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Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.
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November 6, 2015

Ms. Carolyn Bury
U.S. Environmental Protection Agency, Region V
77 West Jackson Boulevard
Mail Code DE-9J
Chicago, IL 60604-3590

Re: Former Koppers Wood-Treating Site – Carbondale, Illinois
Final Human Health Risk Assessment and Responses to USEPA's 10/6/15 Comments

Dear Ms. Bury:

Enclosed please find the final Human Health Risk Assessment (HHRA) for the Former Koppers Wood-Treating Site in Carbondale, Illinois (the Site) prepared by Arcadis U.S., Inc. (Arcadis) on behalf of Beazer East, Inc. (Beazer). The HHRA evaluates potential adverse human health effects attributable to potential exposures to Site-related constituents, and was prepared in accordance with the Human Health Risk Assessment Work Plan (Arcadis, 2014), which was approved by USEPA in a letter to Beazer dated September 25, 2014. The attached version reflects USEPA's October 6, 2015 comments regarding a redline version of the HHRA that was provided by Arcadis to the USEPA on April 27, 2015, subsequent edits to the draft Conceptual Site Model (CSM) figure submitted by Arcadis on October 22, 2015, and discussions during a conference call on October 28, 2015. USEPA's approval to finalize the document to reflect the agreed-upon modifications was provided via email on October 29, 2015.

In addition to the enclosed document, provided below is a summary of USEPA's comments from the October 6, 2015 letter to Beazer, along with a summary of how each comment was addressed. USEPA's comments are presented below in bold font followed by our responses in italicized font.

Figure 2. Conceptual Site Model

1. **Add a column for "Primary Constituents of Concern" after "Potential Sources" and list the Site COCs, including creosote as a DNAPL.**

Figure 2, Conceptual Site Model was revised to specify the primary constituents of concern associated with each potential source as a combined column.

2. **The CSM does not include DNAPL and its migration pathway to receptors; the constituent and its pathway must be added.**

Figure 2, Conceptual Site Model has been revised as requested.

3. **Change "Potential Sources" to "Sources."**

Figure 2, Conceptual Site Model has been revised as requested.

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4. **Under "Potential Sources," the word "possible" must be struck from the text in the box that states "possible releases during historic operations as a wood-treating facility." Releases have been documented and described in Beazer documents. Therefore, the word "possible" is inaccurate.**

Figure 2, Conceptual Site Model has been revised as requested.

5. **Under "Primary Media," change the box with the words "onsite soil" to "on-site surface and subsurface soil."**

Figure 2, Conceptual Site Model has been revised as requested.

6. **Add "gravity" under Potential Transport Mechanisms to account for DNAPL migration around the Site in the subsurface and on the surface, including into the waterways.**

Figure 2, Conceptual Site Model has been revised as requested, and flow lines were adjusted to reflect this added transport mechanism.

7. **For off-site soil south of the site, the current/future adult and child resident exposure pathway status should be changed from "incomplete" to "complete but insignificant." EPA's analysis of neighborhood soil concluded that exposure to contaminants of interest is complete but insignificant based on the COC concentrations observed in off-site soil. A footnote could be added in the CSM figure explaining the rationale.**

As discussed with USEPA during a conference call on October 28, 2015, this proposed change would conflict with previous communications from USEPA; specifically, USEPA's March 14, 2014 letter to Beazer and the HHRA Work Plan approved by USEPA on September 25, 2014. USEPA subsequently withdrew this comment via email on October 29, 2015; therefore, no change has been made to Figure 2, Conceptual Site Model regarding this withdrawn comment.

8. **For off-site soil west, north, and east of the site, the current/future adult and child resident exposure pathway status should be changed from "incomplete" to "complete but insignificant." Land-use in these areas includes farms, light commercial/industrial and undeveloped areas.**

Figure 2, Conceptual Site Model has been revised as requested.

9. **There should be a way to capture off-site surface water and sediment west, north, and east of the site for the current/future adult and child resident exposure pathway status. Land use in these areas includes farms, light commercial/industrial and undeveloped areas. For example, exposures to Smith Ditch, which runs from the Site to private property (farmland) to the north, were evaluated in the HHRA. Exposures to Smith Ditch water and sediment would be "complete" and presumably "insignificant."**

Figure 2, Conceptual Site Model has been revised as requested. The "NA" symbols for the "Current/Future Adult and Child Resident" for "OFF-SITE SOIL WEST, NORTH, AND EAST OF THE SITE" and for "SURFACE WATER" and "SEDIMENT" have been changed to open circles noting that that those exposure pathways are "Potentially Complete but Insignificant."

Other than a typo on page 6, second paragraph which states, "of the on-Site of off-Site" EPA has no further requests for revisions.

The report has been revised to address this typo.

Addressing Uncertainty Regarding Fish Ingestion

USEPA's October 6, 2015 letter also stated that "significant uncertainty" was associated with the evaluation of potential risks related to consumption of fish from Crab Orchard Creek (COC). USEPA attributed this uncertainty to a small sample set of fish that were caught close to the Site and the absence of fish samples from more distant downstream locations. USEPA believes that uncertainty is somewhat offset by the fact that a fish consumption advisory has been established for Crab Orchard Creek in Jackson County, but, in consultation with Illinois EPA, believes additional fish sampling is appropriate before eliminating the consumption advisory. Accordingly, USEPA is requiring that Beazer include fish tissue monitoring as a component of the Monitored Natural Recovery (MNR) program to be implemented for COC, and as a means for ultimately developing an "exit strategy" for the consumption advisory. This culminated in the following excerpt from the USEPA's October 6, 2015 letter:

> "The EPA will approve the revised HHRA with the caveat that, because the current fish consumption exposure analysis is encumbered with uncertainty, and given the importance of human health protection, Beazer must include an analysis of Site contaminant fish body-burden in its MNR remedy. We anticipate that the MNR remedy plan will include an exit strategy based on a determination to be made by the IFCMP that will allow Beazer to discontinue monitoring fish body burden."

Beazer disagrees with USEPA's characterization of the uncertainty associated with potential COC fish consumption risks as "significant." To the contrary, Beazer believes the available data are sufficient to demonstrate that potential risks associated with the presence of Site-related constituents in COC fish are within or below USEPA's allowable risk range. Several conversations and two evaluations, in addition to the HHRA, have documented that finding.

In an Arcadis memo dated October 18, 2012[1], a conservative estimate of productivity for the portion of COC from the Site to the most downstream sediment sampling location (COC-BC-14, which is approximately 3.5 miles downstream from the confluence of Piles Fork and COC and only approximately 1.1 miles upstream of the Dillinger Road bridge) yields an upper bound estimate of 30 kg of edible size whole fish per year. This translates into one meal produced every 9.2 days (about 25 grams/day) and eaten by a single person throughout the year. This production rate is below the ingestion rate of one meal per week (about 32 grams/day) assumed by IEPA when setting the fish advisory. Though this difference in rates may not appear very large, keep in mind that the productivity-based fish consumption rate assumes all the fish produced by this portion of COC are eaten by a ***single*** person. If this portion of COC were fished by 10 people, only about 2.5 grams/day could be produced for each person.

Additionally, an Arcadis April 18, 2013 letter to Dr. Thomas Hornshaw of IEPA employed a spatial weighting approach to estimate exposure point concentrations for the entire length of COC (i.e., from Crab Orchard Lake downstream to the Big Muddy River) given that the fish consumption advisory is applicable to all of COC, not just the portion immediately downstream of the Site. The risk assessments conducted by USEPA assumed that this entire length of COC has a concentration equal to that observed near the Site. The

[1] The Arcadis memo dated October 18, 2012 was included as an attachment to a February 18, 2013 letter from Beazer to IEPA regarding the Fish Consumption Advisory Assessment.

spatial weighting approach accounts for observed changes in the concentration of dioxin in sediments and fish with distance from the Site. When these differences in dioxin concentration with distance from the Site are accounted for, potential risks associated with dioxin in edible fish fall within USEPA's acceptable risk range and meet IEPA's target risk for both adult and child consumers even assuming an unrestricted consumption rate (225 meals per year, 140 grams/day). Using a still conservative but more representative consumption rate of one meal per week (32 grams/day) potential risks are well below the IEPA target risk of $1x10^{-5}$ and are in the low-end of USEPA's acceptable risk range.

The findings about potential risk summarized above indicate that a very large margin of safety exists between any risk that may be associated with consumption of COC fish, IEPA target risk levels, and especially USEPA's allowable risk range. Beazer believes these findings indicate that when conservative but reasonable and representative assumptions are used to estimate potential risks associated with dioxins that may be present in COC fish, little uncertainty surrounds the conclusions that such potential risks are within or below USEPA's allowable risk range.

Notwithstanding Beazer's disagreement with USEPA's position that substantial uncertainty exists in the estimation of potential risk from consumption of COC fish, Beazer is amenable to working in good faith with the USEPA toward developing a reasonable fish tissue monitoring component of the MNR Plan, including an attainable exit strategy for such component. In the meantime, pending its final review of the enclosed HHRA, we understand that USEPA will issue a written approval of the HHRA under the condition that we collectively work toward the development of a fish tissue sampling component of the MNR Plan. It is Beazer's understanding that such written approval will be provided by USEPA within the next several weeks.

Please feel free to contact me at 412-208-8867 if you have any questions or require additional information regarding this submittal, and to discuss potential dates for a meeting or conference call to continue prior discussions concerning an MNR Plan, including fish tissue monitoring components.

Sincerely,

Michael Slenska, P.E.
Senior Environmental Manager

Enclosure

cc: Tammy Moore, USEPA
Jose Cisneros, USEPA
Chip McChesney, Beazer
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Human Health Risk Assessment for the Former Koppers Wood-Treating Site

Carbondale, Illinois

November 6, 2015

Human Health Risk Assessment for the Former Koppers Wood-Treating Site

Carbondale, Illinois

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Tables

Figures

Appendices

Acronyms and Abbreviations

95th UCL	95th percentil upper confidence limit
ABS_d	dermal absorption factor
ABS_{GI}	gastrointestinal absorption factor
ABS_o	oral absorption fraction
ADD	average daily dose
ADE	average daily exposure
ASL	above screening level
AT	averaging time
Ba_{deer}	biotransfer factor for deer
BaP	benzo(a)pyrene
BaP-TE	benzo(a)pyrene toxic equivalents
bgs	below ground surface
Br	plant-soil bioconcentration factor
BSL	below screening level
B_{soil}	soil bioavailability factor
BW	body weight
C	concentration
Cal EPA	California Environmental Protection Agency
CAMU	corrective action management unit
C_{deer}	constituent concentration in deer meat
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	conversion factor
cm^2	square centimeters
cm^2/d	cubic centimeters per day
COC	Crab Orchard Creek
COPC	constituent of potential concern

C_{plant}	constituent concentration in plant tissue
CS	constituent concentration in soil
C_{sw}	constituent concentration in surface water
CSF	cancer slope factor
DA_{event}	absorbed dose
days/yr	days per year
DL	detection limit
DNAPL	dense non-aqueous phase liquid
ED	exposure duration
EF	exposure frequency
EFH	Exposure Factors Handbook
EPC	exposure point concentration
ET	exposure time
EV	event frequency
events/day	events per day
FA	fraction absorbed of water
FI	fraction ingestion
ft	feet
g/day	grams per day
GI	gastro-intestinal
g/kg-day	gram per kilogram per day
HASP	health and safety plan
HEAST	Health Effects Assessment Summary Tables
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
hr/day	hour per day
hr/event	hour per event

IEPA	Illinois Environmental Protection Agency
IR	ingestion rate
IRIS	Integrated Risk Information System
IUR	inhalation unit risk
kg	kilograms
kg/day	kilogram per day
Kp	dermal permeability constant
L	liter
LADD	lifetime average daily dose
LADE	lifetime average daily exposure
L/day	liters per day
LOAEL	lowest observed adverse effects level
m^3	cubic meter
m^3/kg	cubic meter per kilogram
mg	milligram
mg/cm^2	milligrams per square centimeter
mg/cm^2-event	milligram per square centimeter per event
mg/day	milligrams per day
mg/kg	milligram per kilogram
mg/kg-day	milligram per kilogram per day
$(mg/kg\text{-}day)^{-1}$	per milligram per kilogram per day
mg/kg ww	milligram per kilogram in wet weight
mg/m^3	milligram per cubic meter
m^3/kg	cubic meter per kilogram
MW	mega watt
NA	not available
NAS	National Academy of Sciences
ND	non-detect

NOAEL	no observed adverse effects level
NSL	no screening level
NTX	no toxicity data available
PAHs	polynuclear aromatic hydrocarbons
PEF	particulate emission factor
PELCR	potential excess lifetime cancer risk
POTW	publicly owned treatment works
PPE	personal protection equipment
PPRTV	provisional peer reviewed toxicity values
PRG	preliminary remediation goal
Q_{plant}	quantity of plants ingested
Q_{soil}	quantity of soil ingested
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RME	reasonable maximum exposure
RSL	regional screening levels
SA	surface area
SVOCs	semivolatile organic compounds
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDD-TEQ	2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
TEF	toxic equivalency factors
T_{event}	lag time per event
t_{event}	event duration
UCL	upper confidence limit
ug/kg	microgram per kilogram
ug/L	micrograms per liter

ug/m^3	microgram per cubic meter
$(ug/m^3)^{-1}$	per microgram per cubic meter
UR	unit risk
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds
yrs	years

1. Introduction

On behalf of Beazer East, Inc. (Beazer), ARCADIS has developed this human health risk assessment (HHRA) for the Former Koppers Wood-Treating Site (Site) in Carbondale, Illinois. The objective of the HHRA is to evaluate potential adverse human health effects attributable to potential exposures to Site-related constituents. To achieve this purpose, this HHRA is structured to estimate the potential health risk associated with potential exposures to the constituents at this Site, which are then compared to a risk limit that is defined as a matter of United States Environmental Protection Agency (USEPA) policy as being "acceptable". If the estimated potential risk is less than the policy-based risk limit, the concentrations at a site are characterized as being below a level of concern for human health risk and there is no need to take further action to reduce either the media-specific concentrations or the potential for contact by people. If the estimated potential risk exceeds the acceptable theoretical risk limit, actions may be evaluated to reduce those potential risks, including limiting the potential for exposure and reducing the concentrations of constituents in the media of concern. The risk estimates provided in this HHRA are likely to overestimate actual risks, if any, to provide a conservative basis for future risk management decisions. The conclusions of the HHRA, along with the ecological risk assessment, will be used by risk managers to determine whether any further remedial actions need to be implemented at the Site and, as necessary, to potentially assist in the development of cleanup levels or establishment of additional institutional controls protective of human health.

This HHRA is prepared in accordance with the USEPA-approved work plan (ARCADIS 2014) and current USEPA human health risk assessment approaches defined under the CERCLA regulatory framework (USEPA 1988) including USEPA Risk Assessment Guidance for Superfund (RAGS) Volume I, Human Health Evaluation Manuals (Part A [1989], Part D [2001], Part E [2004], Part F [2009]), USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002) ; and other recent USEPA risk assessment guidance. This HHRA supersedes a November 2014 version of the document, and incorporates revisions to address USEPA comments dated March 5, 2015 and October 6, 2015.

1.1 Site Description and Setting

The Site is located in the northeastern portion of the City of Carbondale in Jackson County, Illinois (Figure 1). Land use surrounding the Site is a mixture of residential, agricultural, and commercial/industrial. The southern edge of the Site is bordered by a former railroad property owned by Illinois Central Gulf Railroad. A residential portion of the City of Carbondale lies south of the railroad property adjacent to the western part of the Site; open and wooded areas are present to the south adjacent to the central and eastern parts of the Site. North Marion Street cuts through the western end of the Site. To the west of North Marion Street lies some wooded property, a former railroad property, and a

commercial/industrial area. The land to the north and east of the Site consists of cultivated, vacant, and wooded areas. A few residences are also located to the north of the property. The property itself (approximately 218 acres) consists of mainly grassy and wooded areas, with several gravel access roads. A garage, office building and waste- water treatment system are located in the west-central portion of the Site. Glade Creek flows to the northwest across the Site's southwestern corner, wraps around to the north of the Site, and then flows to the southeast across the eastern portion of the Site. Various surface water drainage ditches and wetlands areas are present on the Site. All of these features eventually drain to Glade Creek to the west, north, or east of the Site.

1.2 Summary of Operational History

Ayer & Lord Tie Company began producing pressure-treated railroad crossties, utility poles, and other wood products at the Site in approximately 1905. In 1940, Koppers Company purchased the facility. The facility changed ownership (largely through corporate mergers, acquisitions and reconfigurations) numerous times between 1988 and 1992, when the Site was conveyed to Beazer. Wood-treating operations at the Site ceased in 1991.

During the years of operation, a variety of chemicals were used at one time or another, including creosote, pentachlorophenol, fluoro-chrome-arsenate phenol, chromated zinc chloride, and non-combustible fire retardant. The treatment process generally involved pressurized impregnation of wood-treating compounds into the wood products, after which time the wood was staged in designated areas to "drip dry" and await shipment from the facility. Liquids generated by the process were subject to various methods of treatment and discharge over the operational history of the Site. Historical treatment methods included use of lagoons, impoundments, and spray fields. Beginning in the 1970s, more advanced treatment methods were employed, providing for on-Site treatment followed by discharge to the Carbondale Publicly Owned Treatment Works (POTW) for additional treatment under a discharge permit.

1.3 Prior Remedial Activities

Numerous remediation activities have occurred at the Site over the years, including actions that were taken while the facility was operating, as part of facility decommissioning, and following facility decommissioning. A summary of the completed remediation activities conducted while the facility was operating and during facility decommissioning is provided below.

- Between 1981 and 1983, soil containing creosote was excavated from the area between the former lagoon area, Glade Creek, and the north drainage ditch. The soil was stockpiled on top of plastic. In 2005, these waste piles were removed and placed into an on-Site containment cell (further discussed below).

- Between 1988 and 1991 the former surface impoundments (part of the facility's waste water treatment system during operation) were closed. A total of 5,794 tons of sludge and underlying soil was removed from the bottom of the impoundments, stabilized, and sent off-Site for disposal. Following sludge removal, an engineered cover was constructed over the impoundments.

- In 1990, a "grout blanket" was installed in a portion of Glade Creek in the eastern end of the Site as an Interim Remedial Measure. The purpose of the grout blanket was to inhibit the possible discharge of creosote into the creek from underlying soils. The grout blanket was decommissioned in 2004 as part of the Glade Creek channel relocation efforts (further discussed below).

- Between 1991 and 1992, the wood-treating facility was decommissioned. During this time, the majority of the former treatment process buildings and equipment were demolished and storage tanks were dismantled and removed from the Site. The remainder of the buildings and structures were demolished in 2005 prior to installing the former process area surface cover (further discussed below).

In 2004, USEPA issued a *RCRA Corrective Action Final Decision and Response to Comments* document that outlined additional corrective actions to be implemented at the Site. These corrective actions were conducted between 2004 and 2010, and included the following:

- In 2004, a Corrective Action Management Unit (CAMU) containment cell was constructed to provide for long-term consolidation and containment of remediation waste generated from various areas of the Site. A total of approximately 31,200 cubic yards of materials were placed in the containment cell. An engineered cover system was installed over the cell in 2010.

- Between 2004 and 2005, an approximately 1,500-foot section of Glade Creek in the eastern portion of the Site was relocated east of its previous location to circumvent a zone of subsurface DNAPL. Soils excavated to construct the new channel were used to backfill the old channel. In addition, a 35-foot deep barrier trench was constructed along the former channel alignment to collect subsurface DNAPL and minimize the potential for DNAPL to migrate toward and discharge to the relocated channel. Trench spoils were placed in the CAMU containment cell.

- In 2005, a DNAPL recovery system was installed in an existing recovery well located in the former process area.

- In 2005, various waste piles, soil/debris piles, and coal tar/asphalt materials were excavated and placed in the CAMU containment cell.

- Between 2005 and 2006, a 27.4-acre surface cover was installed over the former process area of the Site to mitigate direct contact with impacted surface soils. Portions of the cover also included a synthetic liner to minimize rainwater infiltration to groundwater.

- Between 2005 and 2006, visibly impacted sediments were excavated from Glade Creek (from the relocated section downstream to Piles Fork). Excavated sediments were placed in the CAMU containment cell.

- In 2008 a culvert was installed in an on-Site drainage ditch.

- In 2010, a 7.9-acre surface cover was installed in the former lagoon area, and soils were removed from various areas of the Site, including the North Drainage Ditch and portions of the railroad property south of the Site. Excavated soils were placed in the CAMU containment cell and the final cover was installed on the cell.

1.4 Document Organization

The remaining sections of this report describe the methodology and results of the HHRA. This HHRA was conducted in accordance with the USEPA-approved work plan (ARCADIS 2014) and follows the four-step process of hazard identification (Section 2), exposure assessment (Section 3), toxicity assessment (Section 4), and risk characterization (Section 5) as defined by the National Academy of Sciences (NAS 1983) and USEPA (2000). A qualitative uncertainty assessment is also included (Section 6) followed by a summary section (Section 7).

2. Hazard Identification

In the Hazard Identification step, analytical data are evaluated and constituents of potential concern (COPCs) are identified in each environmental medium for evaluation in the quantitative risk assessment.

Multiple remedial activities have occurred at the Site. As a result some of the historical soil and sediment data do not reflect current conditions at the Site. Consequently, to characterize current conditions at the Site, the data supporting the HHRA include soil, sediment, surface water, and fish data collected in 2005 or later.

Most of the data collected after 2005 and used in this HHRA were collected in accordance with the following USEPA-approved work plans (each specific work plan provides details regarding the rationale for specific sample locations and sampling methodologies):

- April 22, 2005 Revised Supplemental Soil Sampling Work Plan (BBL 2005)
- February 21, 2006 Sampling and Analysis Plan for Southern Drainage Ditches (BBL 2006), as revised to address USEPA comments dated March 2, 2006
- December 18, 2007 Baseline Characterization Work Plan (BCWP; ARCADIS 2007)
- January 4, 2008 Addendum to June 15, 2006 Southern Drainage Ditches Report/Work Plan (ARCADIS 2008)
- October 26, 2009 Work Plan for Additional Investigations (Beazer 2009)
- March 25, 2010 Additional Sampling Locations email (ARCADIS 2010)
- January 24, 2011 Work Plan for Additional PCDD/PCDF Sampling (ARCADIS 2011)
- November 19, 2012 Work Plan for Additional Soil Sampling and PCDD/PCDF Analysis (ARCADIS 2012)

Each of these work plans was reviewed and approved by USEPA before sample collection occurred. Each of these sampling efforts was also conducted in accordance with the Quality Assurance Project Plan (QAPP) (ARCADIS 2008c) to ensure proper collection and analysis procedures were followed.

Groundwater data were not evaluated in the screening because exposure to COPCs in groundwater is not anticipated under any of the on-Site or off-Site receptor scenarios. Under current conditions, on-Site groundwater is not used as a potable water supply. During routine maintenance activities, it is possible for maintenance personnel to contact groundwater while monitoring groundwater wells, but health and safety rules governing such monitoring require use of personal protective equipment that prevents dermal exposures to constituents in groundwater. Anticipated future solar development at the Site will also not result in exposure to constituents in groundwater because no groundwater

wells will need to be drilled as part of the solar development nor will excavation need to occur below the groundwater table. Further, the facility is served by a public water supply, and City ordinance precludes potable well installations in areas served by public water. Finally, future use of onsite groundwater is expected to be precluded by deed restrictions to be imposed for the property. Thus, under current and future conditions on-Site exposure to constituents in groundwater is not expected to occur.

Current and future off-Site exposure to constituents in groundwater is also not expected to occur. Such exposure is possible via two pathways: potable use of groundwater, and migration of constituents in shallow groundwater and direct contact with groundwater in basements of nearby homes. Exposure to constituents in groundwater through potable use is not occurring and is not expected to occur because a public water supply exists for all nearby homes and City ordinance precludes potable wells in areas served by public water. In addition, extensive groundwater monitoring data indicate that constituents in shallow groundwater are not currently migrating off-Site. Future offsite migration is shallow groundwater is also not anticipated, and this will continue to be evaluated through ongoing implementation of the Site's groundwater monitoring program. Thus, under current and future conditions, off-Site exposure to constituents in groundwater is not expected to occur.

All constituents that are detected in at least one sample collected at the Site were included in the COPC screening. The screening process and results are summarized below for each medium retained for evaluation.

2.1 On-Site Data

2.1.1 Soil

A total of 210 surface soil samples collected from the Site were evaluated, but not all samples were analyzed for all constituents. One hundred and sixty-three surface soil samples were analyzed for semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs). One hundred and nine samples were sampled for pentachlorophenol. One hundred and forty-two samples were sampled for arsenic. Fifty-five samples were analyzed for chromium and copper. One hundred and three samples were analyzed for dioxins/furans. Surface soil samples were defined as any soil sample collected from the ground surface. The depth of the surface soils varied, however the majority of the surface soils were sampled to a depth of six inches. Table 1 summarizes constituents that were detected in at least one soil sample collected at the Site. Analytical results are presented in Appendix A.

2.1.2 Sediment

A total of 17 sediment samples were collected from the Site, including wetland areas, Smith Ditch, and the Large Pond. Fifteen sediment samples were analyzed for SVOCs including PAHs and pentachlorophenol, arsenic, chromium, and copper. Six sediment samples were analyzed for dioxins/furans. Table 2 summarizes constituents that were detected in at least one sediment sample collected at the Site. Analytical results are presented in Appendix A.

2.2 Off-Site Data

2.2.1 Railroad Property

Thirty-eight surface soil samples were collected from the railroad property to the south of the Site. Thirty-two samples were analyzed for SVOCs including PAHs. Twenty-seven samples were sampled for pentachlorophenol. Twenty-two samples were analyzed for arsenic. Twelve samples were sampled for chromium and copper. Twenty-four samples were analyzed for dioxins/furans. Table 3 summarizes constituents that were detected in at least one soil sample collected from the railroad property. Analytical results are presented in Appendix A.

2.2.2 35' Swath

Nine surface soil samples were collected from the 35-foot swath of Beazer-owned property to the south of the railroad property. Eight samples were analyzed for PAHs and pentachlorophenol. Five samples were analyzed for arsenic. Four samples were sampled for chromium and copper. Six samples were analyzed for dioxins/furans. Table 4 summarizes constituents that were detected in at least one soil sample collected from the 35-foot swath property. Analytical results are presented in Appendix A.

2.2.3 Soil North and West of the Site

Thirteen surface soil samples were collected from the agricultural area to the north and west of the Site. Eleven samples were analyzed for PAHs, pentachlorophenol, arsenic, chromium and copper. Thirteen samples were analyzed for dioxins/furans. Table 5 summarizes constituents that were detected in at least one soil sample collected from the area to the north and west of the Site. Analytical results are presented in Appendix A.

2.2.4 Sediment North and West of the Site

Fourteen sediment samples were collected from Glade Creek and Smith Ditch to the north and west of the Site. Fourteen samples were analyzed for PAHs, pentachlorophenol, arsenic, chromium and copper. Nine samples were analyzed for dioxins/furans. Table 6 summarizes constituents that were detected in at least one sediment sample collected from

Glade Creek and Smith Ditch to the north and west of the Site. Analytical results are presented in Appendix A.

2.2.5 Soil East of the Site

Eight surface soil samples were collected from the floodplain to the east of the Site. Eight samples were analyzed for PAHs, pentachlorophenol, arsenic, chromium and copper. Four samples were analyzed for dioxins/furans. Table 7 summarizes constituents that were detected in at least one soil sample collected from the floodplain to the east of the Site. Analytical results are presented in Appendix A.

2.2.6 Crab Orchard Creek and Piles Fork Sediment

Sediment samples were collected from Crab Orchard Creek and Piles Fork, where recreational activities may occur. Twenty-two sediment samples were collected but not all samples were analyzed for all constituents. Four samples were analyzed for SVOCs, including pentachlorophenol. An additional fifteen samples were analyzed for just PAHs and pentachlorophenol. Nineteen sediment samples were analyzed for arsenic, chromium, and copper. Sixteen sediment samples were analyzed for dioxins/furans. Table 8 summarizes constituents that were detected in at least one sediment sample collected from the Crab Orchard Creek and Piles Fork. Analytical results are presented in Appendix A.

2.2.7 Crab Orchard Creek and Piles Fork Surface Water

Surface water samples were not collected from Crab Orchard Creek or Piles Fork, where recreational activities may occur. Therefore, surface water samples collected from Glade Creek closer to the Site, were used to conservatively estimate potential exposures to constituents in surface water in Crab Orchard Creek and Piles Fork. Four surface water samples were collected from Glade Creek and analyzed for PAHs, pentachlorophenol, arsenic, chromium, and copper. Table 9 summarizes constituents that were detected in at least one surface water sample and used to conservatively represent potential concentrations in Crab Orchard Creek and Piles Fork. Analytical results are presented in Appendix A.

2.2.8 Catfish

Edible-sized catfish were collected from three Crab Orchard Creek locations. Fillet samples were analyzed for PAHs, pentachlorophenol, arsenic, chromium, copper, and dioxins/furans. Table 10 summarizes constituents that were detected in at least one catfish sample. Analytical results are presented in Appendix A.

2.3 Screening of Compounds of Potential Concern

Maximum detected soil and sediment concentrations were conservatively screened against the regional screening levels (RSLs) (USEPA 2014a) or against USEPA's dioxin PRGs (http://www.epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html) for 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents (TCDD-TEQ). For potential on-Site soil exposures commercial/industrial RSLs/PRGs were used (Table 1). For potential on-Site sediment exposures commercial/industrial RSLs/PRGs were adjusted for an exposure frequency of 16 days per year, which is a conservative estimate of potential exposure to sediments that recognizes the small size and limited extent of ditches on-Site and that most of the ditches are in areas of the Site that are difficult to access. The 16 days per year assumes a commercial/industrial worker may contact on-Site sediments twice per month during the warmer months of the year (March through October) (Table 2).

For all off-Site soils, residential RSLs/PRGs were used for screening (Tables 3, 4, 5, and 7). Off-Site sediments along Smith Ditch and Glade Creek to the west and north of the Site were screened separately from off-Site sediments along Piles Fork and Crab Orchard Creek to the east of the Site because land use differs and associated receptors differ. The HHRA assumes Piles Fork and Crab Orchard Creek can support fishing and kayaking. To the west and north the creeks are too small to support such recreational activity but do pass near residential properties and, thus, direct contact exposures are possible. For off-Site sediments, residential RSLs/PRGs were modified to reflect a 16 day per year exposure frequency and used for COPC screening (Tables 6 and 8). This exposure frequency assumes exposure to sediment twice a month during the warmer months of the year (March through October, i.e., the times of year when recreational activities are likely to be greatest).

If maximum concentrations of a constituent are below the RSLs/PRGs, that constituent was not included as a COPC and was not retained in the HHRA. Screening COPCs against RSLs/PRGs results in the exclusion of some compounds that were detected relatively often (i.e., greater than 5% frequency of detection). However, the screening levels are developed to intentionally be conservative. Further, screening the maximum concentration against such conservative screening levels means that while these compounds may have been detected relatively frequently all the detected concentrations were below the conservative screening level and, therefore, are not expected to pose an unacceptable risk and will not change the results of the overall evaluation of potential risk presented in this risk assessment

For surface water and fish concentrations, which do not have RSLs, all detected constituents were retained as COPCs in the HHRA.

In accordance with USEPA guidance (1993), potentially carcinogenic polycyclic aromatic hydrocarbons (PAHs) are assumed to have analogous modes of action to benzo(a)pyrene (BaP). BaP, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene,

dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are considered by USEPA to be potentially carcinogenic PAHs. However, USEPA has developed carcinogenic toxicity factors only for benzo(a)pyrene, generally assumed to be one of the most potent carcinogenic members of the PAH class of constituents. Therefore, the toxic equivalence of BaP is a quantitative indicator of the comparative carcinogenic potency of a PAH constituent compared to the potency of BaP. Toxic equivalency factors (TEFs) have been developed to relate the carcinogenic potency of all other potentially carcinogenic PAHs to the potency of BaP. These TEFs were applied to concentrations of individual carcinogenic PAHs in each sample and the total BaP-TE was calculated for each sample. If one of the potentially carcinogenic PAHs was not detected in any particular sample, half of the detection limit for that potentially carcinogenic PAH was used in the calculation of BaP-TE for that sample. Table 11 presents the BaP TEFs used in the BaP-TE calculations.

Similar to potentially carcinogenic PAHs, dioxin and furan congeners are conservatively assumed to have analogous modes of action in their carcinogenic toxicity (van den Berg et al., 2006). TEFs have been developed to relate the carcinogenic potency of certain other congeners to the potency of 2,3,7,8-TCDD (van den Berg et al., 2006). Again, these TEFs were applied to concentrations of individual dioxin and furan congeners in each sample and the total TCDD-TEQ was calculated for each sample. If one of the congeners was not detected in any particular sample, half of the detection limit for that congener was used in the calculation of TCDD-TEQ for that sample. For the 17 congeners with TEFs, Table 12 presents the TCDD TEFs used in the TCDD-TEQ calculations.

Tables 1 through 10 present the COPC screening results for on-Site soil, on-Site sediment, off-Site soil, off-Site sediment, surface water, and fish, respectively. In doing so, they identify the media-specific COPCs evaluated in the remainder of this HHRA.

3. Exposure Assessment

The risk assessment process requires the identification of exposure scenarios to assess the potential for current and potential future adverse health effects from COPCs at or near the Site. While these scenarios represent hypothetical people and activities, they reflect the physical description of the Site and the surrounding areas, as well as the activities that may potentially occur in these areas.

For exposure and potential risks to occur, a complete exposure pathway must exist. A complete pathway requires the following elements (USEPA, 1989):

- a source and mechanism for release of constituents;
- a transport or retention medium;
- a point of potential human contact (exposure point) with the affected medium; and
- an exposure route (i.e., ingestion, dermal contact, or inhalation) at the exposure point.

If any one of these elements is missing, the pathway is not considered complete. For example, if human activity patterns and/or the location of potentially exposed individuals relative to the location of an affected exposure medium prevent human contact, then that exposure pathway is not complete.

The exposure assessment is presented in the following four subsections and is consistent with the USEPA-approved work plan (ARCADIS 2014). Section 3.1 presents the current and future Site conditions for the purpose of identifying potential receptor groups. Section 3.2 contains a pathways analysis and identifies all complete and potentially complete exposure scenarios selected for evaluation in the HHRA. Section 3.3 provides the algorithms, receptor-specific exposure assumptions and parameters used to estimate potential exposure (daily intakes) to the COPCs. Section 3.4 describes the methods used to estimate media-specific exposure point concentrations (EPCs) for the identified COPCs and used to estimate potential daily exposures.

3.1 Current and Future Site Conditions

The Site is not currently used for commercial purposes, and activities are primarily limited to operation and maintenance of the previously completed remedy components, such as mowing, maintenance of the CAMU containment cell, recovery of DNAPL at collection points, and periodic groundwater monitoring. Portions along the southern and western property boundaries are fenced to deter access to the Site.

Anticipated future plans include development of a solar energy farm on a portion of the Site (shown as the proposed non-gravel and gravel solar use areas on Figure 1). Future development may also include construction of a bike path along or near the southern boundary of the Site to connect separate bike paths being planned by the City of Carbondale and to potentially provide access to the Green Earth, Inc. Pyles Fork Preserve to the south of the Site. Alternatively, pending further coordination with the City of Carbondale and the Illinois Central Gulf Railroad, the bike path may be constructed on the railroad property that abuts the southern property boundary of the Site.

Additionally, it is currently anticipated that the City of Carbondale will hold a conservation easement for the majority of the Site not planned for solar development. Thus, future exposure is assumed to be associated with recreational use for portions of the Site on which a bike path may be constructed and potential trespassers on portions of the Site outside the solar development area.

3.2 Exposure Areas

For the purposes of the HHRA, the Site is divided into multiple "Exposure Areas" (Figure 1). These exposure areas were developed during prior investigations and evaluations for the Site, and generally divide the Site into areas of current/future use. The various on-Site and off-Site exposure areas and bases for them are summarized below.

Eastern Conservation Exposure Area – Represents the eastern portion of the Site, including floodplain areas, that is primarily undeveloped, wooded, and/or overgrown, and where conservation land use is anticipated.

Southern Conservation Exposure Area – Represents the semi-wooded portion of the Site between the proposed solar area and the residential area located to the south of the Site. This is also potentially representative of where a bike path may be constructed as part of the redevelopment activities.

Proposed Solar Use Area – Represents the portion of the Site where solar panels are currently envisioned in support of a 20 MW solar array. This is the area where solar-related construction and operational activities would occur, and that would be fenced to preclude access.

Central Conservation Exposure Area – Represents the central portion of the Site where conservation land use is anticipated outside the portion of the Site where solar use is proposed.

Western Conservation Exposure Area – Represents the portion of the Site property located west of North Marion Street; which was not part of historical wood-treating operations and where future conservation land use is anticipated.

Off-Site areas were defined where potential risks will be evaluated for one or more receptor scenarios and are summarized below.

North and West of the Site – Includes the areas of Glade Creek and Smith Ditch, and floodplain soils in the immediate vicinity of the creeks that are located to the north and west of the Site. This area extends upstream to the point where Glade Creek crosses the railroad tracks immediately west of the Site and downstream to the point where Glade Creek reaches the Site property.

East of the Site – Represents the small portion of Glade Creek and its floodplain that lays beyond the property boundary to the east of the Site, as well as the downstream portions of Piles Fork and Crab Orchard Creek.

Railroad Property – Represents the area immediately to the south of the Site that includes the former railroad bed (Figure 1).

35' Swath – Includes a thirty-five foot swath of land, owned by Beazer East, Inc., to the south of the railroad property (Figure 1).

3.3 Potential Exposure Pathways and Receptor Populations

Potential exposure pathways are the ways by which potential receptors may be exposed to COPCs. This subsection identifies the complete or potentially complete exposure pathways for each of the identified current and future receptors at this Site, consistent with the USEPA-approved work plan (ARCADIS 2014). Table 13 summarizes the exposure scenarios (receptors and pathways) considered for evaluation in this HHRA.

As presented above (Section 1.2.1), historical wood-treatment methods were associated with releases of wood-treating-related constituents. As discussed in Section 1.3, multiple remedial actions have occurred at the Site to remove and reduce the concentration of constituents both on the Site as well as those that may be transported off the Site via surface water runoff. Residual constituent concentrations have been detected in soil on the Site.

In a letter dated March 14, 2014, USEPA (USEPA 2014b; Appendix B hereto) concludes that exposure pathways for the neighborhood to the south of the Site are incomplete. USEPA cited multiple lines of evidence in supporting this conclusion as quoted below:

> *The following surface soil sampling events in the neighborhood supported [US]EPA's analysis:*
>
> *1) a soil sampling event that USEPA and IEPA completed in 2005*
> *2) a soil sampling event that the City of Carbondale completed in 2006, and*

3) *soil sampling events completed by Beazer East, Inc. in 2012.*

[US]EPA also considered these other available lines of evidence:

1) *the concentrations and distribution of analytes in the soil did not indicate airborne migration under current conditions;*
2) *physical barriers present in the land surface between the Site and the neighborhood would likely prevent overland flow of chemical migration from the Koppers Site to the neighborhood during precipitation events (berm and drainage ditches);*
3) *the contaminant concentrations north of the property line (on the Koppers side) were orders of magnitude higher than concentrations found in the neighborhood to the south (supporting the conclusion that physical barriers prevent overland flow/surface migration to the south);*
4) *the detected chemical concentrations in the neighborhood were generally in the range of urban area background concentrations; and*
5) *the containment remedies and their maintenance within the facility prevent chemicals being released off-site in the future.*

Therefore, the HHRA does not evaluate potential exposure in the neighborhood to the south of the Site. Copies of available work plans (summarizing the sampling scope and rationale) and data reports (summarizing sampling results) for the 2005 USEPA/IEPA, 2006 City of Carbondale, and 2012 Beazer sampling events are included in Appendix B.

On-Site receptors considered to have potentially complete pathways include:

- a current/future on-site adult maintenance worker/caretaker;
- a current/future on-Site adult deer hunter and adolescent and child deer consumer;
- a current/future on-Site adolescent trespasser;
- a future on-Site adult and adolescent hikers/bicycle users;
- a future on-Site solar farm redevelopment worker; and,
- a future on-Site solar farm maintenance worker.

Off-Site receptors considered to have potentially complete pathways include:

- a current/future off-Site adult and adolescent kayaker/canoeist;
- a current/future off-Site adult and adolescent recreational angler and child fish consumer;
- a current/future adolescent trespasser; and,

- hypothetical future adult and adolescent hikers/bicycle users in railroad property.

The current/future on-Site adult maintenance worker/caretaker represents the current Site worker who maintains the Site and performs routine sampling at the Site. This worker is assumed to be exposed to the entire on-Site portion of the Site (Eastern Conservation Exposure Area, Southern Conservation Exposure Area, Proposed Solar Use Exposure Area, Central Conservation Exposure Area, and Western Conservation Exposure Area shown on Figure 1). This individual is assumed to be exposed to surface soil on-Site. The exposure point concentration was estimated to be the spatially-weighted 95th upper confidence limit on the mean of all surface soil data on-Site, as discussed in Section 3.4.5.

The potentially complete pathways to be considered in the HHRA, as well as others determined in coordination with USEPA to be either incomplete or insignificant, are demonstrated in the conceptual site model (Figure 2) and presented in Table 13. The conceptual site model identifies each of the exposure pathways, including the potential primary sources, potentially impacted media (including release and transport mechanisms), potential human receptors that could come into contact with those media, and complete exposure routes for each of those receptor groups.

3.4 Exposure Estimates

The HHRA assumes potential receptors may be exposed to constituents in soil, air sediments and other environmental media while working or recreating on or near the Site. To estimate potential risk to constituents, the potential dose for non-cancer effects is estimated by averaging the dose over the amount of time each receptor may be exposed to constituents at the Site and is referred to as the average daily dose (ADD). The potential dose for potential cancer health effects is estimated by averaging the dose over the life of the receptor and is referred to as the lifetime average daily dose (LADD). The ADD and LADD are combined with toxicity benchmarks to estimate the potential for adverse health effects to occur. To develop the potential dose estimate, conservative assumptions are made about how often and to what extent each receptor is potentially exposed to constituents. Section 4 further discusses the differences between non-cancer and cancer health effects.

The ADD is an estimate of a receptor's potential daily intake from oral and dermal exposure to COPCs with potential non-carcinogenic effects. According to USEPA (1989), the exposure dose should be calculated by averaging over the period of time for which the receptor is assumed to be exposed. For potential exposures that occur over a period that is greater than 10% of a lifetime (or more than 7 years in duration), a chronic ADD is estimated. For potential exposures that are less than 10% of a lifetime (or less than 7 years in duration), a subchronic ADD is estimated. The future on-Site solar farm redevelopment worker scenario, current/future on-Site child deer consumer scenario, and current/future off-Site child recreational angler scenario are assumed to be subchronic exposures, while the

estimated exposures for all other receptor groups are considered chronic. The chronic and subchronic ADD for each COPC via each route of exposure is compared to the chronic or subchronic toxicity value (e.g. the reference dose [RfD]; see Section 4.1) for that COPC to estimate the potential hazard index associated with exposure to that COPC via that route of exposure. Hazard indices are presented and discussed in Section 5.1.

For COPCs associated with potentially carcinogenic effects in humans, the LADD is an estimate of potential daily intake over the course of a lifetime. In accordance with USEPA (1989), the LADD is calculated by averaging the assumed exposure over the receptor's entire lifetime (assumed to be 70 years). The LADD for each COPC via each route of exposure is combined with the cancer slope factor (CSF; see Section 4.2) for that COPC in order to estimate the excess lifetime cancer risk due to exposure to that COPC via that route of exposure. Excess lifetime cancer risks are presented and discussed in Section 5.2.

Consistent with USEPA guidance (USEPA, 2009), inhalation exposures were evaluated in a different manner. Instead of estimating doses, an average daily exposure (ADE) concentration (can be either chronic or subchronic) and a lifetime average daily exposure (LADE) concentration were estimated for non-carcinogens and carcinogens, respectively.

3.4.1 Soil and Sediment

The HHRA assumes potential exposure to soil occurs via incidental ingestion, dermal contact, and inhalation of dust. Because of its high moisture content sediment is not likely to be entrained in the air as dust. Additionally, because sediment is typically removed from hands by movement through the surface water, incidental ingestion of sediment becomes insignificant and the ingestion pathway was considered negligible. Thus, only the potential dermal contact pathway was evaluated for sediment. ADDs and LADDs for soil ingestion were calculated as follows:

$$(L)ADD = \frac{CS \times IR \times ABS_o \times FI \times EF \times ED \times CF}{AT \times BW}$$

where:

(L)ADD	=	(Lifetime) Average Daily Dose Due to Ingestion (mg/kg-day);
CS	=	Constituent Concentration in Soil (mg/kg);
IR	=	Ingestion Rate of Soil or Sediment (mg/day);
ABS_o	=	Oral Absorption Factor (unitless);
FI	=	Fraction Ingested (unitless);
EF	=	Exposure Frequency (days/year);
ED	=	Exposure Duration (years);

CF = Conversion Factor (10^{-6} kg/mg);

AT = Averaging time (days); and

BW = Body weight (kg).

ADDs and LADDs for dermal absorption of soil and sediment were calculated as follows:

$$(L)ADD = \frac{CS \times CF \times AF \times ABS_d \times EF \times ED \times SA}{AT \times BW}$$

where:

(L)ADD = (Lifetime) Average Daily Dose Due to Dermal Contact (mg/kg-day);

CS = Constituent Concentration in Soil and Sediment (mg/kg);

CF = Conversion Factor (10^{-6} kg/mg);

AF = Soil-to-Skin Adherence Factor (mg/cm^2);

ABS_d = Dermal Absorption Factor (unitless);

EF = Exposure Frequency (days/year);

ED = Exposure Duration (years);

SA = Skin Surface Area Available for Contact (cm^2/day);

BW = Body weight (kg); and

AT = Averaging time (days).

ADEs and LADEs for the inhalation of dust from soil were calculated as follows:

$$(L)ADE = \frac{CS \times (1|PEF) \times CF \times ET \times EF \times ED}{AT}$$

where:

(L)ADE = (Lifetime) Average Daily Exposure due to Dust Inhalation (ug/m^3);

CS = Constituent Concentration in Soil (mg/kg);

PEF = Particulate Emissions Factor (m^3/kg);

CF = Conversion factor (10^3 ug/mg);

ET = Exposure time (hours/day);

EF = Exposure frequency (days/year);

ED = Exposure duration (years); and

AT = Averaging time (hours).

