this license;
   iv. licensee fails to comply with any provisions of the NYS Environmental Conservation Law, any other State or Federal laws or regulations of the Department directly related to the licensed activity;
   v. licensee submits a check, money order or voucher for this license or application for this license that is subsequently returned to the Department for insufficient funds or nonpayment after the license has been issued.

   D. The renewal of this license is the responsibility of the licensee. This license is deemed expired on the date of expiration listed on the license unless otherwise notified by the Department.

   E. Direct all questions concerning this license to the Special Licenses Unit (518) 402-8985.
2. A. No endangered/threatened species may be collected or possessed pursuant to this license.

New York State Department of Environmental Conservation
Division of Fish, Wildlife and Marine Resources - Special Licenses Unit
625 Broadway
Albany, NY 12233-4752
Phone Number (518) 402-8985
Fax Number: (518) 402-8925

NEW YORK STATE FISH AND WILDLIFE LICENSE

Conditions:

3. A. The licensee and/or designated agents are authorized to collect fish in the following numbers from Kippers Pond in Horseheads, Chemung county, for scientific purposes:
20 Largemouth bass
20 Common carp
20 Crapple
20 Sunfish
300 Minnow

B. Authorized collecting gear pursuant to this license are electrofishing (boat, backpack, or longline) and minnow trap.

C. Fish collected pursuant to this license may be retained for tissue analysis. Any fish captured which are not to be retained shall be immediately released at their point of capture.

D. The licensee may designate agents to conduct activities authorized by this license. Such designations must be in writing and the licensee must maintain an accurate list of agents he or she designates when conducting activities pursuant to this license.

E. The licensee must submit and maintain an accurate written list of agents to the NYS DEC Special Licenses Unit BEFORE such agents conduct any activity pursuant to this license.

F. The licensee is responsible for all actions taken by his or her designated agents pursuant to this license.

G. This license is not a license to trespass. The licensee and his or her designated agents must obtain permission from the appropriate landowner/land manager prior to conducting activities authorized pursuant to this license.

H. The licensee and/or designated agents must notify the appropriate Regional Environmental Conservation Officer at least 48 hours prior to conducting any collecting activity under this license, (585) 226-6335.

I. The licensee shall file with the Department on or before February 1 a report of activities conducted under this license during the preceding calendar year.

LICENSE
Under the Environmental Conservation Law (ECL)

Licensee Information

License Issued To:
JOHN H SAMUELIAN
INTEGRAL CONSULTING
45 EXCHANGE ST STE 200
PORTLAND, ME 04101

(207) 874-9000

DEC Contact Information

DIVISION OF FISH, WILDLIFE AND MARINE RESOURCES
SPECIAL LICENSES UNIT
625 BROADWAY, ALBANY, NEW YORK 12233-4752
PHONE: (518) 402-8985   FAX: (518) 402-8925
WEBSITE: www.dec.state.ny.us

License Authorizations

License to Collect or Possess: Scientific
License # 1329

New License   Effective Date: 1/27/2011   Expiration Date: 1/26/2012

NYSDEC Approval

By acceptance of this license, the licensee agrees that the license is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this license.

License Regulations

6 NYCRR Part 175
ECL 11-0515 (1)

LICENSE TO COLLECT OR POSSESS: SCIENTIFIC - LICENSE CONDITIONS

1. Collection from the Wild: Authorized Species, Specific The licensee is authorized to collect and possess the following species: 20 Black crappie (Promoxis nigromaculatus), 20 Bluegill sunfish (Lepomis macrochirus), 20 Pumpkinseed (Lepomis gibbosus), 20 White sucker (Catostomus commersonii), 20 Common carp (Cyprinus carpio), 20 Largemouth bass (Micropterus salmoides), 40 Crayfish(Family) Family: Astacidae

2. Scientific Collection - Authorized Activities The licensee is authorized to possess the collected species for the following activity(ies): Residue analyses to support the Human health and Ecological Risk Assessments for Koppers Pond

3. Scientific Collection - Location The licensee is authorized to collect species from the following locations only:
Koppers Pond and two reference ponds authorized by DEC located in the Horseheads area.

4. Scientific Collection - Authorized Fish Collection Equipment The licensee shall only collect fish using
Electroshocking, hand collection and sweep nets.

5. Scientific Collection - Biosafety Protocol The licensee shall conform with all guidelines contained in the NYS DEC Bureau of Fisheries Sampling, Survey, Boat and Equipment Protocol, attached to this license as Appendix I. Any questions regarding the protocols may be directed to the Regional Fisheries Manager at:

Regional Fisheries Manager
NYSDEC REGION 8 HEADQUARTERS
6274 E AVON-LIMA RD
AVON, NY14414

6. Scientific Collection - LCP - No Endangered or Threatened Species No endangered/threatened species may be collected or possessed pursuant to this license.

7. Scientific Collection - Federal and Local Licensing Requirements The licensee shall determine if a corresponding Federal or local Permit is required to exercise the authority granted in this license. If a corresponding Federal or local Permit is required, the licensee shall obtain a valid Federal or local Permit before conducting any activity pursuant to this license.

8. Collection from the Wild - Authority to Designate Agents The licensee is authorized to designate agents to assist the licensee with the activities authorized pursuant to this license provided that:

a. the licensee submits a written request to the NYSDEC Special Licenses Unit at the address listed on the front of this license containing the:
i) name
ii) address
iii) age
iv) phone number of the person he or she is nominating as a designated agent, and;

b. the licensee receives an amended license from the Special Licenses Unit listing the designated agent(s) he or she has nominated before that person can conduct activities authorized by this license.

9. Scientific Collection - Reporting Requirement - Prior to Expiration The licensee shall file a written annual report prior to the expiration date of this license. Such annual report shall contain: a) name of the licensee, b) license number, c) common name of the listed animals collected, d) location(s) of collection, e) date(s) of collection, f) biological data collected and g) final disposition of collected animals. The licensee shall send this report to the NYSDEC Special Licenses Unit 625 Broadway, Albany, NY 12233-4752.

10. Scientific Collection - Reporting Requirement - Macroinvertebrate The licensee shall record and report all macroinvertebrate collections using forms provided by the Department.

11. Scientific Collection – Additional Reporting Requirement The licensee shall file duplicate reports with the following Regional Wildlife Manager or Fisheries Manager.

Regional Fisheries Manager
NYSDEC REGION 8 HEADQUARTERS
6274 E AVON-LIMA RD
AVON, NY14414

GENERAL CONDITIONS - Apply to ALL Authorized Licenses

1. GC – Licensee Shall Read All Conditions The licensee shall read all license conditions prior to conducting any activities authorized pursuant to this license.

2. GC – Reasons for Revocation This license may be revoked for any of the following reasons:

i. licensee provided materially false or inaccurate statements in his or her application, supporting documentation or on required reports;
ii. failure by the licensee to comply with any terms or conditions of this license;
iii. licensee exceeds the scope of the purpose or activities described in his or her application for this license;
iv. licensee fails to comply with any provisions of the NYS Environmental Conservation Law, any other State or Federal laws or regulations of the department directly related to the licensed activity;
v. licensee submits a check, money order or voucher for this license or application for this license that is subsequently returned to the department for insufficient funds or nonpayment after the license has been issued.

3. GC – Licensee Shall Carry Copy of License The licensee shall carry a copy of this license or a document provided by the department, if relevant, when conducting activities pursuant to this license.

4. GC – Licensee Shall Notify of Change of Address The licensee shall notify the Special Licenses Unit in writing, by mail or email, within five (5) days of the official change of residence.

5. GC – License is Not Transferrable This license is not transferrable and is valid only for the person identified as the licensee.

6. GC – Licensee is Liable for Designated Agents If designated agents are authorized pursuant to this license, the licensee shall be liable and responsible for any activities conducted by designated agents pursuant to this license or any actions by designated agents resulting from activities authorized by this license.

7. **GC – Licensee Renewal** The licensee shall submit a written request for the renewal of this license prior to the expiration date listed on the license. The licensee shall include accurate and complete copies of any required reports with their renewal request. This renewal paperwork shall be sent to:

NYSDEC
Special Licenses Unit
625 Broadway
Albany, NY 12233-4752.

This license is deemed expired on the date of expiration listed on the license.

NOTIFICATION OF OTHER LICENSEE OBLIGATIONS

MN– Licensee is Liable
The licensee shall be liable and responsible for any activities conducted under the authority of this license or any actions resulting from activities authorized by the license.

MN – Access by Law Enforcement
The licensee shall allow representatives of the NYS DEC Division of Law Enforcement to enter the licensed premises to inspect his or her operations and records for compliance with license conditions.

Trespassing Prohibited
This license is not a license to trespass. The licensee shall obtain permission from the appropriate landowner/land manager prior to conducting activities authorized pursuant to this license

NYS DEC Division of Fish, Wildlife and Marine Resources, Special Licenses Unit

This document is an official addendum to the attached license, and shall be kept with the license at all times.

Appendix I. NYS DEC Bureau of Fisheries Sampling, Survey, Boat and Equipment Protocol

Sampling and Survey work should be conducted with clean, dry and/or completely disinfected equipment.

For all survey work in streams and rivers where the status of ANS is unknown, sampling should start at the upper most reach, and then work downstream. This will help ensure that non motile ANS will not be transported on boots and gear to uninfected upstream reaches. In streams where the infestation is systemwide, survey order is less important. If the stream or river is already known to be infested with ANS but the extent of infestation is not clear, particular care should be taken to replace or completely disinfect boots and gear before consecutive surveys are conducted.

In general, lakes and ponds which are connected by channels or streams with or without barriers, should be surveyed starting at the uppermost location in the system. Dry or disinfected gear should always be used for lake or pond surveys.

When traveling from a lake or pond to another water body, or from a stream/river site to one that is not downstream in the same system, the following procedures must be followed for boats, trailers and all other gear that comes in contact with the water. *(Note: additional REQUIRED procedures are listed in this protocol for use when moving from whirling disease or zebra mussel positive waters to waters not known to have these organisms.)*

- **Upon launching boat:**
  - **Trailers with carpeted bunks** should be disinfected after the boat is launched and the trailer removed from the water - use a spray bottle with Lysol solution or full-strength vinegar for carpeted trailer bunks.
  - Keep the disinfectant bottle in the truck so the driver can treat the trailer bunks after deploying the boat.

- **Prior to leaving launch site:**
  - Inspect and remove visible aquatic plants, animals and mud from the boat, trailer and equipment at the sampling location.
  - Drain all water from the live well, bilge, etc.
  - Do not transfer any aquatic animals, plants or water from one water body to another.

- Do not store dissolved oxygen probes or other water chemistry gear in lake water - bring distilled or chlorinated tap water for this purpose (follow manufacturers directions).

- **Upon returning to equipment storage area OR before launching in any other water body that is not immediately downstream of prior location (whichever comes first):**

  - Nets, anchors, lines, boots and waders can be dried for 5 days . *When felt soled waders are used special care needs to be taken to ensure that they are totally dry or they must be disinfected as outlined below*) **OR**
  - **All** equipment can be disinfected using one of the following techniques (*Note: for boats this includes surface, motor, bilge, pumps and live wells. All equipment must subsequently be rinsed with clean water. Disinfection must take place away from water bodies*):
    - **In zebra mussel/whirling disease waters - use 10% bleach solution***
    - In all other waters - 1% Virkon Aquatic** is acceptable **OR**
    - Boats, trailers and **all** other equipment can be disinfected using a high temperature pressure washer (steam power washer)- *(Note: this technique is approved for zebra mussel/whirling disease waters;* see Appendix 1 for boat disinfection guidelines).
    -

* **Chlorine bleach**: When handling 10% chlorine bleach solution, be sure to wear protective gear (masks, gloves, goggles, etc.) and use in a well ventilated area (follow precautions on Material Safety Data Sheets (MSDS)). Remove all visible debris from equipment and gear. Spray equipment and gear with the solution so that it is saturated or immerse gear in solution. If equipment or gear is porous (i.e., felt bottomed or neoprene waders) let soak in solution for 10 minutes. Rinse equipment and gear with tap water or with water from the next water body you will be sampling. Dispose of waste chlorine bleach solution away from bodies of water and drinking water sources (follow protocol in MSDS).

** **Virkon Aquatic:** Wear a dust mask and rubber gloves when handling the powder. Mix a 1% (1:100) solution. Remove all visible debris from equipment and gear. Spray equipment and gear with the solution so that it is saturated or immerse gear in solution. If equipment or gear is porous (i.e., felt bottomed or neoprene waders) let soak in solution for 10 minutes. Rinse equipment and gear with tap water or with water from the next water body you will be sampling. Dispose of waste Virkon solution away from bodies of water and drinking water sources (follow protocol in MSDS).