3.4.2 Surface Water

The HHRA assumes potential exposure to surface water occurs via incidental ingestion and dermal contact. ADDs and LADDs for surface water ingestion were calculated as follows:

$$(L)ADD = \frac{C_{sw} \times IR \times CF \times ET \times EF \times ED}{AT \times BW}$$

where:

(L)ADD	=	(Lifetime) Average Daily Dose Due to Ingestion (mg/kg-day);
C_{SW}	=	Constituent Concentration in Surface Water (ug/L);
IR	=	Ingestion Rate of Surface Water (L/hour);
CF	=	Conversion Factor (10^{-3} mg/ug);
ET	=	Exposure Time (hours/day);
EF	=	Exposure Frequency (days/year);
ED	=	Exposure Duration (years);
BW	=	Body Weight (kg); and
AT	=	Averaging Time (days).

ADDs and LADDs for dermal absorption of surface water were calculated as follows:

$$(L)ADD = \frac{DA_{event} \times EV \times EF \times ED \times SA}{AT \times BW}$$

where:

(L)ADD	=	(Lifetime) Average Daily Dose Due to Dermal Contact (mg/kg-day);
DA_{event}	=	Absorbed Dose (mg/cm^2-event);
EV	=	Event Frequency (events/day);
EF	=	Exposure Frequency (days/year);
ED	=	Exposure Duration (years);
SA	=	Skin Surface Area Available for Contact (cm^2);
BW	=	Body weight (kg); and
AT	=	Averaging time (days).

DA_{event} water will be calculated as follows:

If $t_{event} \leq t^*$, then:

$$DA_{event} = 2FA \times K_p \times C_{sw} \times CF \times \sqrt{\frac{6\tau \times t_{event}}{\pi}}$$

If $t_{event} > t^*$, then:

$$DA_{event} = FA \times K_p \times C_{sw} \times CF \times \left[\frac{t_{event}}{1+B} + 2\tau_{event}\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

where:

DA_{event}	=	Absorbed Dose (mg/cm^2-event);
FA	=	Fraction Absorbed of Water (unitless);
K_p	=	Dermal Permeability Coefficient of Compound in Water (cm/hour);
C_{SW}	=	Constituent Concentration in Surface Water (ug/L);
CF	=	Conversion Factor (10^3 cm^3/L x 10^{-3} mg/ug);
T_{event}	=	Lag Time per Event (hours/event);
t_{event}	=	Event Duration (hours/event);
t^*	=	Time to Reach Steady-State (hours) = 2.4 T_{event}; and
B	=	Dimensionless Ratio of the Permeability Coefficient of a Constituent through the Stratum Corneum Relative to its Permeability Coefficient across the Epidermis (unitless).

3.4.3 Fish and Deer

The HHRA assumes potential exposure to fish and deer tissue occurs via consumption of tissue. ADDs and LADDs for fish and deer ingestion were calculated as follows:

$$(L)ADD = \frac{C \times IR \times EF \times ED \times CF}{AT \times BW}$$

where:

(L)ADD	=	(Lifetime) Average Daily Dose Due to Ingestion (mg/kg-day);
C	=	Constituent Concentration in Fish or Deer (mg/kg dry weight);
IR	=	Consumption Rate of Fish or Deer (mg/day wet weight);
EF	=	Exposure Frequency (days/year);
ED	=	Exposure Duration (years);
CF	=	Conversion Factor (10^{-6} kg/mg);

AT = Averaging Time (days); and

BW = Body Weight (kg).

3.4.3.1 Deer Meat EPCs

Concentrations of COPCs in deer meat were estimated using uptake equations found in USEPA's Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA 2005). Equations used to model uptake from soil to beef were used to model deer meat concentrations. COPCs in soil were assumed to be consumed by the deer both through the plants that make up their diet and through direct ingestion of soil that may be on the plants they ingest.

COPC concentrations in the plants in a deer's diet were calculated using the following equation:

$$C_{plant} = C_{soil} \times Br$$

where:

C_{plant} = Constituent Concentration in Plants Due to Root Uptake (mg/kg dry weight);

C_{soil} = Constituent Concentration in Soil (mg/kg); and

Br = Plant-Soil Bioconcentration Factor (unitless).

COPC concentrations in deer meat were calculated using the following equation:

$$C_{deer} = \left(\left(F \times Q_{plant} \times C_{plant} \right) + Q_{soil} \times C_{soil} \times B_{soil} \right) \times Ba_{deer}$$

where:

C_{deer} = Constituent Concentration in Deer Meat (mg/kg dry weight);

F = Fraction of Plants Grown on Site Soil and Ingested by the Deer (unitless);

Q_{plant} = Quantity of Plants Ingested by the Deer per Day (kg dry weight/day);

C_{plant} = Constituent Concentration in Plants (mg/kg dry weight);

Q_{soil} = Quantity of Soil Ingested by the Deer per Day (kg/day);

C_{soil} = Constituent Concentration in Soil (mg/kg);

B_{soil} = Soil Bioavailability Factor (unitless); and

Ba_{deer} = Biotransfer Factor for Deer (beef used as a surrogate) (day/kg fresh weight).

The HHRA assumes deer have a food ingestion rate of 1.74 kg wet weight per day (Sample, 1994) and a soil ingestion rate of 2% of the food ingestion (Sample, 1994). Table 27 presents EPCs for deer meat.

A discussion of the exposure parameters used to estimate potential exposure for the identified receptors is presented in the following sections.

3.4.4 Potential Human Receptors and Exposure Assumptions

Exposure assumptions for on-Site and off-Site receptors considered to have potentially complete pathways are presented in Table 14. These assumptions are consistent with estimating a reasonable maximum exposure (RME) that is representative of a high-end exposures. RME assumptions are not always the maximum exposure possible; rather, they represent a combination of assumptions some of which may be representative of the central tendency for a particular exposure parameter (e.g., bodyweight, exposure frequency) and others that represent the upper end of the likely range of values for an exposure parameter (e.g., soil ingestion rate, exposure duration). Some of the assumptions may be taken from USEPA guidance (e.g., bodyweight, exposure duration, soil ingestion rate) and others may be based on site-specific information (e.g., exposure frequency). When combined, they represent and a high-end (or RME) exposure even when some Site-specific assumptions are employed.

3.4.4.1 Current/Future On-Site Adult Maintenance Worker/Caretaker

The HHRA assumes on-Site adult maintenance workers/caretakers are potentially exposed to surface soils via incidental ingestion, dermal contact and inhalation of dust while mowing the CAMU area and performing other activities related to maintaining the Site. Maintenance workers/caretakers are assumed to be exposed to surface soils at the Site 2½ days/week for 50 weeks/year. Such contact is assumed to occur for 25 years (USEPA 2002).

Because mowing may result in generation of dust from soil, an upper-bound soil ingestion rate of 100 mg/day is assumed, representing twice the typical daily soil ingestion rate (50 mg/day) for adults recommended by USEPA (1997). To be conservative, the HHRA assumes that 100 percent of the soil ingested by the worker for the day is from the Site.

Given the nature of the work, it is most likely that long sleeves and long pants are worn to protect the arms and legs. The HHRA assumes that the head, hands, and forearms have contact with soil. The HHRA also assumes that maintenance workers/caretakers are present on-Site 8 hours/day on each day of exposure.

The exposure assumptions used to evaluate the current/future on-Site adult maintenance worker/caretaker are presented in Table 14.

3.4.4.2 Current/Future On-site Adult Deer Hunter and Adolescent and Child Deer Consumer

A hypothetical scenario was also included under which a family harvests and consumes deer that have foraged at the Site and have potentially been exposed to constituents while foraging. Ingestion rates for wild caught meat are not available from the USEPA's Exposure Factors Handbook (USEPA 2011). Therefore, deer ingestion rates were derived using the methodology described below.

First, the number of deer potentially harvested from the Site was estimated based on data presented in the Summary of 2012-2013 Illinois Deer Seasons (IDNR 2013). Dividing the number of deer harvested in Jackson County, which includes Carbondale, by the number of acres of Jackson County produces a rate of 0.0082 deer harvested per acre. This correlates to an estimated potential average harvest of 1.5 deer per year from the 187-acre Site.

Second, using a mean deer weight of 56.5 kilograms from Sample (1994) and a meat yield from a buck of 40% (http://www.butcher-packer.com/ index.php? main_page= document_ general_info&products_id=331), the Site could potentially yield 34.8 kg of edible meat per year or 95.5 grams per day.

Third, the hypothetical total of 95.5 grams per day was conservatively distributed among a single family of four people representing three different age groups; two adults, one adolescent, and one child, by assuming the same distribution of ingestion rates for the each age group (adult, adolescent, and child) as is presented for total meat ingestion in the 2011 Exposure Factors Handbook (USEPA 2011). The resulting deer ingestion rates are 28.1, 25.0 and 14.2 grams per day, for adults, adolescents and children, respectively.

The exposure assumptions used to evaluate the /future on-Site adult deer hunter and adolescent and child deer consumer are presented in Table 14.

3.4.4.3 Current/Future On-site or Off-Site Adolescent Trespasser

The HHRA assumes that an adolescent (age 6 through 16) could go around or over the fence and potentially be exposed to Site surface soils via incidental ingestion, dermal contact and inhalation of dust. Additionally, the HHRA assumes that an adolescent trespasser may also potentially be exposed to off-Site surface soils via incidental ingestion, dermal contact and inhalation of dust and may potentially be exposed to sediment via dermal contact to the north and west of the Site. The trespasser is assumed to be exposed to surface soils at the Site one day per week for the four warm months of the year. The HHRA assumes the contact occurs for 10 years.

The trespasser is assumed to ingest soil at a rate of 100 mg/day (1997). The HHRA assumes that a trespasser's lower legs, feet, forearms and hands are exposed and potentially have contact with soil. The HHRA assumes that a trespasser contacts on-Site or off-Site soil for two 2 hours per day on each day of exposure.

The exposure assumptions used to evaluate the current/future on-Site or off-Site adolescent trespasser are presented in Table 14.

3.4.4.4 Future On-site or Off-Site Adult and Adolescent Hikers/Bicycle Trail Users

The HHRA assumes that adult and adolescent hikers/bicycle trail users are potentially exposed to surface soils via incidental ingestion, dermal contact and inhalation of dust while walking on or riding on the future bike trail. That trail could be on the Site or possibly on the railroad property to the south of the Site. The hiker/bicycle trail user is assumed to potentially be exposed to surface soils once per week for 52 weeks per year. The HHRA assumes adults will use the bicycle trail for 20 years and that adolescents will use the trail for 10 years.

The HHRA assumes the soil ingestion rate is 100 mg/day for the adult and 200 mg/day for the adolescent. The HHRA conservatively assumes that 10 percent of the soil potentially ingested by the hiker/bicycle trail user for the day is from the Site.

The HHRA assumes adults potentially have their head, hands, forearms and lower legs exposed and that adolescents potentially have their lower legs, forearms, and hands exposed. The HHRA assumes that hiker/bicycle trail users are present on the trail for one hour on each of the 52 days per year of assumed exposure.

The exposure assumptions used to evaluate the future on-Site or off-Site adult and adolescent hikers/bicycle trail users are presented in Table 14.

3.4.4.5 Future On-site Solar Farm Redevelopment Worker

The HHRA assumes that on-Site solar farm redevelopment workers are potentially exposed to surface soils via incidental ingestion, dermal contact and inhalation of dust while installing the solar farm at the Site. The solar farm redevelopment worker is assumed to potentially be exposed to surface soils at the Site five days per week for two months per year. The HHRA assumes this contact occurs for 1 year.

Because installation of solar panels may cause redevelopment workers to come into close contact with soil, an upper-bound soil ingestion rate of 330 mg/day is assumed (USEPA 2002). To be conservative, the HHRA assumes that 100 percent of the soil ingested by the solar farm redevelopment worker for the day is from the Site.

Given the nature of the work, it is most likely that long sleeves and long pants are worn to protect the arms and legs. Thus, is the HHRA assumes that the head, hands, and forearms have contact with soil. The HHRA also assumes that solar farm redevelopment workers are present on-Site 8 hours/day on each day of exposure.

The exposure assumptions used to evaluate the solar farm redevelopment worker are presented in Table 14.

3.4.4.6 Future On-site Solar Farm Maintenance Worker

The HHRA assumes that on-Site solar farm maintenance workers are exposed to surface soils via incidental ingestion, dermal contact and inhalation of dust while performing maintenance activities at the solar farm on the Site. Based on communications with Brightfields (the proposed solar developer) the worker is assumed to be exposed to surface soils at the Site 1 ½ days/week for 50 weeks/year, as representative of the high-end of the likely amount of time a maintenance worker regularly spends at a solar facility. This contact will be assumed to occur for 25 years (USEPA 2002).

Because mowing may result in the generation of dust from soil, an upper-bound soil ingestion rate of 100 mg/day is assumed, representing twice the typical daily soil ingestion rate (50 mg/day) for adults recommended by USEPA (1997). To be conservative, the HHRA assumes that 100 percent of the soil ingested by the solar farm maintenance worker for the day is from the Site.

Given the nature of the work, it is most likely that long sleeves and long pants are worn to protect the arms and legs. Thus, is the HHRA assumes that the head, hands, and forearms have contact with soil. The HHRA also assumes that solar farm maintenance workers are present on-Site 8 hours/day on each day of exposure.

The exposure assumptions used to evaluate the on-Site solar farm maintenance workers are presented in Table 14.

3.4.4.7 Current/Future Off-site Adult and Adolescent Kayaker/Canoeist

The HHRA assumes that off-Site adult and adolescent kayakers/canoeists are exposed to sediments and surface water via dermal contact while kayaking/canoeing on Crab Orchard Creek or Piles Fork. Although the banks of Crab Orchard Creek and Piles Fork are extremely steep in the vicinity of the Site and the water level is often not deep enough for a kayak or canoe, the recreator is conservatively assumed to be exposed to sediments and surface water once/year. This contact will be assumed to occur for 30 years for the adult and 10 years for the adolescent.

The adult is assumed to have their head, hands, forearms and lower legs exposed to the surface water. However, sediment exposure is only likely to occur to hands and feet. Similarly, the adolescent is assumed to have their head, hands, forearms, lower legs, and feet exposed to the surface water. Again, sediment exposure is only likely to occur to hands and feet. The HHRA assumes that the recreator is present 0.5 hours/day on each day of exposure.

The exposure assumptions used to evaluate the off-Site adult and adolescent kayaker/canoeist are presented in Table 14.

3.4.4.8 Current/Future Off-site Adult and Adolescent Recreational Angler and Child Fish Consumer

Although it was difficult to catch enough fish for environmental sampling, the HHRA conservatively assumes that the current/future off-Site adult and adolescent recreational angler are exposed to sediment and surface soils dermal contact and fish tissue via ingestion. The HHRA assumes that the current/future off-Site child fish consumer (ages 1-6) is potentially exposed to COPCs via consumption of fish but not via contact with surface water and sediments given the nature of Crab Orchard Creek or Piles Fork near the Site. The adult and adolescent anglers are assumed to be exposed to sediments and surface water once/year. The HHRA assumes potential exposure to surface water, sediments and fish occurs for 30 years for the adult and 10 years for the adolescent. Children between the ages of 1 and 6 are assumed to consume fish for 5 years.

The adult is assumed to have their head, hands, forearms and lower legs exposed to the surface water. However, sediment exposure is only likely to occur to hands and feet. Similarly, the adolescent is assumed to have their head, hands, forearms, lower legs, and feet exposed to the surface water. Again, sediment exposure is only likely to occur to hands and feet. The HHRA assumes the recreator is present 0.5 hours/day on each day of exposure.

The fish is assumed to be conservatively distributed among a single family of four people representing three different age groups; two adults, one adolescent, and one child, by assuming the same distribution of ingestion rates for the each age group (adult, adolescent, and child) of 8.1 g/day.

The exposure assumptions used to evaluate the off-Site adult and adolescent recreational angler and child fish consumer are presented in Table 14.

3.4.5 Exposure Point Concentrations

Exposure Point Concentrations (EPCs) for COPCs in on-Site surface soil and off-Site surface soil in the railroad property and the 35’ swath of Beazer-owned property to the south were estimated using spatially-weighted 95th percentile upper confidence limits

(UCLs) on the mean to account for the varying densities of sampling locations on different parts of the Site. Spatially-weighted 95th UCLs for each exposure area were calculated using Thiessen polygons, which are a common geostatistical approach for representing the data points of non-equal portions of an area. Geostatistical methods have been researched, used, and endorsed by USEPA for approximately the past two decades. The usefulness of geostatistical tools to help overcome variation in sampling distribution is described in several USEPA documents published over the past twenty years (Breckenridge et al 1991; USEPA 2001). USEPA began research into geostatistical methods around 1985, and has developed its own geostatistical software tools including GEO-PACK and GEO-EAS, which became available in 1990 and 1991, respectively (USEPA 1990; USEPA 1991a). Perhaps most notably, risk assessment guidance published by USEPA includes use of geostatistical methods to improve data analysis and to help determine the EPC.

The Thiessen polygon technique was selected as the most appropriate spatial tool because it captures the representativeness of the sampling locations across the evaluated area without any biases that may be introduced by more complex interpolative geospatial tools such as Kriging or splining.

The Thiessen polygon geostatistical approach involves using software (for example, ArcGIS) to draw polygons within an overall area of interest (e.g., the Site) so that each polygon contains one sample point, and the area within that polygon is closer to that point than it is to any other sample location. All soil within a polygon is then assumed to have the same concentration as that polygon's sample point. This approach reflects the underlying assumption that the concentration of a COPC in soil can be represented by the sample point closest to that location. However, in certain instances, hard boundaries are used to constrain polygon boundaries when a site feature precludes the expectation that soil in a given area is represented by the closest sample point. For example, the following constraints were used when developing polygon boundaries for the Site:

1. North Marion Street was established as a hard boundary between polygons associated with samples to the west of the road and those to the east of the road. This is based on the expectation that the road is a physical boundary that would preclude the expectation that sample points on one side of the road would be representative of soils on the other side of the road given the road's physical features and the differing nature of historical operations on one side versus the other;

2. The former North Drainage Ditch was established as a hard boundary for polygons associated with sample points collected from the former lagoon area. This is based on the North Drainage Ditch being a highly incised drainage feature in this area. The presence of this feature, combined with the substantially different use histories between the areas south (former lagoon) and north (farm field and borrow pit) of the channel, precludes the expectation that samples from the former lagoon would be representative of soil in the farm field and borrow pit; and

3. The boundaries between the railroad property exposure area to the south of the Site and the southern property lines of the Site were established as a hard boundary. This is based on the Site's southern property boundary having been defined as the southern limit of potential ecological exposures associated with the Southern Exposure area at the direction of the USEPA. However, potential human exposures were identified for the railroad property and the 35' swath of Beazer-owned property to the south. A separate set of polygons was established to support the human health risk assessment for the railroad and Beazer-owned properties to the south. Use of the southern property line as a hard boundary is not intended to imply that a physical barrier exists at the property line. Rather, it simply precluded the need for two sets of varying polygons in the Southern Exposure area (i.e., one set supporting the human health risk assessment that includes the railroad property and a second supporting the ecological risk assessment only for the Southern Exposure Area).

A spatially weighted 95th UCL EPC for any given exposure area was calculated by considering the fraction of the total exposure area that each individual polygon represents. This spatially weighted 95th UCL concentration represents a central tendency estimate of the exposure point concentration in the exposure area.

Not all COPCs were analyzed in every sample; therefore, Thiessen polygons were drawn for each COPC. Accordingly, the polygons and calculations differ slightly between COPCs depending on the dataset.

Exposure area boundaries were then overlaid on the Thiessen polygons. This overlaying of the exposure area boundaries on the existing polygons resulted in some polygons being divided between two exposure areas. In other words, a portion of some polygons falls within one exposure area and the remainder falls within another exposure area. In such cases, each portion of the polygon was treated as any other polygon in the respective exposure areas and was assumed to have a concentration equal to that of the original polygon when estimating the spatially weighted EPC for that exposure area (i.e., the upper 95th percentile of the distribution of spatially weighted arithmetic means). This process is illustrated below for the dioxin data at the polygon associated with sample location A1-24 that is located in the former process area east-southeast of the CAMU, as shown on attached Figure 1.

Sample location A1-24 has an associated TCDD-TEQ concentration of 906 ppt. The polygon associated with this sample point includes portions that fall within the existing surface cover of the Proposed Solar Use Area, uncovered portions of the Proposed Solar Use Area, and the Southern Exposure Area. The area and boundaries associated with each portion of the polygon are shown in the following excerpts:

For the portion of this polygon that falls within the surface cover (33,350 ft^2), the process assumes a concentration of "0" because a clean soil cover presently exists in this area. When evaluating this polygon's contribution to the overall Site-wide concentration, the remaining area of the polygon (103,242 ft^2) was assigned a TCDD-TEQ of 906 ppt.

Figures 3 through 10 present the polygons for fluoranthene, naphthalene, pentachlorophenol, pyrene, BaP-TE, arsenic, chromium, and TCDD-TEQ, respectively.

For several other on-Site and off-Site media and exposure areas (i.e., on-Site sediment, off-Site soil to the north & west and east, off-Site sediments, off-Site surface water, and fish tissue), spatially defining the extent of the Thiessen polygons would require the establishment of boundaries for the polygons, some of which might be viewed as arbitrary. For example, for the floodplain soils to the north and west of the Site, any influence of constituents in Glade Creek would be expected to decrease rapidly with distance away from the creek. Thus, floodplain samples were collected close to the creek to maximize finding the highest potential constituent concentrations. How rapidly concentrations decline is not known making the establishment of the outer boundary of a polygon for such a sample arbitrary. Alternatively, establishing boundaries for sediment and fish samples, which are confined to the banks for either Glade Creek, Piles Fork or Crab Orchard Creek, would be possible as is spatially weighting such concentrations (as was done during the evaluation of potential fish consumption risks associated with Crab Orchard Creek [ARCADIS 2013]). However, to be conservative, USEPA's ProUCL software (USEPA 2013) was used to derive the 95% UCL of the arithmetic mean concentration for on-Site and off-Site sediments, off-Site surface water and fish in Crab Orchard Creek. Appendix C presents the results from ProUCL. Tables 15 through 26 present the EPCs for:

- Site surface soil (Table 15);
- current proposed solar use area surface soil (includes both non-gravel and gravel areas shown on Figure 1) (Table 16);

- future proposed solar use area surface soil (which assumes that the portion of the solar use area covered by gravel has non-detectable COPC concentrations; shown as gravel area on Figure 1) (Table 17);
- southern conservation exposure area surface soil (Table 18);
- railroad property surface soil (Table 19);
- 35-foot swath surface soil (Table 20);
- north and west of the Site surface soil (Table 21);
- east of the Site surface soil (Table 22);
- north and west of the Site sediment (Table 23);
- Crab Orchard Creek and Piles Fork sediment (Table 24);
- Crab Orchard Creek and Piles Fork surface water (Table 25); and
- catfish (Table 26).

4. Toxicity Assessment

The purpose of the Toxicity Assessment is to identify the types of adverse health effects a COPC may potentially cause, as well as the relationship between the amount of COPC to which receptors may be exposed (i.e., the dose) and the likelihood of an adverse health effect (i.e., response). Adverse health effects are characterized by USEPA as carcinogenic or non-carcinogenic. Dose-response relationships are defined by USEPA for oral and inhalation routes of exposure. The results of the toxicity assessment, when combined with the results of the exposure assessment (Section 3), are then used to estimate potential risk (Section 5).

This section provides dose-response information for COPCs evaluated in the HHRA. Section 4.1 describes the USEPA approach for developing non-carcinogenic dose-response values. The carcinogenic dose-response relationships developed by USEPA are discussed in Section 4.2. Non-carcinogenic and carcinogenic dose-response values used in this risk assessment are presented in Tables 28, 29, 30 and 31. Dose-response information used in this risk assessment was obtained from the following sources, in order of priority in accordance with USEPA guidance (USEPA 2003b):

- USEPA's IRIS (USEPA, 2014c);
- Provisional Peer Reviewed Toxicity Values (PPRTVs) (USEPA, 2014d); and
- Other sources, such as California EPA and USEPA's Health Effects Assessment Summary Tables (HEAST).

4.1 Non-Carcinogenic Toxicity Values

Constituents with known or potential non-carcinogenic effects are assumed to have a dose below which no adverse effect occurs, or conversely, above which an effect may be seen. This dose is called the threshold dose (or threshold exposure for inhalation pathways). In laboratory experiments, this dose is known as the no observed adverse effect level (NOAEL). The lowest dose at which an adverse effect is seen is called the lowest observed adverse effect level (LOAEL). By applying uncertainty factors to the NOAEL or the LOAEL, the USEPA has developed reference doses (RfDs) for chronic oral and dermal exposures and reference concentrations (RfCs) for chronic inhalation exposures to constituents with potential non-carcinogenic effects (USEPA 2000).

The uncertainty factors account for uncertainties associated with the dose-response value, such as the effect of using an animal study to derive a human dose-response value, extrapolating from the high doses used in the laboratory experiment to the low doses typically encountered in environmental settings, and evaluating sensitive subpopulations. For constituents with potential non-carcinogenic effects, the RfD and RfC provide

reasonable certainty that if the specified exposure dose is below the RfD or the exposure concentration is below the RfC, then no potential non-carcinogenic health effects are expected to occur even if daily exposure were to occur for a lifetime. RfDs are expressed in terms of milligrams of constituent per kilogram of body weight per day (mg/kg-day). RfCs are expressed as milligrams per cubic meter (mg/m^3).

Oral, dermal, and inhalation routes of exposure were evaluated in this risk assessment. Because dermal toxicity values are not generally available, oral dose-response information is used to estimate the potential risk associated with both oral and dermal exposures. In the absence of dermal RfDs, the oral RfD was multiplied by an appropriate gastrointestinal absorption factor (ABS_{GI}) (USEPA 2004) for use in estimating potential non-cancer hazards from dermal exposures. The ABS_{GI} is also known as the oral-to-dermal adjustment factor. The ABS_{GI} factor adjusts the orally-administered dose for the amount absorbed because dermal exposure doses are expressed as "absorbed" doses (note that oral and inhalation doses are usually expressed as "administered" doses). Constituent-specific ABS_{GI}s were obtained from USEPA RAGS Part E (2004) where they exist. A default ABS_{GI} factor of 100% was used where no ABS_{GI} value is recommended by USEPA.

Potential exposures that occur over a period that is greater than 10% of a lifetime (or more than 7 years in duration) are considered chronic exposures and are compared with chronic toxicity values. Potential exposures that are less than 10% of a lifetime (or less than 7 years in duration) are considered subchronic exposures and are compared with subchronic toxicity values, where available. The future on-Site solar farm redevelopment worker scenario, current/future on-Site child deer consumer scenario, and current/future off-Site child recreational angler scenario are assumed to be subchronic exposures and, thus, used the subchronic non-cancer toxicity values. All other scenarios were assumed to potentially be chronic exposures. Toxicity values using in the evaluation of non-carcinogenic effects are presented in Table 28 (oral and dermal) and in Table 29 (inhalation).

4.2 Carcinogenic Toxicity Values

Constituents with known or potential carcinogenic effects are conservatively assumed to have some probability of causing an adverse health response (cancer) at any dose. That is, the threshold dose for the cancer endpoint is assumed to be zero. The cancer-causing potency of known or potential carcinogens is estimated based on laboratory animal toxicological data and human epidemiological data. There is uncertainty in extrapolating observed responses from high doses in laboratory experiments or occupational settings, to the expected responses from low doses typically encountered in environmental settings. USEPA therefore conservatively assumes that the dose-response curve for carcinogens is linear at low doses, i.e., every unit increase of constituent dose corresponds to the same unit increase in the lifetime probability of cancer. The numerical estimate of the cancer-causing potency of a constituent for dermal and oral exposures is referred to by the USEPA as the Cancer Slope Factor (CSF). A CSF is expressed in terms of the inverse of a

milligram of constituent per kilogram body weight per day [(mg/kg-day)$^{-1}$]. For inhalation exposures, the numerical estimate is expressed as an inhalation unit risk (IUR) factor. The IUR is expressed in terms of micrograms of a constituent per cubic meter (µg/m^3)$^{-1}$ and represents the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to a constituent at a concentration of 1 µg/m^3 in air. CSFs and IURs are presented in Table 30 and 31, respectively.

CSFs have not been developed for the dermal exposure route. In the absence of dermal slope factors, the oral slope factor was divided by an appropriate ABS_{GI} (USEPA 2004) for use in estimating potential cancer risk from dermal exposures. Constituent-specific ABS_{GI}s were obtained from USEPA RAGS Part E (2004) where they exist. A default ABS_{GI} factor of 100% was used where no ABS_{GI} value is recommended by USEPA.

5. Risk Characterization

The Risk Characterization combines the results of the Exposure Assessment with the results of the Toxicity Assessment to derive quantitative estimates of the potential for adverse health effects to occur as a result of potential exposure to Site-related constituents. Non-carcinogenic and carcinogenic risk characterizations are described separately below.

5.1 Non-Carcinogenic Risk Characterization

The potential for exposures to COPCs in soil at the Site to result in potential adverse non-carcinogenic health effects is estimated by comparing the ADD for each COPC (as discussed in Section 4.1) with the RfD for that COPC, or in the case of the inhalation pathway, comparing the ADE for each COPC with the RfC for that COPC. The resulting ratio, which is unitless, is known as the hazard quotient (HQ) for that COPC. The summation of all individual COPC HQs is the hazard index (HI). The HI is calculated using the following formula:

$$HI = E_1/RfD_1 + E_2/RfD_2 + \ldots + E_i/RfD_i.$$

where:

HI	=	Hazard Index;
E/RfD	=	Hazard Quotient;
E_i	=	exposure intake for the i^{th} COPC (mg/kg-day); and
RfD_i	=	Reference Dose (mg/kg-day) or Reference Concentration (mg/m^3) for the i^{th} COPC.

When the HQ for a given COPC and pathway does not exceed 1, the RfD has not been exceeded, and potential adverse non-carcinogenic health effects are not expected to occur as a result of exposure to that COPC via that pathway. The HQs for each COPC are summed to yield the Hazard Index (HI) for that pathway. A total HI is then calculated for each exposure medium by summing the pathway-specific HIs. A total HI that does not exceed 1 indicates that potential adverse non-carcinogenic health effects are not expected to occur as a result of that receptor's potential exposure to COPCs in the environmental medium evaluated (USEPA 2000). This approach assumes that sub-threshold chronic exposures to multiple constituents are additive (similarly for subchronic exposures by the future on-site solar farm redevelopment worker, current/future on-Site child deer consumer, and current/future off-Site child recreational angler receptors). However, HIs should only be summed for constituents with the same target organ or endpoint. Therefore, where the Total HI across all media exceeds 1, endpoint-specific HIs are estimated and compared to the HI limit of 1. An endpoint-specific total HI that does not exceed 1 indicates that no potential adverse non-carcinogenic health effects are expected to occur as a result of that

receptor's potential exposure to COPCs in the environmental medium evaluated. An endpoint-specific total HI of greater than 1 indicates a potential for adverse effects to that endpoint.

The estimated hazards from all pathways and COPCs for all on-Site and off-Site exposure areas for each receptor group within each of those areas are summarized below. Each bullet identifies an exposure area and receptor group, presents the HI for that exposure area and receptor group, and refers to the table in which more details (e.g. the HQs associated with specific exposure pathways and COPCs) can be found.

- Current/Future on-Site Adult Maintenance Worker/Caretaker: 2 (with all target organ HIs less than or equal to 1) (Table 32);
- Current/Future On-site Adult Deer Hunter and Consumer: 0.1 (Table 33);
- Current/Future On-site Adolescent Deer Consumer: 0.2 (Table 34);
- Current/Future On-site Child Deer Consumer: 0.3 (Table 35);
- Current/Future On-site Adolescent Trespasser: 0.3 (Table 36);
- Future On-site Adult Hikers/Bicycle Trail Users: 0.3 (Table 37);
- Future On-site Adolescent Hikers/Bicycle Users: 0.8 (Table 38);
- Future On-site Solar Farm Redevelopment Worker: 0.5 (Table 39);
- Future On-site Solar Farm Maintenance Worker: 0.2 (Table 40);
- Current/Future Off-site Adult Kayaker/Canoeist: 0.0001 (Table 41);
- Current/Future Off-site Adolescent Kayaker/Canoeist: 0.0002 (Table 42);
- Current/Future Off-site Adult Recreational Angler: 0.1 (Table 43);
- Current/Future Off-site Adolescent Recreational Angler: 0.1 (Table 44);
- Current/Future Off-site Child Fish Consumer: 0.4 (Table 45);
- Current/Future Off-site Adolescent Trespasser on the Railroad Property: 0.2 (Table 46);
- Current/Future Off-site Adolescent Trespasser on the 35’ Swath Property: 0.3 (Table 47);
- Current/Future Off-site Adolescent Trespasser to Soil North and West of the Site: 0.005 (Table 48);
- Current/Future Off-site Adolescent Trespasser to Soil East of the Site: 0.3 (Table 49);
- Current/Future Off-site Adolescent Trespasser to Sediment North and West of the Site: 0.007 (Table 50);
- Hypothetical Future Off-Site Adult Hikers/Bicycle Trail Users on the Railroad Property: 0.04 (Table 51); and,

- Hypothetical Future Off-Site Adolescent Hikers/Bicycle Trail Users on the Railroad Property: 0.01 (Table 52).

As evident from the summary presented above, all exposure areas and receptors evaluated within those areas in this HHRA have total HIs that are at or below USEPA's limit of 1 indicating that potential non-cancer hazards for all receptor groups are acceptable. Table 53 summarizes HIs for all receptors.

5.2 Potential Carcinogenic Risk Characterization

The purpose of carcinogenic risk characterization is to estimate the potential likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of potential Site-related exposures to COPCs in various environmental media. This likelihood is a function of the dose of a COPC and the CSF for that COPC or, in the case of the inhalation pathway, a function of the exposure to the COPC and the IUR. The relationship between the Potential Excess Lifetime Cancer Risk (PELCR) and the estimated LADD or the LADE of a COPC may be expressed as an exponential equation:

$$.A = 1 - e^{-(BxC)}$$

where:

A = Potential Excess Lifetime Cancer Risk (PELCR) (unitless);

B = Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$ or Unit Risk $(mg/m^3)^{-1}$; and

C = Lifetime Average Daily Dose (mg/kg-day) or Lifetime Average Daily Exposure (mg/m^3).

This is the general form of the equation, and may be used in all cases to estimate potential excess lifetime cancer risk, regardless of the magnitude of the potential estimated risk.

The exponential equation can be simplified to a linear equation, which closely approximates the results of the exponential equation when the product of the dose and cancer slope factor is less than 0.01. The simplified linear form of the equation is expressed as:

$$A = B \times C$$

where:

A = Potential Excess Lifetime Cancer Risk (PELCR) (unitless);

B = Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$ or Unit Risk $(mg/m^3)^{-1}$; and

C = Lifetime Average Daily Dose (mg/kg-day) or Lifetime Average Daily Exposure (mg/m^3).

The exponential equation should be used when the product of the dose and cancer slope factor is greater than 0.01. This practice of using the general equation prevents calculation of potential risks that are greater than one.

The product of the CSF and the LADD or the UR and the LADE is unitless, and provides an estimate of the potential carcinogenic risk associated with a receptor's exposure to that COPC via that pathway. Pathway PELCRs are calculated for each COPC the USEPA assumes may potentially cause cancer. The PELCRs for each pathway by which the receptor is assumed to be exposed are calculated by summing the potential risks derived for each COPC. A Total PELCR is then calculated for each exposure medium by summing the pathway-specific PELCRs.

In general, the USEPA considers PELCRs that are below 1 chance in 1,000,000 (1×10^{-6} or 1E-06) to be so small as to be negligible, and PELCRs above 1E-04 to be sufficiently large they warrant further evaluation and possible mitigation. Potential excess lifetime cancer risk estimates that range between 1E-06 and 1E-04 are generally considered to be acceptable (USEPA 1991b).

The total potential excess lifetime cancer risks from all pathways and COPCs for all on-Site and off-Site exposure areas for each receptor group within each of those areas are summarized below. Each bullet identifies an exposure area and receptor group, presents the PELCR for that exposure area and receptor group, and refers to the table in which more details (e.g. the PELCRs associated with specific exposure pathways and COPCs) can be found.

- Current/Future on-Site Adult Maintenance Worker/Caretaker: 8E-05 (Table 32);
- Current/Future On-site Adult Deer Hunter and Consumer: 1E-05 (Table 33);
- Current/Future On-site Adolescent Deer Consumer: 5E-06 (Table 34);
- Current/Future On-site Child Deer Consumer: 4E-06 (Table 35);
- Current/Future On-site Adolescent Trespasser: 7E-06 (Table 36);
- Future On-site Adult Hiker/Bicycle Trail Users: 9E-06 (Table 37);
- Future On-site Adolescent Hiker/Bicycle Trail Users: 1E-05 (Table 38);
- Future On-site Solar Farm Redevelopment Worker: 2E-06 (Table 39);
- Future On-site Solar Farm Maintenance Worker: 2E-05 (Table 40);
- Current/Future Off-site Adult Kayaker/Canoeist: 4E-05 (Table 41);
- Current/Future Off-site Adolescent Kayaker/Canoeist: 4E-05 (Table 42);
- Current/Future Off-site Adult Recreational Angler: 6E-05 (Table 43);
- Current/Future Off-site Adolescent Recreational Angler: 5E-05 (Table 44);

- Current/Future Off-site Child Fish Consumer: 1E-05 (Table 45);
- Current/Future Off-site Adolescent Trespasser on the Railroad Property: 1E-06 (Table 46);
- Current/Future On-site Adolescent Trespasser on the 35' Swath Property: 6E-06 (Table 47);
- Current/Future Off-site Adolescent Trespasser to Soil North and West of the Site: 7E-07 (Table 48);
- Current/Future Off-site Adolescent Trespasser to Soil East of the Site: 8E-07 (Table 49);
- Current/Future Off-site Adolescent Trespasser to Sediment North and West of the Site: 2E-06 (Table 50);
- Hypothetical Future Off-site Adult Hikers/Bicycle Trail Users on the Railroad Property: 3E-06 (Table 51); and,
- Hypothetical Future Off-site Adolescent Hikers/Bicycle Trail Users on the Railroad Property: 5E-06 (Table 52).

As evident from the summary presented above, all exposure areas and receptors evaluated within those areas in this HHRA have total PELCRs that fall within or below USEPA's acceptable risk range (1E-06 to 1E-04) indicating that potential cancer risks for all receptor groups are acceptable. Table 53 summarizes total PELCRs for all receptors.

6. Uncertainty Analysis

Within any of the four steps of the risk assessment process, assumptions must be made due to a lack of full scientific knowledge. Some of the assumptions are supported by considerable scientific evidence, while others have less support. Every assumption introduces some degree of uncertainty into the risk assessment process. As a result, conservative assumptions have been made throughout the risk assessment to ensure that public health is protected and that potential risks and hazards are not underestimated. It is likely, therefore, that when all of the assumptions are combined, potential risks, if any, are overestimated rather than underestimated.

6.1 Hazard Identification

During the Hazard Identification step, constituents are selected for inclusion in the quantitative risk assessment. All constituents in samples of the various environmental media where detected above relevant risk-based screening criteria as well as constituents without screening criteria were considered COPCs and were evaluated in the HHRA. Several rounds of sampling have been conducted at the Site and data were evaluated using acceptable analytical methodologies. Therefore, it is unlikely that constituents associated with unacceptable risk have been excluded from the risk assessment as part of the COPC selection process in the hazard identification step.

6.2 Exposure Assessment

This HHRA is conducted using RME parameters. During the exposure assessment, average daily doses of COPC to which hypothetical receptors are potentially exposed are estimated in accordance with the USEPA-approved HHRA work plan (ARCADIS 2014). This involves assumptions about how often hypothetical exposure occurs. Such assumptions include location, accessibility, and use of an area. With this in mind, the hypothetical receptor who may potentially be exposed, and the location of exposure, were both defined for this risk assessment. The locations where certain activities were assumed to take place have been purposely selected to be consistent with the use of the Site.

USEPA (2011) recommends an upper bound soil ingestion rate for young children of 200 mg/day. However, based on information provided by the authors of the study upon which that estimate is derived, it appears that a more reasonable upper bound ingestion rate for young children is 100 mg/day (Stanek and Calabrese 2000). Similarly, USEPA (2011) does not specifically recommend an upper bound estimate of soil ingestion for older children and adults, but does recommend an average ingestion rate for these age groups of 50 mg/day. Additional information provided by Stanek et al. (1997) however, indicate that 50 mg/day is a more reasonable upper bound estimate for these age groups. Thus, for the 6 to 16 year old trespasser receptor, it is likely that soil ingestion has been overestimated because a soil ingestion rate of 100 mg/day was used in the trespasser exposure scenarios.

The HHRA used soil adherence factors derived from studies that measured actual soil loading onto skin during various types of activities. The adherence factors were selected based upon similarity of the activities conducted by the study participants to the assumed activities of the hypothetical receptors evaluated in the risk assessment. It was assumed, therefore, that the soil adherence for hypothetical receptors in the risk assessment would be similar to soil adherence observed in the studies. It was also assumed that absorption of constituents from soil adhered to skin would be similar to absorption from soil observed in studies used to derive the absorption adjustment factors. However, such studies typically measure absorption by applying enough soil to the skin so that an "infinite source" of a constituent is available for absorption. This HHRA assumes that the amount of soil assumed to adhere to receptors' skin approximates the "infinite source" amount used to estimate dermal absorption of constituents from soil. However, rates of absorption measured in studies may not be representative of absorption that occurs when lower degrees of adherence occur.

The estimated dermal exposures in this HHRA to COPCs in sediment while kayaking are likely overestimated. USEPA's final Dermal Risk Assessment Guidance manual (USEPA 2004) notes the following with regard to sediment exposure: "For significant dermal exposure to sediments to occur, sediment samples must be located in areas in which individuals are likely to come into direct contact with the sediments. For kayaking, this includes areas which are near shore and in which sediments are exposed at some time during the year. Sediments which are consistently covered by considerable amounts of water are likely to wash off before the individual reaches the shore." Further, for significant dermal absorption of contaminants to occur from water, contact needs to be reasonably extensive and prolonged like that associated with swimming, wading, or showering or bathing. Brief incidental contact while kayaking is unlikely to result in dermal absorption.

6.3 Toxicity Assessment

Toxicity data used for the HHRA can be limited. Much of the data used to generate human health criteria are derived from animal studies. This results in uncertainties, given the following:

Both endpoints of toxicity (effect or target organ) and the doses at which effects are observed are generally extrapolated from animals to humans;

Results of short-term exposure studies are used to predict the effects of long-term exposures;

Results of studies using high doses are used to predict effects from exposures to low doses usually expected at hazardous waste sites; and

Effects exhibited by homogeneous populations of animals (or humans) are used to predict effects in heterogeneous populations with variable sensitivities (e.g., the young, elderly, infirmed).

6.4 Risk Characterization

The risk of potential adverse human health effects depends on estimated levels of potential exposure and on dose-response relationships. Once potential exposure to, and potential risk from, each of the COPCs is estimated, the total risk posed by potential exposure to COPCs is determined by combining the health risk contributed by each COPC. Where COPCs do not interact, do not affect the same target organ or do not have the same mechanism of action, summing the risks for multiple COPCs results in an overestimate of risk posed by the Site. However, in order not to understate the potential risk, it was conservatively assumed that the potential effects of different COPCs are additive.

Potential exposures used to estimate potential risk for the various Site receptors are considered to be upper bound estimates of potential exposure. They represent a combination of assumptions; some of which represent the central tendency for a particular exposure parameter with others representing the upper end of the range of values for an exposure parameter. When combined, they represent a high-end (or RME) exposure even when some Site-specific assumptions are employed. Additional conservatism is embodied in the potential exposure estimates based on the receptor-specific factors as described below.

- **Current/future on-Site adult maintenance worker/caretaker** – In practice, and consistent with the Site's health and safety protocols, the maintenance worker/caretaker utilizes personal protective equipment (PPE) to limit exposure to COPCs at the Site when engaged in activities where the potential for significant direct exposure exists.

- **Future on-Site solar farm redevelopment and maintenance workers** – Redevelopment and future maintenance work would be directed under a health and safety plan which would include the use of PPE to limit exposure to COPCs at the Site.

- **Current/future on-Site adolescent trespasser** – The HHRA assumes trespassing occurs on a regular basis, although evidence does not support this assumption. The Site is currently fenced and trespassers are very rarely observed on the Site. Future plans include continuing to fence portions of the Site and limit potential access to the bike path.

- **Current/future on-Site deer hunter and consumers** – This scenario assumes that the deer spends 100% of its time at the Site and only consumes vegetation from the Site. This is highly unlikely based on the typical home range of deer and the abundance

of preferred forage in adjacent croplands. Therefore, the calculation of COPCs in deer tissue is a likely over-estimate of exposure to the hunter/consumer.

- **Future on-Site hikers/bicycle users** – These receptors are assumed to get 100% of their daily soil exposure from the short time they would spend on the future bike path on the days they are recreating. This scenario also assumes that soil exposure occurs during recreating, which is highly unlikely given that bike path soil will be covered (e.g., by gravel or asphalt) during the construction of the bike path.

- **Current/future off-Site kayaker/canoeists** – The portions of Crab Orchard Creek that are adjacent to the Site have very steep, muddy banks that are difficult to navigate. They also include substantial woody debris and obstructions that make navigating the Creek with a kayak or canoe extremely difficult. Additionally, the water levels fluctuate dramatically throughout the year and are often too low for either a kayak or canoe during the warmer summer months.

- **Current/future off-Site recreational anglers** – As discussed above, the Creek is not very accessible. Additionally, gathering enough fish to conduct laboratory analysis was difficult and it is unlikely that substantial subsistence angling would occur in this portion of the Creek.

The risk and hazard estimates provided in the HHRA are based on RME scenarios that use numerous exposure assumptions that are known to be conservative combined with toxicity factors that are also derived to be conservative. The end result of using multiple conservative assumptions is that the risk and hazard estimates presented in this HHRA likely greatly overstate potential risk for most, if not all, receptors potentially exposed to COPCs at this Site.

7. Summary and Conclusion

This HHRA was conducted in accordance with the USEPA-approved work plan (ARCADIS 2014) and current USEPA guidance to evaluate potential adverse health effects attributable to potential exposures to Site-related constituents. The conclusions of this HHRA can be used to determine whether any further remedial actions need to be implemented at the Site and, as necessary, to potentially assist in the development of cleanup levels or establishment of additional institutional controls protective of human health.

Potential exposures to several on-Site and off-Site exposure areas were evaluated. COPCs were identified by comparing the detected concentrations in relevant environmental samples to conservative risk-based concentrations defined to be protective of the receptors representing these exposure areas. All constituents identified as COPCs were evaluated in this HHRA.

The selection of exposure pathways in this HHRA considered the physical and environmental setting of the Site, local demographics, current and reasonably anticipated future land use, and input provided by the USEPA.

Potential cancer risks and non-carcinogenic hazards were estimated for all complete or potentially complete exposure pathways. Potential exposures to COPCs in each exposure area were estimated in this HHRA using reasonably maximum exposure parameters. Receptors evaluated include:

- current/future on-site adult maintenance workers/caretakers;
- current/future on-Site adult deer hunters and adolescent and child deer consumers;
- current/future on-Site adolescent trespassers;
- future on-Site adult and adolescent hikers/bicycle trail users;
- future on-Site solar farm redevelopment workers;
- future on-Site solar farm maintenance workers;
- current/future off-Site adult and adolescent kayakers/canoeists;
- current/future off-Site adult and adolescent recreational anglers and child fish consumers;
- current/future adolescent trespassers; and
- hypothetical future adult and adolescent hikers/bicycle trail users in railroad property.

For each COPC and exposure scenario, non-carcinogenic hazard indices and potential excess lifetime cancer risks were developed to estimate the potential for non-carcinogenic and carcinogenic health effects in accordance with USEPA guidelines (USEPA, 1989).

Non-cancer hazard indices for all exposure scenarios and receptors were at or below USEPA's HI limit of 1. Potential excess lifetime cancer estimates for all exposure scenarios and receptors were within or below USEPA's range of allowable risk. These findings indicate that potential cancer and non-cancer risk to all areas and receptors included in this risk assessment are acceptable.

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ARCADIS

Tables

TABLE 1
ON-SITE SOIL COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
83-32-9	Acenaphthene	123/163	123	163	75.5	1.3	1100000	SDD-7-TLB	8.5	18000	9800	4500000	no	BSL
208-96-8	Acenaphthylene	154/163	154	163	94.5	3.6	81000	SDD-7-TLB	8.5	92	3640	NA	no	NTX
120-12-7	Anthracene	156/163	156	163	95.7	3.1	500000	SDD-7-TLB	8.5	9.4	9510	23000000	no	BSL
191-24-2	Benzo(ghi)perylene	154/163	154	163	94.5	3.3	220000	SDD-7-TLB	8.5	360	8380	NA	no	NTX
86-74-8	Carbazole	1/1	1	1	100	1300	1300	SDD-16			1300	NA	no	NTX
206-44-0	Fluoranthene	157/163	157	163	96.3	1.7	4900000	SDD-7-TLB	8.5	92	46500	3000000	yes	ASL
86-73-7	Fluorene	137/163	137	163	84.0	1.6	670000	SDD-7-TLB	8.7	2700	7030	3000000	no	BSL
91-20-3	Naphthalene	141/163	141	163	86.5	1.4	680000	SDD-7-TLB	8.5	1900	7340	17000	yes	ASL
87-86-5	Pentachlorophenol	84/109	84	109	77.1	10	190000	SDD-16	43	88000	15800	4000	yes	ASL
85-01-8	Phenanthrene	162/163	162	163	99.4	2.7	1800000	SDD-7-TLB	360	360	21100	NA	no	NTX
108-95-2	Phenol	1/5	1	5	20.0	46	46	GC-BC-FPT3-5R	8.8	98	25.1	25000000	no	BSL
129-00-0	Pyrene	157/163	157	163	96.3	4.4	2500000	SDD-7-TLB	8.5	9.4	28700	2300000	yes	ASL
50-32-8	BaP-TE (NDs = 1/2 DL)	163/163	163	163	100	7.37	699000	SDD-7-TLB			16700	290	yes	ASL
	Metals													
7440-38-2	Arsenic	142/142	142	142	100	1100	63800	A2-15			14500	3000	yes	ASL
7440-47-3	Chromium	55/55	55	55	100	12900	155000	A2-16			30600	6300	yes	ASL
7440-50-8	Copper	55/55	55	55	100	9500	55400	A2-13(3/29/2010)			23500	4700000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	103/103	103	103	100	0.00299	35.6	A3-14			2.75	0.664	yes	ASL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 2
ON-SITE SEDIMENT COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
83-32-9	Acenaphthene	9/15	9	15	60.0	14	2700	GC-BC-10	0.00925	71	257	70000000	no	BSL
208-96-8	Acenaphthylene	13/15	13	15	86.7	0.058	4600	A5-7	0.00925	53	1020	NA	no	NTX
120-12-7	Anthracene	13/15	13	15	86.7	0.069	5600	A5-7	0.00925	53	1310	360000000	no	BSL
191-24-2	Benzo(ghi)perylene	13/15	13	15	86.7	0.11	8600	A5-7	0.00925	53	1990	NA	no	NTX
206-44-0	Fluoranthene	13/15	13	15	86.7	0.11	22000	GC-BC-10	0.00925	53	2420	47000000	no	BSL
86-73-7	Fluorene	11/15	11	15	73.3	0.013	3100	GC-BC-10	0.00925	53	336	47000000	no	BSL
91-20-3	Naphthalene	7/15	7	15	46.7	35	680	A5-7	0.00925	72	115	270000	no	BSL
87-86-5	Pentachlorophenol	12/15	12	15	80.0	0.09	2100	A5-7	0.0455	260	513	63000	no	BSL
85-01-8	Phenanthrene	15/15	15	15	100	0.0065	16000	GC-BC-10			1410	NA	no	NTX
129-00-0	Pyrene	13/15	13	15	86.7	0.078	13000	GC-BC-10	0.00925	53	1670	36000000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	13/13	13	13	100	67.45	9480	A5-7			3250	4500	yes	ASL
	Metals													
7440-38-2	Arsenic	15/15	15	15	100	5.3	71500	GC-BC-09			12300	47000	yes	ASL
7440-47-3	Chromium	15/15	15	15	100	17.95	27000	GC-BC-09			17400	98000	no	BSL
7440-50-8	Copper	15/15	15	15	100	17.7	26800	A5-7			18600	73000000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	6/6	6	6	100	0.037	0.688	SD-BC-01			0.316	13.8	no	BSL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 3
OFF-SITE RAILROAD PROPERTY SOIL COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs														
83-32-9	Acenaphthene	ug/kg	22/32	22	32	68.8	2.2	300000	SB-119	0.64	19	9450	350000	no	BSL
208-96-8	Acenaphthylene	ug/kg	31/32	31	32	96.9	2.8	50000	SB-119	8.9	8.9	2420	NA	no	NTX
120-12-7	Anthracene	ug/kg	32/32	32	32	100	2.5	840000	SB-119			27300	1700000	no	BSL
191-24-2	Benzo(ghi)perylene	ug/kg	31/32	31	32	96.9	6	47000	SB-119	8.5	8.5	3330	NA	no	NTX
206-44-0	Fluoranthene	ug/kg	32/32	32	32	100	5.35	4300000	SB-119			141000	230000	yes	ASL
86-73-7	Fluorene	ug/kg	24/32	24	32	75.0	2.4	140000	SB-119	0.64	280	4450	230000	no	BSL
91-20-3	Naphthalene	ug/kg	30/32	30	32	93.8	2.5	46000	SB-119	8.5	8.8	1780	3800	yes	ASL
87-86-5	Pentachlorophenol	ug/kg	12/27	12	27	44.4	17.5	8000	A1-37	42	870000	17100	990	yes	ASL
85-01-8	Phenanthrene	ug/kg	32/32	32	32	100	6.45	2800000	SB-119			89200	NA	no	NTX
129-00-0	Pyrene	ug/kg	32/32	32	32	100	5.65	2900000	SB-119			95500	170000	yes	ASL
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	30/30	30	30	100	9.75	275000	SB-119			13800	15	yes	ASL
	Metals														
7440-38-2	Arsenic	ug/kg	22/22	22	22	100	3400	36400	A1-11			11100	670	yes	ASL
7440-47-3	Chromium	ug/kg	12/12	12	12	100	11900	20700	A1-45			17500	300	yes	ASL
7440-50-8	Copper	ug/kg	12/12	12	12	100	12500	40100	A1-40			21000	310000	no	BSL
	Dioxins/Furans														
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	24/24	24	24	100	0.00431	7.605	A1-1(12/9/2009)			0.962	0.06	yes	ASL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 4
OFF-SITE 35' SWATH PROPERTY SOIL COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs														
83-32-9	Acenaphthene	ug/kg	5/8	5	8	62.5	5.3	900	A1-41	9.2	19	134	350000	no	BSL
208-96-8	Acenaphthylene	ug/kg	8/8	8	8	100	2.8	2600	SB-115			514	NA	no	NTX
120-12-7	Anthracene	ug/kg	8/8	8	8	100	3.4	3100	SB-115			847	1700000	no	BSL
191-24-2	Benzo(ghi)perylene	ug/kg	8/8	8	8	100	6	4800	A1-41			1550	NA	no	NTX
206-44-0	Fluoranthene	ug/kg	8/8	8	8	100	19	25000	A1-41			5590	230000	no	BSL
86-73-7	Fluorene	ug/kg	6/8	6	8	75.0	3	520	A1-41	9.2	9.4	91.6	230000	no	BSL
91-20-3	Naphthalene	ug/kg	8/8	8	8	100	2.5	3600	SB-115			544	3800	no	BSL
87-86-5	Pentachlorophenol	ug/kg	3/8	3	8	37.5	30.5	3200	SB-115	46	790	568	990	yes	ASL
85-01-8	Phenanthrene	ug/kg	8/8	8	8	100	9.7	12000	A1-41			3010	NA	no	NTX
129-00-0	Pyrene	ug/kg	8/8	8	8	100	13	13000	A1-41			3660	170000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	7/7	7	7	100	15.5	9860	SB-115			3480	15	yes	ASL
	Metals														
7440-38-2	Arsenic	ug/kg	5/5	5	5	100	8500	12850	A1-44(3/30/2010)			10700	670	yes	ASL
7440-47-3	Chromium	ug/kg	4/4	4	4	100	16550	20700	A1-45			18500	300	yes	ASL
7440-50-8	Copper	ug/kg	4/4	4	4	100	12350	23400	A1-45			17700	310000	no	BSL
	Dioxins/Furans														
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	6/6	6	6	100	0.00431	7.605	A1-1(12/9/2009)			1.46	0.06	yes	ASL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 5
OFF-SITE NORTH AND WEST OF THE SITE SOIL COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
83-32-9	Acenaphthene	6/11	6	11	54.5	8.9	240	A4-5	8.4	10	33.3	350000	no	BSL
208-96-8	Acenaphthylene	9/11	9	11	81.8	3.2	580	A4-5	8.4	8.8	101	NA	no	NTX
120-12-7	Anthracene	10/11	10	11	90.9	1.3	860	A4-5	8.8	8.8	132	1700000	no	BSL
191-24-2	Benzo(ghi)perylene	9/11	9	11	81.8	12	1400	A4-5	8.4	8.8	253	NA	no	NTX
206-44-0	Fluoranthene	11/11	11	11	100	5.5	3200	A4-5			514	230000	no	BSL
86-73-7	Fluorene	5/11	5	11	45.5	6.3	230	A4-5	8.4	62	30.1	230000	no	BSL
91-20-3	Naphthalene	7/11	7	11	63.6	5.4	560	A4-5	8.4	10	86.1	3800	no	BSL
85-01-8	Phenanthrene	11/11	11	11	100	6.8	2500	A4-5			351	NA	no	NTX
129-00-0	Pyrene	11/11	11	11	100	3.8	1800	A4-5			305	170000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	11/11	11	11	100	8.38	1730	A4-5			368	15	yes	ASL
	Metals													
7440-38-2	Arsenic	11/11	11	11	100	6900	13000	A4-6			10000	670	yes	ASL
7440-47-3	Chromium	11/11	11	11	100	14700	28200	A4-6			19300	300	yes	ASL
7440-50-8	Copper	11/11	11	11	100	15300	128000	A4-5			35600	310000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	13/13	13	13	100	0.00232	0.0472	A4-6			0.0149	0.06	no	BSL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 6
OFF-SITE NORTH AND WEST OF THE SITE SEDIMENT COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
83-32-9	Acenaphthene	13/14	13	14	92.9	8	1200	A6-3	40	40	187	7700000	no	BSL
208-96-8	Acenaphthylene	14/14	14	14	100	11	340	A6-3			127	NA	no	NTX
120-12-7	Anthracene	14/14	14	14	100	13	460	A6-3			193	37000000	no	BSL
191-24-2	Benzo(ghi)perylene	14/14	14	14	100	39	1400	GC-BC-03			462	NA	no	NTX
206-44-0	Fluoranthene	14/14	14	14	100	87	4600	GC-BC-03			992	5000000	no	BSL
86-73-7	Fluorene	12/14	12	14	85.7	7.9	990	A6-3	40	76	158	5000000	no	BSL
91-20-3	Naphthalene	9/14	9	14	64.3	8.1	2000	A6-3	40	86	252	83000	no	BSL
87-86-5	Pentachlorophenol	4/14	4	14	28.6	82	220	SD-BC-04	50	520	146	22000	no	BSL
85-01-8	Phenanthrene	14/14	14	14	100	37	2100	A6-3			519	NA	no	NTX
129-00-0	Pyrene	14/14	14	14	100	69	2600	GC-BC-03			639	3700000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	14/14	14	14	100	74.2	2600	GC-BC-03			727	330	yes	ASL
	Metals													
7440-38-2	Arsenic	14/14	14	14	100	6700	29200	GC-BC-06			11900	15000	yes	ASL
7440-47-3	Chromium	14/14	14	14	100	14600	60500	A4-1			22100	6600	yes	ASL
7440-50-8	Copper	14/14	14	14	100	12500	39200	GC-BC-04			25900	6800000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	9/9	9	9	100	0.00471	0.144	SD-BC-04			0.0358	1.46	no	BSL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 7
OFF-SITE EAST OF THE SITE SOIL COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
83-32-9	Acenaphthene	6/8	6	8	75.0	3.2	7.3	GC-BC-FPT6-5R	8.7	9.1	4.47	350000	no	BSL
208-96-8	Acenaphthylene	8/8	8	8	100	10	67	GC-BC-FPT6-5L			31.4	NA	no	NTX
120-12-7	Anthracene	8/8	8	8	100	15	80	GC-BC-FPT6-5L			40.9	1700000	no	BSL
191-24-2	Benzo(ghi)perylene	8/8	8	8	100	48	200	GC-BC-FPT6-5L			115	NA	no	NTX
206-44-0	Fluoranthene	8/8	8	8	100	21	160	GC-BC-FPT6-33%R			77.6	230000	no	BSL
86-73-7	Fluorene	8/8	8	8	100	3.7	14	GC-BC-FPT6-5R			8.46	230000	no	BSL
91-20-3	Naphthalene	8/8	8	8	100	3.1	9.4	GC-BC-FPT6-5R			6.04	3800	no	BSL
87-86-5	Pentachlorophenol	4/4	4	4	100	7.2	52	GC-BC-FPT6-33%L			19.0	990	no	BSL
85-01-8	Phenanthrene	8/8	8	8	100	13	53	GC-BC-FPT6-33%R			31.6	NA	no	NTX
129-00-0	Pyrene	8/8	8	8	100	22	160	GC-BC-FPT6-33%R			80.0	170000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	8/8	8	8	100	65.6	236	GC-BC-FPT6-5L			166	15	yes	ASL
	Metals													
7440-38-2	Arsenic	8/8	8	8	100	6300	9400	GC-BC-FPT6-33%L			7530	670	yes	ASL
7440-47-3	Chromium	8/8	8	8	100	15800	27400	GC-BC-FPT6-33%R			20000	300	yes	ASL
7440-50-8	Copper	8/8	8	8	100	16000	27600	GC-BC-FPT6-33%R			20500	310000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	4/4	4	4	100	0.0132	0.165	GC-BC-FPT6-5L			0.0590	0.06	yes	ASL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 8
OFF-SITE EAST OF THE SITE SEDIMENT COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/kg	Maximum Detect ug/kg	Max Detect Location	Minimum Non-Detect ug/kg	Maximum Non-Detect ug/kg	Arithmetic Average ug/kg	Screening Concentration ug/kg	COPC?	Rationale
	SVOCs													
90-12-0	1-Methylnaphthalene	4/4	4	4	100	22	1000	PF-BC-03-NAPL			288	370000	no	BSL
832-69-9	1-Methylphenanthrene	4/4	4	4	100	19	1500	PF-BC-03-NAPL			417	NA	no	NTX
2245-38-7	2,3,5-Trimethylnaphthalene	4/4	4	4	100	14	460	PF-BC-03-NAPL			132	NA	no	NTX
28804-88-8	2,6-Dimethylnaphthalene	4/4	4	4	100	13	890	PF-BC-03-NAPL			248	NA	no	NTX
91-57-6	2-Methylnaphthalene	4/4	4	4	100	14	560	PF-BC-03-NAPL			158	500000	no	BSL
83-32-9	Acenaphthene	17/19	17	19	89.5	20	79000	COC-BC-04-DEL	55.5	83	4760	7700000	no	BSL
208-96-8	Acenaphthylene	19/19	19	19	100	3.8	5700	COC-BC-04-DEL			410	NA	no	NTX
120-12-7	Anthracene	19/19	19	19	100	5.2	54000	COC-BC-04-DEL			3330	37000000	no	BSL
192-97-2	Benzo(e)pyrene	4/4	4	4	100	150	2100	PF-BC-03-NAPL			660	NA	no	NTX
191-24-2	Benzo(ghi)perylene	19/19	19	19	100	15	8100	COC-BC-04-DEL			907	NA	no	NTX
92-52-4	Biphenyl	3/4	3	4	75.0	1.4	2.35	COC-BC-04(7/15/2010)	50	50	7.59	100000	no	BSL
132-65-0	Dibenzothiophene	4/4	4	4	100	12	1000	PF-BC-03-NAPL			284	1700000	no	BSL
206-44-0	Fluoranthene	19/19	19	19	100	15	250000	COC-BC-04-DEL			16100	5000000	no	BSL
86-73-7	Fluorene	19/19	19	19	100	20	78000	COC-BC-04-DEL			4710	5000000	no	BSL
91-20-3	Naphthalene	15/19	15	19	78.9	5.4	4500	COC-BC-04-DEL	55.5	1000	327	83000	no	BSL
87-86-5	Pentachlorophenol	3/19	3	19	15.8	97	150	PF-BC-03-NAPL	47	29000	897	22000	no	BSL
198-55-0	Perylene	4/4	4	4	100	57	490	PF-BC-03-NAPL			173	NA	no	NTX
85-01-8	Phenanthrene	19/19	19	19	100	27	280000	COC-BC-04-DEL			17700	NA	no	NTX
129-00-0	Pyrene	19/19	19	19	100	21	150000	COC-BC-04-DEL			10000	3700000	no	BSL
50-32-8	BaP-TE (NDs = 1/2 DL)	13/13	13	13	100	30.4	37300	COC-BC-04-DEL			4050	330	yes	ASL
	Metals													
7440-38-2	Arsenic	19/19	19	19	100	5950	16600	COC-BC-07			8900	15000	yes	ASL
7440-47-3	Chromium	19/19	19	19	100	12600	22500	COC-BC-04-DEL,GC-BC-16			15700	6600	yes	ASL
7440-50-8	Copper	19/19	19	19	100	12400	23500	GC-BC-16			15900	6800000	no	BSL
	Dioxins/Furans													
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	16/16	16	16	100	0.00247	0.055	GC-BC-16			0.0177	1.46	no	BSL

Notes:
Derivation of screening concentration is discussed in Section 2.3 of the report.
Average calculated including non-detect concentrations at 1/2 the detection limit.
ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available
BSL = maximum concentration below screening level
ASL = maximum concentration above screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 9
OFF-SITE SURFACE WATER COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect ug/L	Maximum Detect ug/L	Max Detect Location	Minimum Non-Detect ug/L	Maximum Non-Detect ug/L	Arithmetic Average ug/L	COPC?	Rationale
	SVOCs												
87-86-5	Pentachlorophenol	1/4	1	4	25	0.76	0.76	GC-BC-05	0.94	1.1	0.568	yes	NSL
83-32-9	Acenaphthene	3/4	3	4	75	0.18	0.24	GC-BC-10	0.2	0.2	0.185	yes	NSL
208-96-8	Acenaphthylene	1/4	1	4	25	0.15	0.15	GC-BC-05	0.19	0.21	0.113	no	NTX
120-12-7	Anthracene	4/4	4	4	100	0.22	0.27	GC-BC-05			0.235	yes	NSL
206-44-0	Fluoranthene	3/4	3	4	75	0.335	0.38	GC-BC-05	0.2	0.2	0.296	yes	NSL
86-73-7	Fluorene	2/4	2	4	50	0.365	0.44	GC-BC-05	0.2	0.21	0.253	yes	NSL
85-01-8	Phenanthrene	4/4	4	4	100	0.23	0.37	GC-BC-05			0.290	no	NTX
129-00-0	Pyrene	3/4	3	4	75	0.0675	0.074	GC-BC-05	0.2	0.2	0.0781	yes	NSL
	Metals												
7440-38-2	Arsenic	4/4	4	4	100	2.6	4.1	GC-BC-05			3.09	yes	NSL
7440-47-3	Chromium	3/4	3	4	75	1.3	1.8	GC-BC-05,GC-BC-08	5	5	1.85	yes	NSL
7440-50-8	Copper	4/4	4	4	100	1.4	2.9	GC-BC-08			2.40	yes	NSL

Notes:

Average calculated including non-detect concentrations at 1/2 the detection limit.

ug/L = microgram per liter

COPC = constituent of potential concern

SVOCs = semi-volatile organic compounds

NSL = no screening level

NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 10
OFF-SITE FISH COPC SCREENING
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Detection Frequency	Detect Count	Result Count	Detection Frequency (%)	Minimum Detect mg/kg	Maximum Detect mg/kg	Max Detect Location	Minimum Non-Detect mg/kg	Maximum Non-Detect mg/kg	Arithmetic Average mg/kg	COPC?	Rationale
	SVOCs												
83-32-9	Acenaphthene	3/3	3	3	100	0.0047	0.022	COC-BC-07-EDCAT			0.0152	yes	NSL
208-96-8	Acenaphthylene	2/3	2	3	66.7	0.00092	0.0018	COC-BC-07-EDCAT	0.00069	0.00069	0.00102	no	NTX
120-12-7	Anthracene	3/3	3	3	100	0.0016	0.0077	COC-BC-07-EDCAT			0.00477	yes	NSL
191-24-2	Benzo(ghi)perylene	1/3	1	3	33.3	0.0025	0.0025	COC-BC-07-EDCAT	0.0007	0.00073	0.00107	no	NTX
206-44-0	Fluoranthene	3/3	3	3	100	0.006	0.02	COC-BC-07-EDCAT			0.015	yes	NSL
86-73-7	Fluorene	3/3	3	3	100	0.0032	0.015	COC-BC-07-EDCAT			0.00973	yes	NSL
85-01-8	Phenanthrene	3/3	3	3	100	0.0064	0.024	COC-BC-07-EDCAT			0.0155	no	NTX
108-95-2	Phenol	3/3	3	3	100	0.0019	0.0081	COC-BC-07-EDCAT			0.00543	yes	NSL
129-0-00	Pyrene	3/3	3	3	100	0.028865	0.1245	COC-BC-07-EDCAT			0.0784	yes	NSL
50-32-8	BaP-TE (NDs = 1/2 DL)	1/3	1	3	33.3	0.0053	0.0053	COC-BC-07-EDCAT	0.0015	0.0015	0.00228	yes	NSL
	Metals												
7440-38-2	Arsenic	3/3	3	3	100	0.06	0.17958	COC-BC-07-EDCAT			0.139	yes	NSL
7440-47-3	Chromium	1/3	1	3	33.3	0.03	0.03	COC-BC-04-EDCAT	0.01449	0.01533	0.015	yes	NSL
7440-50-8	Copper	3/3	3	3	100	0.24	0.42924	COC-BC-07-EDCAT			0.325	yes	NSL
	Dioxins/Furans												
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	3/3	3	3	100	1.60E-07	3.10E-07	COC-BC-07-EDCAT			2.11E-07	yes	NSL

Notes:
Average calculated including non-detect concentrations at 1/2 the detection limit.
mg/kg = milligram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NSL = no screening level
NTX = no toxicity data available. Potential human health risk cannot be quantitatively assessed.

TABLE 11
BENZO(A)PYRENE TOXIC EQUIVALENCY FACTORS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Potentially Carcinogenic PAHs	Toxic Equivalency Factors
Benzo(a)pyrene	1
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(ah)anthracene	1
Indeno(123-cd)pyrene	0.1

TABLE 12
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN TOXIC EQUIVALENCY FACTORS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Dioxin/Furan Congeners	Toxic Equivalency Factors
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01
Octachlorodibenzo-p-dioxin	0.0003
2,3,7,8-Tetrachlorodibenzofuran	0.1
1,2,3,7,8-Pentachlorodibenzofuran	0.03
2,3,4,7,8-Pentachlorodibenzofuran	0.3
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01
Octachlorodibenzofuran	0.0003

TABLE 13
SUMMARY OF EXPOSURE PATHWAYS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Pathway	Pathway Status	Rationale
On-Site Receptor Populations		
Current/Future On-Site Adult Maintenance Worker/Caretaker	Complete	Though exposure potential is limited and may be insignificant because of training and PPE, evaluated quantitatively in the HHRA at USEPA's request assuming a Site-wide exposure area.
Current/Future On-site Adult Deer Hunter and Adolescent and Child Deer Consumer	Complete	One family currently has permission to hunt on-Site. This arrangement is limited to a small portion of the Site and has rarely been utilized. Additionally, much of the Site is within the City limit and discharge of firearms is not allowed within City limits per City ordinances. However, the HHRA conservatively assumes this pathway is complete under the scenario that deer grazing at the Site could be harvested on another property.
Current/Future On-site Adult and Adolescent Recreational Crayfishers	Incomplete	Crayfish collection has not been observed on the Site nor has evidence of such collection been observed. Additionally, field crews targeted crayfish in both Piles Fork and Glade Creek but collected very few, indicating crayfish are not abundant at the Site.
Future On-site Adult and Adolescent Hikers/Bicycle Trail Users	Complete	Evaluated quantitatively in the HHRA for the southern exposure area.
Current/Future On-site Adolescent Trespasser	Complete	Evaluated quantitatively in the HHRA assuming a Site-wide exposure area.
Future On-site Adult Generic Industrial Worker	Incomplete	Future use of the Site is solar and conservation. Institutional controls will preclude generic industrial development without further evaluation to confirm planned use meets allowable risk levels.
Future On-site Solar Farm Redevelopment Worker	Complete	Evaluated quantitatively in the HHRA for the solar exposure area.
Future On-site Solar Farm Maintenance Worker	Complete	Evaluated quantitatively in the HHRA for the solar exposure area.
Future On-site Generic Redevelopment Worker	Incomplete	Institutional Controls will establish protective controls, such as the need for a HASP and management plan to eliminate future exposure in the event of any redevelopment or intrusive work. Institutional controls will preclude generic industrial development without further evaluation to confirm planned use meets allowable risk levels.
Off-Site Receptor Populations		
Current/Future Off-site Adult and Child Residents	Incomplete	USEPA's March 14, 2014 letter indicating the pattern of off-Site concentrations in the residential neighborhood to the south of the Site indicates that releases from the Site are not the source the measured concentrations.
Current/Future Off-site Adult and Adolescent Kayaker/Canoeist	Complete	Though exposure potential is limited and may be insignificant because of the nature of Crab Orchard Creek (COC) near the Site (i.e., steep banks and debris make it hard to access), evaluated quantitatively in the HHRA at USEPA's request assuming exposure to COC sediments and surface water.
Current/Future Off-site Adult and Adolescent Recreational Angler and Child Fish Consumer	Complete	Though exposure potential is limited and may be insignificant because of the nature of COC near the Site (i.e., steep banks and debris make it hard to access, few deep pools to harbor fish), evaluated quantitatively in the HHRA assuming direct exposure to COC sediments and surface water and consumption of fish from COC.
Current/Future Adolescent Trespasser	Complete	Evaluated quantitatively in the HHRA assuming exposure to soil in the railroad property, 35' swath soils, sediments and soils adjacent to creeks to the north and west of the Site, and in the Glade Creek floodplain downstream of the property boundary.
Hypothetical Future Adult and Adolescent Hikers/Bicycle Trail Users on Railroad Property	Complete	Although permission has not been granted to utilize the railroad property for the future bike path, hypothetical hikers/bicycle users are conservatively be assumed to be exposed to the railroad property in the future.

TABLE 14
HUMAN HEALTH EXPOSURE ASSUMPTIONS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Parameter	Units	Current/Future On-Site Adult Maintenance Worker/Caretaker	Notes	Future On-site Solar Farm Redevelopment Worker	Notes	Future On-site Solar Farm Maintenance Worker	Notes	Current/Future Adolescent Trespasser	Notes
Exposure Areas		**On-Site**		**Proposed Solar Use Area**				**On-Site, Railroad Property, and 35' Swath**	
General									
Averaging Time (carcinogenic)	days	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b
Averaging Time (noncarcinogenic)	days	9125	ED x 365 days/year	365	ED x 365 days/year	9125	ED x 365 days/year	3650	ED x 365 days/year
Body Weight	kg	70	USEPA 2002	70	USEPA 2002	70	USEPA 2002	46.8	USEPA 2011; 6 - 16 yr age-adjusted body weight
Exposure Duration	yr	25	USEPA 2002	1	Site-specific	25	USEPA 2002	10	Professional judgment
Soil - Ingestion									
Incidental Soil Ingestion Rate	mg/day	100	USEPA 2002	330	USEPA 2002	100	USEPA 2002	100	USEPA 2002
Fraction of Total Soil Ingested	unitless	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment
Exposure Frequency	days/yr	125	Site-specific (Brightfields' experience) 2.5 days a week; 50 weeks/year	40	Site-specific (Brightfields' experience) 5 days a week; 2 months/year	75	Professional judgment, based on experience at solar facilities; 1.5 days a week; 50 weeks/year	16	Professional judgment; 1 day/week per year; 4 warm months per year
Soil - Dermal Contact									
Exposed Skin Surface Area	cm^2	3300	USEPA 2002; head, hands, and forearms	3300	USEPA 2002; head, hands, and forearms	3300	USEPA 2002; head, hands, and forearms	4890	USEPA 2011; Lower legs, feet, forearms and hands
Skin Adherence Factor	mg/cm^2-event	0.2	USEPA 2002	0.3	USEPA 2002	0.2	USEPA 2002	0.2	USEPA 2007; age-specific & body-part specific
Exposure Frequency	days/yr	125	Site-specific (Brightfields' experience) 2.5 days a week; 50 weeks/year	40	Site-specific (Brightfields' experience) 5 days a week; 2 months/year	75	Professional judgment, based on experience at solar facilities; 1.5 days a week; 50 weeks/year	16	Professional judgment; 1 day/week per year; 4 warm months per year
Fraction Intake	unitless	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment
Soil - Inhalation of Dust									
Exposure Time, Inhalation	hr/day	8	Professional judgment	8	Professional judgment	8	Professional judgment	2	Professional judgment
Exposure Frequency	days/yr	125	Site-specific (Brightfields' experience) 2.5 days a week; 50 weeks/year	40	Site-specific (Brightfields' experience) 5 days a week; 2 months/year	75	Professional judgment, based on experience at solar facilities; 1.5 days a week; 50 weeks/year	16	Professional judgment; 1 day/week per year; 4 warm months per year
Particulate Emission Factor	m^3/kg	1.24E+09	IEPA Default	1.24E+09	IEPA Default	1.24E+09	IEPA Default	1.24E+09	IEPA Default
Surface Water - Dermal Contact									
Exposed Skin Surface Area	cm^2	-		-		-		-	
Event Frequency	events/day	-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-	
Exposure Time, Dermal Contact with Surface Water	hr/event	-		-		-		-	
Sediment - Dermal Contact									
Exposed Skin Surface Area	cm^2	-		-		-		-	
Skin Adherence Factor	mg/cm^2-event	-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-	
Event Frequency	events/day	-		-		-		-	
Fraction Intake	unitless	-		-		-		-	
Deer - Ingestion									
Deer Ingestion Rate	g/day	-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-	
Fraction of Total Deer Ingested	unitless	-		-		-		-	
Fish - Ingestion									
Fish Ingestion Rate	g/day	-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-	
Fraction of Total Fish Ingested	unitless	-		-		-		-	

See Notes on Page 4

TABLE 14
HUMAN HEALTH EXPOSURE ASSUMPTIONS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Parameter	Units	Current/Future On-site Adult Deer Hunter	Notes	Current/Future On-site Adolescent Deer Consumer	Notes	Current/Future On-site Child Deer Consumer	Notes	Future Adult Hikers/Bicycle Users	Notes	Future Adolescent Hikers/Bicycle Users	Notes
Exposure Areas		**Entire Site**				**Entire Site**		**Southern Conservation Exposure Area & Railroad Property**		**Southern Conservation Exposure Area & Railroad Property**	
General											
Averaging Time (carcinogenic)	days	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b
Averaging Time (noncarcinogenic)	days	10950	ED x 365 days/year	3650	ED x 365 days/year	1825	ED x 365 days/year	7300	ED x 365 days/year	3650	ED x 365 days/year
Body Weight	kg	70	USEPA 2002	46.8	USEPA 2011; 6 - 16 yr age-adjusted body weight	16.2	USEPA 2011; 1 - 6 yr age-adjusted body weight	70	USEPA 2002	46.8	USEPA 2011; 6 - 16 yr age-adjusted body weight
Exposure Duration	yr	30	Professional judgment	10	Professional judgment	5	Professional judgment	20	Professional judgment	10	Professional judgment
Soil - Ingestion											
Incidental Soil Ingestion Rate	mg/day	-		-		-		100	USEPA 2002	200	USEPA 2002
Fraction of Total Soil Ingested	unitless	-		-		-		0.1	Professional judgment; Section of bike path through the Site is only a fraction of the larger community bike path	0.1	Professional judgment; Section of bike path through the Site is only a fraction of the larger community bike path
Exposure Frequency	days/yr	-		-		-		52	Professional judgment; 1 day per week	52	Professional judgment; 1 day per week
Soil - Dermal Contact											
Exposed Skin Surface Area	cm^2	-		-		-		5700	USEPA 2002; head, hands, forearms, and lower legs	4890	USEPA 2011; Lower legs, feet, forearms and hands
Skin Adherence Factor	mg/cm^2-event	-		-		-		0.07	USEPA 2002	0.2	USEPA 2002
Exposure Frequency	days/yr	-		-		-		52	Professional judgment; 1 day per week	52	Professional judgment; 1 day per week
Fraction Intake	unitless	-		-		-		0.1	Professional judgment	0.1	Professional judgment
Soil - Inhalation of Dust											
Exposure Time, Inhalation	hr/day	-		-		-		1	Professional judgment	1	Professional judgment
Exposure Frequency	days/yr	-		-		-		52	Professional judgment; 1 day per week	52	Professional judgment; 1 day per week
Particulate Emission Factor	m^3/kg	-		-		-		1.24E+09	IEPA Default	1.24E+09	IEPA Default
Surface Water - Dermal Contact											
Exposed Skin Surface Area	cm^2	-		-		-		-		-	
Event Frequency	events/day	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Exposure Time, Dermal Contact with Surface Water	hr/event	-		-		-		-		-	
Sediment - Dermal Contact											
Exposed Skin Surface Area	cm^2	-		-		-		-		-	
Skin Adherence Factor	mg/cm^2-event	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Event Frequency	events/day	-		-		-		-		-	
Fraction Intake	unitless	-		-		-		-		-	
Deer - Ingestion											
Deer Ingestion Rate	g/day	28.1	IDNR 2013; USEPA 2011; Family of 4 (2 adults, 1 adolescent, 1 child)	25.0	IDNR 2013; USEPA 2011; Family of 4 (2 adults, 1 adolescent, 1 child)	14.2	IDNR 2013; USEPA 2011; Family of 4 (2 adults, 1 adolescent, 1 child)	-		-	
Exposure Frequency	days/yr	365	Averaged over the year	365	Averaged over the year	365	Averaged over the year	-		-	
Fraction of Total Deer Ingested	unitless	1	Professional judgment	1	Professional judgment	1	Professional judgment	-		-	
Fish - Ingestion											
Fish Ingestion Rate	g/day	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Fraction of Total Fish Ingested	unitless	-		-		-		-		-	

See Notes on Page 4

TABLE 14
HUMAN HEALTH EXPOSURE ASSUMPTIONS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Parameter	Units	Current/Future Off-site Adult Kayaker/Canoeist	Notes	Current/Future Off-site Adolescent Kayaker/Canoeist	Notes	Current/Future Off-site Adult Recreational Angler	Notes	Current/Future Off-site Adolescent Recreational Angler	Notes	Current/Future Off-site Child Recreational Angler	Notes
Exposure Areas		**Crab Orchard Creek**		**Crab Orchard Creek**		**Crab Orchard Creek**		**Crab Orchard Creek**		**Crab Orchard Creek**	
General											
Averaging Time (carcinogenic)	days	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b	25550	USEPA 1991b
Averaging Time (noncarcinogenic)	days	10950	ED x 365 days/year	3650	ED x 365 days/year	10950	ED x 365 days/year	3650	ED x 365 days/year	1825	ED x 365 days/year
Body Weight	kg	70	USEPA 2002	46.8	USEPA 2011; 6 - 16 yr age-adjusted body weight	70	USEPA 2002	46.8	USEPA 2011; 6 - 16 yr age-adjusted body weight	16.2	USEPA 2011; 1 - 6 yr age-adjusted body weight
Exposure Duration	yr	30	Professional judgment	10	Professional judgment	30	Professional judgment	10	Professional judgment	5	Professional judgment
Soil - Ingestion											
Incidental Soil Ingestion Rate	mg/day	-		-		-		-		-	
Fraction of Total Soil Ingested	unitless	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Soil - Dermal Contact											
Exposed Skin Surface Area	cm^2	-		-		-		-		-	
Skin Adherence Factor	mg/cm^2-event	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Fraction Intake	unitless	-		-		-		-		-	
Soil - Inhalation of Dust											
Exposure Time, Inhalation	hr/day	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Particulate Emission Factor	m^3/kg	-		-		-		-		-	
Surface Water - Dermal Contact											
Exposed Skin Surface Area	cm^2	5700	USEPA 2002; head, hands, forearms, and lower legs	4890	USEPA 2011; Age-adjusted surface area of head, hands, forearms, feet and lower legs	5700	USEPA 2002; head, hands, forearms, and lower legs	4890	USEPA 2011; Age-adjusted surface area of head, hands, forearms, feet and lower legs	-	
Event Frequency	events/day	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment	-	
Exposure Frequency	days/yr	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment	-	
Exposure Time, Dermal Contact with Surface Water	hr/event	0.5	Professional judgment	0.5	Professional judgment	0.5	Professional judgment	0.5	Professional judgment	-	
Sediment - Dermal Contact											
Exposed Skin Surface Area	cm^2	2275	USEPA 2011; Mean for hands and feet	1576	USEPA 2011; Age-adjusted mean for hands and feet	2275	USEPA 2011; Mean for hands and feet	1576	USEPA 2011; Age-adjusted mean for hands and feet	-	
Skin Adherence Factor	mg/cm^2-event	1	Maximum possible amount based on considerations of skin monolayer loading capacity.	1	Maximum possible amount based on considerations of skin monolayer loading capacity.	1	Maximum possible amount based on considerations of skin monolayer loading capacity.	1	Maximum possible amount based on considerations of skin monolayer loading capacity.	-	
Exposure Frequency	days/yr	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment	-	
Event Frequency	events/day	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment	-	
Fraction Intake	unitless	1	Professional judgment	1	Professional judgment	1	Professional judgment	1	Professional judgment	-	
Deer - Ingestion											
Deer Ingestion Rate	g/day	-		-		-		-		-	
Exposure Frequency	days/yr	-		-		-		-		-	
Fraction of Total Deer Ingested	unitless	-		-		-		-		-	
Fish - Ingestion											
Fish Ingestion Rate	g/day	-		-		8.1	One 227 g meal per week for a family of 4 (2 adults, 1 adolescent, 1 child)	8.1	One 227 g meal per week for a family of 4 (2 adults, 1 adolescent, 1 child)	8.1	One 227 g meal per week for a family of 4 (2 adults, 1 adolescent, 1 child)
Exposure Frequency	days/yr	-		-		365	Averaged over the year	365	Averaged over the year	365	Averaged over the year
Fraction of Total Fish Ingested	unitless	-		-		1	Professional judgment	1	Professional judgment	1	Professional judgment

See Notes on Page 4

TABLE 14
HUMAN HEALTH EXPOSURE ASSUMPTIONS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Notes:
cm^2 = square centimeter
kg = kilogram
L = liter
m^3 = cubic meter
mg = milligram
yr = year

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TABLE 15
EXPOSURE POINT CONCENTRATION SUMMARY - SITE SOIL[1]
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (2)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
WholeSite	**SVOCs**								
	Fluoranthene	mg/kg	9.0E+00	1.2E+01	4.9E+03	1.E+01	mg/kg	95th UCL	UCL < Max
	Naphthalene	mg/kg	8.0E-01	1.4E+00	6.8E+02	1.E+00	mg/kg	95th UCL	UCL < Max
	Pentachlorophenol	mg/kg	2.8E+00	4.3E+00	1.9E+02	4.E+00	mg/kg	95th UCL	UCL < Max
	Pyrene	mg/kg	9.8E+00	1.3E+01	2.5E+03	1.E+01	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	9.1E+00	1.2E+01	7.0E+02	1.E+01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	9.4E+00	1.1E+01	6.4E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.9E+01	2.3E+01	1.6E+02	2.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	1.2E-03	1.8E-03	3.6E-02	2.E-03	mg/kg	95th UCL	UCL < Max

Notes:
(1) The Site consists of the western, central, southern, and eastern conservation exposure areas as well as the non-gravel and gravel proposed solar use areas shown on Figure 1.
(2) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.
mg/kg = milligrams per kilogram
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 16
EXPOSURE POINT CONCENTRATION SUMMARY - PROPOSED SOLAR USE AREA SOIL[1]
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (2)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Solar Area	**SVOCs**								
	Fluoranthene	mg/kg	7.2E+00	1.0E+01	3.8E+02	1.E+01	mg/kg	95th UCL	UCL < Max
	Naphthalene	mg/kg	4.6E-01	1.2E+00	2.4E+02	1.E+00	mg/kg	95th UCL	UCL < Max
	Pentachlorophenol	mg/kg	1.2E+00	2.2E+00	8.9E+01	2.E+00	mg/kg	95th UCL	UCL < Max
	Pyrene	mg/kg	8.4E+00	1.2E+01	2.2E+02	1.E+01	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	7.0E+00	9.6E+00	7.8E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	6.5E+00	7.9E+00	6.4E+01	8.E+00	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.3E+01	1.9E+01	1.6E+02	2.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	3.4E-04	6.0E-04	2.6E-02	6.E-04	mg/kg	95th UCL	UCL < Max

Notes:
(1) Proposed Solar Use Area shown in orange (non-gravel area) and yellow (gravel area) on Figure 1.
(2) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 17

EXPOSURE POINT CONCENTRATION SUMMARY - FUTURE PROPOSED SOLAR USE AREA SOIL(1)

FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (2)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Solar Area	**SVOCs**								
	Fluoranthene	mg/kg	5.3E+00	7.4E+00	3.4E+01	7.E+00	mg/kg	95th UCL	UCL < Max
	Naphthalene	mg/kg	2.5E-01	3.4E-01	2.3E+00	3.E-01	mg/kg	95th UCL	UCL < Max
	Pentachlorophenol	mg/kg	5.2E-01	8.9E-01	7.1E+01	9.E-01	mg/kg	95th UCL	UCL < Max
	Pyrene	mg/kg	6.4E+00	9.0E+00	4.3E+01	9.E+00	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	5.2E+00	7.3E+00	6.8E+01	7.E+00	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	4.8E+00	6.1E+00	6.4E+01	6.E+00	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	7.2E+00	1.2E+01	1.6E+02	1.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	1.2E-04	2.9E-04	2.0E-02	3.E-04	mg/kg	95th UCL	UCL < Max

Notes:

(1) Future Proposed Solar Use Area assumes a portion of the Solar Use Area is covered with gravel (shown in yellow on Figure 1) and a portion is uncovered (shown in orange on Figure 1).

(2) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.

SVOCs = semi-volatile organic compounds

mg/kg = milligrams per kilogram

BaP-TE = benzo(a)pyrene toxic equivalents

TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

Assumes a portion of the proposed solar use area is covered with gravel during construction.