NYSDEC Bureau of Fisheries
Biosecurity Protocol

Boat hulls, anchors, and trailers:

- Always drain the bilges of the boat by removing the drain plug. Bilge pumps are not capable of removing all water from those areas. Wet wells, live wells, and any other compartments that could hold water from an infested field collection site should be drained of water at the field site, and if possible, flushed with hot water, steam or disinfectant solution and allowed to dry before the next use. If appropriate, the field site water may be drained back into the original body of water, as long as conditions and the decontaminant used are such that this would not cause chemical or biological contamination. Otherwise, such water containing disinfectant solutions must be drained into a suitable container for treatment prior to final disposal. Field crews may elect to not drain the bilge area until they return to the storage lot if they are not going to any other bodies of water until decontamination is completed.
- If the bilge water is drained and collected, it must be disinfected and then disposed of by suitable means to avoid causing environmental damage or contamination.
- After draining contained water, all compartments that held water should be washed with a high temperature pressure washer or disinfectant solution and left open to completely dry prior to use in the next site.
- All boats, anchors, trailers used in field sampling will be cleaned using a high temperature pressure washer working from fore to aft and gunnels to keel in a thorough manner.
- While using the high temperature pressure washer, particular attention should be paid to the cooling water intakes on the lower unit of the motor.
- Particular attention should be paid to the carpeted trailer bunks since they can hold water for extended periods of time. These areas should have already been treated with a disinfectant solution when the boat was unloaded into the lake but should be washed with a high temperature pressure washer anyway.
- Lower the motor to drain all water from the lower unit. Replace the motor into the "transom saver" when this is accomplished.

*OWRB, Oklahoma Water Resources Board. 2005. Decontamination Protocol for Aquatic Nuisance Species. Technical Report 05-157.

NYS DEC Aquatic Macro-invertebrate Reporting Form

Licensee Name______________________ License #_______________ Date ________________

Waterbody	Collection Date (mm/dd/yy)	Site Coordinates (UTM18)	Order	# Collected

03/09

APPENDIX E

FISH TISSUE SAMPLE FIELD COLLECTION REPORTS

APPENDIX E
QUALITATIVE ASSESSMENT OF BIOTA AND FISH HABITAT

The current environmental setting and habitats of Koppers Pond was summarized in the *Preliminary Conceptual Site Model* (Koppers Pond RI/FS Group, 2007b). This section summarizes results from the May 2008 sampling event and compares these results to the June 2003 field observations. Attachment E-1 contains representative site photographs from the fish collections.

E.1 Summary of Fish Collections

Table E-1 summarizes the fish that were collected during the May 2008 and provides some key morphometric parameters (e.g., body weight, total length). The gamefish that were collected included black crappie, carp, largemouth bass, and white sucker. None of these fish exhibited any external lesions or physical anomalies. The individual fish were analyzed for chemical parameters and lipid content.

The forage fish that were collected included bluegill sunfish and pumpkinseeds. Three of the bluegill samples were evaluated as individual samples, and one was evaluated as a composite of four fish to achieve sufficient samples mass for chemical analysis. Similarly, there was one composite of pumpkinseed (consisting of four fish) and one individual sample evaluated for chemical analyses. None of these fish exhibited any external lesions or physical anomalies.

One gizzard shad that was collected had some fin erosion and a lip tumor. It was released back to the pond with the agreement of the three agencies as a non-target species and an isolated case of deformity.

E.2 May 2008 Biota and Fish Habitat Assessment

The fish collection effort was not intended as a population survey, and the field team discontinued shocking when the target species and numbers were collected. Several other fish were noted in addition to those retained for chemical analyses. These included yellow perch, largemouth bass, black crappie, four pumpkinseeds and seven bluegills. These were all released. Numerous largemouth bass were observed in the pond, but the collection team did not net them after the target number of specimens had been captured.

In addition to the fish collections, the team made note of the other biota observed in, on or near the pond. The air temperature was 7-10°C, with a light rain falling throughout the sampling period. Because of the inclement weather, there was little visible wildlife activity.

- Avian Species: Among the birds observed at the pond were: red-winged blackbirds, robins, yellow warblers, sparrows, swallows, Canada geese and mallards.

- Reptiles and Amphibians: One Eastern painted turtle was netted by the fish shocking team. While few turtles were observed during the fish collection, numerous turtles, including snapping turtles, were observed on preceding sunny days. No frogs or tadpoles were observed during the fish shocking, but many had been observed on preceding sunny days.

- *Aquatic Insects*: Water striders were observed on the pond surface. The inclement weather likely reduced activities of any flying insects (e.g., dragonflies).

These observations, albeit limited, were consistent with what one would expect to see in warmwater pond areas in this portion of NY State.

E.3 Comparison of 2003 and 2008 Assessments of Biota and Fish Habitat

The worksheets from EPA's *Rapid Bioassessment Protocol* (RBP: Barbour et al., 1999) were used to collect information about the potential habitats and other ecologically-relevant features of Koppers Pond and the immediate area during the June 2003 sampling event (CEC, 2003). There was little apparent change in the vegetative cover adjoining the pond between the June 2003 and May 2008 sampling events, although a detailed assessment of these adjoining areas was not performed in 2008.

The pond conditions were similar between the June 2003 and May 2008 sampling events, with the exception of the pond water levels. During the May 2008 sampling event it was observed that water levels were approximately 2-ft lower than present during the prior sampling events. This was not attributable to a drought, since rainfall has been close to normal in the Horseheads area. The decline is likely due to removal of beaver dams near the pond outlets. The reduction in water levels has resulted in exposure of littoral areas that were formerly under water along portions of the pond perimeter. Additional soil/sediment samples were collected from some of these littoral areas during the May 2008 field sampling event.

E.4 References

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish.* Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
[http://www.epa.gov/owow/monitoring/rbp/]

Civil and Environmental Consultants, Inc. (CEC). 2003. *Investigation of Fish in Koppers Pond for the Kentucky Avenue Wellfield Superfund Site, Horseheads, NY.* 25 July.

Table E-1. Summary of Key Morphometrics and Conditions of Fish Collected from Koppers Pond in May 2008
Kentucky Avenue Wellfield Site, Operable Unit 4, Koppers Pond
Horseheads, New York

Sample ID	Species	Group	Std Length (mm)	Weight (g)	Condition
CC08-01	Carp - *Cyprinus carpio*	Gamefish	560	2,569	Healthy, no physical anomalies
CC08-02	Carp - *Cyprinus carpio*	Gamefish	517	1,909	Healthy, no physical anomalies
CC08-03	Carp - *Cyprinus carpio*	Gamefish	573	2,816	Healthy, no physical anomalies
CC08-04	Carp - *Cyprinus carpio*	Gamefish	621	3,818	Healthy, no physical anomalies
CC08-05	Carp - *Cyprinus carpio*	Gamefish	553	2,188	Healthy, no physical anomalies
WS08-01	White sucker - *Catostomus commersoni*	Gamefish	407	612	Healthy, no physical anomalies
WS08-02	White sucker - *Catostomus commersoni*	Gamefish	390	666	Healthy, no physical anomalies
WS08-03	White sucker - *Catostomus commersoni*	Gamefish	342	373	Healthy, no physical anomalies
WS08-04	White sucker - *Catostomus commersoni*	Gamefish	383	523	Healthy, no physical anomalies
WS08-05	White sucker - *Catostomus commersoni*	Gamefish	412	633	Healthy, no physical anomalies
LB08-01	Largemouth bass - *Micropterus salmoides*	Gamefish	407	843	Healthy, no physical anomalies
LB08-02	Largemouth bass - *Micropterus salmoides*	Gamefish	377	783	Healthy, no physical anomalies
LB08-03	Largemouth bass - *Micropterus salmoides*	Gamefish	395	812	Healthy, no physical anomalies
LB08-04	Largemouth bass - *Micropterus salmoides*	Gamefish	382	759	Healthy, no physical anomalies
LB08-05	Largemouth bass - *Micropterus salmoides*	Gamefish	380	717	Healthy, no physical anomalies
LB08-06	Largemouth bass - *Micropterus salmoides*	Gamefish	381	651	Healthy, no physical anomalies
BC08-01	Black crappie - *Pomoxis nigromaculatus*	Gamefish	292	285	Healthy, no physical anomalies
BC08-02	Black crappie - *Pomoxis nigromaculatus*	Gamefish	268	188	Healthy, no physical anomalies
BC08-03	Black crappie - *Pomoxis nigromaculatus*	Gamefish	218	110	Healthy, no physical anomalies
BC08-04	Black crappie - *Pomoxis nigromaculatus*	Gamefish	275	213	Healthy, no physical anomalies
FF08-01	Bluegill - *Lepomis macrochirus*	Forage Fish	167	90	Healthy, no physical anomalies
FF08-02	Bluegill - *Lepomis macrochirus*	Forage Fish	148	65	Healthy, no physical anomalies
FF08-03	Bluegill - *Lepomis macrochirus*	Forage Fish	183	115	Healthy, no physical anomalies
FF08-04	Bluegill - *Lepomis macrochirus*	Forage Fish	93	14	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	63	3.8	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	102	20	Healthy, no physical anomalies
	Bluegill - *Lepomis macrochirus*	Forage Fish	106	21.8	Healthy, no physical anomalies
FF08-05	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	101	20.2	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	106	22.3	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	71	6.3	Healthy, no physical anomalies
	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	68	5.7	Healthy, no physical anomalies
FF08-06	Pumpkinseed - *Lepomis gibbosus*	Forage Fish	157	83.7	Healthy, no physical anomalies

Notes:
All fish were collected on 16 May 2008.
Forage fish samples FF08-04 and FF08-05 are each composites of four individual fish in order to obtain the mass required for chemical analyses. The remaining forage fish samples yielded sufficient tissue mass with a single fish.
Units: mm = millimiters; g = grams

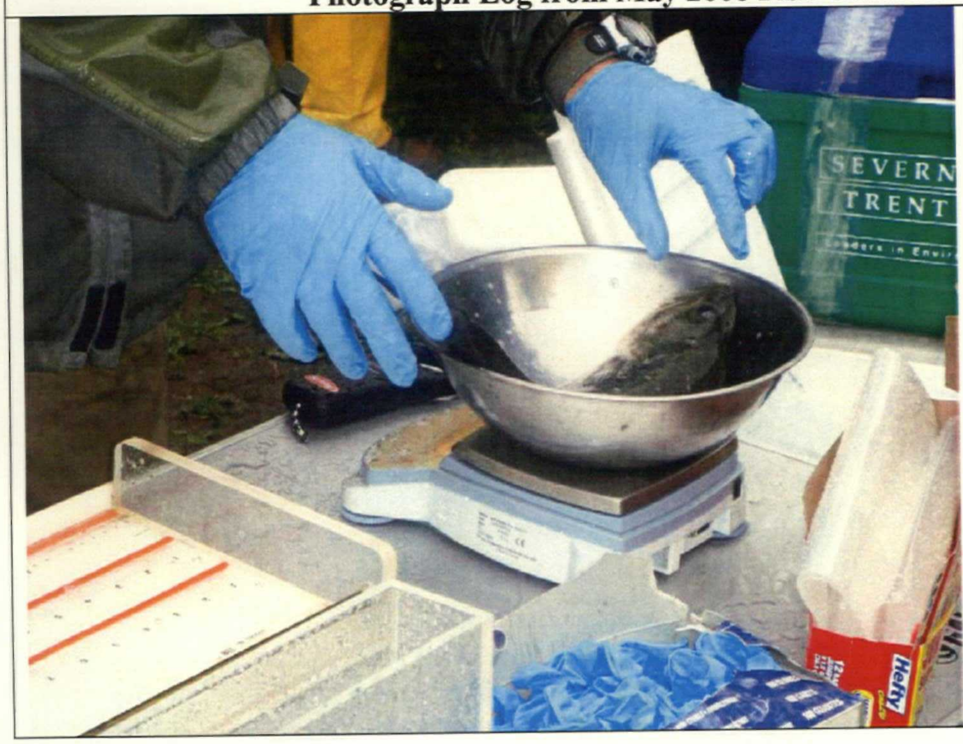
Attachment E-1 – Photograph Log from May 2008 Fish Collections

<table>
<tr><td></td><td><u>Photo #1</u>
Boat launch area. This is the location where water quality parameters were collected for the fish collections.</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td><u>Photo #2</u>
Example of electroshock set-up on the Jon boat.</td></tr>
</table>

Attachment E-1 (continued)
Photograph Log from May 2008 Fish Collections

Photo #3
Mesh-lined holding pen in shallow water near staging area. Used to hold fish prior to processing.

Photo #4
Collecting standard length measurement of a largemouth bass. Note the absence of external lesions and good condition of the sampled fish.

Attachment E-1 (continued) Photograph Log from May 2008 Fish Collections	
 	*Photo #5* Measuring weight of bass.

APPENDIX F

LABORATORY DATA PACKAGES (ELECTRONIC FORMAT)

APPENDIX G

DATA VALIDATION REPORTS
(PLUS COMPACT DISK)

CUMMINGS RITER

CONTENTS

ACRONYMS AND ABBREVIATIONS

J	Estimated concentration (data qualifier)
MDLs	Method Detection Limits
NYSDEC	New York State Department of Environmental Conservation
PCBs	Polychlorinated biphenyls
QAPP	Quality Assurance Project Plan
QC	Quality Control
RLs	Reporting Limits
SVOC	Semivolatile Organic Compounds
TA	TestAmerica (analytical laboratory)
TAL	Target analyte list
UJ	Not-detected with estimated detection limit (data qualifier)
USEPA	US Environmental Protection Agency
VOC	Volatile Organic Compounds

1 INTRODUCTION

This appendix contains the chemical data usability summaries for samples collected in May 2008, October 2010 from Koppers Pond and the Outlet Channels, and the October 2010 samples collected from the Reference Pond. AMEC Earth & Environmental (AMEC) validated the samples collected in 2008, while Integral Consulting (Integral) performed the data validation of the 2010 samples.

A data usability assessment is used to evaluate whether analytical data points are scientifically valid and defensible, and of a sufficient level of precision, accuracy, representativeness, completeness, comparability and sensitivity to support the project goals. Overall, our review of the results indicates the data are generally usable and of good quality to support the project goals and data quality objectives as outlined in the Koppers Pond *Quality Assurance Project Plan* (April 2008).

The analytical data validation reports for the 2010 sample collections are provided in electronic format as part of this appendix. The analytical data reports for the 2010 are provided in electronic format in Appendix K. The analytical data reports for the 2008 samples are provided in Appendix G of the *Site Characterization Study Report*. The key usability results are provided below by media.

2 DATA USABILITY SUMMARY FOR 2008 SAMPLE COLLECTIONS

Samples collected in 2008 included surface water, sediments and fish from Koppers Pond. These samples were validated by AMEC chemists. The data validation reports are provided in Attachment J-1 on the report CD.

2.1 SURFACE WATER AND SEDIMENT SAMPLES

None of the surface water or sediment were rejected. Therefore, 100% of the data should be considered valid which meets the 90% project data quality objective. The types of qualifications applied to the dataset included non-detected data and estimated data.

Non-detected Qualified Data

A number of detected metal, VOC, SVOC, pesticide, and conventional chemistry results were qualified as non-detected because of contamination in the associated laboratory and/or trip blanks or interferences.

Estimated Data

Portions of the VOC, SVOC, pesticide, PCB, metals, AVS/SEM, TOC, and conventional chemistry data were qualified as estimated due to calibration issues, matrix interferences, low and high matrix spike recoveries, field duplicate imprecision, low and high surrogate recoveries, low and high internal standard recoveries, serial dilution results, high percent moisture results, exceeded holding times, and concentrations between the MDLs and RLs.

2.2 FISH SAMPLES

AMEC's review indicates the data for the fish tissue samples were generally usable and of good quality. Approximately 2% of the results were rejected; therefore, 98% of the data should be considered valid, which meets the 90% project data quality objective. Although review of the initial results of fish tissue percent lipid analyses showed no technical validation issues, it was apparent that the reported values were anomalously low based on AMEC's experience in fish tissue evaluations. To confirm these unanticipated lipid results, samples were forwarded to the TestAmerica laboratory in Burlington, Vermont, for comparative analysis of both lipid content and PCBs. The data received from the TestAmerica Burlington re-analyses showed lipid contents that were in-line with expectations and higher PCB concentrations than were reported from the analyses in the TestAmerica Pittsburgh laboratory.

AMEC investigated the fish tissue handling, preparation, extraction, and analytical methods employed by both TestAmerica laboratories and determined the only identified difference between the two laboratories was the use of a Tekmar Tissumizer® during sample preparation at the TestAmerica Burlington laboratory. AMEC, as well as, TestAmerica laboratory staff feel that the tool effectively breaks down the tissue to the cellular level, allowing for a greater extraction efficiency of both the lipids and PCBs compared to other tissue processing methods.

Although both the TestAmerica Pittsburgh and the TestAmerica Burlington data were developed in accordance with USEPA and NYSDEC methods, the TestAmerica Burlington data in fish were considered more representative of the lipid content of these samples and more useful in assessing the dose of PCBs for project purposes.

The types of qualifications applied to the dataset included rejected data, non-detect data and estimated data.

Rejected Data

A single non-detected 4,4'-DDT result was rejected because of a very low matrix spike recovery. In addition, the chromium and/or vanadium results in a number of samples were rejected because of associated blank results above the CRQL.

Non-detected Qualified Data

A number of detected metal and pesticide results were U qualified as non-detected because of contamination in the associated laboratory blanks or interferences. Results that were U qualified as non-detected were not further qualified due to other associated QC outliers.

Estimated Data

Portions of the PCB, pesticide and metals data were qualified as estimated due to high and low surrogate recoveries, high and low matrix spike recoveries, serial dilution imprecision, and concentrations between the MDLs and RLs.

3 DATA USABILITY SUMMARY FOR 2010 SAMPLE COLLECTIONS

Samples collected in 2010 included sediments, fish and vegetation from Koppers Pond and the reference pond. These samples were validated by Integral chemists. The three SDGs were compiled into a single Data Validation Report, which is provided in Attachment J-2 on the report CD.

A total of 1,841 data points were reported. A total of 1,374 results (74.6 percent) were estimated (J/UJ), and five of these results were also qualified as not detected (U). One hundred seventy one results were labeled do-not-report to indicate a more appropriate result exists. No data were rejected and completeness was 100 percent. A summary of all qualified results is presented in Table 3-2 in Attachment J2. Some results were qualified for multiple reasons so the sum of the qualifiers is greater than the number of qualified results.

The data meets the criteria set forth in the referenced quality assurance documents, with the exceptions noted above. Data that has been labeled do-not-report should not be used for any purpose. All other results are acceptable for their intended use as qualified.

3.1 SEDIMENT AND MUDFLAT SAMPLES

Two sediment composite samples from the Reference Pond (one unsieved and one sieved at 0.5 mm size), five samples collected for sediment toxicity testing from Koppers Pond, and three mudflat soil samples from the Outlet/Mudflat area were analyzed for TCL SVOCs, Aroclor PCBs, TOC and TAL metals. The sediment toxicity bioassay report results did not undergo third party data validation.

Rejected Data

None of the analytical results for the sediment samples were rejected.

Non-detected Qualified Data

None of the detected metal or Aroclor PCB results were U qualified as non-detected because of contamination in the associated laboratory blanks or interferences.

Estimated Data

Portions of the SVOCs, PCB, and metals data were qualified as estimated due to elevated moisture contents in the sediment samples. Antimony and cyanide were qualified as estimated results in the three Outlets/Mudflat Area samples due to matrix spike recoveries outside of the control limits. The cyanide data were qualified as estimates in the sediment toxicity samples due to exceeding the holding time.

3.2 FISH SAMPLES

Five gamefish samples collected from the Reference Pond and a single composite of forage fish from West Outlet were collected in October 2010. These were analyzed for Aroclor PCBs, total lipids, and TAL metals by the TA-Burlington laboratory. These results were reported in a single laboratory report (SDG 200-2079-1).

The Aroclor PCB analyses were originally reported at detection limit greater than specified in the Koppers Pond QAPP. Therefore, the Aroclor PCB fractions of these samples were re-analyzed at a lower detection limit.

Rejected Data

None of the analytical results for the fish samples were rejected. However, some of the Aroclor PCB results were labeled as "do-not-report" since they were originally analyzed at an inappropriate detection limit.

Non-detected Qualified Data

None of the detected metal or Aroclor PCB results were U qualified as non-detected because of contamination in the associated laboratory blanks or interferences.

Estimated Data

Portions of the PCB, and metals data were qualified as estimated due to exceeding holding times (re-analyzed Aroclor PCB samples), matrix spike recoveries (zinc only), and serial dilution imprecision (lead only).

3.3 VEGETATION SAMPLES

Seven samples of aquatic and terrestrial vegetation were collected in 2010 from Koppers Pond and the Reference Pond. These were analyzed for Aroclor PCBs and metals by the TA-Burlington laboratory. These results were reported in a single laboratory report (SDG 200-2079-1). The Aroclor PCB analyses were originally reported at detection limit greater than specified in the Koppers Pond QAPP. Therefore, the Aroclor PCB fractions of these samples were re-analyzed at a lower detection limit.

Rejected Data

None of the analytical results for the vegetation samples were rejected. However, some of the Aroclor PCB results were labeled as "do-not-report" since they were originally analyzed at an inappropriate detection limit.

Non-detected Qualified Data

None of the detected metal or Aroclor PCB results were U qualified as non-detected because of contamination in the associated laboratory blanks or interferences.

Estimated Data

Portions of the PCB, and metals data were qualified as estimated due to exceeding holding times (re-analyzed Aroclor PCB samples), high and low surrogate recoveries, high and low matrix spike recoveries, and serial dilution imprecision.

4 DATA ASSESSMENT SYNOPSIS

Based on the Data Validation performed on the 2008 and 2010 samples collected for this project, the percent completeness for useable data ranged from 98 to 100%, which meets the 90% project data quality objective. The project QA program identified issues with the PCB analyses for the 2008 and 2010 samples, and appropriate mitigative control measures were taken to provide data for the project. Some of the chemical results were qualified as estimates, but can still be used as reported to support the risk assessments and risk management.

APPENDIX H

FIELD LOG SHEETS
SLENDER PONDWEED SURVEY
SEPTEMBER 2009

Photo H-1

Industrial Drainageway, looking upstream

Photo H-2

East shoreline
N42.14904
W76.82709

Photo H-3

East outlet
(SP09-002)
N42.14760
W76.82799

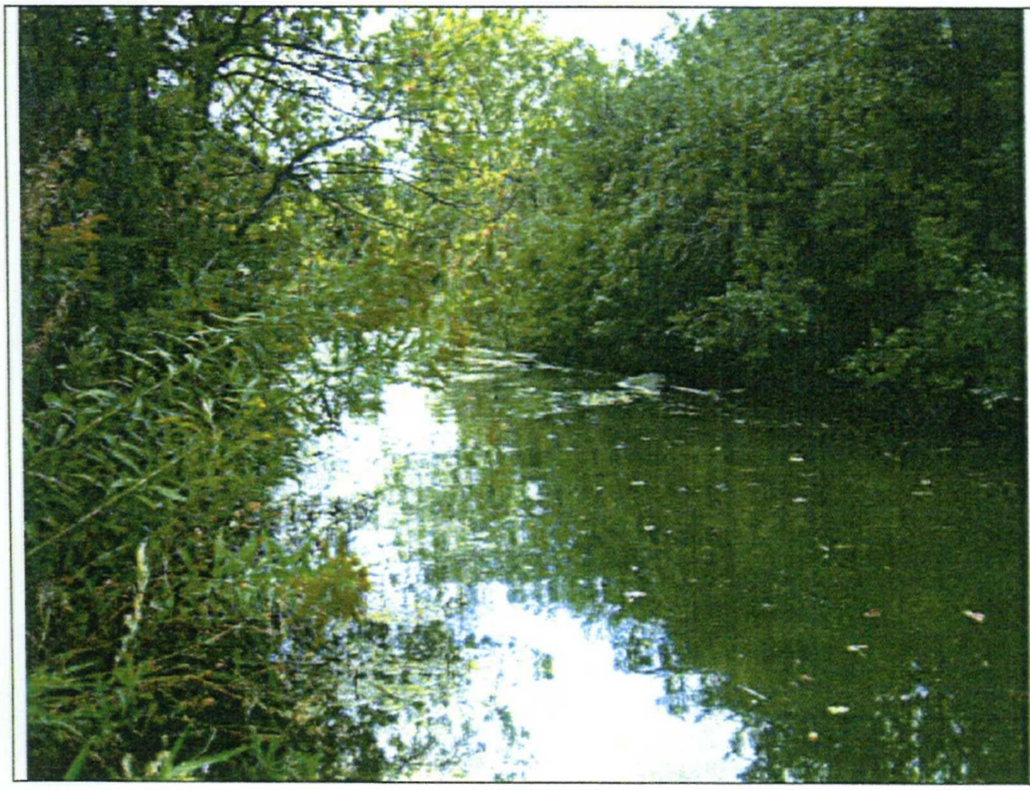


Photo H-4

East outlet
(SP09-001)
N42.14848
W76.82771

Photo H-5

Northeast shoreline
N42.14980
W76.82719

Photo H-6

Northeast shoreline
N42.15006
W76.82639

Photo H-7

Northwest backwater, near SP09-07
N42.15024
W76.83070

Photo H-8

South shoreline, near SP09-10
N42.14886
W76.82832

Photo H-9

Southwest shoreline, near SP09-05 N42.14838 W76.82979

Photo H-10

West shoreline, near SP09-06 N42.14960 W76.83015

Photo H-11

West shoreline, near SP09-09
N42.14963
W76.62950

Lake Name: Koppers Pond						Start Time: 10:25 am			Description Starting Point: East Outlet					Station	
Sampling Date: 9/16/2009						End Time: 1:40 pm			Lat: W76.82771			Long: N42.14848		Description	Comment
						Exotics/Target Plants			Native and Other Plants						
Station #	Sample #	Lat	Long	Depth (m)	Overall Plant Abundance	Northern Slender Pondweed (*Stuckenia filiformis v. alpinus*)			Coontial (*Ceratophyllum demersum*)	Duckweed (*Lemna minor*)					
5	1	W76.82979	N42.14838	0.76	S	Z			S	C				SP09-005	Pond location
6	1	W76.83016	N42.14960	0.46	S	Z			S	Z				SP09-006	Pond location
7	1	W76.83069	N42.15024	0.20	S	Z			S	Z				SP09-007	Pond location
8	1	W76.83023	N42.15142	0.30	S	Z			S	Z				SP09-008	Industrial drainageway
9	1	W76.82950	N42.14963	0.30	S	Z			S	Z				SP09-009	Pond location
10	1	W76.82832	N42.14886	0.61	S	Z			S	Z				SP09-010	Pond location
11	1	W76.82719	N42.14980	0.15	S	Z			S	Z				SP09-011	Pond location
12	1	W76.82639	N42.15006	0.46	S	Z			S	Z				SP09-012	Pond location
13	1	W76.82709	N42.14904	0.30	S	Z			S	Z				SP09-013	Pond location
Abundance Value: Z = Zero; T = Trace, S = Sparse; C = Common															
Additional Comments:		The CSLAP abundance codes were modified since a rake was not used for sample survey (see Technical Memorandum No. 1 for discussion).													
		Lat/Long values based on NAD83.													
		Station # was the GPS waypoint. The corresponding sample ID is shown under the description column.													