TABLE 18
EXPOSURE POINT CONCENTRATION SUMMARY - SOUTHERN CONSERVATION EXPOSURE AREA SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Southern Area	**SVOCs**								
	Fluoranthene	mg/kg	2.8E+01	3.6E+01	3.8E+02	4.E+01	mg/kg	95th UCL	UCL < Max
	Naphthalene	mg/kg	2.4E+00	5.8E+00	2.4E+02	6.E+00	mg/kg	95th UCL	UCL < Max
	Pentachlorophenol	mg/kg	1.1E+01	9.3E+00	1.4E+02	9.E+00	mg/kg	95th UCL	UCL < Max
	Pyrene	mg/kg	3.1E+01	4.0E+01	2.2E+02	4.E+01	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	2.6E+01	3.2E+01	1.1E+02	3.E+01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	1.4E+01	1.6E+01	3.8E+01	2.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	4.1E+01	5.1E+01	7.8E+01	5.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	5.6E-03	8.0E-03	2.6E-02	8.E-03	mg/kg	95th UCL	UCL < Max

Notes:
(1) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 19
EXPOSURE POINT CONCENTRATION SUMMARY - RAILROAD PROPERTY SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Railroad Property	**SVOCs**								
	Fluoranthene	mg/kg	1.3E+02	3.7E+02	4.3E+03	4.E+02	mg/kg	95th UCL	UCL < Max
	Naphthalene	mg/kg	1.6E+00	4.2E+00	4.6E+01	4.E+00	mg/kg	95th UCL	UCL < Max
	Pentachlorophenol	mg/kg	1.3E+01	4.3E+01	4.4E+02	4.E+01	mg/kg	95th UCL	UCL < Max
	Pyrene	mg/kg	8.5E+01	2.5E+02	2.9E+03	3.E+02	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	1.2E+01	2.7E+01	2.8E+02	3.E+01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	1.1E+01	1.3E+01	3.6E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.6E+01	1.8E+01	2.1E+01	2.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	6.9E-04	1.2E-03	7.6E-03	1.E-03	mg/kg	95th UCL	UCL < Max

Notes:
(1) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 20
EXPOSURE POINT CONCENTRATION SUMMARY - 35' SWATH PROPERTY SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
35' Swath	**SVOCs**								
	Pentachlorophenol	mg/kg	1.8E-01	5.2E-01	3.2E+00	5.E-01	mg/kg	95th UCL	UCL < Max
	BaP-TE	mg/kg	2.2E+00	4.7E+00	9.9E+00	5.E+00	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	1.1E+01	1.2E+01	1.3E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.7E+01	1.9E+01	2.1E+01	2.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	7.3E-04	1.9E-03	7.6E-03	2.E-03	mg/kg	95th UCL	UCL < Max

Notes:
(1) Spatially-weighted 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 21
EXPOSURE POINT CONCENTRATION SUMMARY - SOIL NORTH AND WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
North & West of the Site	**SVOCs**								
	BaP-TE	mg/kg	3.7E-01	1.2E+00	1.7E+00	1.E+00	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	1.0E+01	1.1E+01	1.3E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.9E+01	2.2E+01	2.8E+01	2.E+01	mg/kg	95th UCL	UCL < Max

Notes:
(1) ProUCL version 5.0 used to calculate 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents

TABLE 22
EXPOSURE POINT CONCENTRATION SUMMARY - SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
East of the Site	**SVOCs**								
	BaP-TE	mg/kg	1.7E-01	2.1E-01	2.4E-01	2.E-01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	7.5E+00	8.2E+00	9.4E+00	8.E+00	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	2.0E+01	2.3E+01	2.7E+01	2.E+01	mg/kg	95th UCL	UCL < Max
	Dioxins/Furans								
	TCDD-TEQ	mg/kg	5.9E-05	NA	1.7E-04	2.E-04	mg/kg	95th UCL	UCL < Max

Notes:
(1) ProUCL version 5.0 used to calculate 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
NA = not available
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 23
EXPOSURE POINT CONCENTRATION SUMMARY - SEDIMENT NORTH AND WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
North & West of the Site	**SVOCs**								
	BaP-TE	mg/kg	7.3E-01	1.0E+00	2.6E+00	1.E+00	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	1.2E+01	1.6E+01	2.9E+01	2.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	2.2E+01	2.8E+01	6.1E+01	3.E+01	mg/kg	95th UCL	UCL < Max

Notes:
(1) ProUCL version 5.0 used to calculate 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents

TABLE 24
EXPOSURE POINT CONCENTRATION SUMMARY - SEDIMENT EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Crab Orchard Creek & Piles Fork	**SVOCs**								
	BaP-TE	mg/kg	4.1E+00	3.2E+01	3.7E+01	3.E+01	mg/kg	95th UCL	UCL < Max
	Metals								
	Arsenic	mg/kg	8.9E+00	1.0E+01	1.7E+01	1.E+01	mg/kg	95th UCL	UCL < Max
	Chromium	mg/kg	1.6E+01	1.7E+01	2.3E+01	2.E+01	mg/kg	95th UCL	UCL < Max

Notes:
(1) ProUCL version 5.0 used to calculate 95th percentile upper confidence limits (UCLs) on the mean.
SVOCs = semi-volatile organic compounds
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents

TABLE 25
EXPOSURE POINT CONCENTRATION SUMMARY - OFF-SITE SURFACE WATER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Crab Orchard Creek & Piles Fork	**SVOCs**								
	Acenaphthene	ug/L	0.185	NA	2.4E-01	2.4E-01	ug/L	Maximum	
	Anthracene	ug/L	0.235	NA	2.7E-01	2.7E-01	ug/L	Maximum	
	Fluoranthene	ug/L	0.296	NA	3.8E-01	3.8E-01	ug/L	Maximum	Not enough data to develop a 95th UCL
	Fluorene	ug/L	0.253	NA	4.4E-01	4.4E-01	ug/L	Maximum	
	Pentachlorophenol	ug/L	0.568	NA	7.6E-01	7.6E-01	ug/L	Maximum	
	Pyrene	ug/L	0.0781	NA	7.4E-02	7.4E-02	ug/L	Maximum	
	Metals								
	Arsenic	ug/L	3.09	NA	4.1E+00	4.1E+00	ug/L	Maximum	Not enough data to develop a 95th UCL
	Chromium	ug/L	1.85	NA	1.8E+00	1.8E+00	ug/L	Maximum	
	Copper	ug/L	2.40	NA	2.9E+00	2.9E+00	ug/L	Maximum	

Notes:
SVOCs = semi-volatile organic compounds
ug/L = micrograms per liter
NA = not available
95th UCL = 95th percentile upper confidence limit

TABLE 26
EXPOSURE POINT CONCENTRATION SUMMARY - OFF-SITE FISH
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Fish Tissue
Exposure Medium: Fish Tissue

Exposure Point	Compound of Potential Concern	Units	Arithmetic Mean	95% UCL (1)	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
Crab Orchard Creek & Piles Fork	**SVOCs**								
	Acenaphthene	mg/kg ww	1.5E-02	NA	2.2E-02	2.2E-02	mg/kg ww	Maximum	Not enough data to develop a 95th UCL
	Anthracene	mg/kg ww	4.8E-03	NA	7.7E-03	7.7E-03	mg/kg ww	Maximum	
	BaP-TE	mg/kg ww	2.3E-03	NA	5.3E-03	5.3E-03	mg/kg ww	Maximum	
	Fluoranthene	mg/kg ww	1.5E-02	NA	2.0E-02	2.0E-02	mg/kg ww	Maximum	
	Fluorene	mg/kg ww	9.7E-03	NA	1.5E-02	1.5E-02	mg/kg ww	Maximum	
	Phenol	mg/kg ww	5.4E-03	NA	8.1E-03	8.1E-03	mg/kg ww	Maximum	
	Metals								
	Arsenic	mg/kg ww	1.4E-01	NA	1.8E-01	1.8E-01	mg/kg ww	Maximum	Not enough data to develop a 95th UCL
	Chromium	mg/kg ww	1.5E-02	NA	3.0E-02	3.0E-02	mg/kg ww	Maximum	
	Copper	mg/kg ww	3.3E-01	NA	4.3E-01	4.3E-01	mg/kg ww	Maximum	
	Dioxins/Furans								
	TCDD-TEQ	mg/kg ww	2.1E-07	NA	3.1E-07	3.1E-07	mg/kg ww	Maximum	Not enough data to develop a 95th UCL

Notes:
SVOCs = semi-volatile organic compounds
mg/kg ww = milligrams per kilogram wet weight
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
95th UCL = 95th percentile upper confidence limit

TABLE 27
EXPOSURE POINT CONCENTRATION SUMMARY - DEER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Deer Tissue

Exposure Point	Compound of Potential Concern	On-Site Soil EPC (1)	Units	Plant-Soil Bioconcentration Factor for Forage (2)	Above Ground Forage Concentration Due to Root Uptake (2), (3)	Biotransfer Factor for Deer (2), (4)	Metabolism Factor (2)	Concentration in Deer (5)	Units	Exposure Point Concentration			
										Value	Units	Statistic	Rationale
Site	**SVOCs**												
	Fluoranthene	1.2E+01	mg/kg	4.5E-02	1.0E+01	3.1E-03	1.0E+00	8.5E-03	mg/kg ww	8.5E-03	mg/kg ww	95th UCL	UCL < Max
	Naphthalene	1.4E+00	mg/kg	4.4E-01	1.5E+01	5.9E-05	1.0E+00	2.4E-04	mg/kg ww	2.4E-04	mg/kg ww	95th UCL	UCL < Max
	Pentachlorophenol	4.3E+00	mg/kg	4.5E-02	1.6E+00	3.0E-03	1.0E+00	1.3E-03	mg/kg ww	1.3E-03	mg/kg ww	95th UCL	UCL < Max
	Pyrene	1.3E+01	mg/kg	5.0E-02	6.2E+00	2.5E-03	1.0E+00	4.3E-03	mg/kg ww	4.3E-03	mg/kg ww	95th UCL	UCL < Max
	BaP-TE	1.2E+01	mg/kg	1.3E-02	1.6E-01	3.8E-02	1.0E+00	3.9E-03	mg/kg ww	3.9E-03	mg/kg ww	95th UCL	UCL < Max
	Metals												
	Arsenic	1.1E+01	mg/kg	3.6E-02	4.6E-01	2.0E-03	1.0E+00	3.5E-04	mg/kg ww	3.5E-04	mg/kg ww	95th UCL	UCL < Max
	Chromium	2.3E+01	mg/kg	7.5E-03	3.6E-01	5.5E-03	1.0E+00	1.2E-03	mg/kg ww	1.2E-03	mg/kg ww	95th UCL	UCL < Max
	Dioxins/Furans												
	TCDD-TEQ	1.8E-03	mg/kg	4.6E-03	3.7E-08	2.6E-02	1.0E+00	2.4E-07	mg/kg ww	2.4E-07	mg/kg ww	95th UCL	UCL < Max

Notes:
(1) On-Site soil EPC shown in Table 15.
(2) HHRAP 2005.
(3) Concentration in Plant = Concentration in Soil x Plant-Soil Bioconcentration Factor for Forage
(4) Beef cattle used as a surrogate for deer.
(5) Concentration in Deer = ((Fraction of Plant Grown on Site Soil and Ingested by the Deer x Quantity of Plant Ingested by the Deer per Day x Concentration in Plant) + Quantity of Soil Ingested by the Deer per Day x Soil Concentration x Soil Bioavailability Factor) x Biotransfer Factor for Deer. Quantity of forage ingested by the animal per day (kg DW/d) = 0.261 (Sample, 1994 with wet weight conversion from EcoSSL guidance). Quantity of soil ingested by the animal per day (kg/d) = 0.00522 (Sample 1994)
EPC = exposure point concentration
mg/kg = milligrams per kilogram
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg ww - milligrams per kilogram wet weight
95th UCL = 95th percentile upper confidence limit

TABLE 28
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS Number	Compound of Potential Concern (2), (3), (4)	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
			Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
	SVOCs										
83-32-9	Acenaphthene	subchronic	2.0E-01	mg/kg/day	1	2.0E-01	mg/kg/day	Liver	1000	PPRTV	4/6/2011
83-32-9	Acenaphthene	chronic	6.0E-02	mg/kg/day	1	6.0E-02	mg/kg/day	Liver	3000	IRIS	4/1/1994
120-12-7	Anthracene	subchronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	None	1000	PPRTV	6/15/2009
120-12-7	Anthracene	chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	None	3000	IRIS	7/1/1993
50-32-8	BaP-TE	subchronic	NA			NA					
50-32-8	BaP-TE	chronic	NA			NA					
206-44-0	Fluoranthene	subchronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	Kidney	1000	PPRTV	12/27/2012
206-44-0	Fluoranthene	chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	Kidney, liver, hematological	3000	IRIS	7/1/1993
86-73-7	Fluorene	subchronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	Hematological	3000	IRIS, chronic	11/1/1990
86-73-7	Fluorene	chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	Hematological	3000	IRIS	11/1/1990
91-20-3	Naphthalene	subchronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body weight	3000	IRIS, chronic	9/17/1998
91-20-3	Naphthalene	chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body weight	3000	IRIS	9/17/1998
87-86-5	Pentachlorophenol	subchronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Liver	300	IRIS, chronic	9/30/2010
87-86-5	Pentachlorophenol	chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Liver	300	IRIS	9/30/2010
108-95-2	Phenol	subchronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Reproductive	300	IRIS, chronic	9/30/2002
108-95-2	Phenol	chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Reproductive	300	IRIS	9/30/2002
129-00-0	Pyrene	subchronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	None	300	PPRTV	9/5/2007
129-00-0	Pyrene	chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Kidney	3000	IRIS	7/1/1993
	Metals										
7440-38-2	Arsenic	subchronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, hair	3	IRIS, chronic	2/1/1993
7440-38-2	Arsenic	chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, hair	3	IRIS	2/1/1993
7440-47-3	Chromium	subchronic	1.5E+00	mg/kg/day	0.025	3.8E-02	mg/kg/day	None	100	IRIS, chronic	9/3/1998
7440-47-3	Chromium	chronic	1.5E+00	mg/kg/day	0.025	3.8E-02	mg/kg/day	None	100	IRIS	9/3/1998
7440-50-8	Copper	subchronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GI	NA	HEAST	7/31/1997
7440-50-8	Copper	chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GI	NA	HEAST	7/31/1997
	Dioxins/Furans										
1746-01-6	TCDD-TEQ	subchronic	7.0E-10	mg/kg/day	1	7.0E-10	mg/kg/day	Reproductive	30	IRIS, chronic	2/17/2012
1746-01-6	TCDD-TEQ	chronic	7.0E-10	mg/kg/day	1	7.0E-10	mg/kg/day	Reproductive	30	IRIS	2/17/2012

Notes:
(1) Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), July 2004, EPA/540/R/99/005. If not available, assumed to be 100%
RfD = reference dose
HEAST = Health Effect Assessment Summary Tables, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2877#Downloac
IRIS = Integrated Risk Information System; http://www.epa.gov/iris
PPRTV = Provisional Peer Reviewed Toxicity Values; http://hhpprtv.ornl.gov/
GI = gastrointestinal tract
mg/kg/day = milligrams per kilogram per day
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

TABLE 29
NON-CANCER TOXICITY DATA -- INHALATION
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS Number	Compound of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
			Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
	SVOCs							
50-32-8	BaP-TE	subchronic	NA					
50-32-8	BaP-TE	chronic	NA					
206-44-0	Fluoranthene	subchronic	NA					
206-44-0	Fluoranthene	chronic	NA					
91-20-3	Naphthalene	subchronic	3.0E-03	mg/m^3	Respiratory		IRIS, chronic	9/17/1998
91-20-3	Naphthalene	chronic	3.0E-03	mg/m^3	Respiratory		IRIS	9/17/1998
87-86-5	Pentachlorophenol	subchronic	NA					
87-86-5	Pentachlorophenol	chronic	NA					
129-00-0	Pyrene	subchronic	NA					
129-00-0	Pyrene	chronic	NA					
	Metals							
7440-38-2	Arsenic	subchronic	1.5E-05	mg/m^3	Development, cardiovascular, nervous system, respiratory system, skin	NA	CalEPA, chronic	June 2014
7440-38-2	Arsenic	chronic	1.5E-05	mg/m^3	Development, cardiovascular, nervous system, respiratory system, skin	NA	CalEPA	June 2014
7440-47-3	Chromium	subchronic	NA					
7440-47-3	Chromium	chronic	NA					
7440-50-8	Copper	subchronic	NA					
7440-50-8	Copper	chronic	NA					
	Dioxins/Furans							
1746-01-6	TCDD-TEQ	subchronic	4.0E-08	mg/m^3	Liver, reproductive, endocrine, respiratory, hematologic, development	NA	CalEPA, chronic	June 2014
1746-01-6	TCDD-TEQ	chronic	4.0E-08	mg/m^3	Liver, reproductive, endocrine, respiratory, hematologic, development	NA	CalEPA	June 2014

Notes:
NA =not available
Cal EPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Inhalation Reference Exposure Levels, http://www.oehha.ca.gov/air/allrels.html
IRIS = Integrated Risk Information System; http://www.epa.gov/iris
mg/m^3 = milligrams per cubic meter
RfC = reference concentration
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 30
CANCER TOXICITY DATA -- ORAL/DERMAL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS Number	Compound of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description (2)	Oral CSF	
		Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
	SVOCs								
83-32-9	Acenaphthene	NA			NA				
120-12-7	Anthracene	NA			NA				
50-32-8	BaP-TE	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS, Benzo(a)pyrene	11/1/1994
191-24-2	Benzo(ghi)perylene	NA			NA				
206-44-0	Fluoranthene	NA			NA				
86-73-7	Fluorene	NA			NA				
91-20-3	Naphthalene	NA			NA				
87-86-5	Pentachlorophenol	4.0E-01	$(mg/kg\text{-}day)^{-1}$	1	4.0E-01	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	9/30/2010
108-95-2	Phenol	NA			NA				
129-00-0	Pyrene	NA			NA				
	Metals								
7440-38-2	Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	4/10/1998
7440-47-3	Chromium	5.0E-01	$(mg/kg\text{-}day)^{-1}$	0.025	2.0E+01	$(mg/kg\text{-}day)^{-1}$	D	IRIS	9/3/1998
7440-50-8	Copper	NA			NA				
	Dioxins/Furans								
1746-01-6	TCDD-TEQ	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1	1.3E+05	$(mg/kg\text{-}day)^{-1}$	NA	CalEPA	7/21/2009

Notes:

(1) Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), July 2004, EPA/540/R/99/005. If not available, assumed to be 100%.

(2) USEPA (1986) cancer weight-of-evidence categories are as follows

Group A: Carcinogenic to Humans (sufficient evidence of carcinogenicity
Group B: Probably Carcinogenic to Humans
B1 - limited evidence of carcinogenicity in humans
B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
Group C: Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)
Group D: Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)

Cal EPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Cancer Potency Values, http://www.oehha.ca.gov/risk/pdf/tcdb072109alpha.pd
IRIS = Integrated Risk Information System; http://www.epa.gov/iris
CSF = cancer slope factor
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram per day
NA = not available
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 31
CANCER TOXICITY DATA -- INHALATION
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS Number	Compound of Potential Concern	Unit Risk		Weight of Evidence/ Cancer Guideline Description (1)	Unit Risk : Inhalation CSF	
		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
	SVOCs					
83-32-9	Acenaphthene	NA				
120-12-7	Anthracene	NA				
50-32-8	BaP-TE	1.1E-03	$(ug/m^3)^{-1}$	NA	CalEPA, Benzo(a)pyrene	7/21/2009
206-44-0	Fluoranthene	NA				
86-73-7	Fluorene	NA				
91-20-3	Naphthalene	3.4E-05	$(ug/m^3)^{-1}$	NA	CalEPA	7/21/2009
87-86-5	Pentachlorophenol	5.1E-06	$(ug/m^3)^{-1}$	NA	CalEPA	7/21/2009
108-95-2	Phenol	NA				
129-00-0	Pyrene	NA				
	Metals					
7440-38-2	Arsenic	4.3E-03	$(ug/m^3)^{-1}$	A	IRIS	4/10/1998
7440-47-3	Chromium	8.4E-02	$(ug/m^3)^{-1}$	D	IRIS	9/3/1998
7440-50-8	Copper	NA				
	Dioxins/Furans					
1746-01-6	TCDD-TEQ	3.8E+01	$(ug/m^3)^{-1}$	NA	CalEPA	7/21/2009

Notes:
(1) USEPA (1986) cancer weight-of-evidence categories are as follows
Group A: Carcinogenic to Humans (sufficient evidence of carcinogenicity in humans)
Group B: Probably Carcinogenic to Humans
B1 - limited evidence of carcinogenicity in humans
B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
Group C: Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)
Group D: Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)
Cal EPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Cancer Potency Values, http://www.oehha.ca.gov/risk/pdf/tcdb072109alpha.pd
IRIS = Integrated Risk Information System; http://www.epa.gov/iris
CSF = cancer slope factor
NA = not available
$(ug/m^3)^{-1}$ = per microgram per cubic meter
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

TABLE 32
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADULT MAINTENANCE WORKER/CARETAKER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Worker/Caretaker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Site**	**Ingestion**													
				SVOCs												
				BaP-TE	1.2E+01	mg/kg	2.1E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-05	5.8E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.2E+01	mg/kg	2.1E-06	mg/kg-day	NA	NA	NA	5.8E-06	mg/kg-day	4.0E-02	mg/kg-day	1E-04
				Naphthalene	1.4E+00	mg/kg	2.4E-07	mg/kg-day	NA	NA	NA	6.7E-07	mg/kg-day	2.0E-02	mg/kg-day	3E-05
				Pentachlorophenol	4.3E+00	mg/kg	7.5E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-07	2.1E-06	mg/kg-day	5.0E-03	mg/kg-day	4E-04
				Pyrene	1.3E+01	mg/kg	2.2E-06	mg/kg-day	NA	NA	NA	6.2E-06	mg/kg-day	3.0E-02	mg/kg-day	2E-04
				Metals												
				Arsenic	1.1E+01	mg/kg	1.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-06	5.2E-06	mg/kg-day	3.0E-04	mg/kg-day	2E-02
				Chromium	2.3E+01	mg/kg	4.0E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-06	1.1E-05	mg/kg-day	1.5E+00	mg/kg-day	8E-06
				Dioxins/Furans												
				TCDD-TEQ	1.8E-03	mg/kg	3.1E-10	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	4.0E-05	8.7E-10	mg/kg-day	7.0E-10	mg/kg-day	1E+00
			Exp. Route Total								6E-05					1E+00
			Dermal													
				SVOCs												
				BaP-TE	1.2E+01	mg/kg	1.8E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-05	5.0E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.2E+01	mg/kg	1.8E-06	mg/kg-day	NA	NA	NA	5.0E-06	mg/kg-day	4.0E-02	mg/kg-day	1E-04
				Naphthalene	1.4E+00	mg/kg	2.0E-07	mg/kg-day	NA	NA	NA	5.7E-07	mg/kg-day	2.0E-02	mg/kg-day	3E-05
				Pentachlorophenol	4.3E+00	mg/kg	6.5E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-07	1.8E-06	mg/kg-day	5.0E-03	mg/kg-day	4E-04
				Pyrene	1.3E+01	mg/kg	1.9E-06	mg/kg-day	NA	NA	NA	5.4E-06	mg/kg-day	3.0E-02	mg/kg-day	2E-04
				Metals												
				Arsenic	1.1E+01	mg/kg	3.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-07	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	2.3E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.8E-03	mg/kg	6.1E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	8.0E-06	1.7E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								2E-05					2E-01
		Exposure Point Total									8E-05					2E+00
	Exposure Medium Total										8E-05					2E+00
Soil	**Dust**	**Site**	**Inhalation**													
				SVOCs												
				BaP-TE	9.6E-06	ug/m^3	3.9E-07	ug/m^3	1.1E-03	$(ug/m^3)^{-1}$	4.3E-10	1.1E-06	ug/m^3	NA	NA	NA
				Fluoranthene	9.5E-06	ug/m^3	3.9E-07	ug/m^3	NA	NA	NA	1.1E-06	ug/m^3	NA	NA	NA
				Naphthalene	1.1E-06	ug/m^3	4.5E-08	ug/m^3	3.4E-05	$(ug/m^3)^{-1}$	1.5E-12	1.3E-07	ug/m^3	3.0E-03	mg/m^3	4E-08
				Pentachlorophenol	3.5E-06	ug/m^3	1.4E-07	ug/m^3	5.1E-06	$(ug/m^3)^{-1}$	7.2E-13	4.0E-07	ug/m^3	NA	NA	NA
				Pyrene	1.0E-05	ug/m^3	4.2E-07	ug/m^3	NA	NA	NA	1.2E-06	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	8.6E-06	ug/m^3	3.5E-07	ug/m^3	4.3E-03	$(ug/m^3)^{-1}$	1.5E-09	9.8E-07	ug/m^3	1.5E-05	mg/m^3	7E-05
				Chromium	1.9E-05	ug/m^3	7.6E-07	ug/m^3	8.4E-02	$(ug/m^3)^{-1}$	6.4E-08	2.1E-06	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	1.4E-09	ug/m^3	5.8E-11	ug/m^3	3.8E+01	$(ug/m^3)^{-1}$	2.2E-09	1.6E-10	ug/m^3	4.0E-08	mg/m^3	4E-06
			Exp. Route Total								7E-08					7E-05
		Exposure Point Total									7E-08					7E-05
	Exposure Medium Total										7E-08					7E-05
Medium Total											8E-05					2E+00
											Total of Receptor Hazards Across All Media					2E+00

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 33
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADULT DEER HUNTER AND CONSUMER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Deer Hunter
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Deer Meat	**Deer Meat**	**Site**	**Ingestion**													
				SVOCs												
				BaP-TE	3.9E-03	mg/kg ww	6.8E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-06	1.6E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	8.5E-03	mg/kg ww	1.5E-06	mg/kg-day	NA	NA	NA	3.4E-06	mg/kg-day	4.0E-02	mg/kg-day	9E-05
				Naphthalene	2.4E-04	mg/kg ww	4.1E-08	mg/kg-day	NA	NA	NA	9.5E-08	mg/kg-day	2.0E-02	mg/kg-day	5E-06
				Pentachlorophenol	1.3E-03	mg/kg ww	2.2E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	9.0E-08	5.2E-07	mg/kg-day	5.0E-03	mg/kg-day	1E-04
				Pyrene	4.3E-03	mg/kg ww	7.3E-07	mg/kg-day	NA	NA	NA	1.7E-06	mg/kg-day	3.0E-02	mg/kg-day	6E-05
				Metals												
				Arsenic	3.5E-04	mg/kg ww	6.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.1E-08	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	5E-04
				Chromium	1.2E-03	mg/kg ww	2.0E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-07	4.8E-07	mg/kg-day	1.5E+00	mg/kg-day	3E-07
				Dioxins/Furans												
				TCDD-TEQ	2.4E-07	mg/kg ww	4.2E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	5.4E-06	9.7E-11	mg/kg-day	7.0E-10	mg/kg-day	1E-01
			Exp. Route Total								1E-05					1E-01
		Exposure Point Total									1E-05					1E-01
	Exposure Medium Total										1E-05					1E-01
Medium Total											1E-05					1E-01
										Total of Receptor Hazards Across All Media	1E-05			Total of Receptor Hazards Across All Media		1E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg ww = milligram per kilogram wet weight
NA = not available
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

TABLE 34
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADOLESCENT DEER CONSUMER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Deer Hunter
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Deer Meat	**Deer Meat**	**Site**	**Ingestion**													
				SVOCs												
				BaP-TE	3.9E-03	mg/kg ww	3.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06	2.1E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	8.5E-03	mg/kg ww	6.5E-07	mg/kg-day	NA	NA	NA	4.6E-06	mg/kg-day	4.0E-02	mg/kg-day	1E-04
				Naphthalene	2.4E-04	mg/kg ww	1.8E-08	mg/kg-day	NA	NA	NA	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6E-06
				Pentachlorophenol	1.3E-03	mg/kg ww	1.0E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-08	7.0E-07	mg/kg-day	5.0E-03	mg/kg-day	1E-04
				Pyrene	4.3E-03	mg/kg ww	3.3E-07	mg/kg-day	NA	NA	NA	2.3E-06	mg/kg-day	3.0E-02	mg/kg-day	8E-05
				Metals												
				Arsenic	3.5E-04	mg/kg ww	2.7E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-08	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	6E-04
				Chromium	1.2E-03	mg/kg ww	9.1E-08	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-08	6.3E-07	mg/kg-day	1.5E+00	mg/kg-day	4E-07
				Dioxins/Furans												
				TCDD-TEQ	2.4E-07	mg/kg ww	1.9E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.4E-06	1.3E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								5E-06					2E-01
		Exposure Point Total									5E-06					2E-01
	Exposure Medium Total										5E-06					2E-01
Medium Total											5E-06					2E-01
										Total of Receptor Hazards Across All Media	5E-06			Total of Receptor Hazards Across All Media		2E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg ww = milligram per kilogram wet weight
NA = not available
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

TABLE 35
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE CHILD DEER CONSUMER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Deer Consumer
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Deer Meat	**Deer Meat**	**Site**	**Ingestion**													
				SVOCs												
				BaP-TE	3.9E-03	mg/kg ww	2.5E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06	3.5E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	8.5E-03	mg/kg ww	5.3E-07	mg/kg-day	NA	NA	NA	7.5E-06	mg/kg-day	1.0E-01	mg/kg-day	7E-05
				Naphthalene	2.4E-04	mg/kg ww	1.5E-08	mg/kg-day	NA	NA	NA	2.1E-07	mg/kg-day	2.0E-02	mg/kg-day	1E-05
				Pentachlorophenol	1.3E-03	mg/kg ww	8.2E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-08	1.1E-06	mg/kg-day	5.0E-03	mg/kg-day	2E-04
				Pyrene	4.3E-03	mg/kg ww	2.7E-07	mg/kg-day	NA	NA	NA	3.7E-06	mg/kg-day	3.0E-01	mg/kg-day	1E-05
				Metals												
				Arsenic	3.5E-04	mg/kg ww	2.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-08	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	1.2E-03	mg/kg ww	7.4E-08	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08	1.0E-06	mg/kg-day	1.5E+00	mg/kg-day	7E-07
				Dioxins/Furans												
				TCDD-TEQ	2.4E-07	mg/kg ww	1.5E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-06	2.1E-10	mg/kg-day	7.0E-10	mg/kg-day	3E-01
			Exp. Route Total								4E-06					3E-01
		Exposure Point Total									4E-06					3E-01
	Exposure Medium Total										4E-06					3E-01
Medium Total											4E-06					3E-01
										Total of Receptor Hazards Across All Media	4E-06				Total of Receptor Hazards Across All Media	3E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg ww = milligram per kilogram wet weight
NA = not available
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

TABLE 36
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADOLESCENT TRESPASSER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Site**	**Ingestion**													
				SVOCs												
				BaP-TE	1.2E+01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06	1.1E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.2E+01	mg/kg	1.6E-07	mg/kg-day	NA	NA	NA	1.1E-06	mg/kg-day	4.0E-02	mg/kg-day	3E-05
				Naphthalene	1.4E+00	mg/kg	1.8E-08	mg/kg-day	NA	NA	NA	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6E-06
				Pentachlorophenol	4.3E+00	mg/kg	5.8E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08	4.0E-07	mg/kg-day	5.0E-03	mg/kg-day	8E-05
				Pyrene	1.3E+01	mg/kg	1.7E-07	mg/kg-day	NA	NA	NA	1.2E-06	mg/kg-day	3.0E-02	mg/kg-day	4E-05
				Metals												
				Arsenic	1.1E+01	mg/kg	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	2.3E+01	mg/kg	3.1E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-07	2.2E-06	mg/kg-day	1.5E+00	mg/kg-day	1E-06
				Dioxins/Furans												
				TCDD-TEQ	1.8E-03	mg/kg	2.4E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	3.1E-06	1.7E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								5E-06					2E-01
			Dermal													
				SVOCs												
				BaP-TE	1.2E+01	mg/kg	2.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06	1.4E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.2E+01	mg/kg	2.0E-07	mg/kg-day	NA	NA	NA	1.4E-06	mg/kg-day	4.0E-02	mg/kg-day	4E-05
				Naphthalene	1.4E+00	mg/kg	2.3E-08	mg/kg-day	NA	NA	NA	1.6E-07	mg/kg-day	2.0E-02	mg/kg-day	8E-06
				Pentachlorophenol	4.3E+00	mg/kg	7.3E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-08	5.1E-07	mg/kg-day	5.0E-03	mg/kg-day	1E-04
				Pyrene	1.3E+01	mg/kg	2.2E-07	mg/kg-day	NA	NA	NA	1.5E-06	mg/kg-day	3.0E-02	mg/kg-day	5E-05
				Metals												
				Arsenic	1.1E+01	mg/kg	4.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-08	2.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	2.3E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.8E-03	mg/kg	7.0E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	9.1E-07	4.9E-11	mg/kg-day	7.0E-10	mg/kg-day	7E-02
			Exp. Route Total								2E-06					7E-02
		Exposure Point Total									7E-06					3E-01
	Exposure Medium Total										7E-06					3E-01
Soil	**Dust**	**Site**	**Inhalation**													
				SVOCs												
				BaP-TE	9.6E-06	ug/m3	5.0E-09	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	5.5E-12	3.5E-08	ug/m^3	NA	NA	NA
				Fluoranthene	9.5E-06	ug/m3	5.0E-09	ug/m3	NA	NA	NA	3.5E-08	ug/m^3	NA	NA	NA
				Naphthalene	1.1E-06	ug/m3	5.7E-10	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	2.0E-14	4.0E-09	ug/m^3	3.0E-03	mg/m3	1E-09
				Pentachlorophenol	3.5E-06	ug/m3	1.8E-09	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	9.2E-15	1.3E-08	ug/m^3	NA	NA	NA
				Pyrene	1.0E-05	ug/m3	5.4E-09	ug/m3	NA	NA	NA	3.8E-08	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	8.6E-06	ug/m3	4.5E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	1.9E-11	3.1E-08	ug/m^3	1.5E-05	mg/m3	2E-06
				Chromium	1.9E-05	ug/m3	9.7E-09	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	8.1E-10	6.8E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	1.4E-09	ug/m3	7.5E-13	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	2.8E-11	5.2E-12	ug/m^3	4.0E-08	mg/m3	1E-07
			Exp. Route Total								9E-10					2E-06
		Exposure Point Total									9E-10					2E-06
	Exposure Medium Total										9E-10					2E-06
Medium Total											7E-06					3E-01
									Total of Receptor Hazards Across All Media		7E-06			Total of Receptor Hazards Across All Media		3E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 37
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADULT HIKERS/BICYCLE TRAIL USERS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Receptor Population: Hikers/Bicycle Trail Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		
					Value	Units	Value	Units	Value	Units	PELCR	Value	Units	Value	Units	HQ
Soil	**Surface Soil**	**PMP Area**	**Ingestion**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	1.9E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06	6.5E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	3.6E+01	mg/kg	2.1E-07	mg/kg-day	NA	NA	NA	7.3E-07	mg/kg-day	4.0E-02	mg/kg-day	2E-05
				Naphthalene	5.8E+00	mg/kg	3.4E-08	mg/kg-day	NA	NA	NA	1.2E-07	mg/kg-day	2.0E-02	mg/kg-day	6E-06
				Pentachlorophenol	9.3E+00	mg/kg	5.4E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08	1.9E-07	mg/kg-day	5.0E-03	mg/kg-day	4E-05
				Pyrene	4.0E+01	mg/kg	2.3E-07	mg/kg-day	NA	NA	NA	8.2E-07	mg/kg-day	3.0E-02	mg/kg-day	3E-05
				Metals												
				Arsenic	1.6E+01	mg/kg	9.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07	3.2E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	5.1E+01	mg/kg	2.9E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-07	1.0E-06	mg/kg-day	1.5E+00	mg/kg-day	7E-07
				Dioxins/Furans												
				TCDD-TEQ	8.0E-03	mg/kg	4.7E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	6.1E-06	1.6E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								8E-06					2E-01
			Dermal													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	9.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.0E-07	3.4E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	3.6E+01	mg/kg	1.1E-07	mg/kg-day	NA	NA	NA	3.8E-07	mg/kg-day	4.0E-02	mg/kg-day	9E-06
				Naphthalene	5.8E+00	mg/kg	1.7E-08	mg/kg-day	NA	NA	NA	6.1E-08	mg/kg-day	2.0E-02	mg/kg-day	3E-06
				Pentachlorophenol	9.3E+00	mg/kg	2.8E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08	9.8E-08	mg/kg-day	5.0E-03	mg/kg-day	2E-05
				Pyrene	4.0E+01	mg/kg	1.2E-07	mg/kg-day	NA	NA	NA	4.2E-07	mg/kg-day	3.0E-02	mg/kg-day	1E-05
				Metals												
				Arsenic	1.6E+01	mg/kg	1.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-08	3.8E-08	mg/kg-day	3.0E-04	mg/kg-day	1E-04
				Chromium	5.1E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	8.0E-03	mg/kg	5.6E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	7.2E-07	2.0E-11	mg/kg-day	7.0E-10	mg/kg-day	3E-02
			Exp. Route Total								1E-06					3E-02
		Exposure Point Total									9E-06					3E-01
	Exposure Medium Total										9E-06					3E-01
Soil	**Dust**	**PMP Area**	**Inhalation**													
				SVOCs												
				BaP-TE	2.6E-05	ug/m3	4.4E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	4.8E-11	1.5E-07	ug/m^3	NA	NA	NA
				Fluoranthene	2.9E-05	ug/m3	4.9E-08	ug/m3	NA	NA	NA	1.7E-07	ug/m^3	NA	NA	NA
				Naphthalene	4.7E-06	ug/m3	7.9E-09	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	2.7E-13	2.8E-08	ug/m^3	3.0E-03	mg/m^3	9E-09
				Pentachlorophenol	7.5E-06	ug/m3	1.3E-08	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	6.5E-14	4.4E-08	ug/m^3	NA	NA	NA
				Pyrene	3.2E-05	ug/m3	5.5E-08	ug/m3	NA	NA	NA	1.9E-07	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	1.3E-05	ug/m3	2.2E-08	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	9.3E-11	7.5E-08	ug/m^3	1.5E-05	mg/m^3	5E-06
				Chromium	4.1E-05	ug/m3	6.9E-08	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	5.8E-09	2.4E-07	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	6.5E-09	ug/m3	1.1E-11	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	4.2E-10	3.8E-11	ug/m^3	4.0E-08	mg/m^3	1E-06
			Exp. Route Total								6E-09					6E-06
		Exposure Point Total									6E-09					6E-06
	Exposure Medium Total										6E-09					6E-06
Medium Total											9E-06					3E-01
										Total of Receptor Hazards Across All Media	9E-06			Total of Receptor Hazards Across All Media		3E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 38
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE ON-SITE ADOLESCENT HIKERS/BICYCLE TRAIL USERS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Receptor Population: Hikers/Bicycle Trail Users
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**PMP Area**	**Ingestion**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	2.8E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06	1.9E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.6E+01	mg/kg	3.1E-07	mg/kg-day	NA	NA	NA	2.2E-06	mg/kg-day	4.0E-02	mg/kg-day	5E-05
				Naphthalene	5.8E+00	mg/kg	5.0E-08	mg/kg-day	NA	NA	NA	3.5E-07	mg/kg-day	2.0E-02	mg/kg-day	2E-05
				Pentachlorophenol	9.3E+00	mg/kg	8.1E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-08	5.6E-07	mg/kg-day	5.0E-03	mg/kg-day	1E-04
				Pyrene	4.0E+01	mg/kg	3.5E-07	mg/kg-day	NA	NA	NA	2.4E-06	mg/kg-day	3.0E-02	mg/kg-day	8E-05
				Metals												
				Arsenic	1.6E+01	mg/kg	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07	9.6E-07	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	5.1E+01	mg/kg	4.4E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-07	3.1E-06	mg/kg-day	1.5E+00	mg/kg-day	2E-06
				Dioxins/Furans												
				TCDD-TEQ	8.0E-03	mg/kg	7.0E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	9.1E-06	4.9E-10	mg/kg-day	7.0E-10	mg/kg-day	7E-01
			Exp. Route Total								1E-05					7E-01
			Dermal													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	1.8E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06	1.2E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.6E+01	mg/kg	2.0E-07	mg/kg-day	NA	NA	NA	1.4E-06	mg/kg-day	4.0E-02	mg/kg-day	3E-05
				Naphthalene	5.8E+00	mg/kg	3.2E-08	mg/kg-day	NA	NA	NA	2.2E-07	mg/kg-day	2.0E-02	mg/kg-day	1E-05
				Pentachlorophenol	9.3E+00	mg/kg	5.1E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08	3.6E-07	mg/kg-day	5.0E-03	mg/kg-day	7E-05
				Pyrene	4.0E+01	mg/kg	2.2E-07	mg/kg-day	NA	NA	NA	1.6E-06	mg/kg-day	3.0E-02	mg/kg-day	5E-05
				Metals												
				Arsenic	1.6E+01	mg/kg	2.0E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-08	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	5E-04
				Chromium	5.1E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	8.0E-03	mg/kg	1.0E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-06	7.2E-11	mg/kg-day	7.0E-10	mg/kg-day	1E-01
			Exp. Route Total								3E-06					1E-01
		Exposure Point Total									1E-05					8E-01
	Exposure Medium Total										1E-05					8E-01
Soil	**Dust**	**PMP Area**	**Inhalation**													
				SVOCs												
				BaP-TE	2.6E-05	ug/m3	2.2E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	2.4E-11	1.5E-07	ug/m^3	NA	NA	NA
				Fluoranthene	2.9E-05	ug/m3	2.4E-08	ug/m3	NA	NA	NA	1.7E-07	ug/m^3	NA	NA	NA
				Naphthalene	4.7E-06	ug/m3	4.0E-09	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	1.3E-13	2.8E-08	ug/m^3	3.0E-03	mg/m^3	9E-09
				Pentachlorophenol	7.5E-06	ug/m3	6.3E-09	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	3.2E-14	4.4E-08	ug/m^3	NA	NA	NA
				Pyrene	3.2E-05	ug/m3	2.7E-08	ug/m3	NA	NA	NA	1.9E-07	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	1.3E-05	ug/m3	1.1E-08	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	4.6E-11	7.5E-08	ug/m^3	1.5E-05	mg/m^3	5E-06
				Chromium	4.1E-05	ug/m3	3.5E-08	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	2.9E-09	2.4E-07	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	6.5E-09	ug/m3	5.5E-12	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	2.1E-10	3.8E-11	ug/m^3	4.0E-08	mg/m^3	1E-06
			Exp. Route Total								3E-09					6E-06
		Exposure Point Total									3E-09					6E-06
	Exposure Medium Total										3E-09					6E-06
Medium Total											1E-05					8E-01
										Total of Receptor Hazards Across All Media	1E-05			Total of Receptor Hazards Across All Media		8E-01

Notes:

EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk

HQ = hazard quotient
RfD = reference dose
RfC = reference concentration

SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 39
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - FUTURE ON-SITE SOLAR FARM REDEVELOPMENT WORKER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Receptor Population: Solar Farm Redevelopment Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Solar Area**	**Ingestion**													
				SVOCs												
				BaP-TE	9.6E+00	mg/kg	7.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-07	5.0E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.0E+01	mg/kg	7.5E-08	mg/kg-day	NA	NA	NA	5.2E-06	mg/kg-day	1.0E-01	mg/kg-day	5E-05
				Naphthalene	1.2E+00	mg/kg	9.2E-09	mg/kg-day	NA	NA	NA	6.4E-07	mg/kg-day	2.0E-02	mg/kg-day	3E-05
				Pentachlorophenol	2.2E+00	mg/kg	1.6E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	6.4E-09	1.1E-06	mg/kg-day	5.0E-03	mg/kg-day	2E-04
				Pyrene	1.2E+01	mg/kg	8.5E-08	mg/kg-day	NA	NA	NA	6.0E-06	mg/kg-day	3.0E-01	mg/kg-day	2E-05
				Metals												
				Arsenic	7.9E+00	mg/kg	5.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.7E-08	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	1E-02
				Chromium	1.9E+01	mg/kg	1.4E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.9E-08	9.6E-06	mg/kg-day	1.5E+00	mg/kg-day	6E-06
				Dioxins/Furans												
				TCDD-TEQ	6.0E-04	mg/kg	4.5E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	5.8E-07	3.1E-10	mg/kg-day	7.0E-10	mg/kg-day	4E-01
			Exp. Route Total								1E-06					5E-01
			Dermal													
				SVOCs												
				BaP-TE	9.6E+00	mg/kg	2.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-07	1.9E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	1.0E+01	mg/kg	2.9E-08	mg/kg-day	NA	NA	NA	2.0E-06	mg/kg-day	1.0E-01	mg/kg-day	2E-05
				Naphthalene	1.2E+00	mg/kg	3.6E-09	mg/kg-day	NA	NA	NA	2.5E-07	mg/kg-day	2.0E-02	mg/kg-day	1E-05
				Pentachlorophenol	2.2E+00	mg/kg	6.3E-09	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-09	4.4E-07	mg/kg-day	5.0E-03	mg/kg-day	9E-05
				Pyrene	1.2E+01	mg/kg	3.3E-08	mg/kg-day	NA	NA	NA	2.3E-06	mg/kg-day	3.0E-01	mg/kg-day	8E-06
				Metals												
				Arsenic	7.9E+00	mg/kg	5.2E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.8E-09	3.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	1.9E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	6.0E-04	mg/kg	4.0E-13	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	5.2E-08	2.8E-11	mg/kg-day	7.0E-10	mg/kg-day	4E-02
			Exp. Route Total								3E-07					4E-02
		Exposure Point Total									2E-06					5E-01
	Exposure Medium Total										2E-06					5E-01
Soil	**Dust**	**Solar Area**	**Inhalation**													
				SVOCs												
				BaP-TE	7.8E-06	ug/m^3	4.0E-09	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	4.5E-12	2.8E-07	ug/m^3	NA	NA	NA
				Fluoranthene	8.2E-06	ug/m^3	4.3E-09	ug/m3	NA	NA	NA	3.0E-07	ug/m^3	NA	NA	NA
				Naphthalene	1.0E-06	ug/m^3	5.2E-10	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	1.8E-14	3.7E-08	ug/m^3	3.0E-03	mg/m^3	1E-08
				Pentachlorophenol	1.8E-06	ug/m^3	9.2E-10	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	4.7E-15	6.4E-08	ug/m^3	NA	NA	NA
				Pyrene	9.3E-06	ug/m^3	4.9E-09	ug/m3	NA	NA	NA	3.4E-07	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	6.3E-06	ug/m^3	3.3E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	1.4E-11	2.3E-07	ug/m^3	1.5E-05	mg/m^3	2E-05
				Chromium	1.5E-05	ug/m^3	7.8E-09	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	6.6E-10	5.5E-07	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	4.9E-10	ug/m^3	2.5E-13	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	9.7E-12	1.8E-11	ug/m^3	4.0E-08	mg/m^3	4E-07
			Exp. Route Total								7E-10					2E-05
		Exposure Point Total									7E-10					2E-05
	Exposure Medium Total										7E-10					2E-05
Medium Total											2E-06					5E-01
											Total of Receptor Hazards Across All Media	2E-06		Total of Receptor Hazards Across All Media		5E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 40
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - FUTURE ON-SITE SOLAR FARM MAINTENANCE WORKER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Receptor Population: Solar Farm Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Future Solar Area**	**Ingestion**													
				SVOCs												
				BaP-TE	7.3E+00	mg/kg	7.7E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.6E-06	2.1E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	7.4E+00	mg/kg	7.7E-07	mg/kg-day	NA	NA	NA	2.2E-06	mg/kg-day	4.0E-02	mg/kg-day	5E-05
				Naphthalene	3.4E-01	mg/kg	3.5E-08	mg/kg-day	NA	NA	NA	9.9E-08	mg/kg-day	2.0E-02	mg/kg-day	5E-06
				Pentachlorophenol	8.9E-01	mg/kg	9.3E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08	2.6E-07	mg/kg-day	5.0E-03	mg/kg-day	5E-05
				Pyrene	9.0E+00	mg/kg	9.4E-07	mg/kg-day	NA	NA	NA	2.6E-06	mg/kg-day	3.0E-02	mg/kg-day	9E-05
				Metals												
				Arsenic	6.1E+00	mg/kg	6.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-07	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	6E-03
				Chromium	1.2E+01	mg/kg	1.3E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.3E-07	3.5E-06	mg/kg-day	1.5E+00	mg/kg-day	2E-06
				Dioxins/Furans												
				TCDD-TEQ	2.9E-04	mg/kg	3.1E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	4.0E-06	8.6E-11	mg/kg-day	7.0E-10	mg/kg-day	1E-01
			Exp. Route Total								1E-05					1E-01
			Dermal													
				SVOCs												
				BaP-TE	7.3E+00	mg/kg	6.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-06	1.8E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	7.4E+00	mg/kg	6.6E-07	mg/kg-day	NA	NA	NA	1.9E-06	mg/kg-day	4.0E-02	mg/kg-day	5E-05
				Naphthalene	3.4E-01	mg/kg	3.0E-08	mg/kg-day	NA	NA	NA	8.5E-08	mg/kg-day	2.0E-02	mg/kg-day	4E-06
				Pentachlorophenol	8.9E-01	mg/kg	8.0E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-08	2.2E-07	mg/kg-day	5.0E-03	mg/kg-day	4E-05
				Pyrene	9.0E+00	mg/kg	8.1E-07	mg/kg-day	NA	NA	NA	2.3E-06	mg/kg-day	3.0E-02	mg/kg-day	8E-05
				Metals												
				Arsenic	6.1E+00	mg/kg	1.3E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	1.2E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	2.9E-04	mg/kg	6.1E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	7.9E-07	1.7E-11	mg/kg-day	7.0E-10	mg/kg-day	2E-02
			Exp. Route Total								6E-06					3E-02
		Exposure Point Total									2E-05					2E-01
	Exposure Medium Total										2E-05					2E-01
Soil	**Dust**	**Future Solar Area**	**Inhalation**													
				SVOCs												
				BaP-TE	5.9E-06	ug/m^3	1.4E-07	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	1.6E-10	4.0E-07	ug/m^3	NA	NA	NA
				Fluoranthene	6.0E-06	ug/m^3	1.5E-07	ug/m3	NA	NA	NA	4.1E-07	ug/m^3	NA	NA	NA
				Naphthalene	2.7E-07	ug/m^3	6.7E-09	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	2.3E-13	1.9E-08	ug/m^3	3.0E-03	mg/m^3	6E-09
				Pentachlorophenol	7.2E-07	ug/m^3	1.7E-08	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	8.9E-14	4.9E-08	ug/m^3	NA	NA	NA
				Pyrene	7.2E-06	ug/m^3	1.8E-07	ug/m3	NA	NA	NA	5.0E-07	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	4.9E-06	ug/m^3	1.2E-07	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	5.2E-10	3.4E-07	ug/m^3	1.5E-05	mg/m^3	2E-05
				Chromium	9.7E-06	ug/m^3	2.4E-07	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	2.0E-08	6.6E-07	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	2.4E-10	ug/m^3	5.8E-12	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	2.2E-10	1.6E-11	ug/m^3	4.0E-08	mg/m^3	4E-07
			Exp. Route Total								2E-08					2E-05
		Exposure Point Total									2E-08					2E-05
	Exposure Medium Total										2E-08					2E-05
Medium Total											2E-05					2E-01
										Total of Receptor Hazards Across All Media	2E-05			Total of Receptor Hazards Across All Media		2E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 41
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADULT KAYAKER/CANOEIST
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Kayaker/Canoeist
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	**Surface Sediment**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-05	3.7E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.0E+01	mg/kg	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08	2.7E-08	mg/kg-day	3.0E-04	mg/kg-day	9E-05
				Chromium	1.7E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								4E-05					9E-05
		Exposure Point Total									4E-05					9E-05
	Exposure Medium Total										4E-05					9E-05
Medium Total											4E-05					9E-05
Surface Water	**Surface Water**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				Acenaphthene	2.4E-01	ug/L	3.4E-09	mg/kg-day	NA	NA	NA	8.0E-09	mg/kg-day	6.0E-02	mg/kg-day	1E-07
				Anthracene	2.7E-01	ug/L	7.4E-09	mg/kg-day	NA	NA	NA	1.7E-08	mg/kg-day	3.0E-01	mg/kg-day	6E-08
				Fluoranthene	3.8E-01	ug/L	1.9E-08	mg/kg-day	NA	NA	NA	4.5E-08	mg/kg-day	4.0E-02	mg/kg-day	1E-06
				Fluorene	4.4E-01	ug/L	8.6E-09	mg/kg-day	NA	NA	NA	2.0E-08	mg/kg-day	4.0E-02	mg/kg-day	5E-07
				Pentachlorophenol	7.6E-01	ug/L	9.2E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08	2.1E-07	mg/kg-day	5.0E-03	mg/kg-day	4E-05
				Pyrene	7.4E-02	ug/L	3.3E-09	mg/kg-day	NA	NA	NA	7.8E-09	mg/kg-day	3.0E-02	mg/kg-day	3E-07
				Metals												
				Arsenic	4.1E+00	ug/L	2.0E-10	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-10	4.6E-10	mg/kg-day	3.0E-04	mg/kg-day	2E-06
				Chromium	1.8E+00	ug/L	8.6E-11	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	1.7E-09	2.0E-10	mg/kg-day	3.8E-02	mg/kg-day	5E-09
				Copper	2.9E+00	ug/L	1.4E-10	mg/kg-day	NA	NA	NA	3.2E-10	mg/kg-day	4.0E-02	mg/kg-day	8E-09
			Exp. Route Total								4E-08					5E-05
		Exposure Point Total									4E-08					5E-05
	Exposure Medium Total										4E-08					5E-05
Medium Total											4E-08					5E-05
										Total of Receptor Hazards Across All Media	4E-05			Total of Receptor Hazards Across All Media		1E-04