Table H-1. Field Macrophyte Survey Form for Koppers Pond and Industrial Drainageway

Lake Name: Koppers Pond Outlets						Start Time: 10:25 am			Description Starting Point: East Outlet					Station	
Sampling Date: 9/16/2009						End Time: 1:40 pm			Lat: W76.82771			Long: N42.14848		Description	Comment
						Exotics/Target Plants			Native and Other Plants						
Station #	Sample #	Lat	Long	Depth (m)	Overall Plant Abundance	Northern Slender Pondweed (*Stuckenia filiformis v. alpinus*)			Coontial (*Ceratophyllum demersum*)	Duckweed (*Lemna minor*)					
1	1	W76.82771	N42.14848	0.80	Z	Z			Z	Z				SP09-001	East outlet
2	1	W76.82799	N42.14760	0.15	Z	Z			Z	Z				SP09-002	East outlet
3	1	W76.82943	N42.14754	0.20	Z	Z			Z	Z				SP09-003	West outlet
4	1	W76.82993	N42.14776	0.15	Z	Z			Z	Z				SP09-004	West outlet
14	1	W76.82678	N42.14640	0.15	Z	Z			Z	Z				SP09-014	East outlet
Abundance Value: Z = Zero; T = Trace, S = Sparse; C = Common															
Additional Comments:	The CSLAP abundance codes were modified since a rake was not used for sample survey (see Technical Memorandum No. 1 for discussion).														
	Lat/Long values based on NAD83.														
	Station # was the GPS waypoint. The corresponding sample ID is shown under the description column.														

Table H-2. Field Macrophyte Survey Form for Koppers Pond East and West Outlets

APPENDIX I

SUMMARY OF KOPPERS POND AND OUTLET CHANNEL SEDIMENT DATA 1995/1998

Approx. Property Line

Property lines and owners based on Chemung Co. Tax Maps.

Approx. Sample Location

- CDM (1998)
- Phillips (1994-95)

0 250 500 Feet

hheads-4.mxd

Prepared For:
KOPPERS POND
RI/FS GROUP

CUMMINGS RITER CONSULTANTS, INC.

FIGURE I-1
HISTORIC SEDIMENT SAMPLING LOCATIONS
KENTUCKY AVE. WELLFIELD SITE - OU4
HORSEHEADS, NEW YORK

Table I-1
Historical Sediment Sampling Data - Inorganics
Koppers Pond, Horseheads, New York

Parameter	Concentration (mg/kg) by Sample Location and Sampling Date						
	SD-15 06/03/94	SD-16 06/02/94	SD-17 06/03/94	SD-18 06/02/94	SD-19 06/01/94	SD-20 06/01/94	SD-15B 06/06/95
Aluminum	**11,100**	**13,300**	**15,000**	**8,590**	**10,400**	**9,920**	NA
Antimony	9.5 UJ	7.1 UJ	10.9 UJ	7.2 UJ	7.1 UJ	7.1 UJ	NA
Arsenic	**1.9 J**	**7.2 J**	10.9 UJ	**4.3 J**	7.5 UJ	**5.5 J**	NA
Barium	**361**	**239**	**442**	**224**	**164**	**137**	NA
Beryllium	0.95 U	0.71 U	1.1 U	0.72 U	0.71 U	**1.0 B**	NA
Cadmium	**125 J**	1.2 U	1.8 U	**3.1**	1.2 U	1.2 UJ	**549 J**
Calcium	**33,200**	**2,440**	**15,700**	**17,200**	**8,330**	**6,530**	NA
Chromium	**151 J**	**18.8**	**63.1 J**	**39.3 J**	**19.0**	**17.1 J**	**357 J**
Cobalt	**11.1 B**	**12.7**	**17.1 B**	**10.3 B**	**14.5**	**11.7 B**	NA
Copper	**247 J**	**16.6**	**59.1 J**	**60.8 J**	**17.4**	**19.9 J**	NA
Iron	**21,200**	**30,800**	**38,100**	**23,500**	**28,300**	**23,400**	NA
Lead	**93**	**10.5 J**	**33.8 J**	**12.8 J**	**12.7 J**	**15.8 J**	**148 J**
Magnesium	**3,880**	**3,850**	**5,900**	**4,400**	**3,670**	**4,580**	NA
Manganese	**137 J**	**721 J**	**1,470 J**	**337 J**	**421 J**	**448 J**	NA
Mercury	**0.51**	0.12 U	0.16 U	0.12 U	0.11 U	0.11 U	**1.53 J**
Nickel	**125**	**26.5**	**80.6**	**43.8**	**25.3**	**24.2**	NA
Potassium	**1,220**	**525 J**	**1,370 J**	**791 J**	**577 J**	**513 J**	NA
Selenium	0.95 U	0.68 UJ	1.10 U	0.72 UJ	0.75 UJ	0.74 UJ	NA
Silver	**6.7 J**	0.05 U	3.60 UJ	0.05 U	0.05 U	0.05 U	NA
Sodium	**479 B**	**304 B**	**445 B**	**293 B**	**285 B**	**274 B**	NA
Thallium	1.9 U	1.4 U	2.2 UJ	1.4 UJ	1.5 U	1.5 U	NA
Vanadium	**33.7 J**	**20.4 J**	**28.3 J**	**14.7**	**17.7**	**14.8**	NA
Zinc	**1,000 J**	**79.9 J**	**197 J**	**160 J**	**72.1 J**	**96.3 J**	NA
Total Cyanide	R	R	R	R	R	R	NA

See notes at end of table .

Table I-1
Historical Sediment Sampling Data - Inorganics
Koppers Pond, Horseheads, New York

Parameter	Concentration (mg/kg) by Sample Location and Sampling Date						
	SD-16B 06/08/95	SD-17B 06/06/95	SD-18B 06/06/95	SD-19B 06/05/95	SD-20B 06/05/95	SD-01 08/17/98	SD-02 08/18/98
Aluminum	NA	NA	NA	NA	NA	**8,460**	**7,730 J**
Antimony	NA	NA	NA	NA	NA	**1.10 B**	**6.2 BJ**
Arsenic	NA	NA	NA	NA	NA	**3.60**	**5.7 BJ**
Barium	NA	NA	NA	NA	NA	**203**	**536 J**
Beryllium	NA	NA	NA	NA	NA	**0.72 B**	**0.91 BJ**
Cadmium	**13.2**	**2.24 J**	**52.5 J**	**28.9 J**	**29.9 J**	**7.0**	**54.1 J**
Calcium	NA	NA	NA	NA	NA	**16,000 ***	**146,000 *J**
Chromium	**36.5 J**	**35.4**	**189 J**	**97.6 J**	**58.8 J**	**40.7**	**159 J**
Cobalt	NA	NA	NA	NA	NA	**8.4 B**	**7.9 BJ**
Copper	NA	NA	NA	NA	NA	**34.9**	**176 J**
Iron	NA	NA	NA	NA	NA	**18,900**	**12,600 J**
Lead	**101**	**31.5**	**102 J**	**164 J**	**159 J**	**91.6**	**393 J**
Magnesium	NA	NA	NA	NA	NA	**3,480**	**4,370 BJ**
Manganese	NA	NA	NA	NA	NA	**261**	**115 J**
Mercury	**0.120**	**0.122**	**0.877 J**	**0.181 J**	**0.148 J**	0.08 UJ	0.25 UJ
Nickel	NA	NA	NA	NA	NA	**27.7**	**97.3 J**
Potassium	NA	NA	NA	NA	NA	**428 B**	**764 BJ**
Selenium	NA	NA	NA	NA	NA	**1.5 BNJ**	**3.8 BNJ**
Silver	NA	NA	NA	NA	NA	**0.72 B**	**6.4 BJ**
Sodium	NA	NA	NA	NA	NA	**237 B**	**658 BJ**
Thallium	NA	NA	NA	NA	NA	1.2 UJ	3.8 UJ
Vanadium	NA	NA	NA	NA	NA	**12.3 B**	**9.5 BJ**
Zinc	NA	NA	NA	NA	NA	**216**	**1,010 J**
Total Cyanide	NA	NA	NA	NA	NA	0.29 U	0.35 UJ

See notes at end of table .

Table I-1
Historical Sediment Sampling Data - Inorganics
Koppers Pond, Horseheads, New York

Parameter	Concentration (mg/kg) by Sample Location and Sampling Date						
	SD-03 08/18/98	SD-04 08/18/98	SD-05 08/18/98	SD-06 08/19/98	SD-07 08/19/98	SD-08 08/20/98	SD-08 (0-3) 08/20/98
Aluminum	**9,730 J**	**5,850**	**6,760 J**	**4,840 J**	**5,040 J**	**5,850 EJ**	**7,380 EJ**
Antimony	**1.8 BJ**	**0.95 B**	**14.5 BJ**	**6.3 BJ**	1.6 UJ	**3.2 BNJ**	**11.5 BNJ**
Arsenic	**5.3 J**	**4.9**	4.1 UJ	**4.8 BJ**	1.9 UJ	2.7 UNJ	3.7 UNJ
Barium	**251 J**	**77.9**	**565 J**	**510 J**	**346 J**	**393 ENJ**	**739 ENJ**
Beryllium	**0.6 BJ**	**0.48 B**	**0.87 BJ**	**0.76 BJ**	**0.45 BJ**	0.16 UNJ	**0.48 BNJ**
Cadmium	**9 J**	**1.3 B**	**52.8 J**	**59.9 J**	**82 J**	**238 EJ**	**214 EJ**
Calcium	**18,100 *J**	**31,600 ***	**147,000 *J**	**175,000 *J**	**63,400 *J**	**77,400 EJ**	**180,000 EJ**
Chromium	**34.9 J**	**22.7**	**142 J**	**164 J**	**98 J**	**164 EJ**	**197 EJ**
Cobalt	**7.9 BJ**	**5.9 B**	**6.2 BJ**	**7.3 BJ**	**7.7 J**	**7.1 BNJ**	**7.1 BNJ**
Copper	**32.7 J**	**19.5**	**135 J**	**179 J**	**130 J**	**282 EJ**	**294 EJ**
Iron	**19,200 J**	**15,100**	**12,500 J**	**9,630 J**	**9,860 J**	**7,850 EJ**	**10,700 EJ**
Lead	**93.1 J**	**31.2**	**532 J**	**427 J**	**234 J**	**355 EJ**	**617 EJ**
Magnesium	**2,660 J**	**4,810**	**5,670 BJ**	**3,900 BJ**	**2,250 J**	**2,410 BEJ**	**3,730 BEJ**
Manganese	**245 J**	**288**	**126 J**	**101 J**	**96.5 J**	**69 ENJ**	**111 ENJ**
Mercury	0.10 UJ	0.07 UJ	0.29 UJ	0.23 UJ	0.12 UJ	**1.2 *J**	**0.74 *J**
Nickel	**22.7 J**	**18.5**	**60.5 J**	**90.1 J**	**90.8 J**	R	R
Potassium	**629 BJ**	**366 B**	**702 BJ**	**513 BJ**	**415 BJ**	**742 BEJ**	**1,080 BEJ**
Selenium	1.5 UNJ	1.0 UNJ	4.4 UNJ	3.3 UNJ	2.0 UNJ	2.9 UNJ	3.9 UNJ
Silver	**1.1 BJ**	0.28 U	**6.9 BJ**	**6.7 BJ**	**4.5 BJ**	**11.4 J**	**13.7 J**
Sodium	**244 BJ**	**160 B**	**955 BJ**	**809 BJ**	**442 BJ**	**517 BJ**	**945 BJ**
Thallium	1.5 UJ	**1.1 B**	4.5 UJ	3.4 UJ	2.1 UJ	3.0 UNJ	4 UNJ
Vanadium	**14.2 BJ**	**10.0 B**	**9.7 BJ**	**6.4 BJ**	**6.7 BJ**	**11.6 BNJ**	**10.6 BNJ**
Zinc	**244 J**	**101**	**1,130 J**	**1,020 J**	**1,300 J**	**3,500 EJ**	**3,400 EJ**
Total Cyanide	0.14 UJ	0.10 U	**0.56 BJ**	0.32 UJ	0.19 UJ	**1.2 BJ**	**347 J**

See notes at end of table .