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
NA = not available
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
ug/L = microgram per liter

TABLE 42
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT KAYAKER/CANOEIST
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Kayaker/Canoeist
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	**Surface Sediment**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	5.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-05	3.8E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.0E+01	mg/kg	4.0E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-09	2.8E-08	mg/kg-day	3.0E-04	mg/kg-day	9E-05
				Chromium	1.7E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								4E-05					9E-05
		Exposure Point Total									4E-05					9E-05
	Exposure Medium Total										4E-05					9E-05
Medium Total											4E-05					9E-05
Surface Water	**Surface Water**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				Acenaphthene	2.4E-01	ug/L	1.5E-09	mg/kg-day	NA	NA	NA	1.0E-08	mg/kg-day	6.0E-02	mg/kg-day	2E-07
				Anthracene	2.7E-01	ug/L	3.2E-09	mg/kg-day	NA	NA	NA	2.2E-08	mg/kg-day	3.0E-01	mg/kg-day	7E-08
				Fluoranthene	3.8E-01	ug/L	8.2E-09	mg/kg-day	NA	NA	NA	5.7E-08	mg/kg-day	4.0E-02	mg/kg-day	1E-06
				Fluorene	4.4E-01	ug/L	3.7E-09	mg/kg-day	NA	NA	NA	2.6E-08	mg/kg-day	4.0E-02	mg/kg-day	6E-07
				Pentachlorophenol	7.6E-01	ug/L	3.9E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08	2.7E-07	mg/kg-day	5.0E-03	mg/kg-day	5E-05
				Pyrene	7.4E-02	ug/L	1.4E-09	mg/kg-day	NA	NA	NA	1.0E-08	mg/kg-day	3.0E-02	mg/kg-day	3E-07
				Metals												
				Arsenic	4.1E+00	ug/L	8.4E-11	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-10	5.9E-10	mg/kg-day	3.0E-04	mg/kg-day	2E-06
				Chromium	1.8E+00	ug/L	3.7E-11	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	7.4E-10	2.6E-10	mg/kg-day	3.8E-02	mg/kg-day	7E-09
				Copper	2.9E+00	ug/L	5.9E-11	mg/kg-day	NA	NA	NA	4.2E-10	mg/kg-day	4.0E-02	mg/kg-day	1E-08
			Exp. Route Total								2E-08					6E-05
		Exposure Point Total									2E-08					6E-05
	Exposure Medium Total										2E-08					6E-05
Medium Total											2E-08					6E-05
Total of Receptor Hazards Across All Media											4E-05	Total of Receptor Hazards Across All Media				2E-04

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
NA = not available
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
ug/L = microgram per liter

TABLE 43
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADULT RECREATIONAL ANGLER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Angler
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	**Surface Sediment**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-05	3.7E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.0E+01	mg/kg	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08	2.7E-08	mg/kg-day	3.0E-04	mg/kg-day	9E-05
				Chromium	1.7E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								4E-05					9E-05
		Exposure Point Total									4E-05					9E-05
	Exposure Medium Total										4E-05					9E-05
Medium Total											4E-05					9E-05
Surface Water	**Surface Water**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				Acenaphthene	2.4E-01	ug/L	3.4E-09	mg/kg-day	NA	NA	NA	8.0E-09	mg/kg-day	6.0E-02	mg/kg-day	1E-07
				Anthracene	2.7E-01	ug/L	7.4E-09	mg/kg-day	NA	NA	NA	1.7E-08	mg/kg-day	3.0E-01	mg/kg-day	6E-08
				Fluoranthene	3.8E-01	ug/L	1.9E-08	mg/kg-day	NA	NA	NA	4.5E-08	mg/kg-day	4.0E-02	mg/kg-day	1E-06
				Fluorene	4.4E-01	ug/L	8.6E-09	mg/kg-day	NA	NA	NA	2.0E-08	mg/kg-day	4.0E-02	mg/kg-day	5E-07
				Pentachlorophenol	7.6E-01	ug/L	9.2E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08	2.1E-07	mg/kg-day	5.0E-03	mg/kg-day	4E-05
				Pyrene	7.4E-02	ug/L	3.3E-09	mg/kg-day	NA	NA	NA	7.8E-09	mg/kg-day	3.0E-02	mg/kg-day	3E-07
				Metals												
				Arsenic	4.1E+00	ug/L	2.0E-10	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-10	4.6E-10	mg/kg-day	3.0E-04	mg/kg-day	2E-06
				Chromium	1.8E+00	ug/L	8.6E-11	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	1.7E-09	2.0E-10	mg/kg-day	3.8E-02	mg/kg-day	5E-09
				Copper	2.9E+00	ug/L	1.4E-10	mg/kg-day	NA	NA	NA	3.2E-10	mg/kg-day	4.0E-02	mg/kg-day	8E-09
			Exp. Route Total								4E-08					5E-05
		Exposure Point Total									4E-08					5E-05
	Exposure Medium Total										4E-08					5E-05
Medium Total											4E-08					5E-05
Fish Tissue	**Fish Tissue**	**Crab Orchard Creek & Piles Fork**	**Ingestion**													
				SVOCs												
				Acenaphthene	2.2E-02	mg/kg ww	1.1E-06	mg/kg-day	NA	NA	NA	2.5E-06	mg/kg-day	6.0E-02	mg/kg-day	4E-05
				Anthracene	7.7E-03	mg/kg ww	3.8E-07	mg/kg-day	NA	NA	NA	8.9E-07	mg/kg-day	3.0E-01	mg/kg-day	3E-06
				BaP-TE	5.3E-03	mg/kg ww	2.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-06	6.1E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	2.0E-02	mg/kg ww	9.9E-07	mg/kg-day	NA	NA	NA	2.3E-06	mg/kg-day	4.0E-02	mg/kg-day	6E-05
				Fluorene	1.5E-02	mg/kg ww	7.4E-07	mg/kg-day	NA	NA	NA	1.7E-06	mg/kg-day	4.0E-02	mg/kg-day	4E-05
				Phenol	8.1E-03	mg/kg ww	4.0E-07	mg/kg-day	NA	NA	NA	9.4E-07	mg/kg-day	3.0E-01	mg/kg-day	3E-06
				Metals												
				Arsenic	1.8E-01	mg/kg ww	8.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-05	2.1E-05	mg/kg-day	3.0E-04	mg/kg-day	7E-02
				Chromium	3.0E-02	mg/kg ww	1.5E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	7.4E-07	3.5E-06	mg/kg-day	1.5E+00	mg/kg-day	2E-06
				Copper	4.3E-01	mg/kg ww	2.1E-05	mg/kg-day	NA	NA	NA	5.0E-05	mg/kg-day	4.0E-02	mg/kg-day	1E-03
				Dioxins/Furans												
				TCDD-TEQ	3.1E-07	mg/kg ww	1.5E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-06	3.6E-11	mg/kg-day	7.0E-10	mg/kg-day	5E-02
			Exp. Route Total								2E-05					1E-01
		Exposure Point Total									2E-05					1E-01
	Exposure Medium Total										2E-05					1E-01
Medium Total											2E-05					1E-01
										Total of Receptor Hazards Across All Media	6E-05			Total of Receptor Hazards Across All Media		1E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk

HQ = hazard quotient
RfD = reference dose
RfC = reference concentration

SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

NA = not available
ug/L = microgram per liter
mg/kg ww = milligram per kilogram wet weight

TABLE 44
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT RECREATIONAL ANGLER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Angler
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	**Surface Sediment**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				BaP-TE	3.2E+01	mg/kg	5.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-05	3.8E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.0E+01	mg/kg	4.0E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-09	2.8E-08	mg/kg-day	3.0E-04	mg/kg-day	9E-05
				Chromium	1.7E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								4E-05					9E-05
		Exposure Point Total									4E-05					9E-05
	Exposure Medium Total										4E-05					9E-05
Medium Total											4E-05					9E-05
Surface Water	**Surface Water**	**Crab Orchard Creek & Piles Fork**	**Dermal**													
				SVOCs												
				Acenaphthene	2.4E-01	ug/L	1.5E-09	mg/kg-day	NA	NA	NA	1.0E-08	mg/kg-day	6.0E-02	mg/kg-day	2E-07
				Anthracene	2.7E-01	ug/L	3.2E-09	mg/kg-day	NA	NA	NA	2.2E-08	mg/kg-day	3.0E-01	mg/kg-day	7E-08
				Fluoranthene	3.8E-01	ug/L	8.2E-09	mg/kg-day	NA	NA	NA	5.7E-08	mg/kg-day	4.0E-02	mg/kg-day	1E-06
				Fluorene	4.4E-01	ug/L	3.7E-09	mg/kg-day	NA	NA	NA	2.6E-08	mg/kg-day	4.0E-02	mg/kg-day	6E-07
				Pentachlorophenol	7.6E-01	ug/L	3.9E-08	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08	2.7E-07	mg/kg-day	5.0E-03	mg/kg-day	5E-05
				Pyrene	7.4E-02	ug/L	1.4E-09	mg/kg-day	NA	NA	NA	1.0E-08	mg/kg-day	3.0E-02	mg/kg-day	3E-07
				Metals												
				Arsenic	4.1E+00	ug/L	8.4E-11	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-10	5.9E-10	mg/kg-day	3.0E-04	mg/kg-day	2E-06
				Chromium	1.8E+00	ug/L	3.7E-11	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	7.4E-10	2.6E-10	mg/kg-day	3.8E-02	mg/kg-day	7E-09
				Copper	2.9E+00	ug/L	5.9E-11	mg/kg-day	NA	NA	NA	4.2E-10	mg/kg-day	4.0E-02	mg/kg-day	1E-08
			Exp. Route Total								2E-08					6E-05
		Exposure Point Total									2E-08					6E-05
	Exposure Medium Total										2E-08					6E-05
Medium Total											2E-08					6E-05
Fish Tissue	**Fish Tissue**	**Crab Orchard Creek & Piles Fork**	**Ingestion**													
				SVOCs												
				Acenaphthene	2.2E-02	mg/kg ww	5.4E-07	mg/kg-day	NA	NA	NA	3.8E-06	mg/kg-day	6.0E-02	mg/kg-day	6E-05
				Anthracene	7.7E-03	mg/kg ww	1.9E-07	mg/kg-day	NA	NA	NA	1.3E-06	mg/kg-day	3.0E-01	mg/kg-day	4E-06
				BaP-TE	5.3E-03	mg/kg ww	1.3E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-07	9.2E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	2.0E-02	mg/kg ww	4.9E-07	mg/kg-day	NA	NA	NA	3.5E-06	mg/kg-day	4.0E-02	mg/kg-day	9E-05
				Fluorene	1.5E-02	mg/kg ww	3.7E-07	mg/kg-day	NA	NA	NA	2.6E-06	mg/kg-day	4.0E-02	mg/kg-day	6E-05
				Phenol	8.1E-03	mg/kg ww	2.0E-07	mg/kg-day	NA	NA	NA	1.4E-06	mg/kg-day	3.0E-01	mg/kg-day	5E-06
				Metals												
				Arsenic	1.8E-01	mg/kg ww	4.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-06	3.1E-05	mg/kg-day	3.0E-04	mg/kg-day	1E-01
				Chromium	3.0E-02	mg/kg ww	7.4E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-07	5.2E-06	mg/kg-day	1.5E+00	mg/kg-day	3E-06
				Copper	4.3E-01	mg/kg ww	1.1E-05	mg/kg-day	NA	NA	NA	7.4E-05	mg/kg-day	4.0E-02	mg/kg-day	2E-03
				Dioxins/Furans												
				TCDD-TEQ	3.1E-07	mg/kg ww	7.7E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.0E-06	5.4E-11	mg/kg-day	7.0E-10	mg/kg-day	8E-02
			Exp. Route Total								9E-06					2E-01
		Exposure Point Total									9E-06					2E-01
	Exposure Medium Total										9E-06					2E-01
Medium Total											9E-06					2E-01
										Total of Receptor Hazards Across All Media	5E-05			Total of Receptor Hazards Across All Media		2E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/L = microgram per liter
mg/kg ww = milligram per kilogram wet weight

TABLE 45
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE CHILD FISH CONSUMER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Fish Consumer
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Fish Tissue	**Fish Tissue**	**Crab Orchard Creek & Piles Fork**	**Ingestion**													
				SVOCs												
				Acenaphthene	2.2E-02	mg/kg ww	7.9E-07	mg/kg-day	NA	NA	NA	1.1E-05	mg/kg-day	2.0E-01	mg/kg-day	6E-05
				Anthracene	7.7E-03	mg/kg ww	2.8E-07	mg/kg-day	NA	NA	NA	3.9E-06	mg/kg-day	1.0E+00	mg/kg-day	4E-06
				BaP-TE	5.3E-03	mg/kg ww	1.9E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06	2.7E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	2.0E-02	mg/kg ww	7.1E-07	mg/kg-day	NA	NA	NA	1.0E-05	mg/kg-day	1.0E-01	mg/kg-day	1E-04
				Fluorene	1.5E-02	mg/kg ww	5.4E-07	mg/kg-day	NA	NA	NA	7.5E-06	mg/kg-day	4.0E-02	mg/kg-day	2E-04
				Phenol	8.1E-03	mg/kg ww	2.9E-07	mg/kg-day	NA	NA	NA	4.1E-06	mg/kg-day	3.0E-01	mg/kg-day	1E-05
				Metals												
				Arsenic	1.8E-01	mg/kg ww	6.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-06	9.0E-05	mg/kg-day	3.0E-04	mg/kg-day	3E-01
				Chromium	3.0E-02	mg/kg ww	1.1E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-07	1.5E-05	mg/kg-day	1.5E+00	mg/kg-day	1E-05
				Copper	4.3E-01	mg/kg ww	1.5E-05	mg/kg-day	NA	NA	NA	2.1E-04	mg/kg-day	4.0E-02	mg/kg-day	5E-03
				Dioxins/Furans												
				TCDD-TEQ	3.1E-07	mg/kg ww	1.1E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.4E-06	1.6E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								1E-05					5E-01
		Exposure Point Total									1E-05					5E-01
	Exposure Medium Total										1E-05					5E-01
Medium Total											1E-05					5E-01
											Total of Receptor Hazards Across All Media	1E-05		Total of Receptor Hazards Across All Media		5E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg ww = milligram per kilogram wet weight
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available

TABLE 46
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT TRESPASSER - RAILROAD PROPERTY
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Railroad Property**	**Ingestion**													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	3.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-06	2.5E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	5.0E-06	mg/kg-day	NA	NA	NA	3.5E-05	mg/kg-day	4.0E-02	mg/kg-day	9E-04
				Naphthalene	4.2E+00	mg/kg	5.6E-08	mg/kg-day	NA	NA	NA	3.9E-07	mg/kg-day	2.0E-02	mg/kg-day	2E-05
				Pentachlorophenol	4.3E+01	mg/kg	5.7E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-07	4.0E-06	mg/kg-day	5.0E-03	mg/kg-day	8E-04
				Pyrene	2.5E+02	mg/kg	3.4E-06	mg/kg-day	NA	NA	NA	2.4E-05	mg/kg-day	3.0E-02	mg/kg-day	8E-04
				Metals												
				Arsenic	1.3E+01	mg/kg	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	4E-03
				Chromium	1.8E+01	mg/kg	2.4E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-07	1.6E-06	mg/kg-day	1.5E+00	mg/kg-day	1E-06
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	1.6E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.1E-06	1.1E-10	mg/kg-day	7.0E-10	mg/kg-day	2E-01
			Exp. Route Total								5E-06					2E-01
			Dermal													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	4.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-06	3.2E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	6.4E-06	mg/kg-day	NA	NA	NA	4.5E-05	mg/kg-day	4.0E-02	mg/kg-day	1E-03
				Naphthalene	4.2E+00	mg/kg	7.1E-08	mg/kg-day	NA	NA	NA	5.0E-07	mg/kg-day	2.0E-02	mg/kg-day	2E-05
				Pentachlorophenol	4.3E+01	mg/kg	7.3E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-07	5.1E-06	mg/kg-day	5.0E-03	mg/kg-day	1E-03
				Pyrene	2.5E+02	mg/kg	4.3E-06	mg/kg-day	NA	NA	NA	3.0E-05	mg/kg-day	3.0E-02	mg/kg-day	1E-03
				Metals												
				Arsenic	1.3E+01	mg/kg	5.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-08	3.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	1.8E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	4.7E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	6.1E-07	3.3E-11	mg/kg-day	7.0E-10	mg/kg-day	5E-02
			Exp. Route Total								4E-06					5E-02
		Exposure Point Total									1E-05					2E-01
	Exposure Medium Total										1E-05					2E-01
Soil	**Dust**	**Railroad Property**	**Inhalation**													
				SVOCs												
				BaP-TE	2.2E-05	ug/m^3	1.1E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	1.2E-11	7.9E-08	ug/m^3	NA	NA	NA
				Fluoranthene	3.0E-04	ug/m^3	1.6E-07	ug/m3	NA	NA	NA	1.1E-06	ug/m^3	NA	NA	NA
				Naphthalene	3.4E-06	ug/m^3	1.8E-09	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	6.0E-14	1.2E-08	ug/m^3	3.0E-03	mg/m^3	4E-09
				Pentachlorophenol	3.4E-05	ug/m^3	1.8E-08	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	9.2E-14	1.3E-07	ug/m^3	NA	NA	NA
				Pyrene	2.0E-04	ug/m^3	1.1E-07	ug/m3	NA	NA	NA	7.4E-07	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	1.0E-05	ug/m^3	5.4E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	2.3E-11	3.8E-08	ug/m^3	1.5E-05	mg/m^3	3E-06
				Chromium	1.4E-05	ug/m^3	7.4E-09	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	6.2E-10	5.2E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	9.6E-10	ug/m^3	5.0E-13	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	1.9E-11	3.5E-12	ug/m^3	4.0E-08	mg/m^3	9E-08
			Exp. Route Total								7E-10					3E-06
		Exposure Point Total									7E-10					3E-06
	Exposure Medium Total										7E-10					3E-06
Medium Total											1E-05					2E-01
										Total of Receptor Hazards Across All Media	1E-05			Total of Receptor Hazards Across All Media		2E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 47
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT TRESPASSER - 35' SWATH PROPERTY
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**35' Swath**	**Ingestion**													
				SVOCs												
				BaP-TE	4.7E+00	mg/kg	6.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.6E-07	4.4E-07	mg/kg-day	NA	NA	NA
				Pentachlorophenol	5.2E-01	mg/kg	7.0E-09	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-09	4.9E-08	mg/kg-day	5.0E-03	mg/kg-day	1E-05
				Metals												
				Arsenic	1.2E+01	mg/kg	1.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	4E-03
				Chromium	1.9E+01	mg/kg	2.6E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-07	1.8E-06	mg/kg-day	1.5E+00	mg/kg-day	1E-06
				Dioxins/Furans												
				TCDD-TEQ	1.9E-03	mg/kg	2.6E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	3.4E-06	1.8E-10	mg/kg-day	7.0E-10	mg/kg-day	3E-01
			Exp. Route Total								4E-06					3E-01
			Dermal													
				SVOCs												
				BaP-TE	4.7E+00	mg/kg	8.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-07	5.6E-07	mg/kg-day	NA	NA	NA
				Pentachlorophenol	5.2E-01	mg/kg	8.9E-09	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	3.6E-09	6.2E-08	mg/kg-day	5.0E-03	mg/kg-day	1E-05
				Metals												
				Arsenic	1.2E+01	mg/kg	4.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.1E-08	3.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	1.9E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.9E-03	mg/kg	7.6E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	9.9E-07	5.3E-11	mg/kg-day	7.0E-10	mg/kg-day	8E-02
			Exp. Route Total								2E-06					8E-02
		Exposure Point Total									6E-06					3E-01
	Exposure Medium Total										6E-06					3E-01
	Exposure Medium Total										6E-06					3E-01
Soil	**Dust**	**35' Swath**	**Inhalation**													
				SVOCs												
				BaP-TE	3.8E-06	ug/m^3	2.0E-09	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	2.2E-12	1.4E-08	ug/m^3	NA	NA	NA
				Pentachlorophenol	4.2E-07	ug/m^3	2.2E-10	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	1.1E-15	1.5E-09	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	9.8E-06	ug/m^3	5.1E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	2.2E-11	3.6E-08	ug/m^3	1.5E-05	mg/m^3	2E-06
				Chromium	1.5E-05	ug/m^3	8.0E-09	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	6.8E-10	5.6E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	1.6E-09	ug/m^3	8.1E-13	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	3.1E-11	5.7E-12	ug/m^3	4.0E-08	mg/m^3	1E-07
			Exp. Route Total								7E-10					3E-06
		Exposure Point Total									7E-10					3E-06
	Exposure Medium Total										7E-10					3E-06
Medium Total											6E-06					3E-01
										Total of Receptor Hazards Across All Media	6E-06			Total of Receptor Hazards Across All Media		3E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 48
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT TRESPASSER - SOIL NORTH & WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**North & West of Site**	**Ingestion**													
				SVOCs												
				BaP-TE	1.2E+00	mg/kg	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07	1.1E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.1E+01	mg/kg	1.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	2.2E+01	mg/kg	2.9E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-07	2.0E-06	mg/kg-day	1.5E+00	mg/kg-day	1E-06
			Exp. Route Total								5E-07					3E-03
			Dermal													
				SVOCs												
				BaP-TE	1.2E+00	mg/kg	2.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-07	1.4E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.1E+01	mg/kg	4.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-08	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	1E-03
				Chromium	2.2E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								2E-07					1E-03
		Exposure Point Total									7E-07					5E-03
	Exposure Medium Total										7E-07					5E-03
Soil	**Dust**	**North & West of Site**	**Inhalation**													
				SVOCs												
				BaP-TE	9.6E-07	ug/m^3	5.0E-10	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	5.5E-13	3.5E-09	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	9.0E-06	ug/m^3	4.7E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	2.0E-11	3.3E-08	ug/m^3	1.5E-05	mg/m^3	2E-06
				Chromium	1.7E-05	ug/m^3	9.1E-09	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	7.6E-10	6.4E-08	ug/m^3	NA	NA	NA
			Exp. Route Total								8E-10					2E-06
		Exposure Point Total									8E-10					2E-06
	Exposure Medium Total										8E-10					2E-06
Medium Total											7E-07					5E-03
										Total of Receptor Hazards Across All Media	7E-07			Total of Receptor Hazards Across All Media		5E-03

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
NA = not available
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 49
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT TRESPASSER - SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**East of Site**	**Ingestion**													
				SVOCs												
				BaP-TE	2.1E-01	mg/kg	2.8E-09	mg/kg-day	7.3E+00	(mg/kg-day)-1	2.1E-08	2.0E-08	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	8.2E+00	mg/kg	1.1E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	1.6E-07	7.7E-07	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	2.3E+01	mg/kg	3.0E-07	mg/kg-day	5.0E-01	(mg/kg-day)-1	1.5E-07	2.1E-06	mg/kg-day	1.5E+00	mg/kg-day	1E-06
				Dioxins/Furans												
				TCDD-TEQ	1.7E-04	mg/kg	2.2E-12	mg/kg-day	1.3E+05	(mg/kg-day)-1	2.9E-07	1.5E-11	mg/kg-day	7.0E-10	mg/kg-day	2E-02
			Exp. Route Total								6E-07					2E-02
			Dermal													
				SVOCs												
				BaP-TE	2.1E-01	mg/kg	3.6E-09	mg/kg-day	7.3E+00	(mg/kg-day)-1	2.6E-08	2.5E-08	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	8.2E+00	mg/kg	3.2E-08	mg/kg-day	1.5E+00	(mg/kg-day)-1	4.8E-08	2.3E-07	mg/kg-day	3.0E-04	mg/kg-day	8E-04
				Chromium	2.3E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	(mg/kg-day)-1	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.7E-04	mg/kg	6.5E-13	mg/kg-day	1.3E+05	(mg/kg-day)-1	8.4E-08	4.5E-12	mg/kg-day	7.0E-10	mg/kg-day	6E-03
			Exp. Route Total								2E-07					7E-03
		Exposure Point Total									8E-07					3E-02
	Exposure Medium Total										8E-07					3E-02
Soil	**Dust**	**East of Site**	**Inhalation**													
				SVOCs												
				BaP-TE	1.7E-07	ug/m^3	8.9E-11	ug/m3	1.1E-03	(ug/m^3)$^{-1}$	9.7E-14	6.2E-10	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	6.6E-06	ug/m^3	3.4E-09	ug/m3	4.3E-03	(ug/m^3)$^{-1}$	1.5E-11	2.4E-08	ug/m^3	1.5E-05	mg/m^3	2E-06
				Chromium	1.8E-05	ug/m^3	9.5E-09	ug/m3	8.4E-02	(ug/m^3)$^{-1}$	8.0E-10	6.6E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	1.3E-10	ug/m^3	6.9E-14	ug/m3	3.8E+01	(ug/m^3)$^{-1}$	2.6E-12	4.9E-13	ug/m^3	4.0E-08	mg/m^3	1E-08
			Exp. Route Total								8E-10					2E-06
		Exposure Point Total									8E-10					2E-06
	Exposure Medium Total										8E-10					2E-06
Medium Total											8E-07					3E-02
											Total of Receptor Hazards Across All Media					3E-02

Notes:
NA = not available

EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
(mg/kg-day)$^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
ug/m^3 = microgram per cubic meter
(ug/m^3)$^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 50
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT TRESPASSER - SEDIMENT NORTH & WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Kayaker/Canoeist
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	**Surface Sediment**	**North & West of Site**	**Dermal**													
				SVOCs												
				BaP-TE	1.0E+00	mg/kg	8.8E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	1.4E-06	6.2E-07	mg/kg-day	NA	NA	NA
				Metals												
				Arsenic	1.6E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	4.6E-07	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7E-03
				Chromium	2.8E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	(mg/kg-day)-1	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
			Exp. Route Total								2E-06					7E-03
		Exposure Point Total									2E-06					7E-03
	Exposure Medium Total										2E-06					7E-03
Medium Total											2E-06					7E-03
										Total of Receptor Hazards Across All Media	2E-06				Total of Receptor Hazards Across All Media	7E-03

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
NA = not available
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day

TABLE 51
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADULT HIKER/BICYCLE TRAIL USERS - RAILROAD PROPERTY
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Future
Receptor Population: Hikers/Bicycle Trail Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Railroad Property**	**Ingestion**													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	(mg/kg-day)-1	1.1E-06	5.5E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	2.2E-06	mg/kg-day	NA	0.0E+00	NA	7.6E-06	mg/kg-day	4.0E-02	mg/kg-day	2E-04
				Naphthalene	4.2E+00	mg/kg	2.4E-08	mg/kg-day	NA	0.0E+00	NA	8.5E-08	mg/kg-day	2.0E-02	mg/kg-day	4E-06
				Pentachlorophenol	4.3E+01	mg/kg	2.5E-07	mg/kg-day	4.0E-01	(mg/kg-day)-1	9.9E-08	8.7E-07	mg/kg-day	5.0E-03	mg/kg-day	2E-04
				Pyrene	2.5E+02	mg/kg	1.5E-06	mg/kg-day	NA	0.0E+00	NA	5.1E-06	mg/kg-day	3.0E-02	mg/kg-day	2E-04
				Metals												
				Arsenic	1.3E+01	mg/kg	7.5E-08	mg/kg-day	1.5E+00	(mg/kg-day)-1	1.1E-07	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	9E-04
				Chromium	1.8E+01	mg/kg	1.0E-07	mg/kg-day	5.0E-01	(mg/kg-day)-1	5.1E-08	3.6E-07	mg/kg-day	1.5E+00	mg/kg-day	2E-07
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	6.9E-12	mg/kg-day	1.3E+05	(mg/kg-day)-1	9.0E-07	2.4E-11	mg/kg-day	7.0E-10	mg/kg-day	3E-02
			Exp. Route Total								2E-06					4E-02
			Dermal													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	8.1E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	5.9E-07	2.8E-07	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	1.1E-06	mg/kg-day	NA	0.0E+00	NA	4.0E-06	mg/kg-day	4.0E-02	mg/kg-day	1E-04
				Naphthalene	4.2E+00	mg/kg	1.3E-08	mg/kg-day	NA	0.0E+00	NA	4.4E-08	mg/kg-day	2.0E-02	mg/kg-day	2E-06
				Pentachlorophenol	4.3E+01	mg/kg	1.3E-07	mg/kg-day	4.0E-01	(mg/kg-day)-1	5.2E-08	4.5E-07	mg/kg-day	5.0E-03	mg/kg-day	9E-05
				Pyrene	2.5E+02	mg/kg	7.6E-07	mg/kg-day	NA	0.0E+00	NA	2.7E-06	mg/kg-day	3.0E-02	mg/kg-day	9E-05
				Metals												
				Arsenic	1.3E+01	mg/kg	9.0E-09	mg/kg-day	1.5E+00	(mg/kg-day)-1	1.4E-08	3.2E-08	mg/kg-day	3.0E-04	mg/kg-day	1E-04
				Chromium	1.8E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	(mg/kg-day)-1	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	8.3E-13	mg/kg-day	1.3E+05	(mg/kg-day)-1	1.1E-07	2.9E-12	mg/kg-day	7.0E-10	mg/kg-day	4E-03
			Exp. Route Total								8E-07					5E-03
		Exposure Point Total									3E-06					4E-02
	Exposure Medium Total										3E-06					4E-02
Soil	**Dust**	**Railroad Property**	**Inhalation**													
				SVOCs												
				BaP-TE	2.2E-05	ug/m^3	3.7E-08	ug/m3	1.1E-03	(ug/m^3)$^{-1}$	4.0E-11	1.3E-07	ug/m^3	NA	NA	NA
				Fluoranthene	3.0E-04	ug/m^3	5.1E-07	ug/m3	NA	NA	NA	1.8E-06	ug/m^3	NA	NA	NA
				Naphthalene	3.4E-06	ug/m^3	5.7E-09	ug/m3	3.4E-05	(ug/m^3)$^{-1}$	1.9E-13	2.0E-08	ug/m^3	3.0E-03	mg/m^3	7E-09
				Pentachlorophenol	3.4E-05	ug/m^3	5.8E-08	ug/m3	5.1E-06	(ug/m^3)$^{-1}$	3.0E-13	2.0E-07	ug/m^3	NA	NA	NA
				Pyrene	2.0E-04	ug/m^3	3.5E-07	ug/m3	NA	NA	NA	1.2E-06	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	1.0E-05	ug/m^3	1.8E-08	ug/m3	4.3E-03	(ug/m^3)$^{-1}$	7.6E-11	6.2E-08	ug/m^3	1.5E-05	mg/m^3	4E-06
				Chromium	1.4E-05	ug/m^3	2.4E-08	ug/m3	8.4E-02	(ug/m^3)$^{-1}$	2.0E-09	8.4E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	9.6E-10	ug/m^3	1.6E-12	ug/m3	3.8E+01	(ug/m^3)$^{-1}$	6.2E-11	5.7E-12	ug/m^3	4.0E-08	mg/m^3	1E-07
			Exp. Route Total								2E-09					4E-06
		Exposure Point Total									2E-09					4E-06
	Exposure Medium Total										2E-09					4E-06
Medium Total											3E-06					4E-02
										Total of Receptor Hazards Across All Media	3E-06			Total of Receptor Hazards Across All Media		4E-02

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
(mg/kg-day)$^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
(ug/m^3)$^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 52
CALCULATION OF CANCER RISKS AND NON-CANCER HAZARDS - CURRENT/FUTURE OFF-SITE ADOLESCENT HIKER/BICYCLE TRAIL USERS - RAILROAD PROPERTY
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Scenario Timeframe: Current/Future
Receptor Population: Hikers/Bicycle Trail Users
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Compound of Potential Concern	EPC		Potential Cancer Risk Calculations					Potential Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		PELCR	Intake/Exposure Concentration		RfD/RfC		HQ
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	**Surface Soil**	**Railroad Property**	**Ingestion**													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	2.3E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-06	1.6E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	3.3E-06	mg/kg-day	NA	NA	NA	2.3E-05	mg/kg-day	4.0E-02	mg/kg-day	6E-04
				Naphthalene	4.2E+00	mg/kg	3.6E-08	mg/kg-day	NA	NA	NA	2.5E-07	mg/kg-day	2.0E-02	mg/kg-day	1E-05
				Pentachlorophenol	4.3E+01	mg/kg	3.7E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-07	2.6E-06	mg/kg-day	5.0E-03	mg/kg-day	5E-04
				Pyrene	2.5E+02	mg/kg	2.2E-06	mg/kg-day	NA	NA	NA	1.5E-05	mg/kg-day	3.0E-02	mg/kg-day	5E-04
				Metals												
				Arsenic	1.3E+01	mg/kg	1.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-07	7.9E-07	mg/kg-day	3.0E-04	mg/kg-day	3E-03
				Chromium	1.8E+01	mg/kg	1.5E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	7.7E-08	1.1E-06	mg/kg-day	1.5E+00	mg/kg-day	7E-07
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	1.0E-11	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-06	7.2E-11	mg/kg-day	7.0E-10	mg/kg-day	1E-01
			Exp. Route Total								3E-06					1E-01
			Dermal													
				SVOCs												
				BaP-TE	2.7E+01	mg/kg	1.5E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06	1.0E-06	mg/kg-day	NA	NA	NA
				Fluoranthene	3.7E+02	mg/kg	2.1E-06	mg/kg-day	NA	NA	NA	1.5E-05	mg/kg-day	4.0E-02	mg/kg-day	4E-04
				Naphthalene	4.2E+00	mg/kg	2.3E-08	mg/kg-day	NA	NA	NA	1.6E-07	mg/kg-day	2.0E-02	mg/kg-day	8E-06
				Pentachlorophenol	4.3E+01	mg/kg	2.4E-07	mg/kg-day	4.0E-01	$(mg/kg\text{-}day)^{-1}$	9.4E-08	1.7E-06	mg/kg-day	5.0E-03	mg/kg-day	3E-04
				Pyrene	2.5E+02	mg/kg	1.4E-06	mg/kg-day	NA	NA	NA	9.8E-06	mg/kg-day	3.0E-02	mg/kg-day	3E-04
				Metals												
				Arsenic	1.3E+01	mg/kg	1.7E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08	1.2E-07	mg/kg-day	3.0E-04	mg/kg-day	4E-04
				Chromium	1.8E+01	mg/kg	0.0E+00	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	0.0E+00	0.0E+00	mg/kg-day	3.8E-02	mg/kg-day	0E+00
				Dioxins/Furans												
				TCDD-TEQ	1.2E-03	mg/kg	1.5E-12	mg/kg-day	1.3E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-07	1.1E-11	mg/kg-day	7.0E-10	mg/kg-day	2E-02
			Exp. Route Total								1E-06					2E-02
		Exposure Point Total									5E-06					1E-01
	Exposure Medium Total										5E-06					1E-01
Soil	**Dust**	**Railroad Property**	**Inhalation**													
				SVOCs												
				BaP-TE	2.2E-05	ug/m^3	1.8E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	2.0E-11	1.3E-07	ug/m^3	NA	NA	NA
				Fluoranthene	3.0E-04	ug/m^3	2.6E-07	ug/m3	NA	NA	NA	1.8E-06	ug/m^3	NA	NA	NA
				Naphthalene	3.4E-06	ug/m^3	2.9E-09	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	9.7E-14	2.0E-08	ug/m^3	3.0E-03	mg/m^3	7E-09
				Pentachlorophenol	3.4E-05	ug/m^3	2.9E-08	ug/m3	5.1E-06	$(ug/m^3)^{-1}$	1.5E-13	2.0E-07	ug/m^3	NA	NA	NA
				Pyrene	2.0E-04	ug/m^3	1.7E-07	ug/m3	NA	NA	NA	1.2E-06	ug/m^3	NA	NA	NA
				Metals												
				Arsenic	1.0E-05	ug/m^3	8.8E-09	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	3.8E-11	6.2E-08	ug/m^3	1.5E-05	mg/m^3	4E-06
				Chromium	1.4E-05	ug/m^3	1.2E-08	ug/m3	8.4E-02	$(ug/m^3)^{-1}$	1.0E-09	8.4E-08	ug/m^3	NA	NA	NA
				Dioxins/Furans												
				TCDD-TEQ	9.6E-10	ug/m^3	8.1E-13	ug/m3	3.8E+01	$(ug/m^3)^{-1}$	3.1E-11	5.7E-12	ug/m^3	4.0E-08	mg/m^3	1E-07
			Exp. Route Total								1E-09					4E-06
		Exposure Point Total									1E-09					4E-06
	Exposure Medium Total										1E-09					4E-06
Medium Total											5E-06					1E-01
										Total of Receptor Hazards Across All Media	5E-06			Total of Receptor Hazards Across All Media		1E-01

Notes:
EPC - exposure point concentration
CSF = cancer slope factor
PELCR = potential excess lifetime cancer risk
HQ = hazard quotient
RfD = reference dose
RfC = reference concentration
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
mg/kg = milligram per kilogram
$(mg/kg\text{-}day)^{-1}$ = per milligram per kilogram-day
mg/kg-day = milligram per kilogram-day
NA = not available
ug/m^3 = microgram per cubic meter
$(ug/m^3)^{-1}$ = per microgram per cubic meter
mg/m^3 = milligram per cubic meter

TABLE 53
SUMMARY OF ESTIMATED POTENTIAL HUMAN HEALTH RISKS AND HAZARDS
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

Receptor Exposure Group	Total Potential Excess Lifetime Cancer Risk	Total Potential Non-Cancer Hazard Index
On-Site Receptor Populations		
Current/Future On-Site Adult Maintenance Worker/Caretaker (1)	8E-05	1
Current/Future On-site Adult Deer Hunter and Adolescent and Child Deer Consumer		
Adult	1E-05	0.1
Adolescent	5E-06	0.2
Child	4E-06	0.3
Current/Future On-site Adolescent Trespasser	7E-06	0.3
Future On-site Adult and Adolescent Hiker/Bicycle Trail Users		
Adult	9E-06	0.3
Adolescent	1E-05	0.8
Future On-site Solar Farm Redevelopment Worker	2E-06	0.5
Future On-site Solar Farm Maintenance Worker	2E-05	0.5
Off-Site Receptor Populations		
Current/Future Off-site Adult and Adolescent Kayaker/Canoeist		
Adult	4E-05	0.0001
Adolescent	4E-05	0.0002
Current/Future Off-site Adult and Adolescent Recreational Angler and Child Fish Consumer		
Adult	6E-05	0.1
Adolescent	5E-05	0.2
Child	1E-05	0.5
Current/Future Adolescent Trespasser		
Railroad Property	1E-05	0.2
35' Swath Property	6E-06	0.3
Soil North & West of the Site	7E-07	0.005
Soil East of the Site	8E-07	0.03
Sediment North & West of the Site	2E-06	0.007
Hypothetical Future Adult and Adolescent Hiker/Bicycle Trail Users in Railroad Property		
Adult	3E-06	0.04
Adolescent	5E-06	0.1

Note:

(1) Total HI is 2. However, endpoint-specific hazard indices calculated for the on-Site adult maintenance worker/caretaker do not exceed a target HI of 1 for any endpoint evaluated (circulatory system, whole body, nervous system, development, skin, kidney, liver, respiratory system, endocrine, or reproductive).

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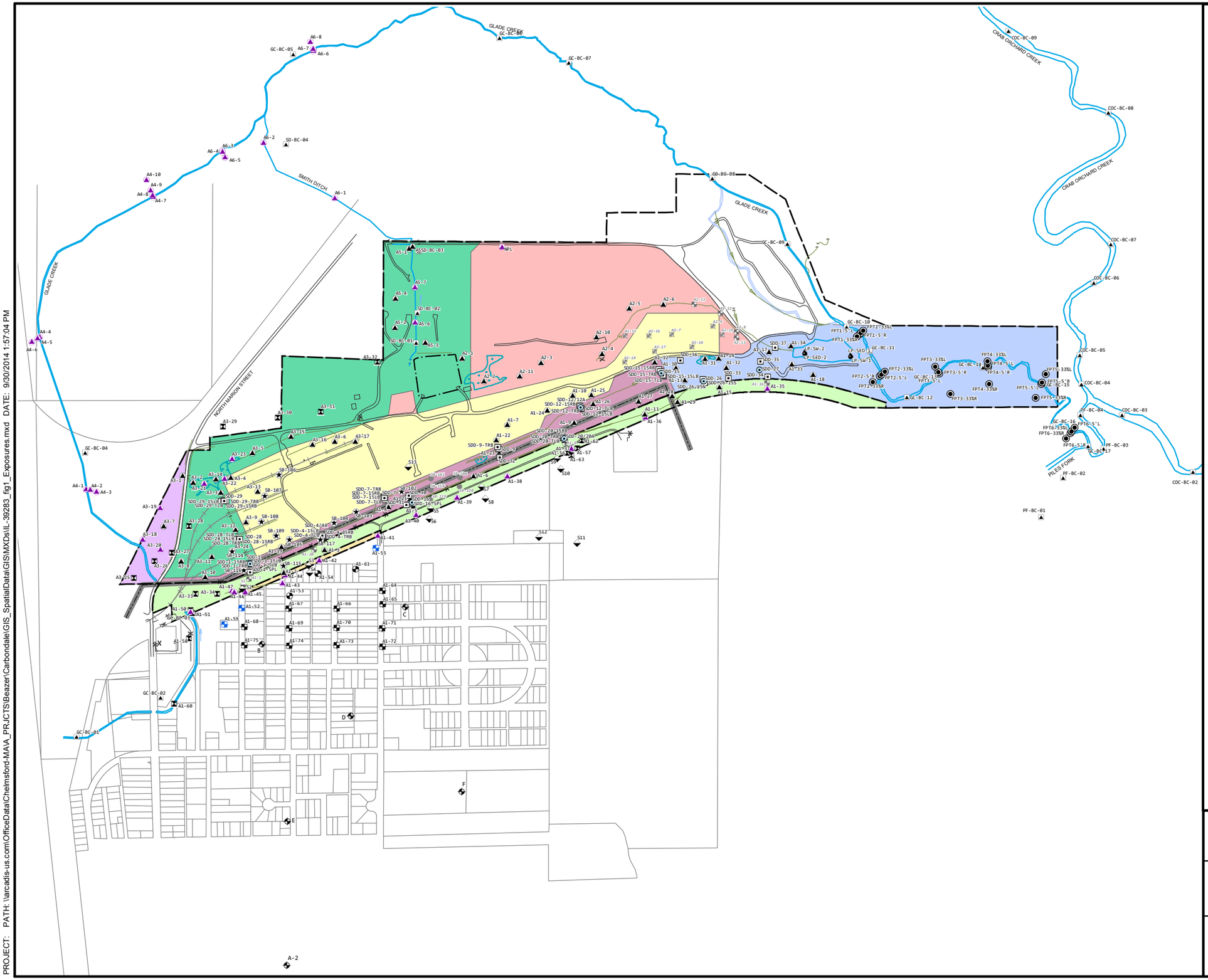
Figures



LEGEND:

- 2005 EPA SAMPLE
- 2005 SURFACE COVER
- 2006 SOUTHERN DRAINAGE
- 2008 SOUTHERN DRAINAGE
- 2009 SP LOCATION
- 2010 SP LOCATION
- BCWP
- COMPOSITE AUG 2012
- COMPOSITE NOV 2012
- FLOODPLAIN SAMPLE
- GRAB- AUG 2012
- RESIDENTIAL
- SEDIMENT-SURFACE WATER
- SP-USEPA
- COVERED- FORMER LAGOON
- REMOVED SAMPLES
- REMOVED EPA SAMPLE
- REMOVED SB- SOIL/DEBRIS PILE AREA
- DRAINAGE DITCH
- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- WETLAND
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- PROPERTY LINE
- CAMU CONTAINMENT AREA
- POTENTIAL BIKE PATH
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA

0 600 1,200

SCALE IN FEET

BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

SAMPLE LOCATIONS AND EXPOSURE AREAS

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FIGURE 1

CITY: CHELMSFORD_DIV/GROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\OfficeData\Chelmsford-MAA_PROJCTS\Beazer\Carbondale\GIS_SpatialData\GIS\MXDs\IL-39283_fig1_Exposures.mxd DATE: 9/30/2014 1:57:04 PM

SOURCE(S)	PRIMARY MEDIA / CONSTITUENTS OF CONCERN	POTENTIAL TRANSPORT MECHANISMS	SECONDARY MEDIA	POTENTIAL TRANSPORT MECHANISMS	TERTIARY MEDIA	EXPOSURE MEDIA	EXPOSURE ROUTE	POTENTIAL RECEPTORS												
								ON-SITE RECEPTORS									OFF-SITE RECEPTORS			
								Current/ Future Adult Maintenance Worker/ Caretaker	Current/ Future Adult, Adolescent and Child Deer Consumer [1]	Current/Future On-Site Adult and Adolescent Recreational Crayfishers	Future Adult and Adolescent Hikers/ Bicycle Trail Users	Current/Future Adolescent Trespasser	Future On-site Adult Generic Industrial Worker	Future Solar Farm Redevelopment Worker	Future Solar Farm Maintenance Worker	Future On-site Generic Redevelopment Worker	Current/ Future Adult and Adolescent Kayaker/ Canoeist	Current/ Future Adult and Adolescent Recreational Angler and Child Fish Consumer	Current/ Future Adolescent Trespasser	Hypothetical Future Adult and Adolescent Hikers/ Bicycle Trail Users on Railroad Property	Current/Future Adult and Child Resident
RELEASES DURING HISTORIC OPERATIONS AS A WOOD-TREATING FACILITY	ON-SITE SURFACE AND SUBSURFACE SOIL / PAHS, PENTACHLOROPHENOL, ARSENIC, CHROMIUM, COPPER, DIOXINS/FURANS		ON-SITE SURFACE AND SUBSURFACE SOIL			ON-SITE SURFACE AND SUBSURFACE SOIL	Dermal Absorption	●	NA	NA	●	●	X [3]	●	●	X [4]	NA	NA	NA	NA	NA
							Incidental Ingestion	●	NA	NA	●	●	X [3]	●	●	X [4]	NA	NA	NA	NA	NA
		WIND DISPERSION & TRANSPORT OF SOIL DERIVED DUST	DUST			DUST	Inhalation of Outdoor Air/Dust	●	NA	NA	●	●	X [3]	●	●	X [4]	NA	NA	●	●	X
			OFF-SITE SURFACE SOIL			OFF-SITE SURFACE SOIL WEST, NORTH, AND EAST OF SITE	Dermal Absorption	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	●	●	○
							Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	●	●	○
	DNAPL (CREOSOTE) / PAHS					OFF-SITE SURFACE SOIL SOUTH OF SITE	Dermal Absorption	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	X
							Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	X
		UPTAKE BY PLANTS AND ANIMALS	DEER			DEER	Ingestion	NA	●	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LEACHING INFILTRATION PERCOLATION	GROUNDWATER			GROUNDWATER	Dermal Absorption	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
							Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		GRAVITY		GROUNDWATER TRANSPORT & DISCHARGE																
		WATER RUNOFF	SURFACE WATER		SURFACE WATER	SURFACE WATER	Dermal Absorption	NA	NA	NA	NA	NA	NA	NA	NA	NA	●	●	○	NA	○
							Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	○	○	○	NA	○
			SEDIMENT		SEDIMENT	SEDIMENT	Dermal Absorption	NA	NA	NA	NA	NA	NA	NA	NA	NA	●	●	●	NA	○
							Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	○	○	○	NA	○
				BIOUPTAKE	FISH	FISH	Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	●	NA	NA	NA
					CRAYFISH[2]	CRAYFISH[2]	Ingestion	NA	NA	X	NA	NA	NA	NA	NA	NA	NA	X [2]	NA	NA	NA

LEGEND:

X	Incomplete Exposure Pathway
○	Exposure Pathway Potentially Complete but Insignificant
●	Exposure Pathway Potentially Complete
NA	Not Applicable to Receptor
PAHS	Polynuclear Aromatic Hydrocarbons

Notes:

(1) The adult, adolescent, and child deer consumers are assumed to eat deer that foraged on-Site but were harvested off-Site. Therefore, their exposure to Site constituents is only via uptake into deer meat.

(2) No crayfish collection or any evidence of this activity has been observed to occur at the Site. Based on field work conducted in both Piles Fork and Glade Creek indicate crayfish are not abundant.

(3) Future use of the Site is as a solar farm and conservation open space. Institutional controls will preclude generic industrial development without further evaluation to confirm planned use meets allowable risk levels.

(4) Institutional controls will establish worker protective controls to eliminate any potential future exposures. Furthermore, institutional controls will preclude generic industrial development without further evaluation to confirm planned use meets allowable risk levels.

FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

HHRA CONCEPTUAL SITE MODEL FOR POTENTIAL EXPOSURE

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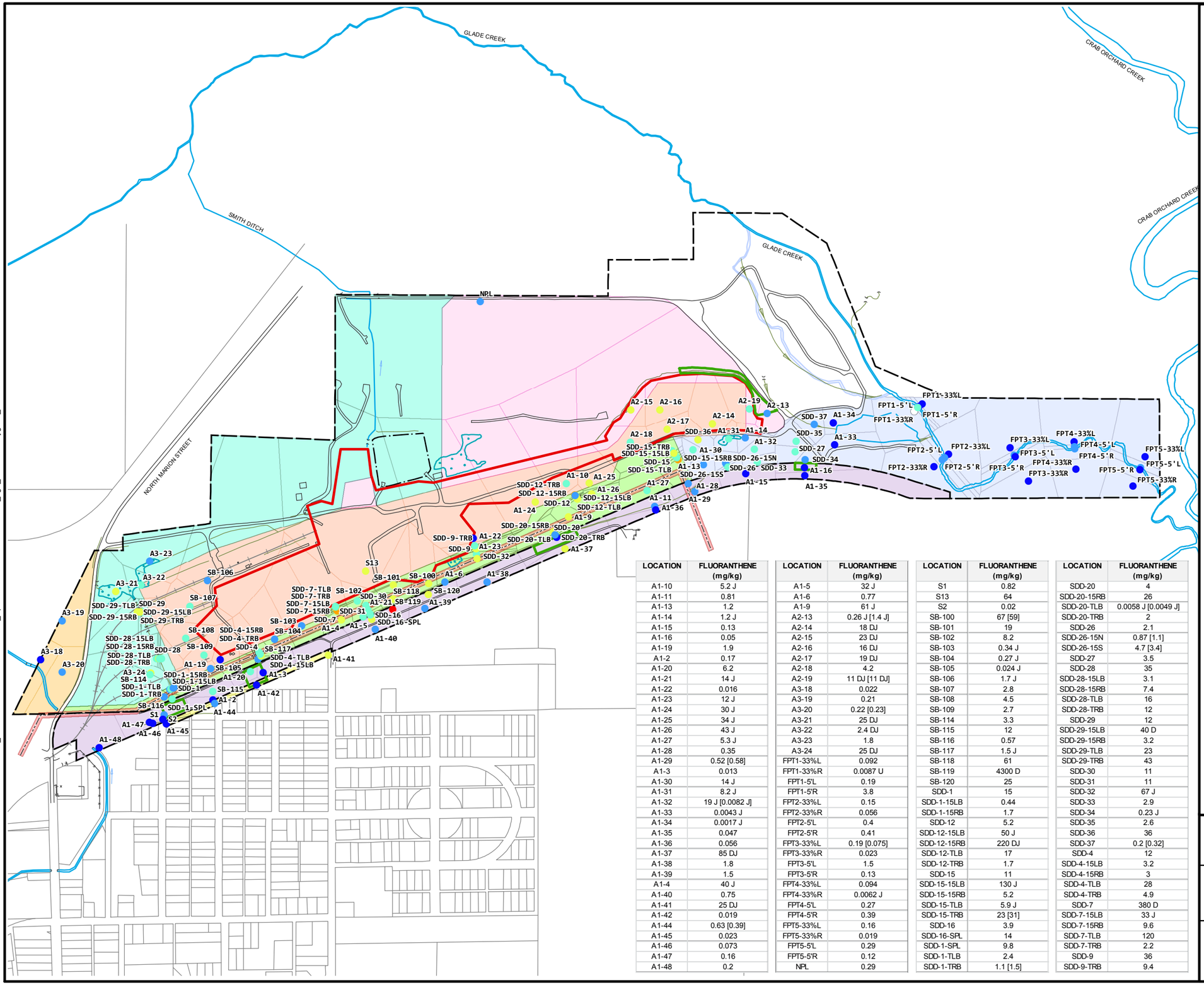
FIGURE 2



LOCATION	FLUORANTHENE (mg/kg)
A1-10	5.2 J
A1-11	0.81
A1-13	1.2
A1-14	1.2 J
A1-15	0.13
A1-16	0.05
A1-19	1.9
A1-2	0.17
A1-20	6.2
A1-21	14 J
A1-22	0.016
A1-23	12 J
A1-24	30 J
A1-25	34 J
A1-26	43 J
A1-27	5.3 J
A1-28	0.35
A1-29	0.52 [0.58]
A1-3	0.013
A1-30	14 J
A1-31	8.2 J
A1-32	19 J [0.0082 J]
A1-33	0.0043 J
A1-34	0.0017 J
A1-35	0.047
A1-36	0.056
A1-37	85 DJ
A1-38	1.8
A1-39	1.5
A1-4	40 J
A1-40	0.75
A1-41	25 DJ
A1-42	0.019
A1-44	0.63 [0.39]
A1-45	0.023
A1-46	0.073
A1-47	0.16
A1-48	0.2

LOCATION	FLUORANTHENE (mg/kg)
A1-5	32 J
A1-6	0.77
A1-9	61 J
A2-13	0.26 J [1.4 J]
A2-14	18 DJ
A2-15	23 DJ
A2-16	16 DJ
A2-17	19 DJ
A2-18	4.2
A2-19	11 DJ [11 DJ]
A3-18	0.022
A3-19	0.21
A3-20	0.22 [0.23]
A3-21	25 DJ
A3-22	2.4 DJ
A3-23	1.8
A3-24	25 DJ
FPT1-33%L	0.092
FPT1-33%R	0.0087 U
FPT1-5'L	0.19
FPT1-5'R	3.8
FPT2-33%L	0.15
FPT2-33%R	0.056
FPT2-5'L	0.4
FPT2-5'R	0.41
FPT3-33%L	0.19 [0.075]
FPT3-33%R	0.023
FPT3-5'L	1.5
FPT3-5'R	0.13
FPT4-33%L	0.094
FPT4-33%R	0.0062 J
FPT4-5'L	0.27
FPT4-5'R	0.39
FPT5-33%L	0.16
FPT5-33%R	0.019
FPT5-5'L	0.29
FPT5-5'R	0.12
NPL	0.29

LOCATION	FLUORANTHENE (mg/kg)
S1	0.82
S13	64
S2	0.02
SB-100	67 [59]
SB-101	19
SB-102	8.2
SB-103	0.34 J
SB-104	0.27 J
SB-105	0.024 J
SB-106	1.7 J
SB-107	2.8
SB-108	4.5
SB-109	2.7
SB-114	3.3
SB-115	12
SB-116	0.57
SB-117	1.5 J
SB-118	61
SB-119	4300 D
SB-120	25
SDD-1	15
SDD-1-15LB	0.44
SDD-1-15RB	1.7
SDD-12	5.2
SDD-12-15LB	50 J
SDD-12-15RB	220 DJ
SDD-12-TLB	17
SDD-12-TRB	1.7
SDD-15	11
SDD-15-15LB	130 J
SDD-15-15RB	5.2
SDD-15-TLB	5.9 J
SDD-15-TRB	23 [31]
SDD-16	3.9
SDD-16-SPL	14
SDD-1-SPL	9.8
SDD-1-TLB	2.4
SDD-1-TRB	1.1 [1.5]

LOCATION	FLUORANTHENE (mg/kg)
SDD-20	4
SDD-20-15RB	26
SDD-20-TLB	0.0058 J [0.0049 J]
SDD-20-TRB	2
SDD-26	2.1
SDD-26-15N	0.87 [1.1]
SDD-26-15S	4.7 [3.4]
SDD-27	3.5
SDD-28	35
SDD-28-15LB	3.1
SDD-28-15RB	7.4
SDD-28-TLB	16
SDD-28-TRB	12
SDD-29	12
SDD-29-15LB	40 D
SDD-29-15RB	3.2
SDD-29-TLB	23
SDD-29-TRB	43
SDD-30	11
SDD-31	11
SDD-32	67 J
SDD-33	2.9
SDD-34	0.23 J
SDD-35	2.6
SDD-36	36
SDD-37	0.2 [0.32]
SDD-4	12
SDD-4-15LB	3.2
SDD-4-15RB	3
SDD-4-TLB	28
SDD-4-TRB	4.9
SDD-7	380 D
SDD-7-15LB	33 J
SDD-7-15RB	9.6
SDD-7-TLB	120
SDD-7-TRB	2.2
SDD-9	36
SDD-9-TRB	9.4

LEGEND:

FLUORANTHENE (mg/kg)

- NOT DETECTED
- ≤ 0.2
- 0.2 - 2
- 2 - 14
- 14 - 95
- 95 - 640
- > 640
- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

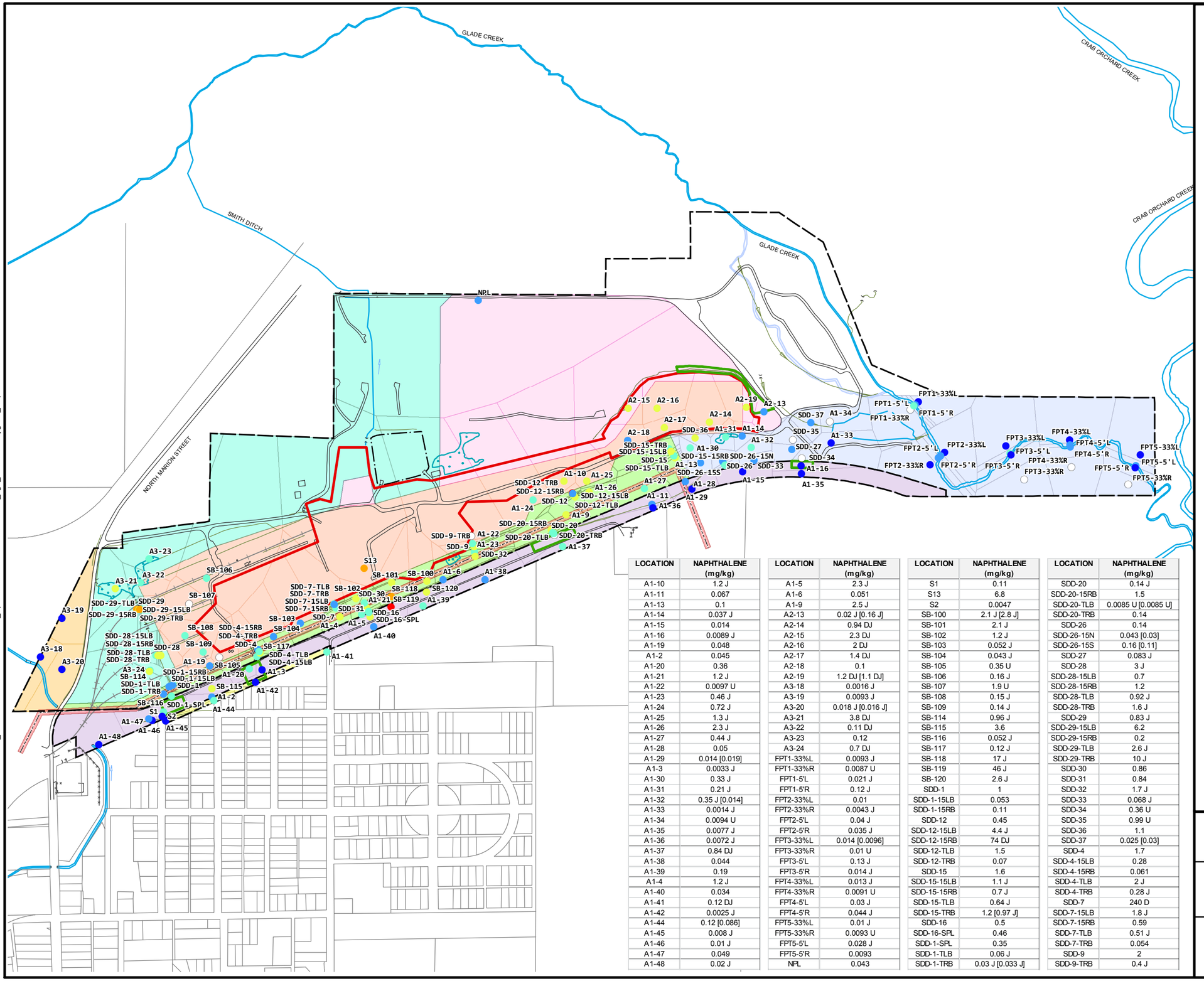
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

FLUORANTHENE THIESSEN POLYGON MAP

ARCADIS

FIGURE 3

CITY: CHELMSFORD_DIVGROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\OfficeData\Chelmsford-MA\A_PRJCTS\Beazer\Carbondale\GIS_SpatialData\GISMXDs\IL-39283_fig2_ThiessenPolygons_Fluoranthene.mxd DATE: 9/30/2014 2:47:07 PM



LOCATION	NAPHTHALENE (mg/kg)
A1-10	1.2 J
A1-11	0.067
A1-13	0.1
A1-14	0.037 J
A1-15	0.014
A1-16	0.0089 J
A1-19	0.048
A1-2	0.045
A1-20	0.36
A1-21	1.2 J
A1-22	0.0097 U
A1-23	0.46 J
A1-24	0.72 J
A1-25	1.3 J
A1-26	2.3 J
A1-27	0.44 J
A1-28	0.05
A1-29	0.014 [0.019]
A1-3	0.0033 J
A1-30	0.33 J
A1-31	0.21 J
A1-32	0.35 J [0.014]
A1-33	0.0014 J
A1-34	0.0094 U
A1-35	0.0077 J
A1-36	0.0072 J
A1-37	0.84 DJ
A1-38	0.044
A1-39	0.19
A1-4	1.2 J
A1-40	0.034
A1-41	0.12 DJ
A1-42	0.0025 J
A1-44	0.12 [0.086]
A1-45	0.008 J
A1-46	0.01 J
A1-47	0.049
A1-48	0.02 J

LOCATION	NAPHTHALENE (mg/kg)
A1-5	2.3 J
A1-6	0.051
A1-9	2.5 J
A2-13	0.02 J [0.16 J]
A2-14	0.94 DJ
A2-15	2.3 DJ
A2-16	2 DJ
A2-17	1.4 DJ
A2-18	0.1
A2-19	1.2 DJ [1.1 DJ]
A3-18	0.0016 J
A3-19	0.0093 J
A3-20	0.018 J [0.016 J]
A3-21	3.8 DJ
A3-22	0.11 DJ
A3-23	0.12
A3-24	0.7 DJ
FPT1-33%L	0.0093 J
FPT1-33%R	0.0087 U
FPT1-5'L	0.021 J
FPT1-5'R	0.12 J
FPT2-33%L	0.01
FPT2-33%R	0.0043 J
FPT2-5'L	0.04 J
FPT2-5'R	0.035 J
FPT3-33%L	0.014 [0.0096]
FPT3-33%R	0.01 U
FPT3-5'L	0.13 J
FPT3-5'R	0.014 J
FPT4-33%L	0.013 J
FPT4-33%R	0.0091 U
FPT4-5'L	0.03 J
FPT4-5'R	0.044 J
FPT5-33%L	0.01 J
FPT5-33%R	0.0093 U
FPT5-5'L	0.028 J
FPT5-5'R	0.0093
NPL	0.043

LOCATION	NAPHTHALENE (mg/kg)
S1	0.11
S13	6.8
S2	0.0047
SB-100	2.1 J [2.8 J]
SB-101	2.1 J
SB-102	1.2 J
SB-103	0.052 J
SB-104	0.043 J
SB-105	0.35 U
SB-106	0.16 J
SB-107	1.9 U
SB-108	0.15 J
SB-109	0.14 J
SB-114	0.96 J
SB-115	3.6
SB-116	0.052 J
SB-117	0.12 J
SB-118	17 J
SB-119	46 J
SB-120	2.6 J
SDD-1	1
SDD-1-15LB	0.053
SDD-1-15RB	0.11
SDD-12	0.45
SDD-12-15LB	4.4 J
SDD-12-15RB	74 DJ
SDD-12-TLB	1.5
SDD-12-TRB	0.07
SDD-15	1.6
SDD-15-15LB	1.1 J
SDD-15-15RB	0.7 J
SDD-15-TLB	0.64 J
SDD-15-TRB	1.2 [0.97 J]
SDD-16	0.5
SDD-16-SPL	0.46
SDD-1-SPL	0.35
SDD-1-TLB	0.06 J
SDD-1-TRB	0.03 J [0.033 J]

LOCATION	NAPHTHALENE (mg/kg)
SDD-20	0.14 J
SDD-20-15RB	1.5
SDD-20-TLB	0.0085 U [0.0085 U]
SDD-20-TRB	0.14
SDD-26	0.14
SDD-26-15N	0.043 [0.03]
SDD-26-15S	0.16 [0.11]
SDD-27	0.083 J
SDD-28	3 J
SDD-28-15LB	0.7
SDD-28-15RB	1.2
SDD-28-TLB	0.92 J
SDD-28-TRB	1.6 J
SDD-29	0.83 J
SDD-29-15LB	6.2
SDD-29-15RB	0.2
SDD-29-TLB	2.6 J
SDD-29-TRB	10 J
SDD-30	0.86
SDD-31	0.84
SDD-32	1.7 J
SDD-33	0.068 J
SDD-34	0.36 U
SDD-35	0.99 U
SDD-36	1.1
SDD-37	0.025 [0.03]
SDD-4	1.7
SDD-4-15LB	0.28
SDD-4-15RB	0.061
SDD-4-TLB	2 J
SDD-4-TRB	0.28 J
SDD-7	240 D
SDD-7-15LB	1.8 J
SDD-7-15RB	0.59
SDD-7-TLB	0.51 J
SDD-7-TRB	0.054
SDD-9	2
SDD-9-TRB	0.4 J

LEGEND:

NAPHTHALENE (mg/kg)

- NOT DETECTED
- ≤ 0.02
- 0.02 - 0.1
- 0.1 - 0.9
- 0.9 - 6
- 6 - 37
- > 37
- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

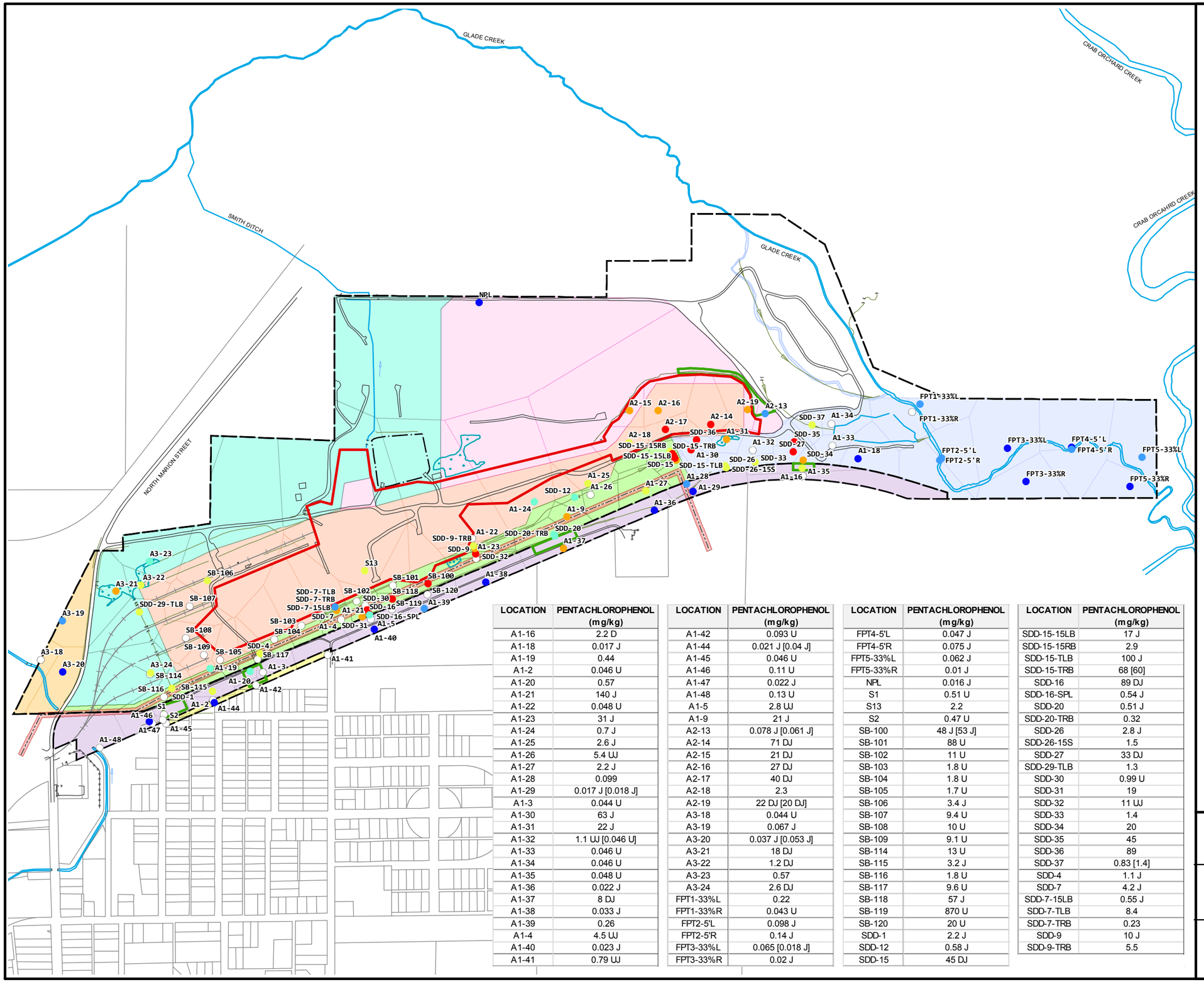
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

NAPHTHALENE THIESSEN POLYGON MAP

ARCADIS

FIGURE 4

CITY: CHELMSFORD DIVGROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\Office\Data\Chelmsford-MA\A_PRJCTS\Beazer\Carbondale\GIS_SpatialData\GISMXDs\IL-39283_fig3_ThiessenPolygons_Naphthalene.mxd DATE: 9/30/2014 2:54:09 PM



LOCATION	PENTACHLOROPHENOL (mg/kg)
A1-16	2.2 D
A1-18	0.017 J
A1-19	0.44
A1-2	0.046 U
A1-20	0.57
A1-21	140 J
A1-22	0.048 U
A1-23	31 J
A1-24	0.7 J
A1-25	2.6 J
A1-26	5.4 UJ
A1-27	2.2 J
A1-28	0.099
A1-29	0.017 J [0.018 J]
A1-3	0.044 U
A1-30	63 J
A1-31	22 J
A1-32	1.1 UJ [0.046 U]
A1-33	0.046 U
A1-34	0.046 U
A1-35	0.048 U
A1-36	0.022 J
A1-37	8 DJ
A1-38	0.033 J
A1-39	0.26
A1-4	4.5 UJ
A1-40	0.023 J
A1-41	0.79 UJ

LOCATION	PENTACHLOROPHENOL (mg/kg)
A1-42	0.093 U
A1-44	0.021 J [0.04 J]
A1-45	0.046 U
A1-46	0.11 U
A1-47	0.022 J
A1-48	0.13 U
A1-5	2.8 UJ
A1-9	21 J
A2-13	0.078 J [0.061 J]
A2-14	71 DJ
A2-15	21 DJ
A2-16	27 DJ
A2-17	40 DJ
A2-18	2.3
A2-19	22 DJ [20 DJ]
A3-18	0.044 U
A3-19	0.067 J
A3-20	0.037 J [0.053 J]
A3-21	18 DJ
A3-22	1.2 DJ
A3-23	0.57
A3-24	2.6 DJ
FPT1-33%L	0.22
FPT1-33%R	0.043 U
FPT2-5'L	0.098 J
FPT2-5'R	0.14 J
FPT3-33%L	0.065 [0.018 J]
FPT3-33%R	0.02 J

LOCATION	PENTACHLOROPHENOL (mg/kg)
FPT4-5'L	0.047 J
FPT4-5'R	0.075 J
FPT5-33%L	0.062 J
FPT5-33%R	0.01 J
NPL	0.016 J
S1	0.51 U
S13	2.2
S2	0.47 U
SB-100	48 J [53 J]
SB-101	88 U
SB-102	11 U
SB-103	1.8 U
SB-104	1.8 U
SB-105	1.7 U
SB-106	3.4 J
SB-107	9.4 U
SB-108	10 U
SB-109	9.1 U
SB-114	13 U
SB-115	3.2 J
SB-116	1.8 U
SB-117	9.6 U
SB-118	57 J
SB-119	870 U
SB-120	20 U
SDD-1	2.2 J
SDD-12	0.58 J
SDD-15	45 DJ

LOCATION	PENTACHLOROPHENOL (mg/kg)
SDD-15-15LB	17 J
SDD-15-15RB	2.9
SDD-15-TLB	100 J
SDD-15-TRB	68 [60]
SDD-16	89 DJ
SDD-16-SPL	0.54 J
SDD-20	0.51 J
SDD-20-TRB	0.32
SDD-26	2.8 J
SDD-26-15S	1.5
SDD-27	33 DJ
SDD-29-TLB	1.3
SDD-30	0.99 U
SDD-31	19
SDD-32	11 UJ
SDD-33	1.4
SDD-34	20
SDD-35	45
SDD-36	89
SDD-37	0.83 [1.4]
SDD-4	1.1 J
SDD-7	4.2 J
SDD-7-15LB	0.55 J
SDD-7-TLB	8.4
SDD-7-TRB	0.23
SDD-9	10 J
SDD-9-TRB	5.5

LEGEND:

PENTACHLOROPHENOL (mg/kg)

- NOT DETECTED
- ≤ 0.06
- 0.06 - 0.3
- 0.3 - 1
- 1 - 6
- 6 - 30
- > 30

- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

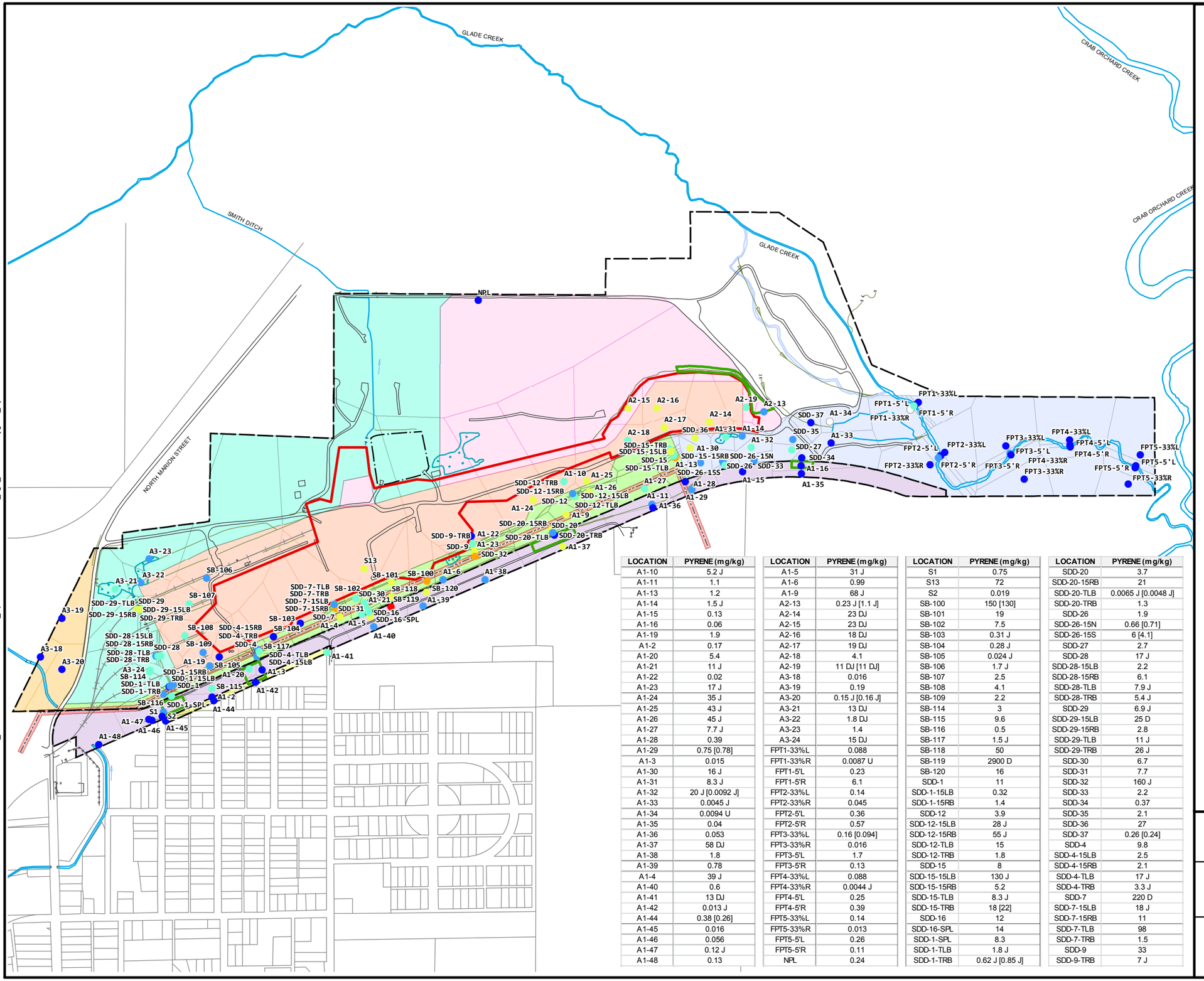
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

PENTACHLOROPHENOL THIESSEN POLYGON MAP

ARCADIS

FIGURE 5

CITY: CHELMSFORD DIV/GROUP: ENV/IEST DB: mbuonarduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\Officedata\Chelmsford-MA\A_PRJCTS\Beazer\Carbondale\GIS_SpatialData\GIS\MXDs\IL-39283_fig4_ThiessenPolygons_Penta.mxd DATE: 9/30/2014 3:31:39 PM



LOCATION	PYRENE (mg/kg)
A1-10	5.2 J
A1-11	1.1
A1-13	1.2
A1-14	1.5 J
A1-15	0.13
A1-16	0.06
A1-19	1.9
A1-2	0.17
A1-20	5.4
A1-21	11 J
A1-22	0.02
A1-23	17 J
A1-24	35 J
A1-25	43 J
A1-26	45 J
A1-27	7.7 J
A1-28	0.39
A1-29	0.75 [0.78]
A1-3	0.015
A1-30	16 J
A1-31	8.3 J
A1-32	20 J [0.0092 J]
A1-33	0.0045 J
A1-34	0.0094 U
A1-35	0.04
A1-36	0.053
A1-37	58 DJ
A1-38	1.8
A1-39	0.78
A1-4	39 J
A1-40	0.6
A1-41	13 DJ
A1-42	0.013 J
A1-44	0.38 [0.26]
A1-45	0.016
A1-46	0.056
A1-47	0.12 J
A1-48	0.13

LOCATION	PYRENE (mg/kg)
A1-5	31 J
A1-6	0.99
A1-9	68 J
A2-13	0.23 J [1.1 J]
A2-14	23 DJ
A2-15	23 DJ
A2-16	18 DJ
A2-17	19 DJ
A2-18	4.1
A2-19	11 DJ [11 DJ]
A3-18	0.016
A3-19	0.19
A3-20	0.15 J [0.16 J]
A3-21	13 DJ
A3-22	1.8 DJ
A3-23	1.4
A3-24	15 DJ
FPT1-33%L	0.088
FPT1-33%R	0.0087 U
FPT1-5'L	0.23
FPT1-5'R	6.1
FPT2-33%L	0.14
FPT2-33%R	0.045
FPT2-5'L	0.36
FPT2-5'R	0.57
FPT3-33%L	0.16 [0.094]
FPT3-33%R	0.016
FPT3-5'L	1.7
FPT3-5'R	0.13
FPT4-33%L	0.088
FPT4-33%R	0.0044 J
FPT4-5'L	0.25
FPT4-5'R	0.39
FPT5-33%L	0.14
FPT5-33%R	0.013
FPT5-5'L	0.26
FPT5-5'R	0.11
NPL	0.24

LOCATION	PYRENE (mg/kg)
S1	0.75
S13	72
S2	0.019
SB-100	150 [130]
SB-101	19
SB-102	7.5
SB-103	0.31 J
SB-104	0.28 J
SB-105	0.024 J
SB-106	1.7 J
SB-107	2.5
SB-108	4.1
SB-109	2.2
SB-114	3
SB-115	9.6
SB-116	0.5
SB-117	1.5 J
SB-118	50
SB-119	2900 D
SB-120	16
SDD-1	11
SDD-1-15LB	0.32
SDD-1-15RB	1.4
SDD-12	3.9
SDD-12-15LB	28 J
SDD-12-15RB	55 J
SDD-12-TLB	15
SDD-12-TRB	1.8
SDD-15	8
SDD-15-15LB	130 J
SDD-15-15RB	5.2
SDD-15-TLB	8.3 J
SDD-15-TRB	18 [22]
SDD-16	12
SDD-16-SPL	14
SDD-1-SPL	8.3
SDD-1-TLB	1.8 J
SDD-1-TRB	0.62 J [0.85 J]

LOCATION	PYRENE (mg/kg)
SDD-20	3.7
SDD-20-15RB	21
SDD-20-TLB	0.0065 J [0.0048 J]
SDD-20-TRB	1.3
SDD-26	1.9
SDD-26-15N	0.66 [0.71]
SDD-26-15S	6 [4.1]
SDD-27	2.7
SDD-28	17 J
SDD-28-15LB	2.2
SDD-28-15RB	6.1
SDD-28-TLB	7.9 J
SDD-28-TRB	5.4 J
SDD-29	6.9 J
SDD-29-15LB	25 D
SDD-29-15RB	2.8
SDD-29-TLB	11 J
SDD-29-TRB	26 J
SDD-30	6.7
SDD-31	7.7
SDD-32	160 J
SDD-33	2.2
SDD-34	0.37
SDD-35	2.1
SDD-36	27
SDD-37	0.26 [0.24]
SDD-4	9.8
SDD-4-15LB	2.5
SDD-4-15RB	2.1
SDD-4-TLB	17 J
SDD-4-TRB	3.3 J
SDD-7	220 D
SDD-7-15LB	18 J
SDD-7-15RB	11
SDD-7-TLB	98
SDD-7-TRB	1.5
SDD-9	33
SDD-9-TRB	7 J

LEGEND:

PYRENE (mg/kg)
- NOT DETECTED
- ≤ 0.4
- 0.4 - 2.4
- 2.4 - 15
- 15 - 85
- 85 - 500
- > 500

- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

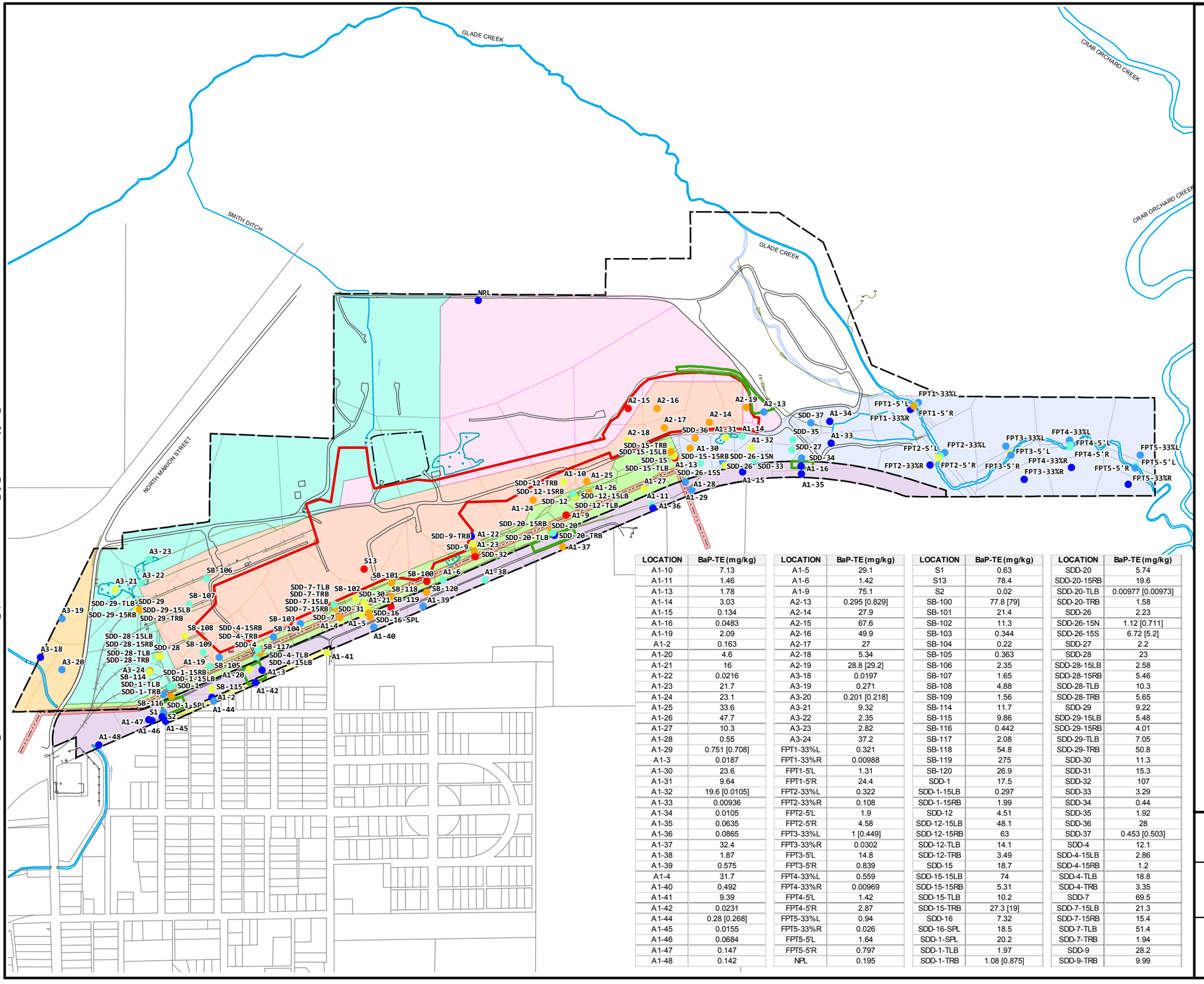
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

PYRENE THIESSEN POLYGON MAP

ARCADIS

FIGURE 6

CITY: CHELMSFORD DIVGROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\Officedata\Chelmsford-MA\A_PRJCTS\Beazer\Carbondale\GIS_SpatialData\GISMXDs\IL-39283_fig5_ThiessenPolygons_Pyrene.mxd DATE: 9/30/2014 3:03:08 PM



LOCATION	BaP-TE (mg/kg)
A1-10	7.13
A1-11	1.46
A1-13	1.78
A1-14	3.03
A1-15	0.134
A1-16	0.0483
A1-19	2.09
A1-2	0.163
A1-20	4.6
A1-21	16
A1-22	0.0216
A1-23	21.7
A1-24	23.1
A1-25	33.6
A1-26	47.7
A1-27	10.3
A1-28	0.55
A1-29	0.751 [0.708]
A1-3	0.0187
A1-30	23.6
A1-31	9.64
A1-32	19.6 [0.0105]
A1-33	0.00936
A1-34	0.0105
A1-35	0.0635
A1-36	0.0865
A1-37	32.4
A1-38	1.87
A1-39	0.575
A1-4	31.7
A1-40	0.492
A1-41	9.39
A1-42	0.0231
A1-44	0.28 [0.268]
A1-45	0.0155
A1-46	0.0684
A1-47	0.147
A1-48	0.142