Table I-1
Historical Sediment Sampling Data - Inorganics
Koppers Pond, Horseheads, New York

Parameter	Concentration (mg/kg) by Sample Location and Sampling Date						
	SD-08 (3-9) 08/20/98	SD-08 (9-12) 08/20/98	SD-08 (12-17) 08/20/98	SD-09 08/20/98	SD-09 (0-6) 08/20/98	SD-09 (6-12) 08/20/98	SD-10 08/19/98
Aluminum	**8,860 EJ**	**12,600 J**	**20,500 EJ**	**10,000 EJ**	NA	NA	**9,900 J**
Antimony	2.0 UNJ	2.0 UJ	1.3 UNJ	**3.8 BNJ**	NA	NA	NA
Arsenic	**3.9 BNJ**	**6.0 BJ**	**4.4 NJ**	NA	NA	NA	NA
Barium	**546 ENJ**	**340 J**	**306 ENJ**	**558 ENJ**	NA	NA	**473 J**
Beryllium	**0.24 BNJ**	**0.83 BJ**	**1.1 BNJ**	**0.27 BNJ**	NA	NA	NA
Cadmium	**418 EJ**	**34 J**	**0.84 BEJ**	**304 EJ**	NA	NA	**135 J**
Calcium	**115,000 EJ**	**21,900 *J**	**6,580 EJ**	NA	NA	NA	NA
Chromium	**311 EJ**	**140 J**	R	**231 EJ**	NA	NA	**329 J**
Cobalt	**13.2 BNJ**	**12.2 BJ**	**8.0 BNJ**	**10.8 BNJ**	NA	NA	**10.1 BJ**
Copper	**570 EJ**	**207 J**	**37.1 EJ**	**371 EJ**	NA	NA	**354 J**
Iron	**12,700 EJ**	**19,100 J**	**18,500 EJ**	NA	NA	NA	NA
Lead	**378 EJ**	**52.9 J**	**18.8 EJ**	**509 EJ**	NA	NA	**459 J**
Magnesium	**3,750 EJ**	**3,480 J**	**3,770 EJ**	NA	NA	NA	NA
Manganese	**100 ENJ**	**122 J**	**123 ENJ**	NA	NA	NA	NA
Mercury	**1.2 *J**	0.07 UJ	**0.44 *J**	**0.38 *J**	NA	NA	NA
Nickel	**210 NJ**	R	R	NA	NA	NA	**156 J**
Potassium	**975 BEJ**	**1,060 BJ**	**1,460 BEJ**	NA	NA	NA	NA
Selenium	2.5 UNJ	**3.6 NJ**	**1.7 BJ**	NA	NA	NA	NA
Silver	**16.1 J**	**4.5 BJ**	0.42 UNJ	**15.6 J**	NA	NA	**9.3 BJ**
Sodium	**522 BJ**	**499 BJ**	**339 BJ**	NA	NA	NA	NA
Thallium	2.6 UNJ	2.5 UJ	1.6 UNJ	NA	NA	NA	NA
Vanadium	**17.3 BNJ**	**18.6 BJ**	**23.3 NJ**	**18 BNJ**	NA	NA	**12.1 BJ**
Zinc	**5,450 EJ**	**369 J**	R	**4,470 EJ**	NA	NA	**2,120 J**
Total Cyanide	**0.94 BJ**	0.23 UJ	**1.5 J**	**0.5 BJ**	NA	NA	NA

See notes at end of table .

Table I-1
Historical Sediment Sampling Data - Inorganics
Koppers Pond, Horseheads, New York

Parameter	Concentration (mg/kg) by Sample Location and Sampling Date						
	SD-11 08/20/98	SD-12 (0-6) 08/19/98	SD-12 (6-12) 08/19/98	SD-12 (12-18) 08/19/98	SD-12 (18-21) 08/19/98	SD-13 08/19/98	SD-20 8/201998
Aluminum	NA	**8,320 J**	**5,480 J**	**4,600 J**	**11,300 J**	**6,180 J**	**7,300 EJ**
Antimony	NA	**3.1 BJ**	**2.9 BJ**	**2.7 BJ**	**2.2 BJ**	**10.4 BJ**	**3.6 BNJ**
Arsenic	NA	**6.1 BJ**	**4.1 BJ**	**5.4 BJ**	**5.4 BJ**	**7.8 BJ**	**4.3 BNJ**
Barium	NA	**680 J**	**485 J**	**326 J**	**1,490 J**	**684 J**	**522 ENJ**
Beryllium	NA	**0.6 BJ**	**0.41 BJ**	**0.6 BJ**	**1.1 BJ**	**0.47 BJ**	0.15 UNJ
Cadmium	NA	**583 J**	**647 J**	**749 J**	**44.9 J**	**415 J**	**502 EJ**
Calcium	NA	**128,000 *J**	**120,000 *J**	**133,000 *J**	**25200 *J**	**125,000 *J**	**110,000 EJ**
Chromium	NA	**330 J**	**245 J**	**460 J**	**144 J**	**342 J**	**246 EJ**
Cobalt	NA	**10.4 BJ**	**10.4 BJ**	**18.6 BJ**	**13.5 BJ**	**7.2 BJ**	**8.6 BNJ**
Copper	NA	**694 J**	**680 J**	**960 J**	**212 J**	**544 J**	**541 EJ**
Iron	NA	**11,700 J**	**9,230 J**	**11,400 J**	**16700 J**	**10,700 J**	**9,240 EJ**
Lead	NA	**1440 J**	**729 J**	**349 J**	**61 J**	**2210 J**	**734 EJ**
Magnesium	NA	**4,220 J**	**3,490 J**	**4,120 J**	**3280 J**	**3,690 BJ**	**3,520 BEJ**
Manganese	NA	**109 J**	**82 J**	**97 J**	**118 J**	**99 J**	**84 ENJ**
Mercury	NA	**0.64 J**	0.17 UJ	**0.77 J**	**0.40 J**	0.23 UJ	**1.0 J**
Nickel	NA	**142 J**	**143 J**	**395 J**	**147 J**	**155 J**	R
Potassium	NA	**780 BJ**	**438 BJ**	**404 BJ**	**997 BJ**	**569 BJ**	**1,100 BEJ**
Selenium	NA	2.9 UNJ	2.6 UNJ	2.1 UNJ	**3.1 NJ**	3.4 UNJ	2.7 UJ
Silver	NA	**38 J**	**27.5 J**	**23.1 J**	**6.3 J**	**39.6 J**	**25.6 J**
Sodium	NA	**744 BJ**	**589 BJ**	**576 BJ**	**604 BJ**	**863 BJ**	**633 BJ**
Thallium	NA	3.0 UJ	2.6 UJ	2.1 UJ	**2.5 BJ**	3.5 UJ	2.8 UNJ
Vanadium	NA	**11.3 BJ**	**7.7 BJ**	**10.5 BJ**	**16 BJ**	**8.7 BJ**	**22.1 BNJ**
Zinc	NA	**12,500 J**	**12,300 J**	**9,690 J**	**357 J**	**6,820 J**	**6,680 EJ**
Total Cyanide	NA	0.27 UJ	0.24 UJ	0.2 UJ	**0.36 BJ**	0.33 UJ	0.26 UJ

See notes at end of table .

Table I-1
Historical Sediment Analytical Data
Koppers Pond, Horseheads, New York

1. *Operable Unit 3 RI data are from Philip Environmental (March 1996).*
   1998 data are from CDM (February 1999).
2. *For sampling locations, see Figure 3.*
3. *For clarity, all detections are shown in* ***bold-face type****.*
4. *"NA" indicates data not available due to missing page in CDM (February 1999) report.*
5. *All results are reported on a dry-weight basis.*
6. *Inorganic data qualifiers:*
   U - not detected at indicated reporting limit.
   B - detected concentration below quantitation limit but above instrument detection limit.
   N - matrix spike/matrix spike duplicate (MS/MSD) recoveries outside control limits.
   J - constituent also detected in corresponding method blank.
   ** - the relative percent difference (RPD) of the MS/MSD recovered outside control limits.*
   E- reported concentration is estimated due to matrix interference.
   R - data rejected in validation.

Table I-2
Historical Sediment Analytical Data - VOCs and SVOCs
Koppers Pond, Horseheads, New York

Parameter	Concentration (ug/kg) by Sample Location and Sampling Date						
	SD-15 06/03/94	SD-16 06/02/94	SD-17 06/03/94	SD-18 06/02/94	SD-19 06/01/94	SD-20 06/01/94	SD-15B 06/06/95
Volatile Organic Compounds							
Carbon disulfide	**7 J**	12 UJ	**5 J**	13 UJ	12 U	12 U	NA
Methylene chloride	**45 BJ**	38 UJ	43 UJ	34 UJ	15 J	12 UJ	NA
Toluene	15 U	12 U	15 U	13 U	12 U	**5 J**	NA
Semi-Volatile Organic Compounds							
Acenaphthene	490 U	400 U	**210 J**	420 U	400 U	390 U	891 UJ
Anthracene	490 U	400 U	**170 J**	420 U	400 U	390 U	891 UJ
Benzo(a)anthracene	**33 J**	400 U	**140 J**	420 U	**23 J**	390 U	891 UJ
Benzo(a)pyrene	**47 J**	400 U	**110 J**	420 U	400 U	390 U	**200 J**
Benzo(b)fluoranthene	**40 J**	400 U	**150 J**	420 U	400 U	390 U	**350 J**
Benzo(ghi)perylene	**28 J**	400 U	**68 J**	420 U	400 U	390 U	**200 J**
Benzo(k)fluoranthene	**44 J**	400 U	**180 J**	420 U	400 U	390 U	891 UJ
bis(2-Ethylhexyl) phthalate	**100 J**	400 U	**35 J**	**29 J**	400 U	**29 J**	891 UJ
Carbazole	490 U	400 U	**40 J**	420 U	400 U	390 U	NA
Chrysene	**58 J**	400 U	**260 J**	**22 J**	400 U	390 U	**280 J**
Dibenzofuran	490 U	400 U	**140 J**	420 U	400 U	390 U	891 UJ
Di-n-butyl phthalate	**68 J**	**22 J**	490 U	**26 J**	400 U	390 U	891 UJ
Fluoranthene	**100 J**	400 U	**740**	**33 J**	400 U	390 U	**530 J**
Fluorene	490 U	400 U	**250 J**	420 U	400 U	390 U	891 UJ
Indeno(1,2,3-cd)pyrene	490 U	400 U	**61 J**	420 U	400 U	390 U	**130 J**
Naphthalene	490 U	400 U	**36 J**	420 U	400 U	390 U	891 UJ
Phenanthrene	**43 J**	400 U	**190 J**	420 U	400 U	390 U	891 UJ
Pyrene	**63 J**	400 U	**440 J**	**25 J**	400 U	390 U	891 UJ

See notes at end of table.

Table I-2
Historical Sediment Analytical Data - VOCs and SVOCs
Koppers Pond, Horseheads, New York

Parameter	Concentration (ug/kg) by Sample Location and Sampling Date				
	SD-16B 06/08/95	**SD-17B 06/06/95**	**SD-18B 06/06/95**	**SD-19B 06/05/95**	**SD-20B 06/05/95**
Volatile Organic Compounds					
Carbon disulfide	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds					
Acenaphthene	597 U	559 U	917 U	1,270 U	750 U
Anthracene	597 U	559 U	917 U	1,270 U	750 U
Benzo(a)anthracene	597 U	559 U	917 U	1,270 U	**300 J**
Benzo(a)pyrene	**87 J**	559 U	917 U	**190 J**	**300 J**
Benzo(b)fluoranthene	**170 J**	559 U	**170 J**	**400 J**	**520 J**
Benzo(ghi)perylene	**69 J**	559 U	917 U	**160 J**	**230 J**
Benzo(k)fluoranthene	597 U	**90 J**	917 U	1,270 U	750 U
bis(2-Ethylhexyl) phthalate	597 U	559 U	**110 J**	**180 J**	750 U
Carbazole	NA	NA	NA	NA	750 U
Chrysene	**110 J**	559 U	917 U	**270 J**	**410 J**
Dibenzofuran	597 U	559 U	917 U	1,270 U	750 U
Di-n-butyl phthalate	597 U	559 U	917 U	**140 J**	**79 J**
Fluoranthene	**280 J**	**62 J**	**200 J**	**350 J**	**610 J**
Fluorene	597 U	559 U	917 U	1,270 U	750 U
Indeno(1,2,3-cd)pyrene	597 U	559 U	917 U	1,270 U	**200 J**
Naphthalene	597 U	559 U	917 U	1,270 U	750 U
Phenanthrene	**97 J**	559 U	917 U	1,270 U	**370 J**
Pyrene	**160 J**	**64 J**	**170 J**	**490 J**	**750 J**

See notes at end of table.