LOCATION	BaP-TE (mg/kg)
A1-5	29.1
A1-6	1.42
A1-9	75.1
A2-13	0.295 [0.829]
A2-14	27.9
A2-15	67.6
A2-16	49.9
A2-17	27
A2-18	5.34
A2-19	28.8 [29.2]
A3-18	0.0197
A3-19	0.271
A3-20	0.201 [0.218]
A3-21	9.32
A3-22	2.35
A3-23	2.82
A3-24	37.2
FPT1-33%L	0.321
FPT1-33%R	0.00988
FPT1-5'L	1.31
FPT1-5'R	24.4
FPT2-33%L	0.322
FPT2-33%R	0.108
FPT2-5'L	1.9
FPT2-5'R	4.58
FPT3-33%L	1 [0.449]
FPT3-33%R	0.0302
FPT3-5'L	14.8
FPT3-5'R	0.839
FPT4-33%L	0.559
FPT4-33%R	0.00969
FPT4-5'L	1.42
FPT4-5'R	2.87
FPT5-33%L	0.94
FPT5-33%R	0.026
FPT5-5'L	1.64
FPT5-5'R	0.797
NPL	0.195

LOCATION	BaP-TE (mg/kg)
S1	0.63
S13	78.4
S2	0.02
SB-100	77.8 [79]
SB-101	21.4
SB-102	11.3
SB-103	0.344
SB-104	0.22
SB-105	0.363
SB-106	2.35
SB-107	1.65
SB-108	4.88
SB-109	1.56
SB-114	11.7
SB-115	9.86
SB-116	0.442
SB-117	2.08
SB-118	54.8
SB-119	275
SB-120	26.9
SDD-1	17.5
SDD-1-15LB	0.297
SDD-1-15RB	1.99
SDD-12	4.51
SDD-12-15LB	48.1
SDD-12-15RB	63
SDD-12-TLB	14.1
SDD-12-TRB	3.49
SDD-15	18.7
SDD-15-15LB	74
SDD-15-15RB	5.31
SDD-15-TLB	10.2
SDD-15-TRB	27.3 [19]
SDD-16	7.32
SDD-16-SPL	18.5
SDD-1-SPL	20.2
SDD-1-TLB	1.97
SDD-1-TRB	1.08 [0.875]

LOCATION	BaP-TE (mg/kg)
SDD-20	5.74
SDD-20-15RB	19.6
SDD-20-TLB	0.00977 [0.00973]
SDD-20-TRB	1.58
SDD-26	2.23
SDD-26-15N	1.12 [0.711]
SDD-26-15S	6.72 [5.2]
SDD-27	2.2
SDD-28	23
SDD-28-15LB	2.58
SDD-28-15RB	5.46
SDD-28-TLB	10.3
SDD-28-TRB	5.65
SDD-29	9.22
SDD-29-15LB	5.48
SDD-29-15RB	4.01
SDD-29-TLB	7.05
SDD-29-TRB	50.8
SDD-30	11.3
SDD-31	15.3
SDD-32	107
SDD-33	3.29
SDD-34	0.44
SDD-35	1.92
SDD-36	28
SDD-37	0.453 [0.503]
SDD-4	12.1
SDD-4-15LB	2.86
SDD-4-15RB	1.2
SDD-4-TLB	18.8
SDD-4-TRB	3.35
SDD-7	69.5
SDD-7-15LB	21.3
SDD-7-15RB	15.4
SDD-7-TLB	51.4
SDD-7-TRB	1.94
SDD-9	28.2
SDD-9-TRB	9.99

LEGEND:

BaP-TE (mg/kg)
- ≤ 0.2
- 0.2 - 0.95
- 0.95 - 4
- 4 - 17
- 17 - 67
- > 67

- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

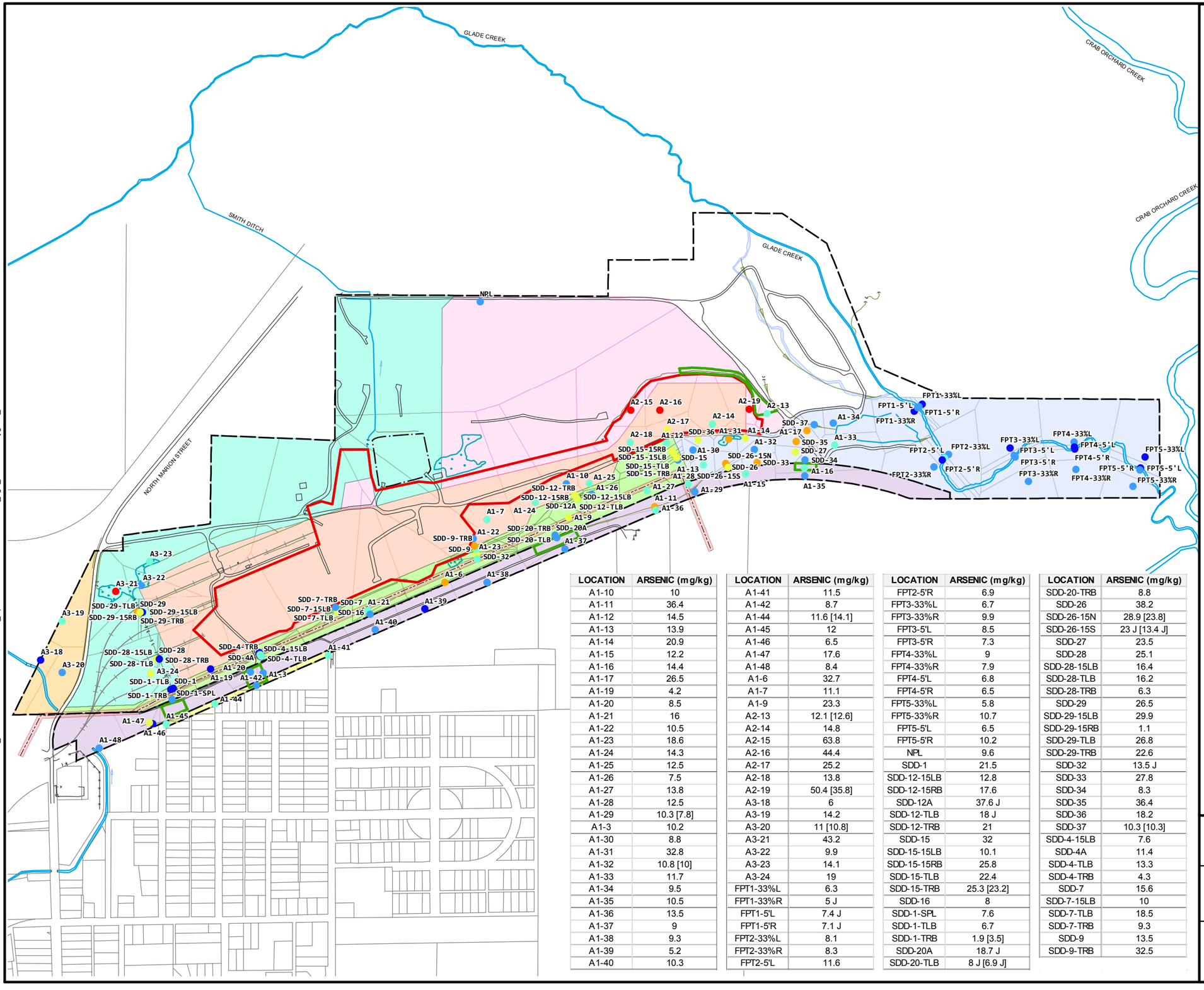
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

BAP-TE THIESSEN POLYGON MAP

ARCADIS

FIGURE 7

CITY: CHELMSFORD_DIV/GROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT PATH: \\arcadis-us.com\OfficeData\Chelmsford-MAIA_PROJCTS\Beazer\Carbondale\GIS_SpatialData\GIS\MXDs\IL-39283_fig6_ThiessenPolygons_BaP.mxd DATE: 9/30/2014 3:06:12 PM



LOCATION	ARSENIC (mg/kg)
A1-10	10
A1-11	36.4
A1-12	14.5
A1-13	13.9
A1-14	20.9
A1-15	12.2
A1-16	14.4
A1-17	26.5
A1-19	4.2
A1-20	8.5
A1-21	16
A1-22	10.5
A1-23	18.6
A1-24	14.3
A1-25	12.5
A1-26	7.5
A1-27	13.8
A1-28	12.5
A1-29	10.3 [7.8]
A1-3	10.2
A1-30	8.8
A1-31	32.8
A1-32	10.8 [10]
A1-33	11.7
A1-34	9.5
A1-35	10.5
A1-36	13.5
A1-37	9
A1-38	9.3
A1-39	5.2
A1-40	10.3

LOCATION	ARSENIC (mg/kg)
A1-41	11.5
A1-42	8.7
A1-44	11.6 [14.1]
A1-45	12
A1-46	6.5
A1-47	17.6
A1-48	8.4
A1-6	32.7
A1-7	11.1
A1-9	23.3
A2-13	12.1 [12.6]
A2-14	14.8
A2-15	63.8
A2-16	44.4
A2-17	25.2
A2-18	13.8
A2-19	50.4 [35.8]
A3-18	6
A3-19	14.2
A3-20	11 [10.8]
A3-21	43.2
A3-22	9.9
A3-23	14.1
A3-24	19
FPT1-33%L	6.3
FPT1-33%R	5 J
FPT1-5'L	7.4 J
FPT1-5'R	7.1 J
FPT2-33%L	8.1
FPT2-33%R	8.3
FPT2-5'L	11.6

LOCATION	ARSENIC (mg/kg)
FPT2-5'R	6.9
FPT3-33%L	6.7
FPT3-33%R	9.9
FPT3-5'L	8.5
FPT3-5'R	7.3
FPT4-33%L	9
FPT4-33%R	7.9
FPT4-5'L	6.8
FPT4-5'R	6.5
FPT5-33%L	5.8
FPT5-33%R	10.7
FPT5-5'L	6.5
FPT5-5'R	10.2
NPL	9.6
SDD-1	21.5
SDD-12-15LB	12.8
SDD-12-15RB	17.6
SDD-12A	37.6 J
SDD-12-TLB	18 J
SDD-12-TRB	21
SDD-15	32
SDD-15-15LB	10.1
SDD-15-15RB	25.8
SDD-15-TLB	22.4
SDD-15-TRB	25.3 [23.2]
SDD-16	8
SDD-1-SPL	7.6
SDD-1-TLB	6.7
SDD-1-TRB	1.9 [3.5]
SDD-20A	18.7 J
SDD-20-TLB	8 J [6.9 J]

LOCATION	ARSENIC (mg/kg)
SDD-20-TRB	8.8
SDD-26	38.2
SDD-26-15N	28.9 [23.8]
SDD-26-15S	23 J [13.4 J]
SDD-27	23.5
SDD-28	25.1
SDD-28-15LB	16.4
SDD-28-TLB	16.2
SDD-28-TRB	6.3
SDD-29	26.5
SDD-29-15LB	29.9
SDD-29-15RB	1.1
SDD-29-TLB	26.8
SDD-29-TRB	22.6
SDD-32	13.5 J
SDD-33	27.8
SDD-34	8.3
SDD-35	36.4
SDD-36	18.2
SDD-37	10.3 [10.3]
SDD-4-15LB	7.6
SDD-4A	11.4
SDD-4-TLB	13.3
SDD-4-TRB	4.3
SDD-7	15.6
SDD-7-15LB	10
SDD-7-TLB	18.5
SDD-7-TRB	9.3
SDD-9	13.5
SDD-9-TRB	32.5

LEGEND:

ARSENIC (mg/kg)

- ≤ 7
- 7 - 11
- 11 - 16
- 16 - 26
- 26 - 40
- > 40

- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 600 1,200

SCALE IN FEET

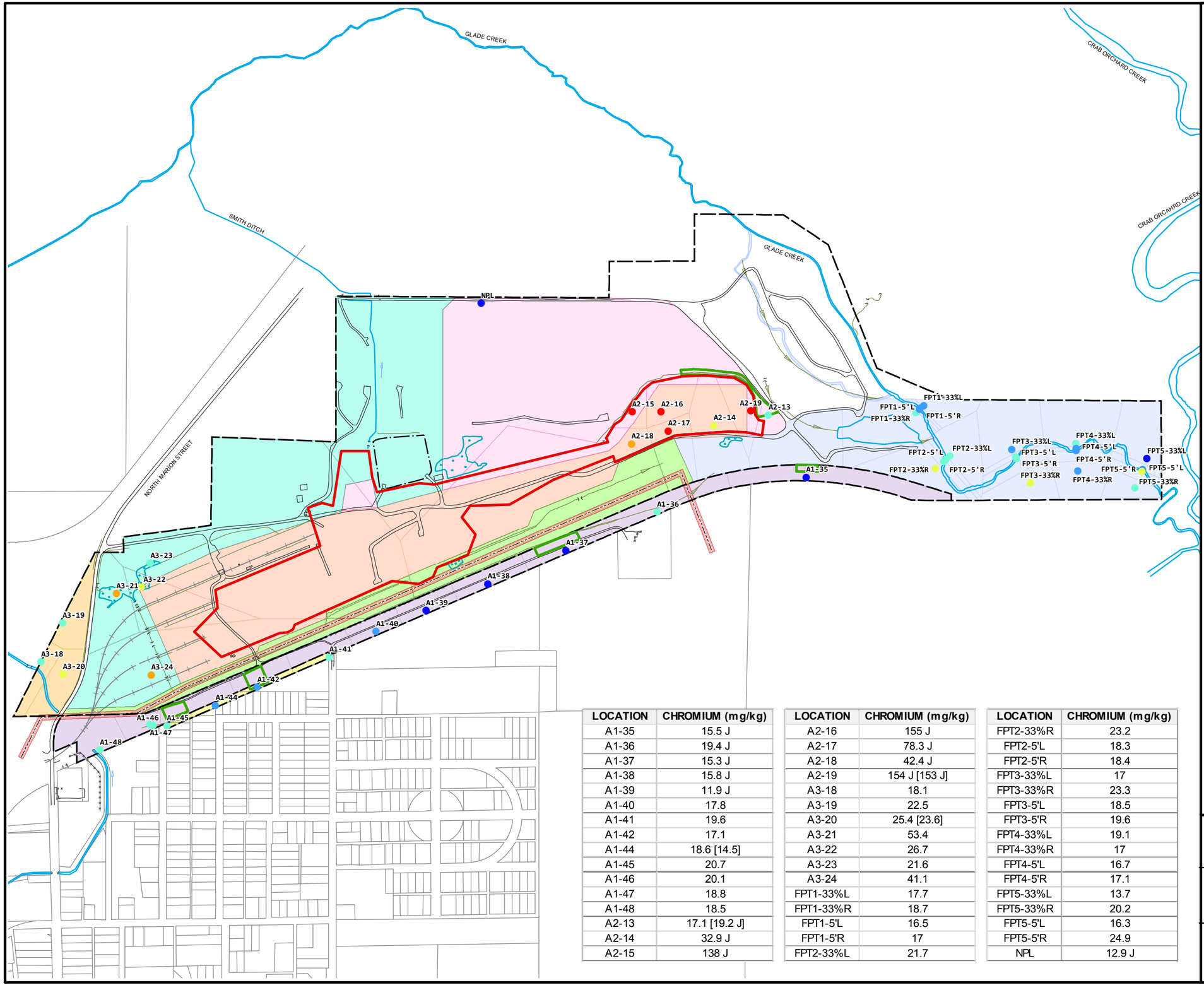
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

ARSENIC THIESSEN POLYGON MAP

ARCADIS

FIGURE
8

CITY: CHELMSFORD_DIV/GROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\OfficeData\Chelmsford-MAA_PROJCTS\Beazer\Carbondale\GIS_SpatialData\GIS\MXDs\IL_39283_fig7_ThiessenPolygons_Ars.mxd DATE: 9/30/2014 4:01:13 PM



LOCATION	CHROMIUM (mg/kg)
A1-35	15.5 J
A1-36	19.4 J
A1-37	15.3 J
A1-38	15.8 J
A1-39	11.9 J
A1-40	17.8
A1-41	19.6
A1-42	17.1
A1-44	18.6 [14.5]
A1-45	20.7
A1-46	20.1
A1-47	18.8
A1-48	18.5
A2-13	17.1 [19.2 J]
A2-14	32.9 J
A2-15	138 J

LOCATION	CHROMIUM (mg/kg)
A2-16	155 J
A2-17	78.3 J
A2-18	42.4 J
A2-19	154 J [153 J]
A3-18	18.1
A3-19	22.5
A3-20	25.4 [23.6]
A3-21	53.4
A3-22	26.7
A3-23	21.6
A3-24	41.1
FPT1-33%L	17.7
FPT1-33%R	18.7
FPT1-5'L	16.5
FPT1-5'R	17
FPT2-33%L	21.7

LOCATION	CHROMIUM (mg/kg)
FPT2-33%R	23.2
FPT2-5'L	18.3
FPT2-5'R	18.4
FPT3-33%L	17
FPT3-33%R	23.3
FPT3-5'L	18.5
FPT3-5'R	19.6
FPT4-33%L	19.1
FPT4-33%R	17
FPT4-5'L	16.7
FPT4-5'R	17.1
FPT5-33%L	13.7
FPT5-33%R	20.2
FPT5-5'L	16.3
FPT5-5'R	24.9
NPL	12.9 J

LEGEND:

CHROMIUM (mg/kg)
- ≤ 16
- 16 - 18
- 18 - 23
- 23 - 36
- 36 - 68
- > 68

GLADE CREEK OLD LOCATION
RIVER/CREEK
DRAINAGE DITCH
WETLAND
CAMU CONTAINMENT AREA
ABANDONED RAILROAD
SITE FEATURES
FENCE
OFF-SITE PROPERTY
POTENTIAL BIKE PATH
PROPERTY BOUNDARY
POTENTIAL BIKE PATH LOCATION
WESTERN CONSERVATION EXPOSURE AREA
CENTRAL CONSERVATION EXPOSURE AREA
PROPOSED NON-GRAVEL SOLAR USE AREA
PROPOSED GRAVEL SOLAR USE AREA
SOUTHERN CONSERVATION EXPOSURE AREA
EASTERN CONSERVATION EXPOSURE AREA
RAILROAD PROPERTY EXPOSURE AREA
35' SWATH EXPOSURE AREA
SOIL CAP
SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

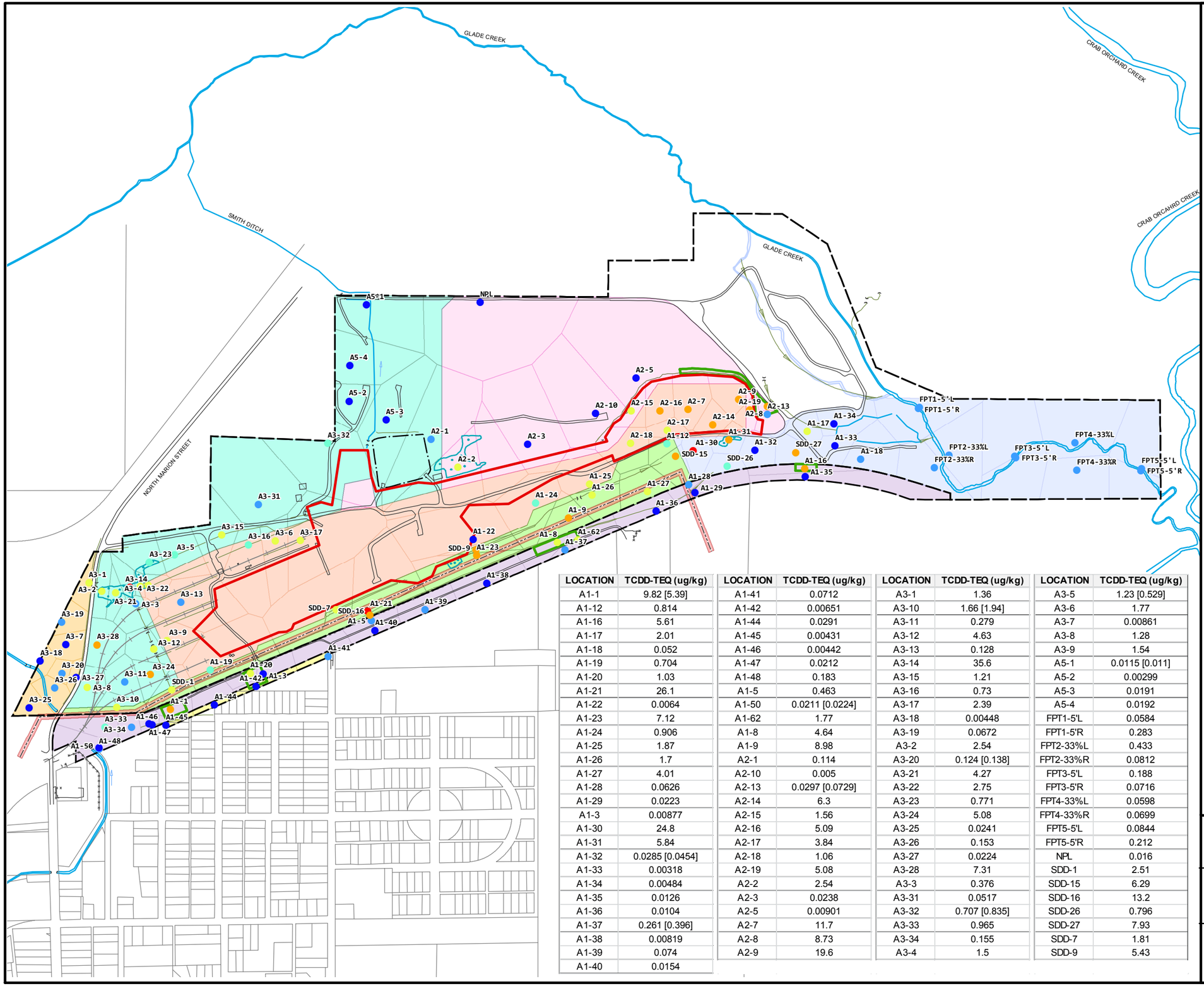
BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

CHROMIUM THIESSEN POLYGON MAP

ARCADIS

FIGURE 9

CITY: CHELMSFORD DIV/GROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: \\arcadis-us.com\OfficeData\Chelmsford-MAA_PRJCTS\Beazer\Carbondale\GIS_SpatialData\GIS\MXDs\IL-39283_fig8_ThiessenPolygons_Chromium.mxd DATE: 9/30/2014 4:06:14 PM



LOCATION	TCDD-TEQ (ug/kg)
A1-1	9.82 [5.39]
A1-12	0.814
A1-16	5.61
A1-17	2.01
A1-18	0.052
A1-19	0.704
A1-20	1.03
A1-21	26.1
A1-22	0.0064
A1-23	7.12
A1-24	0.906
A1-25	1.87
A1-26	1.7
A1-27	4.01
A1-28	0.0626
A1-29	0.0223
A1-3	0.00877
A1-30	24.8
A1-31	5.84
A1-32	0.0285 [0.0454]
A1-33	0.00318
A1-34	0.00484
A1-35	0.0126
A1-36	0.0104
A1-37	0.261 [0.396]
A1-38	0.00819
A1-39	0.074
A1-40	0.0154

LOCATION	TCDD-TEQ (ug/kg)
A1-41	0.0712
A1-42	0.00651
A1-44	0.0291
A1-45	0.00431
A1-46	0.00442
A1-47	0.0212
A1-48	0.183
A1-5	0.463
A1-50	0.0211 [0.0224]
A1-62	1.77
A1-8	4.64
A1-9	8.98
A2-1	0.114
A2-10	0.005
A2-13	0.0297 [0.0729]
A2-14	6.3
A2-15	1.56
A2-16	5.09
A2-17	3.84
A2-18	1.06
A2-19	5.08
A2-2	2.54
A2-3	0.0238
A2-5	0.00901
A2-7	11.7
A2-8	8.73
A2-9	19.6

LOCATION	TCDD-TEQ (ug/kg)
A3-1	1.36
A3-10	1.66 [1.94]
A3-11	0.279
A3-12	4.63
A3-13	0.128
A3-14	35.6
A3-15	1.21
A3-16	0.73
A3-17	2.39
A3-18	0.00448
A3-19	0.0672
A3-2	2.54
A3-20	0.124 [0.138]
A3-21	4.27
A3-22	2.75
A3-23	0.771
A3-24	5.08
A3-25	0.0241
A3-26	0.153
A3-27	0.0224
A3-28	7.31
A3-3	0.376
A3-31	0.0517
A3-32	0.707 [0.835]
A3-33	0.965
A3-34	0.155
A3-4	1.5

LOCATION	TCDD-TEQ (ug/kg)
A3-5	1.23 [0.529]
A3-6	1.77
A3-7	0.00861
A3-8	1.28
A3-9	1.54
A5-1	0.0115 [0.011]
A5-2	0.00299
A5-3	0.0191
A5-4	0.0192
FPT1-5'L	0.0584
FPT1-5'R	0.283
FPT2-33%L	0.433
FPT2-33%R	0.0812
FPT3-5'L	0.188
FPT3-5'R	0.0716
FPT4-33%L	0.0598
FPT4-33%R	0.0699
FPT5-5'L	0.0844
FPT5-5'R	0.212
NPL	0.016
SDD-1	2.51
SDD-15	6.29
SDD-16	13.2
SDD-26	0.796
SDD-27	7.93
SDD-7	1.81
SDD-9	5.43

LEGEND:

TCDD-TEQ (ug/kg)

- ≤ 0.05
- 0.05 - 0.7
- 0.7 - 1
- 1 - 5
- 5 - 20
- > 20

- GLADE CREEK OLD LOCATION
- RIVER/CREEK
- DRAINAGE DITCH
- WETLAND
- CAMU CONTAINMENT AREA
- ABANDONED RAILROAD
- SITE FEATURES
- FENCE
- OFF-SITE PROPERTY
- POTENTIAL BIKE PATH
- PROPERTY BOUNDARY
- POTENTIAL BIKE PATH LOCATION
- WESTERN CONSERVATION EXPOSURE AREA
- CENTRAL CONSERVATION EXPOSURE AREA
- PROPOSED NON-GRAVEL SOLAR USE AREA
- PROPOSED GRAVEL SOLAR USE AREA
- SOUTHERN CONSERVATION EXPOSURE AREA
- EASTERN CONSERVATION EXPOSURE AREA
- RAILROAD PROPERTY EXPOSURE AREA
- 35' SWATH EXPOSURE AREA
- SOIL CAP
- SOIL REMOVAL AREA

0 630 1,260

SCALE IN FEET

BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

DIOXIN-FURAN THIESSEN POLYGON MAP

ARCADIS

FIGURE 10

CITY: CHELMSFORD DIV/GROUP: ENV/IEST DB: mbuonanduci LD: PIC: PM: TM:
PROJECT: PATH: G:\A_PROJCTS\Beazer\Carbondale\GIS_Spatial\Data\GIS\MXDs\IL-39283_fig9_ThiessenPolygons_DiFu.mxd DATE: 10/2/2014 10:01:28 AM

ARCADIS

Appendix A

Data by Media

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A1-10 0 - 0.5 12/08/09	A1-12 0 - 0.5 12/08/09	A1-13 0 - 0.5 12/08/09	A1-14 0 - 0.5 12/08/09	A1-17 0 - 0.5 12/08/09	A1-18 0 - 0.5 12/08/09	A1-19 0 - 0.5 12/09/09	A1-21 0 - 0.5 12/08/09	A1-22 0 - 0.5 12/09/09	A1-23 0 - 0.5 12/09/09	A1-24 0 - 0.5 12/09/09	A1-25 0 - 0.5 12/09/09	A1-26 0 - 0.5 12/09/09	A1-27 0 - 0.5 12/09/09	A1-30 0 - 0.5 12/08/09	A1-31 0 - 0.5 12/08/09	A1-32 0 - 0.5 12/08/09	A1-33 0 - 0.5 12/08/09	A1-34 0 - 0.5 12/08/09	A1-4 0 - 0.5 12/08/09
	SVOCs																					
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 U	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 U	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	240 U	NA
83-32-9	Acenaphthene	ug/kg	150 J	NA	14 J	29 J	NA	NA	17 J	1,400 UJ	2 J	210 J	220 J	1,500 UJ	400 J	99 J	400 J	210 J	88 J [9.3 U]	9.4 U	9.4 U	270 J
208-96-8	Acenaphthylene	ug/kg	1,400 J	NA	270	730 J	NA	NA	360	4,900 J	5.7 J	2,500 J	3,300 J	5,600 J	8,300 J	1,600 J	4,400 J	2,100 J	3,000 J [9.3 U]	9.4 U	9.4 U	4,600 J
120-12-7	Anthracene	ug/kg	1,900 J	NA	320	850 J	NA	NA	510	5,700 J	5.2 J	3,800 J	3,700 J	7,500 J	9,700 J	2,800 J	35,000 J	3,100 J	2,700 J [2.6 J]	9.4 U	9.4 U	4,500 J
56-55-3	Benzo(a)anthracene	ug/kg	3,800 J	NA	980	1,100 J	NA	NA	1,400	8,100 J	16	13,000 J	22,000 J	24,000 J	31,000 J	5,800 J	9,900 J	4,400 J	14,000 J [5.1 J]	3.5 J	9.4 U	29,000 J
50-32-8	Benzo(a)pyrene	ug/kg	4,100 J	NA	950	1,600 J	NA	NA	1,100	6,800 J	12	11,000 J	13,000 J	18,000 J	27,000 J	5,900 J	14,000 J	4,700 J	11,000 J [3.9 J]	3.6 J	9.4 U	18,000 J
205-99-2	Benzo(b)fluoranthene	ug/kg	9,300 J	NA	2,600	3,900 J	NA	NA	2,800	22,000 J	36	36,000 J	29,000 J	48,000 J	63,000 J	14,000 J	33,000 J	17,000 J	28,000 J [9.5]	3.9 J	2.7 J	46,000 J
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	4,600 J	NA	1,300	2,400 J	NA	NA	1,600	15,000 J	17	14,000 J	12,000 J	20,000 J	32,000 J	6,600 J	17,000 J	7,500 J	11,000 J [5.4 J]	3.3 J	9.4 U	16,000 J
207-08-9	Benzo(k)fluoranthene	ug/kg	160 UJ	NA	18 U	150 UJ	NA	NA	42 U	6,500 J	9.7 U	990 UJ	500 UJ	1,500 UJ	1,100 UJ	490 UJ	1,400 UJ	590 UJ	220 UJ [9.3 U]	9.4 U	9.4 U	920 UJ
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	5,000 J	NA	1,500	1,800 J	NA	NA	2,000	11,000 J	17	17,000 J	23,000 J	32,000 J	43,000 J	9,000 J	24,000 J	9,600 J	21,000 J [8.5 J]	3.2 J	9.4 U	34,000 J
53-70-3	Dibenzo(a,h)anthracene	ug/kg	1,300 J	NA	360	700 J	NA	NA	440	4,700 J	2.8 J	4,500 J	3,900 J	6,500 J	8,500 J	1,800 J	3,700 J	2,100 J	3,400 J [9.3 U]	9.4 U	9.4 U	4,600 J
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	5,200 J	NA	1,200	1,200 J	NA	NA	1,900	14,000 J	16	12,000 J	30,000 J	34,000 J	43,000 J	5,300 J	14,000 J	8,200 J	19,000 J [8.2 J]	4.3 J	1.7 J	40,000 J
86-73-7	Fluorene	ug/kg	170 J	NA	25	79 J	NA	NA	28 J	1,400 UJ	2.1 J	370 J	290 J	500 J	650 J	190 J	760 J	300 J	130 J [9.3 U]	9.4 U	9.4 U	260 J
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 U	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	4,100 J	NA	1,100	2,300 J	NA	NA	1,300	14,000 J	15	13,000 J	11,000 J	19,000 J	28,000 J	5,800 J	16,000 J	6,900 J	10,000 J [4.4 J]	2.7 J	2.6 J	16,000 J
91-20-3	Naphthalene	ug/kg	1,200 J	NA	100	37 J	NA	NA	48	1,200 J	9.7 U	460 J	720 J	1,300 J	2,300 J	440 J	330 J	210 J	350 J [14]	1.4 J	9.4 U	1,200 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 U	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	NA	NA	NA	17 J	440	140,000 J	48 U	31,000 J	700 J	2,600 J	5,400 UJ	2,200 J	63,000 J	22,000 J	1,100 UJ [46 U]	46 U	46 U	4,500 UJ
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	3,400 J	NA	270	180 J	NA	NA	290	5,600 J	9.7	1,600 J	3,100 J	6,500 J	14,000 J	1,400 J	2,000 J	1,000 J	3,300 J [19]	6.2 J	3 J	8,300 J
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 U	NA
129-00-0	Pyrene	ug/kg	5,200 J	NA	1,200	1,500 J	NA	NA	1,900	11,000 J	20	17,000 J	35,000 J	43,000 J	45,000 J	7,700 J	16,000 J	8,300 J	20,000 J [9.2 J]	4.5 J	9.4 U	39,000 J
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	7,130	NA	1,780	3,030	NA	NA	2,090	16,000	21.6	21,700	23,100	33,600	47,700	10,300	23,600	9,640	19,600 [10.5]	9.36	10.5	31,700
	Metals																					
7440-38-2	Arsenic	ug/kg	10,000	14,500	13,900	20,900	26,500	NA	4,200	16,000	10,500	18,600	14,300	12,500	7,500	13,800	8,800	32,800	10,800 [10,000]	11,700	9,500	NA
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																					
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	36.2	NA	NA	82.8 EJ	2.03 J	35.7 EJ	1,060 EJ	0.114	356 EJ	51.9 EJ	110 EJ	74 EJ	278 EJ	1,010 EJ	216 EJ	1.2 J [1.97 J]	0.0931 J	0.165 J	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	4.97	NA	NA	9.5	0.426 J	8.22 EJ	110 EJ	0.00724	36.9	4.93	7.18	2.09	12	106 EJ	23.8	0.129 J [0.182 J]	0.00775 J	0.0168 J	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	0.272	NA	NA	0.679	0.0353 J	0.545	6.48	0.00146 U	3	0.374	0.549	0.147	0.784	6.89	2.2	0.00967 J [0.0127 J]	0.000771 J	0.00156 J	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	0.103	NA	NA	0.39	0.0127 J	0.146	4.74	0.000701 U	2.1	0.119	0.275	1.06	0.575	6.26	1.74	0.00936 J [0.0149 J]	0.000846 J	0.00105 J	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	0.119	NA	NA	0.437	0.0103 J	0.207	1.3	0.000281 U	2.81	0.352	0.455	0.104	0.518	5.31	1.97	0.00535 J [0.00766 J]	0.000366 UXJ	0.000883 J	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	0.736	NA	NA	2.22	0.0673 J	0.811	21.5	0.00134 J	8.18	1.03	1.22	1.99	3.73	23.2	6.57	0.0249 J [0.0392 J]	0.00229 J	0.00364 J	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	0.0258 J	NA	NA	0.117	0.00543 J	0.0729	0.601	0.000303 U	0.761	0.0721	0.119	0.0308 J	0.162	1.51	0.54	0.00241 J [0.00333 J]	0.000182 UJ	0.000203 UJ	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	0.155	NA	NA	0.628	0.0214 J	0.277	9.75	0.000882 UX	4.07	0.209	0.505	1.45	1.59	11.1	2.98	0.013 J [0.0197 J]	0.00167 J	0.0015 UXJ	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	0.0224 J	NA	NA	0.15	0.00242 J	0.0315	0.127	0.000497 U	0.624	0.0865	0.0844	0.0235 J	0.0964	1.2	0.515	0.00133 J [0.00172 J]	0.000281 UJ	0.000324 UJ	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	0.0174 J	NA	NA	0.0882	0.00339 J	0.0516	1.3	0.000425 UX	0.362	0.0361	0.0579 J	0.297	0.151	1.32	0.419	0.00275 J [0.00488 J]	0.000422 J	0.000406 J	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	0.00427 J	NA	NA	0.0763	0.00061 UXJ	0.00649	0.0312 J	0.000153 U	0.226	0.0181	0.0192 J	0.00889 J	0.0276 J	0.598	0.169	0.00108 J [0.00162 J]	0.000128 UJ	0.000128 U	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	0.0696	NA	NA	0.289	0.0127	0.163	1.1	0.00037 U	1.23	0.153	0.176	0.0524 J	0.261	2.33	1.06	0.00385 J [0.00508 J]	0.00047 J	0.000623 J	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	0.0295 J	NA	NA	0.104	0.00199 J	0.0375	0.0412 J	0.000142 U	0.47	0.161	0.0824	0.0179 J	0.0797	2.06	0.382	0.00199 J [0.00329 J]	0.000108 UXJ	0.000444 J	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	0.00427 J	NA	NA	0.0069 J	0.000407 UXJ	0.00357	0.103	0.000833 J	0.0261	0.00388	0.00917 J	0.0708	0.0162	0.0742	0.0406	0.000483 UXJ [0.000712 J]	0.00019 UXJ	0.000136 UXJ	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	0.00049 U	NA	NA	0.0237	0.000342 J	0.00143	0.0057 UX	0.000136 U	0.0522	0.00378	0.00487 J	0.00511 U	0.00602 UX	0.132	0.0415	0.000891 J [0.00141 J]	0.00011 UJ	0.0000464 UXJ	NA
3268-87-9	OCDD	ug/kg	NA	785 EJ	NA	NA	1,700 EDJ	30 EJ	19.6 D	29,300 EDJ	12.7 EJ	1,890 D	112 D	1,010 EJ	288 EJ	639 D	20,600 EDJ	4,170 EDJ	17.4 EJ [25.1 EJ]	3.46 J	5.47 J	NA
39001-02-0	OCDF	ug/kg	NA	33.5	NA	NA	62.4	2.16 J	54.4 EJ	598 EJ	0.0439	239 EJ	29.3 EJ	49.4	14.7	87.9	742 EJ	150 EJ	0.673 J [0.978 J]	0.038 J	0.107 J	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	0.814	NA	NA	2.01	0.052	0.704	26.1	0.0064	7.12	0.906	1.87	1.7	4.01	24.8	5.84	0.0285 [0.0454]	0.00318	0.00484	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A1-6 0 - 0.5 12/09/09	A1-7 0 - 0.5 12/09/09	A1-9 0 - 0.5 12/09/09	A2-1 0 - 5 12/10/09	A2-10 0 - 0.5 12/08/09	A2-11 0 - 5 12/10/09	A2-13 0 - 0.5 03/29/10	A2-14 0 - 0.5 03/29/10	A2-15 0 - 0.5 03/29/10	A2-16 0 - 0.5 03/29/10	A2-17 0 - 0.5 03/29/10	A2-18 0 - 0.5 03/29/10	A2-19 0 - 0.5 03/29/10	A2-2 0 - 5 12/10/09	A2-3 0 - 4 12/10/09	A2-4 0 - 0.5 12/08/09	A2-5 0 - 0.5 12/08/09	A2-7 0 - 0.5 12/08/09	A2-8 0 - 0.5 12/08/09	A2-9 0 - 0.5 12/08/09	A3-1 0 - 0.5 12/10/09	A3-10 0 - 0.5 12/09/09	A3-11 0 - 0.5 12/09/09
	SVOCs																								
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	22 J	NA	510 J	NA	NA	NA	6.4 J [33]	260 DJ	960 DJ	690 DJ	470 DJ	51	570 DJ [570 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
208-96-8	Acenaphthylene	ug/kg	210	NA	14,000 J	NA	NA	NA	81 J [280 J]	6,100 DJ	17,000 DJ	15,000 DJ	7,800 DJ	1,300	8,900 DJ [9,200 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
120-12-7	Anthracene	ug/kg	320	NA	19,000 J	NA	NA	NA	91 [170 J]	8,400 DJ	24,000 DJ	27,000 DJ	12,000 DJ	1,400	32,000 DJ [26,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
56-55-3	Benzo(a)anthracene	ug/kg	700	NA	58,000 J	NA	NA	NA	140 J [440 J]	17,000 DJ	20,000 DJ	16,000 DJ	12,000 DJ	2,800	8,000 DJ [7,600 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
50-32-8	Benzo(a)pyrene	ug/kg	700	NA	41,000 J	NA	NA	NA	180 J [570 J]	16,000 DJ	39,000 DJ	28,000 DJ	15,000 DJ	3,200	17,000 DJ [17,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
205-99-2	Benzo(b)fluoranthene	ug/kg	2,400	NA	100,000 J	NA	NA	NA	400 JY [720]	38,000 DJ	91,000 DJY	79,000 DJY	41,000 DJY	6,000	35,000 DJ [43,000 DJY]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	910	NA	48,000 J	NA	NA	NA	150 J [490 J]	12,000 DJ	34,000 DJ	29,000 DJ	15,000 DJ	2,700	15,000 DJ [16,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
207-08-9	Benzo(k)fluoranthene	ug/kg	32 U	NA	900 UJ	NA	NA	NA	370 JY [280]	18,000 DJ	83,000 DJY	72,000 DJY	37,000 DJY	2,600	13,000 DJ [39,000 DJY]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	1,200	NA	53,000 J	NA	NA	NA	220 [620]	24,000 DJ	27,000 DJ	23,000 DJ	16,000 DJ	4,400	21,000 DJ [17,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
53-70-3	Dibenzo(a,h)anthracene	ug/kg	320	NA	14,000 J	NA	NA	NA	44 [100]	4,900 DJ	13,000 DJ	8,700 DJ	4,800 DJ	960	5,700 DJ [5,100 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	770	NA	61,000 J	NA	NA	NA	260 J [1,400 J]	18,000 DJ	23,000 DJ	16,000 DJ	19,000 DJ	4,200	11,000 DJ [11,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-73-7	Fluorene	ug/kg	28 J	NA	840 J	NA	NA	NA	19 UJ [81 J]	390 DJ	1,400 DJ	1,200 DJ	610 DJ	81	3,100 DJ [1,500 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	930	NA	42,000 J	NA	NA	NA	130 J [400 J]	13,000 DJ	36,000 DJ	30,000 DJ	15,000 DJ	2,700	16,000 DJ [16,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-20-3	Naphthalene	ug/kg	51	NA	2,500 J	NA	NA	NA	20 J [160 J]	940 DJ	2,300 DJ	2,000 DJ	1,400 DJ	100	1,200 DJ [1,100 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	21,000 J	NA	NA	NA	78 J [61 J]	71,000 DJ	21,000 DJ	27,000 DJ	40,000 DJ	2,300	22,000 DJ [20,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	150	NA	15,000 J	NA	NA	NA	86 J [1,200 J]	2,900 DJ	4,100 DJ	3,100 DJ	2,800 DJ	550	6,000 DJ [3,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	990	NA	68,000 J	NA	NA	NA	230 J [1,100 J]	23,000 DJ	23,000 DJ	18,000 DJ	19,000 DJ	4,100	11,000 DJ [11,000 DJ]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	1,420	NA	75,100	NA	NA	NA	295 [829]	27,900	67,600	49,900	27,000	5,340	28,800 [29,200]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Metals																									
7440-38-2	Arsenic	ug/kg	32,700	11,100	23,300	NA	NA	NA	12,100 [12,600]	14,800	63,800	44,400	25,200	13,800	50,400 [35,800]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	17,100 [19,200 J]	32,900 J	138,000 J	155,000 J	78,300 J	42,400 J	154,000 J [153,000 J]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	45,800 J [65,000]	19,900	36,800	41,300	27,200	34,000	39,000 [42,100]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																									
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	NA	327 D	3.5	0.128	20.6	1 [2.57]	296 EJ	79.8 EDJ	252 EJ	181 EDJ	37	262 EDJ	92.9 EJ	0.552 J	0.819	0.23	598 EJ	352 EJ	890 EJ	52.4 EJ	78.4 EJ [84 EJ]	10.9
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	NA	45.1	0.569	0.0108	1	0.251 [0.611]	31.6	10.5 EJ	27.9	22.2	4.58	38.1 EJ	13.8	0.0497 J	0.113	0.0176	94.2 EJ	46.2	111 EJ	8.19	10.4 [14.4]	2.09
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	NA	2.93	0.057 J	0.00101 J	0.0925	0.0164 [0.0395]	2.58	1.2	2.47	1.67	0.44	3.21	1.25	0.00606 U	0.00944	0.00164 J	6.23	3.42	7.61	0.674	0.664 [0.862]	0.152
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	NA	1.88	0.0222 J	0.00149 J	0.0329 J	0.0132 [0.03]	1.43	0.152	1.09	0.718	0.182	2	0.515	0.0137 J	0.00347 J	0.00331 J	3.3	4.83	4.44	0.33	0.49 [0.585]	0.0973
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	NA	4.51	0.0882	0.00113 J	0.0388 J	0.00839 [0.0218]	0.871	0.733	1.73	0.961	0.994	1.56	1.55	0.00329 U	0.0117	0.00199 J	4.26	1.97	3.85	0.433	0.31 [0.372]	0.102
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	NA	21.8	0.12	0.00337 J	0.252	0.029 [0.0726]	6.33	1.82	4.62	3.92	0.89	6.97 EJ	2.58	0.00676 U	0.0202	0.0072	12	9.66	18.9	1.46	1.89 [2.6]	0.332
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	NA	1.11	0.0204 J	0.000326 J	0.0108 J	0.00332 J [0.00842]	0.241	0.136	0.352	0.242	0.192	0.366	0.355	0.00345 U	0.0024 J	0.000638 J	0.872	0.527	0.881	0.126	0.117 [0.128]	0.0373 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	NA	9.83	0.0423 J	0.00259 J	0.0785	0.0125 [0.0308]	2.3	0.355	1.17	1.04	0.296	2.11	0.949	0.00742 J	0.00622	0.00518	3.89	3.62	4.71	0.626	0.781 [0.866]	0.153
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	NA	0.783	0.0238 J	0.000359 J	0.0104 J	0.00188 J [0.0048 J]	0.142	0.155	0.355	0.198	0.218	0.295	0.316	0.00584 U	0.00257 J	0.000504 J	0.722	0.492	0.615	0.0913	0.0549 J [0.0602 J]	0.018 J
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	NA	0.188	0.0107 J	0.000938 J	0.0093 J	0.00363 J [0.00755]	0.237	0.0481	0.133	0.137	0.0483 UX	0.244	0.16	0.00478 U	0.00133 J	0.00192 J	0.313	0.851	0.554	0.108	0.137 [0.161]	0.0296 J
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	NA	0.158	0.00738 J	0.000141 UXJ	0.00338 J	0.00085 UX [0.00292 J]	0.0256 J	0.0257	0.0624	0.0354 J	0.0502 J	0.0623	0.0842	0.00231 U	0.000534 J	0.000237 UXJ	0.127	0.113	0.167	0.0202 J	0.0159 J [0.0143 J]	0.00339 J
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	NA	1.21	0.0383 J	0.000619 J	0.0283 J	0.00683 [0.0161]	0.646	0.281	0.653	0.482	0.278	0.929	0.592	0.00408 U	0.0039 J	0.00132 J	1.42	1.2	1.53	0.274	0.247 [0.313]	0.0647
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	NA	0.842	0.0338 J	0.00048 J	0.00636 UX	0.00287 J [0.00715]	0.104	0.153	0.332	0.203	0.393	0.303	0.367	0.00205 U	0.00477 J	0.000947 J	0.693	0.611	0.658	0.0765	0.0199 J [0.0419 J]	0.0125 J
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	NA	0.0197	0.00303 UX	0.000255 UXJ	0.0029 U	0.00048 J [0.000768 J]	0.016	0.0032	0.00664 U	0.00944 J	0.00757 J	0.0136	0.014	0.0033 J	0.000542 J	0.000179 UXJ	0.0178	0.083	0.0297	0.00952 J	0.0162 J [0.00294 J]	0.000558 UX
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	NA	0.0277	0.00333 J	0.000154 U	0.00274 U	0.00123 [0.00226]	0.00691 U	0.00564	0.00752 UX	0.01 U	0.00935 J	0.011	0.0131	0.00132 U	0.000197 UXJ	0.000177 U	0.0157	0.0262	0.0332	0.0046 J	0.00488 UX [0.00571 J]	0.00143 U
3268-87-9	OCDD	ug/kg	NA	NA	1,860 D	46.4	4.61	337 EJ	13.5 EJ [35.1 EJ]	4,850 EDJ	537 EDJ	3,270 EDJ	2,630 EDJ	583 EJ	709 EDJ	1,540 EJ	27.8	17.2 EJ	7.26	4,670 DEJ	4,280 EDJ	16,800 EDJ	854 EJ	678 EJ [832 EJ]	99.5 EJ
39001-02-0	OCDF	ug/kg	NA	NA	294 EJ	2.85	0.0449	6.55	1.35 [3.19]	202 EJ	61.5 D	158 EJ	130 EJ	25.1	186 EJ	83.1	0.217	0.637	0.08	551 DEJ	250 EJ	771 EJ	51	58.7 [80.3]	10.7
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	NA	8.98	0.114	0.005	0.377	0.0297 [0.0729]	6.3	1.56	5.09	3.84	1.06	5.08	2.54	0.0238	0.0231	0.00901	11.7	8.73	19.6	1.36	1.66 [1.94]	0.279