Table I-2
Historical Sediment Analytical Data - VOCs and SVOCs
Koppers Pond, Horseheads, New York

1. *Operable Unit 3 RI data are from Philip Environmental (March 1996).*
2. *Only analytes detected in one or more samples are listed. Other VOC and SVOC analytes were not detected in any sediment sample above reporting limits.*
3. *For sampling locations, see Figure 3.*
4. *For clarity, all detections are shown in* ***bold-face type****.*
5. *"NA" indicates sample not analyzed for this compound.*
6. *All results are reported on a dry-weight basis.*
7. *Organic data qualifiers:*
   U - not detected at indicated detection limit
   J - analyte detected, but concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   B - constituent also detected in corresponding method blank

Table I-3
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

Parameter	Concentration by Sample Location and Sampling Date						
	SD-15 06/03/94	SD-16 06/02/94	SD-17 06/03/94	SD-18 06/02/94	SD-19 06/01/94	SD-20 06/01/94	SD-15B 06/06/95
Pesticides (ug/kg)							
4,4'-DDD	4.9 U	4.0 U	4.9 U	4.2 U	4.0 U	3.9 U	86.2 UJ
4,4'-DDE	4.9 U	4.0 U	4.9 U	**1.7 J**	4.0 U	3.9 U	86.2 UJ
4,4'-DDT	4.9 U	4.0 U	4.9 U	**0.62 JP**	4.0 U	3.9 U	86.2 UJ
Aldrin	2.5 U	2.1 U	2.5 U	2.2 U	2.1 U	2.0 U	43.1 UJ
Alpha-chlordane	2.5 U	2.1 U	2.5 U	**0.38 JP**	2.1 U	2.0 U	431 UJ
Delta-BHC	2.5 U	2.1 U	2.5 U	2.2 U	2.1 U	2.0 U	43.1 UJ
Dieldrin	4.9 U	4.0 U	4.9 U	4.2 U	4.0 U	3.9 U	86.2 UJ
Endosulfan II	4.9 U	4.0 U	4.9 U	**0.94 JP**	4.0 U	3.9 U	86.2 UJ
Endrin	4.9 U	4.0 U	4.9 U	**0.55 JP**	4.0 U	3.9 U	86.2 UJ
Endrin aldehyde	4.9 U	4.0 U	4.9 U	4.2 U	4.0 U	3.9 U	86.2 UJ
Endrin ketone	4.9 U	4.0 U	4.9 U	**1.5 J**	4.0 U	3.9 U	86.2 UJ
Gamma-chlordane	2.5 U	2.1 U	2.5 U	**1.1 JP**	2.1 U	2.0 U	431 UJ
Heptachlor	2.5 U	2.1 U	2.5 U	2.2 U	2.1 U	2.0 U	43.1 UJ
Heptachlor epoxide	2.5 U	2.1 U	2.5 U	**0.54 JP**	2.1 U	2.0 U	43.1 UJ
Lindane	2.5 U	2.1 U	2.5 U	2.2 U	2.1 U	2.0 U	43.1 UJ
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	49 U	40 U	**150**	**5.6**	40 U	39 U	431 UJ
Aroclor 1254	**1,300**	40 U	**470**	**110**	40 U	39 U	**1,100 J**
Aroclor 1260	**310**	40 U	**170 P**	**51 P**	40 U	39 U	862 UJ
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

Table I-3
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

Parameter	Concentration by Sample Location and Sampling Date						
	SD-16B 06/08/95	**SD-17B 06/06/95**	**SD-18B 06/06/95**	**SD-19B 06/05/95**	**SD-20B 06/05/95**	**SD-01 08/17/98**	**SD-02 08/18/98**
Pesticides (ug/kg)							
4,4'-DDD	**5.6 J**	54.6 UJ	91.3 UJ	**4.6 J**	**13 J**	4.3 UJ	**4.1 NJ**
4,4'-DDE	57.7 U	54.6 U	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	4.6 UJ
4,4'-DDT	57.7 U	54.6 U	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	**5.0 NJ**
Aldrin	28.9 U	27.3 U	45.6 UJ	62.5 UJ	36.8 UJ	2.2 UJ	2.4 UJ
Alpha-chlordane	289 U	273 U	456 UJ	625 UJ	368 UJ	2.2 UJ	2.4 UJ
Delta-BHC	28.9 U	27.3 U	45.6 UJ	62.5 UJ	36.8 UJ	**2.7 U**	2.4 UJ
Dieldrin	57.7 U	54.6 U	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	4.6 UJ
Endosulfan II	57.7 U	54.6 U	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	4.6 UJ
Endrin	57.7 UJ	54.6 UJ	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	4.6 UJ
Endrin aldehyde	57.7 UJ	54.6 UJ	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	**3.2 NJ**
Endrin ketone	57.7 U	54.6 U	91.3 UJ	125 UJ	73.5 UJ	4.3 UJ	4.6 UJ
Gamma-chlordane	289 U	273 U	456 UJ	625 UJ	368 UJ	2.2 UJ	**0.99 J**
Heptachlor	28.9 U	27.3 U	45.6 UJ	62.5 UJ	36.8 UJ	2.2 UJ	2.4 UJ
Heptachlor epoxide	28.9 U	27.3 U	45.6 UJ	62.5 UJ	36.8 UJ	2.2 UJ	2.4 UJ
Lindane	28.9 U	27.3 U	45.6 UJ	62.5 UJ	36.8 UJ	2.2 UJ	2.4 UJ
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	289 U	273 U	456 UJ	625 UJ	368 UJ	43 UJ	46 UJ
Aroclor 1254	577 U	**170 J**	**1,200 J**	1,250 UJ	735 UJ	43 UJ	46 UJ
Aroclor 1260	577 U	546 U	913 UJ	1250 UJ	735 UJ	43 UJ	46 UJ
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	**48,010**	**27,100**

Table I-3
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

Parameter	Concentration by Sample Location and Sampling Date						
	SD-03 08/18/98	SD-04 08/18/98	SD-05 08/18/98	SD-06 08/19/98	SD-07 08/19/98	SD-08 08/20/98	SD-08 (0-3) 08/20/98
Pesticides (ug/kg)							
4,4'-DDD	17 UJ	R	15 UJ	140 UJ	97 UJ	130 UJ	160 UJ
4,4'-DDE	17 UJ	5.5 UJ	15 UJ	140 UJ	97 UJ	130 UJ	160 UJ
4,4'-DDT	R	**22 J**	**38 J**	140 UJ	97 UJ	**170 J**	**270 J**
Aldrin	8.9 UJ	2.8 UJ	7.8 UJ	71 UJ	50 UJ	65 UJ	85 UJ
Alpha-chlordane	8.9 UJ	2.8 UJ	7.8 UJ	71 UJ	50 UJ	**54 J**	**160 J**
Delta-BHC	**9.5 J**	2.8 UJ	7.8 UJ	71 UJ	50 UJ	65 UJ	85 UJ
Dieldrin	17 UJ	5.5 UJ	15 UJ	140 UJ	97 UJ	130 UJ	160 UJ
Endosulfan II	17 UJ	5.5 UJ	**9 J**	140 UJ	97 UJ	130 UJ	160 UJ
Endrin	17 UJ	5.5 UJ	**6.5 J**	140 UJ	97 UJ	**90 J**	160 UJ
Endrin aldehyde	17 UJ	**5.1 NJ**	15 UJ	140 UJ	97 UJ	130 UJ	**40 NJ**
Endrin ketone	17 UJ	5.5 UJ	15 UJ	140 UJ	97 UJ	130 UJ	160 UJ
Gamma-chlordane	**11 J**	**3.2 J**	7.8 UJ	71 UJ	50 UJ	**100 J**	**240 J**
Heptachlor	**7.8 J**	2.8 UJ	7.8 UJ	71 UJ	50 UJ	65 UJ	85 UJ
Heptachlor epoxide	8.9 UJ	**1.9 J**	7.8 UJ	71 UJ	50 UJ	65 UJ	85 UJ
Lindane	8.9 UJ	2.8 UJ	7.8 UJ	71 UJ	50 UJ	65 UJ	85 UJ
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	170 UJ	55 UJ	150 UJ	1,400 UJ	970 UJ	1,300 UJ	1,600 UJ
Aroclor 1254	170 UJ	55 UJ	150 UJ	**410 J**	**220 J**	**1,500 J**	**2,900 J**
Aroclor 1260	170 UJ	55 UJ	150 UJ	1,400 UJ	970 UJ	1,300 UJ	1,600 UJ
Total Organic Carbon (mg/kg)	**101,800**	**40,370**	**101,300**	**106,500**	**96,870**	**101,800**	NA

Table I-3
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

Parameter	Concentration by Sample Location and Sampling Date						
	SD-08 (3-9) 08/20/98	**SD-08 (9-12) 08/20/98**	**SD-08 (12-17) 08/20/98**	**SD-09 08/20/98**	**SD-09 (0-6) 08/20/98**	**SD-09 (6-12) 08/20/98**	**SD-10 08/19/98**
Pesticides (ug/kg)							
4,4'-DDD	100 UJ	100 UJ	69 UJ	120 UJ	110 UJ	72 UJ	180 UJ
4,4'-DDE	100 UJ	**110 NJ**	69 UJ	120 UJ	110 UJ	72 UJ	180 UJ
4,4'-DDT	**190 J**	**570 J**	**45 J**	**120 J**	110 UJ	**100 J**	180 UJ
Aldrin	53 UJ	52 UJ	35 UJ	61 UJ	**28 J**	37 UJ	94 UJ
Alpha-chlordane	**53 J**	**170 J**	35 UJ	**40 J**	59 UJ	**33 J**	94 UJ
Delta-BHC	53 UJ	52 UJ	35 UJ	61 UJ	59 UJ	37 UJ	94 UJ
Dieldrin	100 UJ	**38 J**	69 UJ	120 UJ	110 UJ	72 UJ	180 UJ
Endosulfan II	100 UJ	**250 J**	69 UJ	120 UJ	110 UJ	72 UJ	180 UJ
Endrin	**89 J**	**260 J**	**24 J**	**71 J**	**90 J**	**57 J**	180 UJ
Endrin aldehyde	**68 NJ**	100 UJ	69 UJ	120 UJ	110 UJ	**40 NJ**	180 UJ
Endrin ketone	**92 NJ**	100 UJ	69 UJ	120 UJ	110 UJ	72 UJ	180 UJ
Gamma-chlordane	**120 J**	**250 J**	**28 J**	**80 J**	59 UJ	**76 J**	94 UJ
Heptachlor	53 UJ	52 UJ	35 UJ	61 UJ	**48 J**	37 UJ	94 UJ
Heptachlor epoxide	53 UJ	52 UJ	35 UJ	61 UJ	59 UJ	37 UJ	94 UJ
Lindane	53 UJ	52 UJ	35 UJ	61 UJ	**39 J**	37 UJ	94 UJ
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	1,000 UJ	1,000 UJ	690 UJ	1,200 UJ	1,100 UJ	720 UJ	1,800 UJ
Aroclor 1254	**1,500 J**	**4,100 J**	**400 J**	**1,100 J**	**320 J**	**320 J**	**730 J**
Aroclor 1260	1,000 UJ	1,000 UJ	690 UJ	1,200 UJ	1,100 UJ	720 UJ	1,800 UJ
Total Organic Carbon (mg/kg)	NA	NA	NA	**103,200**	NA	NA	**205,800**

Table I-3
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

Parameter	Concentration by Sample Location and Sampling Date							
	SD-11 08/20/98	SD-12 08/19/98	SD-12 (0-6) 08/19/98	SD-12 (6-12) 08/19/98	SD-12 (12-18) 08/19/98	SD-12 (18-21) 08/19/98	SD-13 08/19/98	SD-20 8/201998
Pesticides (ug/kg)								
4,4'-DDD	110 UJ	110 UJ	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	110 UJ
4,4'-DDE	110 UJ	110 UJ	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	110 UJ
4,4'-DDT	**110 J**	**140 J**	120 UJ	**140 J**	89 UJ	100 UJ	**140 J**	**480 J**
Aldrin	57 UJ	57 UJ	**33 J**	52 UJ	46 UJ	52 UJ	63 UJ	57 UJ
Alpha-chlordane	**36 J**	**42 J**	61 UJ	**38 J**	46 UJ	52 UJ	63 UJ	**180 J**
Delta-BHC	57 UJ	57 UJ	61 UJ	52 UJ	46 UJ	52 UJ	63 UJ	57 UJ
Dieldrin	110 UJ	110 UJ	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	110 UJ
Endosulfan II	110 UJ	110 UJ	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	110 UJ
Endrin	**62 J**	**72 J**	**100 J**	**70 J**	89 UJ	100 UJ	120 UJ	**280 J**
Endrin aldehyde	110 UJ	**47 NJ**	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	110 UJ
Endrin ketone	110 UJ	110 UJ	120 UJ	100 UJ	89 UJ	100 UJ	120 UJ	**62 NJ**
Gamma-chlordane	**83 J**	**98 J**	61 UJ	**87 J**	46 UJ	52 UJ	**87 NJ**	**280 J**
Heptachlor	57 UJ	57 UJ	**56 J**	52 UJ	46 UJ	52 UJ	63 UJ	57 UJ
Heptachlor epoxide	57 UJ	57 UJ	61 UJ	52 UJ	46 UJ	52 UJ	63 UJ	57 UJ
Lindane	57 UJ	57 UJ	**45 J**	52 UJ	46 UJ	52 UJ	63 UJ	57 UJ
Polychlorinated Biphenyls (ug/kg)								
Aroclor 1248	1,100 UJ	1,100 UJ	1,200 UJ	1,000 UJ	890 UJ	1,000 UJ	1,200 UJ	1,000 UJ
Aroclor 1254	**1,100 J**	**1,200 J**	1,200 UJ	**1,100 J**	**290 J**	1,000 UJ	**1,100 J**	**4,500 J**
Aroclor 1260	1,100 UJ	1,100 UJ	1,200 UJ	1,000 UJ	890 UJ	1,000 UJ	1,200 UJ	1,000 UJ
Total Organic Carbon (mg/kg)	**132,200**	**104,400**	NA	NA	NA	NA	**135,700**	**151,450**

Table 6
Historical Sediment Analytical Data - Pesticides and PCBs
Koppers Pond, Horseheads, New York

1. *Operable Unit 3 RI data are from Philip Environmental (March 1996).*
   1998 data are from CDM (February 1999).
2. *Only analytes detected in one or more samples are listed. Other pesticide and PCB analytes were not detected in any sediment sample above reporting limits.*
3. *For sampling locations, see Figure 3.*
4. *For clarity, all detections are shown in* ***bold-face type****.*
5. *All results are reported on a dry-weight basis.*
6. *Organic data qualifiers:*
   U - not detected at indicated reporting limit.
   J - analyte detected, but concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   P - percent difference between results from both columns was greater than 25 percent.
   N - compound is presumed to be present based on analytical evidence.

APPENDIX J

SUMMARY OF KOPPERS POND FISH SAMPLING DATA - 2003

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number						
	Common Carp					White Sucker	
	CC-1-LS	CC-2-LS	CC-3-LS	CC-4-RS	CC-5-RS	WS-1-LS	WS-2-LS
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	**150**	200 U	**120 J**	250 U	100 U	**47 J**	50 U
Aroclor 1254	**530**	**1,000**	**1,300**	**2,000**	**570**	**590**	**310**
Aroclor 1260	**170**	**160 J**	**230 J**	**400**	**76 J**	**80 J**	**34 J**
Total PCBs	**850**	**1,160**	**1,650**	**2,400**	**646**	**717**	**344**
Metals (mg/kg)							
Aluminum	**4.5 B**	**4.4 B**	**3.1 B**	**4.8 B**	**3.1 B**	**8.0 B**	**4.2 B**
Antimony	**0.16 B**	1.3 U	1.3 U	**0.32 B**	1.3 U	1.4 U	1.5 U
Arsenic	1.5 U	1.3 U	1.3 U	1.5 U	1.3 U	1.4 U	1.5 U
Barium	**2.0**	**2.1**	**2.9**	**0.99**	**1.9**	**2.1**	**1.1**
Beryllium	0.30 U	0.27 U	0.26 U	0.29 U	0.26 U	0.29 U	0.30 U
Cadmium	**0.15 B**	**0.093 B**	**0.056 B**	**0.095 B**	**0.033 B**	**0.27 B**	0.30 U
Calcium	**4,200**	**4,600**	**6,800**	**3,900**	**4,700**	**6,800**	**4,800**
Chromium	**0.29 B**	**0.21 B**	**0.24 B**	**0.24 B**	**0.16 B**	**0.56**	**0.16 B**
Cobalt	0.50 U	0.45 U	0.43 U	0.49 U	0.44 U	0.48 U	0.50 U
Copper	**1.1**	**0.93**	**1.1**	**1.3**	**0.71 B**	**1.4**	**0.45 B**
Iron	**15 B**	**7.9 B**	**7.7 B**	**12 B**	**3.9 B**	**13 B**	**2.3 B**
Lead	**0.68 B**	**0.90**	**1.60**	**0.59 B**	**0.52 B**	**1.40**	**0.35 B**
Magnesium	**260**	**290**	**310**	**250**	**310**	**370**	**310**
Manganese	**2.0**	**0.40**	**0.52**	**1.6**	**0.47**	**0.24**	**0.40**
Mercury	**0.035**	**0.0087 B**	**0.0044 B**	**0.10 B**	**0.0044 B**	**0.0098 B**	**0.0086 B**
Nickel	0.99 U	0.89 U	0.87 U	0.98 U	0.88 U	0.95 U	0.99 U
Potassium	**2,900**	**2,900**	**2,700**	**1,800**	**3,100**	**3,500**	**3,200**
Selenium	**0.37 B**	**0.67 B**	**0.56 B**	**0.69 B**	**0.34 B**	**0.43 B**	**0.44 B**
Silver	0.49 U	0.44 U	0.43 U	0.48 U	0.45 U	**0.093 B**	0.50 U
Sodium	**730**	**710**	**770**	**990**	**750**	**690**	**690**
Zinc	**15**	**30**	**23**	**19**	**23**	**15**	**9.6**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number						
	White Sucker			Largemouth Bass		Pumpkinseed	
	WS-3-LS	WS-4-RS	WS-5-RS	LB-1-RS	LB-2-RS	PS-1	PS-2
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	100 U	**210**	200 U	50 U	**29 J**	**63**	**86**
Aroclor 1254	**570**	**160**	**1,300**	**420**	**180**	**420**	**410**
Aroclor 1260	**74 J**	**38 J**	**200 J**	**86**	**58**	**77 J**	**99**
Total PCBs	**644**	**408**	**1,500**	**506**	**267**	**560**	**595**
Metals (mg/kg)							
Aluminum	**4.4 B**	19 U	**3.4 B**	18 U	17 U	**15 B**	**18 B**
Antimony	1.3 U	1.4 U	**0.45 B**	1.4 U	1.3 U	**0.27 B**	**0.28 B**
Arsenic	1.3 U	1.4 U	1.4 U	1.4 U	1.3 U	1.5 U	1.5 U
Barium	**0.6**	**1.3**	**1.5**	**0.43**	**0.71**	**2.3**	**3.1**
Beryllium	0.26 U	0.28 U	0.28 U	0.27 U	0.26 U	0.30 U	0.30 U
Cadmium	**0.053 B**	0.28 U	**0.030 B**	0.27 U	0.26 U	**0.14 B**	**0.54**
Calcium	**1,300**	**3,800**	**7,100**	**5,800**	**7,300**	**12,000**	**16,000**
Chromium	**0.17 B**	**0.16 B**	**0.3**	**0.13 B**	**0.23 B**	**0.58**	**1.0**
Cobalt	0.43 U	0.47 U	0.46 U	0.45 U	0.43 U	**0.065 B**	0.50 U
Copper	**0.67 B**	**0.57 B**	**1.1**	**0.51 B**	**0.67 B**	**2.2**	**1.5**
Iron	**4.7 B**	**4.1 B**	**8.8 B**	**3.3 B**	**3.0 B**	**21**	**29**
Lead	**0.56 B**	**0.32 B**	**0.55 B**	**0.19 B**	**0.17 B**	**1.1**	**2.1**
Magnesium	**280**	**310**	**360**	**300**	**320**	**390**	**470**
Manganese	**0.15 B**	**0.25**	**0.24**	**0.11 B**	**0.18**	**1.1**	**1.1**
Mercury	**0.0041 B**	**0.012**	**0.0045 B**	**0.056**	**0.091**	**0.011**	**0.0095 B**
Nickel	0.85 U	0.93 U	**0.24 B**	0.91 U	0.85 U	**0.23 B**	**0.38 B**
Potassium	**3,400**	**3,200**	**3,300**	**3,100**	**2,900**	**2,700**	**2,700**
Selenium	**0.59 B**	**0.43 B**	**0.55 B**	**0.47 B**	1.3 U	**0.64 B**	**0.80 B**
Silver	0.50 U	0.47 U	0.47 U	0.49 U	0.43 U	0.50 U	**0.064 B**
Sodium	**560**	**640**	**790**	**790**	**800**	**940**	**1,000**
Zinc	**8.4**	**10**	**11**	**9.6**	**8.0**	**27**	**33**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number					
	Pumpkinseed				Black Crappie	
	PS-3	PS-4	PS-5	PS-6	BC-1-RS	BC-2-RS
Polychlorinated Biphenyls (ug/kg)						
Aroclor 1248	140 U	**1,100**	50 U	100 U	50 U	50 U
Aroclor 1254	**950**	200 U	**200**	**670**	**220**	**490**
Aroclor 1260	**330**	**82 J**	**140**	**200**	**130**	**120**
Total PCBs	**1,280**	**1,182**	**340**	**870**	**350**	**610**
Metals (mg/kg)						
Aluminum	**12 B**	**14 B**	**70**	**7.2 B**	**3.2 B**	**3.3 B**
Antimony	**0.26 B**	**0.17 B**	**0.28 B**	**0.35 B**	**0.33 B**	1.2 U
Arsenic	1.3 U	1.3 U	**0.33 B**	1.4 U	1.3 U	1.2 U
Barium	**3.1**	**2.7**	**3.8**	**1.7**	**2.4**	**3.8**
Beryllium	0.26 U	0.26 U	0.25 U	0.29 U	0.27 U	0.25 U
Cadmium	**0.084 B**	**0.11 B**	**0.42**	**0.090 B**	0.27 U	**0.088 B**
Calcium	**16,000**	**15,000**	**16,000**	**18,000**	**18,000**	**20,000**
Chromium	**0.60**	**0.69**	**0.74**	**0.50**	**0.35**	**0.46**
Cobalt	0.44 U	0.44 U	**0.13 B**	0.48 U	0.44 U	0.42 U
Copper	**0.76 B**	**0.98**	**1.3**	**0.52 B**	**0.48 B**	**0.46 B**
Iron	**26**	**24**	**220**	**18**	**7.8 B**	**9.5 B**
Lead	**1.1**	**1.2**	**1.6**	**1.0**	**0.63 B**	**0.64 B**
Magnesium	**440**	**440**	**450**	**440**	**490**	**510**
Manganese	**1.0**	**1.6**	**5.8**	**0.6**	**1.9**	**1.8**
Mercury	**0.0087 B**	**0.013**	**0.019**	**0.038**	**0.047**	**0.022**
Nickel	0.88 U	**0.31 B**	**0.35 B**	0.95 U	**0.24 B**	0.83 U
Potassium	**2,500**	**2,600**	**2,300**	**2,400**	**2,500**	**2,300**
Selenium	**0.58 B**	**0.61 B**	**0.84 B**	**0.39 B**	**0.56 B**	**0.80 B**
Silver	0.50 U	0.43 U	**0.097 B**	0.45 U	0.47 U	0.45 U
Sodium	**1,400**	**1,100**	**1,400**	**1,300**	**1,100**	**970**
Zinc	**27**	**27**	**28**	**27**	**24**	**29**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number			
	Black Crappie	Green Sunfish		
	BC-3-RS	GS-1-RS	GS-2-RS	GS-3-RS
Polychlorinated Biphenyls (ug/kg)				
Aroclor 1248	**52**	50 U	50 U	**56**
Aroclor 1254	**480**	**360**	**480**	**240**
Aroclor 1260	**110**	**94**	**130**	**110**
Total PCBs	**642**	**454**	**610**	**406**
Metals (mg/kg)				
Aluminum	17 U	20 U	**23**	**14 B**
Antimony	1.2 U	**0.37 B**	1.3 U	1.3 U
Arsenic	1.2 U	1.5 U	1.3 U	1.3 U
Barium	**3.3**	**4.0**	**1.7**	**2.0**
Beryllium	0.25 U	0.30 U	0.27 U	0.27 U
Cadmium	**0.030 B**	**0.051 B**	**0.30**	**0.12 B**
Calcium	**15,000**	**18,000**	**12,000**	**13,000**
Chromium	**0.35**	**0.42**	**0.40**	**0.58**
Cobalt	0.42 U	0.50 U	**0.11 B**	**0.14 B**
Copper	**0.56 B**	**0.56 B**	**0.78 B**	**0.82 B**
Iron	**9.2 B**	**7.3 B**	**52**	**35**
Lead	**0.34 B**	**0.63 B**	**0.91**	**0.99**
Magnesium	**450**	**490**	**400**	**400**
Manganese	**1.6**	**1.9**	**1.6**	**1.1**
Mercury	**0.012**	**0.015**	**0.052**	**0.037**
Nickel	0.83 U	0.99 U	**0.20 B**	**0.30 B**
Potassium	**2,500**	**2,400**	**2,500**	**2,400**
Selenium	**0.62 B**	**0.52 B**	**0.58 B**	**0.96 B**
Silver	0.46 U	0.44 U	0.42 U	0.43 U
Sodium	**940**	**990**	**1,100**	**1,200**
Zinc	**28**	**32**	**32**	**22**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

1. *Data from CEC (July 2003). See Table 1 of that report for inventory of fish samples, including sample numbers, species, weight, and length.*
2. *Only analytes detected in one or more samples are listed. Other analytes were not detected in any sample above reporting limits.*
3. *For clarity, all detections are shown in* ***bold-face type****.*
4. *Organic data qualifiers:*
   U - not detected at indicated detection limit.
   J - analyte detected, but concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
5. *Inorganic data qualifiers:*
   U - not detected at indicated detection limit.
   B - detected concentration below quantitation limit but above instrument detection limit.

APPENDIX J

SUMMARY OF KOPPERS POND FISH SAMPLING DATA - 2003

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number						
	Common Carp					White Sucker	
	CC-1-LS	CC-2-LS	CC-3-LS	CC-4-RS	CC-5-RS	WS-1-LS	WS-2-LS
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	**150**	200 U	**120 J**	250 U	100 U	**47 J**	50 U
Aroclor 1254	**530**	**1,000**	**1,300**	**2,000**	**570**	**590**	**310**
Aroclor 1260	**170**	**160 J**	**230 J**	**400**	**76 J**	**80 J**	**34 J**
Total PCBs	**850**	**1,160**	**1,650**	**2,400**	**646**	**717**	**344**
Metals (mg/kg)							
Aluminum	**4.5 B**	**4.4 B**	**3.1 B**	**4.8 B**	**3.1 B**	**8.0 B**	**4.2 B**
Antimony	**0.16 B**	1.3 U	1.3 U	**0.32 B**	1.3 U	1.4 U	1.5 U
Arsenic	1.5 U	1.3 U	1.3 U	1.5 U	1.3 U	1.4 U	1.5 U
Barium	**2.0**	**2.1**	**2.9**	**0.99**	**1.9**	**2.1**	**1.1**
Beryllium	0.30 U	0.27 U	0.26 U	0.29 U	0.26 U	0.29 U	0.30 U
Cadmium	**0.15 B**	**0.093 B**	**0.056 B**	**0.095 B**	**0.033 B**	**0.27 B**	0.30 U
Calcium	**4,200**	**4,600**	**6,800**	**3,900**	**4,700**	**6,800**	**4,800**
Chromium	**0.29 B**	**0.21 B**	**0.24 B**	**0.24 B**	**0.16 B**	**0.56**	**0.16 B**
Cobalt	0.50 U	0.45 U	0.43 U	0.49 U	0.44 U	0.48 U	0.50 U
Copper	**1.1**	**0.93**	**1.1**	**1.3**	**0.71 B**	**1.4**	**0.45 B**
Iron	**15 B**	**7.9 B**	**7.7 B**	**12 B**	**3.9 B**	**13 B**	**2.3 B**
Lead	**0.68 B**	**0.90**	**1.60**	**0.59 B**	**0.52 B**	**1.40**	**0.35 B**
Magnesium	**260**	**290**	**310**	**250**	**310**	**370**	**310**
Manganese	**2.0**	**0.40**	**0.52**	**1.6**	**0.47**	**0.24**	**0.40**
Mercury	**0.035**	**0.0087 B**	**0.0044 B**	**0.10 B**	**0.0044 B**	**0.0098 B**	**0.0086 B**
Nickel	0.99 U	0.89 U	0.87 U	0.98 U	0.88 U	0.95 U	0.99 U
Potassium	**2,900**	**2,900**	**2,700**	**1,800**	**3,100**	**3,500**	**3,200**
Selenium	**0.37 B**	**0.67 B**	**0.56 B**	**0.69 B**	**0.34 B**	**0.43 B**	**0.44 B**
Silver	0.49 U	0.44 U	0.43 U	0.48 U	0.45 U	**0.093 B**	0.50 U
Sodium	**730**	**710**	**770**	**990**	**750**	**690**	**690**
Zinc	**15**	**30**	**23**	**19**	**23**	**15**	**9.6**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number						
	White Sucker			Largemouth Bass		Pumpkinseed	
	WS-3-LS	WS-4-RS	WS-5-RS	LB-1-RS	LB-2-RS	PS-1	PS-2
Polychlorinated Biphenyls (ug/kg)							
Aroclor 1248	100 U	**210**	200 U	50 U	**29 J**	**63**	**86**
Aroclor 1254	**570**	**160**	**1,300**	**420**	**180**	**420**	**410**
Aroclor 1260	**74 J**	**38 J**	**200 J**	**86**	**58**	**77 J**	**99**
Total PCBs	**644**	**408**	**1,500**	**506**	**267**	**560**	**595**
Metals (mg/kg)							
Aluminum	**4.4 B**	19 U	**3.4 B**	18 U	17 U	**15 B**	**18 B**
Antimony	1.3 U	1.4 U	**0.45 B**	1.4 U	1.3 U	**0.27 B**	**0.28 B**
Arsenic	1.3 U	1.4 U	1.4 U	1.4 U	1.3 U	1.5 U	1.5 U
Barium	**0.6**	**1.3**	**1.5**	**0.43**	**0.71**	**2.3**	**3.1**
Beryllium	0.26 U	0.28 U	0.28 U	0.27 U	0.26 U	0.30 U	0.30 U
Cadmium	**0.053 B**	0.28 U	**0.030 B**	0.27 U	0.26 U	**0.14 B**	**0.54**
Calcium	**1,300**	**3,800**	**7,100**	**5,800**	**7,300**	**12,000**	**16,000**
Chromium	**0.17 B**	**0.16 B**	**0.3**	**0.13 B**	**0.23 B**	**0.58**	**1.0**
Cobalt	0.43 U	0.47 U	0.46 U	0.45 U	0.43 U	**0.065 B**	0.50 U
Copper	**0.67 B**	**0.57 B**	**1.1**	**0.51 B**	**0.67 B**	**2.2**	**1.5**
Iron	**4.7 B**	**4.1 B**	**8.8 B**	**3.3 B**	**3.0 B**	**21**	**29**
Lead	**0.56 B**	**0.32 B**	**0.55 B**	**0.19 B**	**0.17 B**	**1.1**	**2.1**
Magnesium	**280**	**310**	**360**	**300**	**320**	**390**	**470**
Manganese	**0.15 B**	**0.25**	**0.24**	**0.11 B**	**0.18**	**1.1**	**1.1**
Mercury	**0.0041 B**	**0.012**	**0.0045 B**	**0.056**	**0.091**	**0.011**	**0.0095 B**
Nickel	0.85 U	0.93 U	**0.24 B**	0.91 U	0.85 U	**0.23 B**	**0.38 B**
Potassium	**3,400**	**3,200**	**3,300**	**3,100**	**2,900**	**2,700**	**2,700**
Selenium	**0.59 B**	**0.43 B**	**0.55 B**	**0.47 B**	1.3 U	**0.64 B**	**0.80 B**
Silver	0.50 U	0.47 U	0.47 U	0.49 U	0.43 U	0.50 U	**0.064 B**
Sodium	**560**	**640**	**790**	**790**	**800**	**940**	**1,000**
Zinc	**8.4**	**10**	**11**	**9.6**	**8.0**	**27**	**33**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number					
	Pumpkinseed				Black Crappie	
	PS-3	PS-4	PS-5	PS-6	BC-1-RS	BC-2-RS
Polychlorinated Biphenyls (ug/kg)						
Aroclor 1248	140 U	**1,100**	50 U	100 U	50 U	50 U
Aroclor 1254	**950**	200 U	**200**	**670**	**220**	**490**
Aroclor 1260	**330**	**82 J**	**140**	**200**	**130**	**120**
Total PCBs	**1,280**	**1,182**	**340**	**870**	**350**	**610**
Metals (mg/kg)						
Aluminum	**12 B**	**14 B**	**70**	**7.2 B**	**3.2 B**	**3.3 B**
Antimony	**0.26 B**	**0.17 B**	**0.28 B**	**0.35 B**	**0.33 B**	1.2 U
Arsenic	1.3 U	1.3 U	**0.33 B**	1.4 U	1.3 U	1.2 U
Barium	**3.1**	**2.7**	**3.8**	**1.7**	**2.4**	**3.8**
Beryllium	0.26 U	0.26 U	0.25 U	0.29 U	0.27 U	0.25 U
Cadmium	**0.084 B**	**0.11 B**	**0.42**	**0.090 B**	0.27 U	**0.088 B**
Calcium	**16,000**	**15,000**	**16,000**	**18,000**	**18,000**	**20,000**
Chromium	**0.60**	**0.69**	**0.74**	**0.50**	**0.35**	**0.46**
Cobalt	0.44 U	0.44 U	**0.13 B**	0.48 U	0.44 U	0.42 U
Copper	**0.76 B**	**0.98**	**1.3**	**0.52 B**	**0.48 B**	**0.46 B**
Iron	**26**	**24**	**220**	**18**	**7.8 B**	**9.5 B**
Lead	**1.1**	**1.2**	**1.6**	**1.0**	**0.63 B**	**0.64 B**
Magnesium	**440**	**440**	**450**	**440**	**490**	**510**
Manganese	**1.0**	**1.6**	**5.8**	**0.6**	**1.9**	**1.8**
Mercury	**0.0087 B**	**0.013**	**0.019**	**0.038**	**0.047**	**0.022**
Nickel	0.88 U	**0.31 B**	**0.35 B**	0.95 U	**0.24 B**	0.83 U
Potassium	**2,500**	**2,600**	**2,300**	**2,400**	**2,500**	**2,300**
Selenium	**0.58 B**	**0.61 B**	**0.84 B**	**0.39 B**	**0.56 B**	**0.80 B**
Silver	0.50 U	0.43 U	**0.097 B**	0.45 U	0.47 U	0.45 U
Sodium	**1,400**	**1,100**	**1,400**	**1,300**	**1,100**	**970**
Zinc	**27**	**27**	**28**	**27**	**24**	**29**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

Parameter	Concentration by Species and Sample Number			
	Black Crappie	Green Sunfish		
	BC-3-RS	GS-1-RS	GS-2-RS	GS-3-RS
Polychlorinated Biphenyls (ug/kg)				
Aroclor 1248	**52**	50 U	50 U	**56**
Aroclor 1254	**480**	**360**	**480**	**240**
Aroclor 1260	**110**	**94**	**130**	**110**
Total PCBs	**642**	**454**	**610**	**406**
Metals (mg/kg)				
Aluminum	17 U	20 U	**23**	**14 B**
Antimony	1.2 U	**0.37 B**	1.3 U	1.3 U
Arsenic	1.2 U	1.5 U	1.3 U	1.3 U
Barium	**3.3**	**4.0**	**1.7**	**2.0**
Beryllium	0.25 U	0.30 U	0.27 U	0.27 U
Cadmium	**0.030 B**	**0.051 B**	**0.30**	**0.12 B**
Calcium	**15,000**	**18,000**	**12,000**	**13,000**
Chromium	**0.35**	**0.42**	**0.40**	**0.58**
Cobalt	0.42 U	0.50 U	**0.11 B**	**0.14 B**
Copper	**0.56 B**	**0.56 B**	**0.78 B**	**0.82 B**
Iron	**9.2 B**	**7.3 B**	**52**	**35**
Lead	**0.34 B**	**0.63 B**	**0.91**	**0.99**
Magnesium	**450**	**490**	**400**	**400**
Manganese	**1.6**	**1.9**	**1.6**	**1.1**
Mercury	**0.012**	**0.015**	**0.052**	**0.037**
Nickel	0.83 U	0.99 U	**0.20 B**	**0.30 B**
Potassium	**2,500**	**2,400**	**2,500**	**2,400**
Selenium	**0.62 B**	**0.52 B**	**0.58 B**	**0.96 B**
Silver	0.46 U	0.44 U	0.42 U	0.43 U
Sodium	**940**	**990**	**1,100**	**1,200**
Zinc	**28**	**32**	**32**	**22**

See notes at end of table.

Table J-1
Fish Tissue Analytical Data - July 2003 Sampling
Koppers Pond, Horseheads, New York

1. *Data from CEC (July 2003). See Table 1 of that report for inventory of fish samples, including sample numbers, species, weight, and length.*
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3. *For clarity, all detections are shown in* ***bold-face type***.
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   U - not detected at indicated detection limit.
   J - analyte detected, but concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
5. *Inorganic data qualifiers:*
   U - not detected at indicated detection limit.
   B - detected concentration below quantitation limit but above instrument detection limit.