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A3-12 0 - 0.5 12/10/09	A3-13 0 - 0.5 12/09/09	A3-14 0 - 0.5 12/10/09	A3-15 0 - 0.5 12/09/09	A3-16 0 - 0.5 12/09/09	A3-17 0 - 4 12/10/09	A3-18 0 - 0.5 03/30/10	A3-19 0 - 0.5 03/30/10	A3-2 0 - 0.5 12/10/09	A3-20 0 - 0.5 03/30/10	A3-21 0 - 0.5 03/30/10	A3-22 0 - 0.5 03/30/10	A3-23 0 - 0.5 03/30/10	A3-24 0 - 0.5 03/30/10	A3-25 08/09/12	A3-26 08/09/12	A3-27 08/09/12	A3-28 08/09/12	A3-3 0 - 0.5 12/09/09	A3-31 08/09/12	A3-32 08/08/12	A3-4 0 - 0.5 12/09/09	A3-5 0 - 0.5 12/09/09	A3-6 0 - 4 12/09/09
	SVOCs																									
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	NA	NA	NA	NA	NA	1.3 J	7.8 J	NA	8.1 J [7.9 J]	860 DJ	120 DJ	47 J	420 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
208-96-8	Acenaphthylene	ug/kg	NA	NA	NA	NA	NA	NA	4.7 J	120	NA	64 [70]	4,400 DJ	1,500 DJ	1,100	10,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
120-12-7	Anthracene	ug/kg	NA	NA	NA	NA	NA	NA	5.8 J	170	NA	74 [82]	9,200 DJ	2,200 DJ	1,200	7,800 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
56-55-3	Benzo(a)anthracene	ug/kg	NA	NA	NA	NA	NA	NA	11	160	NA	110 J [110 J]	9,400 DJ	1,300 DJ	1,000	17,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
50-32-8	Benzo(a)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	12	150 J	NA	120 J [130 J]	5,100 DJ	1,100 DJ	1,600	28,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	22	290 J	NA	210 J [250 J]	21,000 DJ	2,700 DJ	4,100 JY	45,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	NA	NA	NA	NA	NA	14	180 J	NA	150 J [180 J]	8,600 DJ	2,600 DJ	1,900	24,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	7.4 J	100 J	NA	97 J [84 J]	6,100 DJ	1,000 DJ	3,600 JY	25,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	NA	NA	NA	NA	NA	13	180	NA	130 J [150 J]	11,000 DJ	1,500 DJ	1,800	19,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	NA	NA	NA	NA	NA	3.1 J	56 J	NA	35 J [35 J]	210 UJ	600 DJ	470	260 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	22	210	NA	220 [230]	25,000 DJ	2,400 DJ	1,800	25,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-73-7	Fluorene	ug/kg	NA	NA	NA	NA	NA	NA	1.6 J	13 J	NA	9.7 J [11 J]	920 DJ	160 DJ	79	570 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	12	190 J	NA	130 J [160 J]	10,000 DJ	2,400 DJ	2,000	26,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-20-3	Naphthalene	ug/kg	NA	NA	NA	NA	NA	NA	1.6 J	9.3 J	NA	18 J [16 J]	3,800 DJ	110 DJ	120	700 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	44 U	67 J	NA	37 J [53 J]	18,000 DJ	1,200 DJ	570	2,600 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	9.3	46	NA	74 [73]	15,000 DJ	610 DJ	570	3,200 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	NA	NA	NA	NA	NA	16	190	NA	150 J [160 J]	13,000 DJ	1,800 DJ	1,400	15,000 DJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	NA	NA	NA	NA	NA	19.7	271	NA	201 [218]	9,320	2,350	2,820	37,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Metals																									
7440-38-2	Arsenic	ug/kg	NA	NA	NA	NA	NA	NA	6,000	14,200	NA	11,000 [10,800]	43,200	9,900	14,100	19,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	18,100	22,500	NA	25,400 [23,600]	53,400	26,700	21,600	41,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	17,400	22,900	NA	34,100 [32,400]	40,000	41,700	21,900	28,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																									
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	169 EJ	4.1	1,890 EJ	32.1	18.3	77.9 EJ	0.111	2	130 EJ	4.15 EJ [4.43 EJ]	160 EDJ	105 EDJ	17.2 EJ	117 EDJ	0.715	5 E	0.532	343 DE	13.4	1.46	23.9 DE [28.6 E]	51.6 EJ	37.1 J [10.8 J]	107 EJ
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	30.1	0.801	326 EJ	8.88	3.7	20.1	0.0134	0.435	16.6	0.815 [0.925]	40.6 EJ	23.7 EJ	4.51 EJ	26.8 EJ	0.0349	0.864	0.0692	68.9 DE	2.36	0.14	5.5 E [5.81 E]	10.3	5.56 [1.92]	10.5
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	2.32	0.0557 J	24.8	0.88	0.406	1.79	0.00138 U	0.0386	1.41	0.0607 [0.0672]	3.29	1.77	0.46	2.71	0.00351	0.0697	0.00537	6.06 D	0.166	0.00994	0.379 [0.423]	0.678	0.625 [0.262]	0.777
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	1.16	0.0509 J	8.5 J	0.27	0.229	0.397	0.00141 J	0.0199	0.451	0.0377 [0.0408]	1.36	0.78	0.165	1.16	0.00533	0.039	0.0069	1.82	0.114	0.0198	0.233 [0.28]	0.437	0.167 [0.0746]	0.251
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	2.09	0.0332 J	9.29 J	1.5	0.596	2.4	0.000955 J	0.0361	0.607	0.0465 [0.0542]	2.58	1.82	1.02	7.74 EJ	0.00257	0.0476	0.00701	1.84	0.121	0.00748	0.229 [0.242]	0.86	2.02 [0.946]	0.894
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	4.36	0.122	45.6 J	1.13	0.713	2.22	0.00269 UX	0.0591	3.56	0.118 [0.133]	4.96 EJ	2.58	0.536	3.88	0.0145	0.16	0.0179	6.66 E	0.296	0.0585	1.01 [1.22]	1.32	0.71 [0.282]	1.57
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.629	0.019 J	3.06 J	0.29	0.163	0.512	0.000821 U	0.0137	0.183	0.0223 [0.0233]	0.759	0.545	0.227	1.73	0.00116 J	0.0255	0.0042	0.98 P	0.0558 J	0.00386	0.132 [0.142]	0.308	0.414 [0.197]	0.237
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	2.04	0.0818	18.9	0.442	0.368	0.661	0.00363 U	0.0307	0.948	0.0699 [0.0725]	2.23	1.37	0.258	2.05	0.0104	0.0861	0.011	3.02 E	0.174	0.0475	0.514 [0.632]	0.796	0.252 [0.0956]	0.532
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.381	0.00679 U	0.938	0.435	0.165	0.521	0.00134 U	0.0105	0.129	0.011 [0.0119]	0.441	0.322	0.26	1.65	0	0.00997	0.000638 J	0.125	0.0232 UX	0.000771 J	0.0558 [0.0324]	0.16	0.475 [0.281]	0.163
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.436	0.0266 J	2.11	0.105	0.124	0.0999	0.00123 U	0.00866	0.145	0.0144 [0.0162]	0.375	0.252	0.0576	0.429	0.00224 J	0.0175	0.00466	0.616	0.0638 J	0.0123	0.0837 [0.0968]	0.166	0.0347 J [0.0146 J]	0.0636
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.093	0.00185 UX	0.314 J	0.0839	0.0493 J	0.0998	0.000851 U	0.00245 UX	0.0272 J	0.00377 J [0.00447 J]	0.0927	0.0681	0.056	0.302	0.000402 J	0.0043	0.00172 J	0.0667	0.0105 U	0.000973 J	0.0209 [0.0229]	0.0475 J	0.105 [0.0634 J]	0.0362 J
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	1.13	0.0366 J	4.33	0.554	0.322	0.865	0.000968 U	0.024	0.471	0.041 [0.0489]	1.36	0.92	0.365	2.32	0.00203 J	0.049	0.00608	1.84	0.0916	0.00568	0.24 [0.248]	0.476	0.517 [0.274]	0.336
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.672	0.00528 J	1.17 J	0.393	0.179	0.871	0.000863 J	0.0203	0.0719	0.0256 [0.0306]	0.721	0.531	0.514	2.97	0	0.013	0.00368	0.11	0.0219 J	0.00161 J	0.0422 [0.0819]	0.291	0.514 [0.419]	0.105
1746-01-6	2,3,7,8-TCDD	ug/kg	0.0339	0.00327 UX	0.124 J	0.00644 J	0.0148	0.00651 J	0.000651 U	0.000854 UX	0.0104 J	0.0018 UX [0.00243]	0.0329	0.0224	0.00498	0.0375	0.000361 J	0.00372	0.000808	0.0388	0.00687 J	0.00135	0.00305 [0.00375]	0.0195	0.00292 UX [0.00443 UJ]	0.00546 UX
51207-31-9	2,3,7,8-TCDF	ug/kg	0.0148	0.00129 U	0.0288 J	0.0132	0.0088	0.0119	0.00046 U	0.00119	0.00658 J	0.0019 [0.00264]	0.0162	0.0128	0.0131	0.0615	0	0.00369 B	0.00181	0.00931 B	0.0072 U	0.00081	0.00419 B [0.00509]	0.00858 J	0.0236 [0.0196]	0.00582 J
3268-87-9	OCDD	ug/kg	2,350 EJ	42.2	4,700 DEJ	278 EJ	168 EJ	750 EJ	4.2	23.8 EJ	703 DEJ	49.1 EJ [51.8 EJ]	570 EDJ	471 EDJ	137 EDJ	524 EDJ	34.4 E	84 D	13.6 BE	2,270 DE	161 EJ	22.5 BE	198 [240 DE]	502 EJ	445 EJ [114 EJ]	221 D
39001-02-0	OCDF	ug/kg	181 EJ	3.49	556	52.7	18.4	120 EJ	0.0708	2.08	125 EJ	3.66 [3.95]	207 EJ	98.2 EJ	18.9 EJ	100 EJ	0.147	4.62 E	0.327	438 DE	15.9	0.803	27.3 E [28.4 E]	50.5	30.3 [10.5]	77.2
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	4.63	0.128	35.6	1.21	0.73	2.39	0.00448	0.0672	2.54	0.124 [0.138]	4.27	2.75	0.771	5.08	0.0241	0.153	0.0224	7.31	0.376	0.0517	0.707 [0.835]	1.5	1.23 [0.529]	1.77

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A3-7 0 - 0.5 12/09/09	A3-8 0 - 0.5 12/09/09	A3-9 0 - 0.5 12/09/09	A5-1 0 - 0.5 12/09/09	A5-2 0 - 0.5 12/09/09	A5-3 0 - 0.5 12/09/09	A5-4 0 - 0.5 12/09/09	A5-5 0 - 0.5 12/10/09	GC-BC-FPT1-33%L 0 - 0.5 03/12/08	GC-BC-FPT1-33%L 0.5 - 2 03/12/08	GC-BC-FPT1-33%R 0 - 0.5 03/11/08	GC-BC-FPT1-33%R 0.5 - 2 03/11/08	GC-BC-FPT1-5L 0 - 0.5 03/12/08	GC-BC-FPT1-5L 0.5 - 2 03/12/08	GC-BC-FPT1-5R 0 - 0.5 03/11/08	GC-BC-FPT1-5R 0 - 0.5 06/24/08	GC-BC-FPT1-5R 0.5 - 2 03/11/08
	SVOCs																		
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	18 U	9.2 J	8.7 U	3.3 J [3.1 J]	13 J	200	310 J	NA	160 J
208-96-8	Acenaphthylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	87	170	8.7 U	38 [45]	270	700	6,700	NA	3,100
120-12-7	Anthracene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	130	260	8.7 U	60 [62]	280	1,900	6,600	NA	4,300
56-55-3	Benzo(a)anthracene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	110	270	8.7 U	72 [110]	370	1,100	8,100	NA	3,300
50-32-8	Benzo(a)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	200	450	8.7 U	88 [150]	800	1,000	16,000	NA	8,000
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	380 JX	830 JX	2.6 J	200 JX [310 JX]	1,400 JX	1,800 JX	28,000 JX	NA	14,000 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	250	490	8.7 U	94 [160]	780	2,300	14,000	NA	9,200
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	410 JX	830 JX	8.7 U	200 JX [340 JX]	1,500 JX	1,800 JX	28,000 JX	NA	13,000 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	160	410	2 J	93 [160]	500	1,000	9,300	NA	4,200
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	46	110	8.7 U	24 [44]	240	400	3,200	NA	2,600
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	92	210	8.7 U	40 J [85 J]	190	3,100	3,800	NA	1,800
86-73-7	Fluorene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	14 J	42	8.7 U	6 J [8 J]	40 J	320	1,300	NA	610
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	220	440	8.7 U	91 [150]	730	1,900	13,000	NA	8,300
91-20-3	Naphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	9.3 J	9 J	8.7 U	4.2 J [6.1 J]	21 J	22 J	120 J	NA	110 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	220	NA	43 U	NA	NA	8,800	NA	NA	2,400
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	25	36	3.4 J	15 [26]	52	2,000	320 J	NA	360
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	88	320	8.7 U	57 [84]	230	2,600	6,100	NA	3,000
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	321	723	9.88	150 [255]	1,310	1,900	24,400	NA	13,300
	Metals																		
7440-38-2	Arsenic	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	6,300	7,000	5,000 J	7,500 [6,000]	7,400 J	9,900	7,100 J	NA	12,500
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	17,700	18,900	18,700	19,500 [18,200]	16,500	22,300	17,000	NA	44,900
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	18,800	17,900	17,200	19,200 [18,800]	17,100	19,300	19,800	NA	25,200
	Dioxins/Furans																		
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.205	38.2 EJ	67.6 EJ	0.258 J [0.215 J]	0.0911 J	0.613 J	0.632 J	0.245 J	NA	14.7	NA	2.08 [2.38]	2.43	NA	NA	12.2 D	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.0144	7.19 J	10.8	0.034 J [0.0308 J]	0.00754 J	0.0795 J	0.0803 J	0.0238 J	NA	2.23	NA	0.345 [0.425]	0.339	NA	NA	1.92	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.000985 U	0.709	0.779	0.00285 J [0.00268 J]	0.000811 J	0.00841 J	0.00883 J	0.0024 J	NA	0.17	NA	0.0288 [0.0298]	0.0247	NA	NA	0.133	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.00229 J	0.398	0.379	0.00248 J [0.00307 J]	0.00089 J	0.00708 J	0.00703 J	0.00179 J	NA	0.125	NA	0.0144 [0.0182]	0.0178	NA	NA	0.0953	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.00119 J	1.36	0.558	0.00377 J [0.00287 J]	0.000512 J	0.00461 J	0.00448 J	0.00152 J	NA	0.0909	NA	0.0185 [0.0178]	0.0148	NA	NA	0.0673	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00451 J	1.04	1.38	0.00673 J [0.00711 J]	0.00176 J	0.0193 J	0.0194 J	0.00505 J	NA	0.332	NA	0.0529 [0.0621]	0.0542	NA	NA	0.274	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.000675 J	0.324	0.181	0.00268 J [0.00192 J]	0.000235 UJ	0.00239 J	0.00255 J	0.000585 J	NA	0.0269 J	NA	0.00587 J [0.00539]	0.00493 J	NA	NA	0.0213 J	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.00356 J	0.548	0.645	0.00457 J [0.00485 J]	0.00125 J	0.0115 J	0.0114 J	0.00327 J	NA	0.102	NA	0.019 [0.0249]	0.0214	NA	NA	0.0852	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.0006 U	0.249	0.0955	0.00115 J [0.000902 J]	0.000364 UJ	0.00153 J	0.0014 J	0.000613 UJ	NA	0.02	NA	0.00387 [0.0039]	0.0031	NA	NA	0.0148	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00126 J	0.104	0.115	0.00126 J [0.00178 J]	0.000325 UJ	0.00298 J	0.0028 J	0.000736 J	NA	0.0165	NA	0.00336 [0.00377]	0.00411	NA	NA	0.014	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000415 J	0.0556	0.023 J	0.0013 UXJ [0.00128 J]	0.000337 UJ	0.000626 J	0.000621 J	0.000656 UJ	NA	0.00401	NA	0.000924 J [0.000972 J]	0.000881 J	NA	NA	0.00301	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.000953 J	0.452	0.328	0.00378 J [0.00377 J]	0.000411 UXJ	0.00531 J	0.00593 J	0.00134 J	NA	0.0554	NA	0.0109 [0.0107]	0.00894	NA	NA	0.036	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.000926 J	0.499	0.0751	0.00441 J [0.00441 J]	0.000328 UJ	0.00182 J	0.00178 J	0.000784 J	NA	0.0199	NA	0.00622 [0.00562]	0.00446	NA	NA	0.013	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000239 UX	0.00754	0.0129	0.000478 J [0.000567 J]	0.000225 UJ	0.000377 UJ	0.000508 UJ	0.000412 UJ	NA	0.000807	NA	0.000399 J [0.000408 J]	0.000445 J	NA	NA	0.00113	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000475 J	0.00734	0.00363 J	0.000979 J [0.00132 J]	0.000286 UJ	0.000425 J	0.000553 UJ	0.000324 UJ	NA	0.00144	NA	0.000661 UX [0.000652	0.000643	NA	NA	0.00115	NA
3268-87-9	OCDD	ug/kg	11.1 EJ	345 EJ	731 EJ	9.49 EJ [7.16 J]	3.85 J	10.2 EJ	10.2 EJ	9.32 EJ	NA	159 D	NA	29.3 [30.7]	38	NA	NA	196 D	NA
39001-02-0	OCDF	ug/kg	0.0593	37 EJ	65.9	0.125 J [0.113 J]	0.0329 J	0.287 J	0.286 J	0.104 J	NA	13.2	NA	1.94 [2.41]	1.99	NA	NA	11	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.00861	1.28	1.54	0.0115 [0.011]	0.00299	0.0191	0.0192	0.00813	NA	0.321	NA	0.0521 [0.0585]	0.0584	NA	NA	0.283	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-FPT2-33%L 0 - 0.5 03/12/08	GC-BC-FPT2-33%L 0.5 - 2 03/12/08	GC-BC-FPT2-33%R 0 - 0.5 03/11/08	GC-BC-FPT2-33%R 0.5 - 2 03/11/08	GC-BC-FPT2-5L 0 - 0.5 03/12/08	GC-BC-FPT2-5L 0.5 - 2 03/12/08	GC-BC-FPT2-5R 0 - 0.5 03/11/08	GC-BC-FPT2-5R 0.5 - 2 03/11/08	GC-BC-FPT3-33%L 0 - 0.5 03/12/08	GC-BC-FPT3-33%L 0.5 - 2 03/12/08	GC-BC-FPT3-33%L 0.5 - 2 06/24/08	GC-BC-FPT3-33%R 0 - 0.5 03/11/08	GC-BC-FPT3-33%R 0.5 - 2 03/11/08	GC-BC-FPT3-5L 0 - 0.5 03/12/08
	SVOCs															
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	3.4 J	3.5 J [9.2 U]	2.7 J	8.9 U	42	280 J	45 J	440 J	8.5 J [4.8 J]	7 J	NA	10 U	8.4 U [8.6 U]	130 J
208-96-8	Acenaphthylene	ug/kg	76	39 J [7.4 J]	35	22	420	4,200	1,300	5,300	200 [70]	150	NA	10	8.4 U [8.6 U]	4,200
120-12-7	Anthracene	ug/kg	110	57 J [8.3 J]	50	30	430	6,700	1,100	12,000	240 [82]	210	NA	14	8.4 U [8.6 U]	3,800
56-55-3	Benzo(a)anthracene	ug/kg	140	82 J [17 J]	43	14	500	2,700	880	4,200	370 [200]	140	NA	14	8.4 U [8.6 U]	3,000
50-32-8	Benzo(a)pyrene	ug/kg	180	120 J [22 J]	61	42	1,200	8,100	2,800	13,000	630 [280]	310	NA	18	8.4 U [8.6 U]	9,000
205-99-2	Benzo(b)fluoranthene	ug/kg	450 JX	250 JX [47 JX]	150 JX	73 JX	2,000 JX	12,000 JX	4,400 JX	24,000 JX	1,100 JX [490 JX]	530 JX	NA	42 JX	8.4 U [8.6 U]	14,000 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	190	110 J [25 J]	67	57	1,300	14,000	3,200	16,000	560 [250]	370	NA	22	8.4 U [8.6 U]	11,000
207-08-9	Benzo(k)fluoranthene	ug/kg	490 JX	250 JX [52 JX]	160 JX	72 JX	2,200 JX	12,000 JX	4,800 JX	24,000 JX	1,200 JX [540 JX]	530 JX	NA	46 JX	8.4 U [8.6 U]	15,000 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	250	120 J [23 J]	78	21	680	3,400	1,400	8,000	500 [280]	200	NA	24	8.4 U [8.6 U]	5,000
53-70-3	Dibenzo(a,h)anthracene	ug/kg	59	36 J [6.6 J]	20	16	310	3,200	900	3,700	160 [72]	72	NA	4.2 J	8.4 U [8.6 U]	3,000
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	150	39 [14]	56	6.8 J	400	1,400	410	3,000	190 [75]	65	NA	23	8.4 U [8.6 U]	1,500
86-73-7	Fluorene	ug/kg	11	6.1 J [9.2 U]	5.4 J	7.6 J	94	1,100	200	1,300	38 [17]	35	NA	3.3 J	2.2 J [8.6 U]	870
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	190	100 J [24 J]	62	55	1,200	12,000	3,000	15,000	520 [220]	320	NA	19	8.4 U [8.6 U]	9,900
91-20-3	Naphthalene	ug/kg	10	4.9 J [3.2 J]	4.3 J	8.9 U	40 J	120 J	35 J	900 U	14 [9.6]	6.3 J	NA	10 U	8.4 U [8.6 U]	130 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	54 [14 J]	NA	23 J	98 J	NA	140 J	NA	65 [18 J]	NA	NA	20 J	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	23	12 [6.2 J]	17	4.6 J	130	290 J	100	720 J	53 [30]	20	NA	9.6 J	3.1 J [2.3 J]	390
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	140	81 J [19 J]	45	14	360	2,700	570	5,100	160 [94]	110	NA	16	8.4 U [8.6 U]	1,700
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	322	202 [37.9]	108	72.9	1,900	14,100	4,580	21,300	1,000 [449]	487	NA	30.2	9.71 [9.94]	14,800
	Metals															
7440-38-2	Arsenic	ug/kg	8,100	9,000 [9,100]	8,300	9,300	11,600	12,800	6,900	9,700	6,700	8,100	NA	9,900	5,100 [5,500]	8,500
7440-47-3	Chromium	ug/kg	21,700	23,700 [21,800]	23,200	19,800	18,300	23,500	18,400	36,900	17,000	23,000	NA	23,300	13,400 [14,600]	18,500
7440-50-8	Copper	ug/kg	22,000	21,600 [21,100]	20,600	16,300	20,600	17,100	18,700	20,300	19,400	19,600	NA	22,400	8,600 [10,400]	19,300
	Dioxins/Furans															
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	22.7	NA	3.25	NA	NA	28.5	NA	149 D	NA	NA	14.6	NA	0.109 [0.151]	8.64
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	2.5	NA	0.61	NA	NA	3.61	NA	19.5 DJ	NA	NA	2.95	NA	0.0143 [0.0236]	1.01
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.208	NA	0.0481	NA	NA	0.259	NA	1.64 D	NA	NA	0.234	NA	0.00123 J [0.0015 J]	0.0889
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.097	NA	0.0166	NA	NA	0.203	NA	1.57	NA	NA	0.0824	NA	0.00108 J [0.00157 J]	0.084
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.101	NA	0.0288	NA	NA	0.128	NA	0.829	NA	NA	0.134	NA	0.000603 J [0.000842 J]	0.0548
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.424	NA	0.0782	NA	NA	0.61	NA	2.96	NA	NA	0.346	NA	0.00277 [0.00366]	0.183
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.0277 J	NA	0.0099 J	NA	NA	0.0408 J	NA	0.192 J	NA	NA	0.0348 J	NA	0.000298 U [0.000369 J]	0.014 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.137	NA	0.0241	NA	NA	0.19	NA	0.585	NA	NA	0.0891	NA	0.00146 J [0.00224 J]	0.0564
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.017	NA	0.00572	NA	NA	0.0276	NA	0.204	NA	NA	0.0255	NA	0.000403 U [0.000202 J]	0.0132
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.0152	NA	0.00321	NA	NA	0.0252	NA	0.111	NA	NA	0.0121	NA	0.000414 J [0.000552 UX]	0.00882
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.00332	NA	0.00209 J	NA	NA	0.00704	NA	0.0381	NA	NA	0.00393	NA	0.000156 U [0.00013 J]	0.00272
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.0518	NA	0.0151	NA	NA	0.0736	NA	0.383	NA	NA	0.0628	NA	0.000328 U [0.00059 J]	0.0268
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.0169	NA	0.0113	NA	NA	0.0291	NA	0.155	NA	NA	0.0395	NA	0.00027 J [0.000337 J]	0.0148
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000752	NA	0.000419 J	NA	NA	0.00141	NA	0.00453	NA	NA	0.000626	NA	0.000135 J [0.000187 J]	0.000893
51207-31-9	2,3,7,8-TCDF	ug/kg	0.00265	NA	0.00192	NA	NA	0.00218	NA	0.00641	NA	NA	0.00181	NA	0.000206 J [0.000189 UX]	0.00107 UX
3268-87-9	OCDD	ug/kg	224 D	NA	52.9 D	NA	NA	388 DJ	NA	1,010 D	NA	NA	185 DJ	NA	3.61 [4.92]	105 D
39001-02-0	OCDF	ug/kg	16.6 D	NA	3.67	NA	NA	23.6 D	NA	130 D	NA	NA	16.8 D	NA	0.0956 [0.16]	6.18
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.433	NA	0.0812	NA	NA	0.61	NA	2.88	NA	NA	0.341	NA	0.00365 [0.00481]	0.188

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-FPT3-5L 0.5 - 2 03/12/08	GC-BC-FPT3-5R 0 - 0.5 03/11/08	GC-BC-FPT3-5R 0.5 - 2 03/11/08	GC-BC-FPT4-33%L 0 - 0.5 03/12/08	GC-BC-FPT4-33%L 0.5 - 2 03/12/08	GC-BC-FPT4-33%R 0 - 0.5 03/11/08	GC-BC-FPT4-33%R 0.5 - 2 03/11/08	GC-BC-FPT4-5L 0 - 0.5 03/12/08	GC-BC-FPT4-5L 0.5 - 2 03/12/08	GC-BC-FPT4-5R 0 - 0.5 03/11/08	GC-BC-FPT4-5R 0.5 - 2 03/11/08	GC-BC-FPT5-33%L 0 - 0.5 03/12/08	GC-BC-FPT5-33%L 0.5 - 2 03/12/08	GC-BC-FPT5-33%R 0 - 0.5 03/12/08
	SVOCs															
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	18 U	NA	NA	NA	8.8 U	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	18 U	NA	NA	NA	8.8 U	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	460 U	NA	NA	NA	220 U	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	470 J	11 J	14 J [15 J]	9.7 J	13	9.1 U	8.8 U	20 J	65 J	46 J	4.8 J	15 J	8.6 J	9.3 U
208-96-8	Acenaphthylene	ug/kg	7,900	210	330 [420]	170	130	3.6 J	8.8 U	350	1,300	870	130	250	200	8.5 J
120-12-7	Anthracene	ug/kg	8,700	210	360 [550]	180	180	15	8.8 U	350	1,500	800	230	250	220	11
56-55-3	Benzo(a)anthracene	ug/kg	4,500	250	180 [350]	160	220	4.7 J	8.8 U	420	1,600	780	150	300	210	14
50-32-8	Benzo(a)pyrene	ug/kg	17,000	510	460 [690]	320	340	3.4 J	8.8 U	880	3,700	1,900	320	590	530	15
205-99-2	Benzo(b)fluoranthene	ug/kg	25,000 JX	840 JX	730 JX [1,100 JX]	570 JX	630 JX	7.8 JX	8.8 U	1,400 JX	5,600 JX	2,400	560 JX	990 JX	820 JX	32 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	21,000	560	780 [1,600]	450	380	9.1 U	8.8 U	930	3,800	2,200	560	520	770	17
207-08-9	Benzo(k)fluoranthene	ug/kg	25,000 JX	910 JX	800 JX [1,200 JX]	620 JX	620 JX	8.5 JX	8.8 U	1,500 JX	5,500 JX	880	560 JX	1,100 JX	890 JX	35 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	7,100	360	260 [330]	210	270	5.3 J	8.8 U	600	2,100	1,100	200	410	310	27
53-70-3	Dibenzo(a,h)anthracene	ug/kg	5,900	160	200 [310]	120	130	9.1 U	8.8 U	260	830	440	120	160	140	4.5 J
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	1,500	130	140 [210]	94	120	6.2 J	8.8 U	270	610	390	75	160	110	19
86-73-7	Fluorene	ug/kg	2,300	44	60 [62]	35	33	9.1 U	8.8 U	77	350	220	16	52	30	5.7 J
67-72-1	Hexachloroethane	ug/kg	NA	NA	90 U	NA	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	19,000	510	700 [1,300]	400	340	4 J	8.8 U	840	3,600	2,000	480	500	650	15
91-20-3	Naphthalene	ug/kg	880 U	14 J	11 J [25 J]	13 J	17	9.1 U	8.8 U	30 J	47 J	44 J	8.7 J	10 J	19 J	9.3 U
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	18 U	NA	NA	NA	8.8 U	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	770 J	NA	190 J [760 J]	NA	36 J	NA	43 U	47 J	NA	75 J	NA	62 J	NA	10 J
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	390 J	36	30 [60]	34	46	4.9 J	2.7 J	78	140	98	28	35	33	8.5 J
108-95-2	Phenol	ug/kg	NA	NA	46	NA	NA	NA	8.8 U	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	3,400	130	110 [250]	88	190	4.4 J	8.8 U	250	1,200	390	160	140	120	13
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	28,000	839	829 [1,290]	559	595	9.69	10.2	1,420	5,670	2,870	565	940	847	26
	Metals															
7440-38-2	Arsenic	ug/kg	9,400	7,300	10,200 [8,800]	9,000	9,500	7,900	5,700	6,800	7,100	6,500	10,700	5,800	7,500	10,700
7440-47-3	Chromium	ug/kg	22,700	19,600	31,000 [25,000]	19,100	23,800	17,000	15,500	16,700	17,900	17,100	29,800	13,700	21,100	20,200
7440-50-8	Copper	ug/kg	21,800	20,400	22,400 [20,600]	19,500	22,700	13,600	10,900	18,000	18,900	19,400	23,400	37,100	27,700	42,000
	Dioxins/Furans															
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	3.28	NA	2.47	NA	3.35	NA	NA	6.01	NA	3.84	NA	10.9 J	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	0.348	NA	0.355	NA	0.632	NA	NA	0.786	NA	0.744	NA	1.67	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	0.0287	NA	0.0308	NA	0.0535	NA	NA	0.0603	NA	0.0613	NA	0.117	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	0.0275	NA	0.0206	NA	0.0111	NA	NA	0.0497	NA	0.0163	NA	0.074	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	0.0177	NA	0.0177	NA	0.017	NA	NA	0.0337	NA	0.0273	NA	0.0605	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	0.0675	NA	0.0626	NA	0.105	NA	NA	0.144 J	NA	0.114	NA	0.257	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	0.00471 J	NA	0.00555	NA	0.00509 J	NA	NA	0.0101 J	NA	0.00888 J	NA	0.0162	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	0.0233	NA	0.0231	NA	0.0191	NA	NA	0.0442	NA	0.0244	NA	0.0737	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	0.00491	NA	0.00416	NA	0.00269	NA	NA	0.00879	NA	0.00401	NA	0.0142	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	0.00396	NA	0.00395	NA	0.00216 J	NA	NA	0.00708	NA	0.00257	NA	0.0104	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	0.00124 J	NA	0.00135 J	NA	0.000406 UX	NA	NA	0.00206 J	NA	0.000629 J	NA	0.00435	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	0.0109	NA	0.0112	NA	0.01	NA	NA	0.0211	NA	0.0163	NA	0.0348	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	0.00632	NA	0.00653	NA	0.0017 J	NA	NA	0.0117	NA	0.00517	NA	0.0207	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	0.000548	NA	0.000596	NA	0.000278 J	NA	NA	0.000795	NA	0.000229 J	NA	0.000935	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	0.000787	NA	0.000787	NA	0.000442 J	NA	NA	0.00116	NA	0.000491 J	NA	0.0016	NA
3268-87-9	OCDD	ug/kg	NA	40.8	NA	31.8 J	NA	27.6	NA	NA	86 D	NA	36	NA	124 DJ	NA
39001-02-0	OCDF	ug/kg	NA	2.08	NA	2.06	NA	4.24	NA	NA	4.73	NA	4.29	NA	9.32 J	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	0.0716	NA	0.0598	NA	0.0699	NA	NA	0.139	NA	0.0841	NA	0.238	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-FPT5-33%R 0.5 - 2 03/12/08	GC-BC-FPT5-5L 0 - 0.5 03/12/08	GC-BC-FPT5-5L 0.5 - 2 03/12/08	GC-BC-FPT5-5R 0 - 0.5 03/12/08	GC-BC-FPT5-5R 0.5 - 2 03/12/08	NPL 0 - 0.5 03/29/10	SB-100 0 - 0.5 05/03/05	SB-101 0 - 0.5 05/03/05	SB-102 0 - 0.5 05/03/05	SB-103 0 - 0.5 05/03/05	SB-104 0 - 0.5 05/03/05	SB-105 0 - 0.5 05/03/05	SB-106 0 - 0.5 05/03/05	SB-107 0 - 0.5 05/03/05	SB-108 0 - 0.5 05/03/05	SB-109 0 - 0.5 05/03/05	SB-114 0 - 0.5 05/03/05	SB-116 0 - 0.5 05/03/05	SB-117 0 - 0.5 05/03/05	SB-118 05/03/05	SDD-1 0 - 0.5 03/08/06	SDD-1 1.5 - 2 03/08/06
	SVOCs																							
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	1,100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	8.9 U	23 J	43 U	7 J	9 U	11 J	970 J [700 J]	18,000 U	130 J	360 U	9.6 J	350 U	2,000 U	1,900 U	62 J	1,900 U	130 J	360 U	2,000 U	1,600 J	400 J	410 J
208-96-8	Acenaphthylene	ug/kg	8.9 U	440	340	200	19	39	6,800 J [5,800 J]	5,200 J	1,400 J	130 J	63 J	21 J	810 J	340 J	1,200 J	420 J	2,200 J	120 J	560 J	14,000 J	4,700	4,400
120-12-7	Anthracene	ug/kg	8.9 U	430	360	220	23	58	9,500 J [8,100 J]	7,000 J	1,100 J	160 J	87 J	20 J	650 J	270 J	1,200 J	520 J	1,100 J	150 J	370 J	14,000 J	5,600	5,100
56-55-3	Benzo(a)anthracene	ug/kg	1.7 J	530	390	170	30	140	71,000 [66,000]	11,000 J	5,200	200 J	140 J	14 J	980 J	1,100 J	2,300	1,100 J	3,700	290 J	1,100 J	20,000 J	7,800	5,300
50-32-8	Benzo(a)pyrene	ug/kg	2 J	1,000	1,000	470	46	140	49,000 [51,000]	12,000 J	7,400	160 J	92 J	350 U	1,100 J	790 J	2,600	700 J	7,800	240 J	1,100 J	36,000	11,000	11,000
205-99-2	Benzo(b)fluoranthene	ug/kg	2.6 J	1,600 JX	1,500 JX	750 JX	84 JX	160	110,000 [130,000]	25,000	12,000	440	290 J	81 J	2,900	2,000	6,200	2,100	11,000	570	2,400	64,000	17,000	17,000
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	8.9 U	1,100	1,500	640	47	120	18,000 J [11,000 J]	12,000 J	4,800	280 J	160 J	31 J	2,700	1,400 J	3,700	1,200 J	4,600	220 J	1,100 J	19,000 J	11,000	9,800
207-08-9	Benzo(k)fluoranthene	ug/kg	8.9 U	1,700 JX	1,650 JX	820 JX	83 JX	69	40,000 [61,000]	8,700 J	4,400	140 J	81 J	350 U	870 J	710 J	1,800 J	560 J	3,600	160 J	780 J	16,000 J	6,600	5,700
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	8.9 U	640	480	250	32	150	78,000 [71,000]	17,000 J	6,700	300 J	200 J	19 J	1,600 J	1,500 J	3,900	1,700 J	4,300	400	1,400 J	28,000	13,000	9,500
53-70-3	Dibenzo(a,h)anthracene	ug/kg	8.9 U	310	310	170	14	15 J	8,200 J [6,400 J]	4,700 J	1,700 J	96 J	71 J	350 U	660 J	440 J	1,100 J	440 J	1,900 J	94 J	510 J	8,200 J	2,900	2,500
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	8.9 U	290	190	120	14	290	67,000 [59,000]	19,000	8,200	340 J	270 J	24 J	1,700 J	2,800	4,500	2,700	3,300	570	1,500 J	61,000	15,000	8,500
86-73-7	Fluorene	ug/kg	8.9 U	100	46	37	6.3 J	8.6 J	720 J [690 J]	570 J	73 J	360 U	370 U	350 U	2,000 U	1,900 U	58 J	1,900 U	93 J	360 U	2,000 U	1,100 J	510 J	440
67-72-1	Hexachloroethane	ug/kg	NA	NA	210 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	8.9 U	1,000	1,200	570	44	94	20,000 [13,000 J]	9,900 J	4,400	220 J	130 J	20 J	1,900 J	980 J	3,100	940 J	4,900	200 J	1,100 J	20,000 J	10,000	8,600
91-20-3	Naphthalene	ug/kg	8.9 U	28 J	29 J	9.3	9 U	43	2,100 J [2,800 J]	2,100 J	1,200 J	52 J	43 J	350 U	160 J	1,900 U	150 J	140 J	960 J	52 J	120 J	17,000 J	1,000	540
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	320	NA	45 U	16 J	48,000 J [53,000 J]	88,000 U	11,000 U	1,800 U	1,800 U	1,700 U	3,400 J	9,400 U	10,000 U	9,100 U	13,000 U	1,800 U	9,600 U	57,000 J	2,200 J	1,300 J
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	3.5 J	70	57	27	6.5 J	190	4,200 J [4,100 J]	3,500 J	3,100	180 J	140 J	16 J	560 J	210 J	550 J	710 J	810 J	250 J	430 J	15,000 J	1,200	1,000
108-95-2	Phenol	ug/kg	NA	NA	43 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	8.9 U	260	270	110	17	240	150,000 [130,000]	19,000	7,500	310 J	280 J	24 J	1,700 J	2,500	4,100	2,200	3,000	500	1,500 J	50,000	11,000	6,400
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	7.37	1,640	1,640	797	76.7	195	77,800 [79,000]	21,400	11,300	344	220	363	2,350	1,650	4,880	1,560	11,700	442	2,080	54,800	17,500	16,700
	Metals																							
7440-38-2	Arsenic	ug/kg	6,100	6,500	8,800	10,200	8,700	9,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	21,500	9,700
7440-47-3	Chromium	ug/kg	15,900	16,300	23,000	24,900	24,800	12,900 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	12,400	17,200	20,000	22,000	22,000	21,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																							
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.09 J	3.74	NA	9.48	NA	0.413	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	118	15
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.00745	0.5	NA	1.41	NA	0.0518	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20	2.9 J
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.000569 J	0.0383	NA	0.11	NA	0.004 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.61	0.226
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.0011 J	0.0363	NA	0.0851	NA	0.00475 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.37	0.0394
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.000346 J	0.0223	NA	0.0654	NA	0.00355 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.821	0.101 J
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00193 J	0.0799	NA	0.229	NA	0.0114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.03	0.354
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.000184 U	0.00558	NA	0.0172	NA	0.00195 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.222 J	0.027 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.0016 J	0.0315	NA	0.0791	NA	0.00723	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.708	0.0846
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.000264 U	0.00514	NA	0.014	NA	0.00101 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.121	0.00558
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.000528 J	0.00485	NA	0.0107	NA	0.00244 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.111	0.00982
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000301 U	0.00147 J	NA	0.0039	NA	0.000808 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0235	0.00287
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.000208 U	0.0115	NA	0.0345	NA	0.00348 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.499	0.0579
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.000334 U	0.0059	NA	0.0187	NA	0.00328 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.142	0.0183
1746-01-6	2,3,7,8-TCDD	ug/kg	0.00008 U	0.000582	NA	0.00107	NA	0.00063 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00996	0.00118
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000124 J	0.000702	NA	0.00149	NA	0.000928 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00441	0.000588
3268-87-9	OCDD	ug/kg	6.26	47.3 J	NA	97.9 DJ	NA	12.6 EJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,140	197
39001-02-0	OCDF	ug/kg	0.0393	3	NA	7.08	NA	0.215	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	112 J	23.2 J
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.00404	0.0844	NA	0.212	NA	0.016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.51	0.331

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	SDD-1-15LB 0 - 0.5 03/06/08	SDD-1-15RB 0 - 0.5 03/06/08	SDD-12 0 - 0.5 03/08/06	SDD-12-15LB 0 - 0.5 03/10/08	SDD-12-15RB 0 - 0.5 03/10/08	SDD-12A 0 - 0.5 03/11/08	SDD-12-TLB 0 - 0.5 03/11/08	SDD-12-TLB 0.5 - 2 03/11/08	SDD-12-TLB 2 - 6 03/11/08	SDD-12-TRB 0 - 0.5 03/11/08	SDD-15 0 - 0.5 03/08/06	SDD-15 1.5 - 2 03/08/06	SDD-15-15LB 0 - 0.5 03/10/08	SDD-15-15RB 0 - 0.5 03/10/08	SDD-15-TLB 0 - 0.5 03/11/08	SDD-15-TLB 0.5 - 2 03/11/08	SDD-15-TLB 2 - 6 03/11/08	SDD-15-TRB 0 - 0.5 03/10/08	SDD-16 0 - 0.5 03/08/06	SDD-16 1.5 - 2 03/08/06	SDD-1-SPL 0 - 0.5 03/13/08
	SVOCs																						
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	11 J	34 J	83 J	970 J	710 J	NA	240 J	250 J	8.7 U	22 J	340 J	360 J	2,200 UJ	82 J	2,100 UJ	2,700 UJ	45 U	390 J [1,000 U]	390 U	930 U	230 J
208-96-8	Acenaphthylene	ug/kg	100	730	1,300	15,000 J	15,000 J	NA	2,700	3,900	73	570	7,100	6,800	13,000 J	900	2,200 J	4,900 J	780	7,500 [4,200]	2,400	4,700	4,100
120-12-7	Anthracene	ug/kg	97	600	1,600	9,300 J	23,000 J	NA	3,800	5,400	81	470	8,400	9,100	9,800 J	1,100	3,700 J	7,000 J	930	9,000 [6,000]	3,400	9,100	2,600
56-55-3	Benzo(a)anthracene	ug/kg	190	890	2,600	30,000 J	40,000 J	NA	8,600	11,000	170	1,700	6,800	8,500	71,000 J	3,000	4,700 J	6,300 J	890	11,000 [11,000]	3,100	8,400	8,100
50-32-8	Benzo(a)pyrene	ug/kg	150	1,000	2,600	29,000 J	40,000 J	NA	8,100	11,000	220	2,100	10,000	14,000	53,000 J	3,200	5,200 J	11,000 J	1,400	15,000 [11,000]	3,000	9,100	12,000
205-99-2	Benzo(b)fluoranthene	ug/kg	520 JX	2,700 JX	5,400	62,000 JX	89,000 DJ	NA	21,000 JX	26,000 JX	500 JX	4,900 JX	22,000	26,000	86,000 J	6,100	17,000 JX	30,000 JX	4,000 JX	41,000 JX [31,000 JX]	12,000	18,000	21,000 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	200 J	1,600 J	3,100	22,000 J	27,000 J	NA	7,100	11,000	210	1,600	17,000	19,000	35,000 J	2,400	7,000 J	17,000 J	2,300	21,000 J [11,000]	6,900	8,600	16,000
207-08-9	Benzo(k)fluoranthene	ug/kg	500 JX	2,600 JX	1,800	62,000 JX	28,000 DJ	NA	21,000 JX	25,000 JX	500 JX	4,800 JX	8,700	8,900	54,000 J	3,400	16,000 JX	30,000 JX	4,400 JX	44,000 JX [34,000 JX]	5,000	8,300	23,000 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,300	NA	NA
218-01-9	Chrysene	ug/kg	280	1,400	3,800	32,000 J	63,000 J	NA	12,000	14,000	270	2,100	11,000	12,000	86,000 J	4,700	6,500 J	11,000 J	1,700	20,000 [19,000]	7,900	16,000	8700
53-70-3	Dibenzo(a,h)anthracene	ug/kg	52 J	460 J	810	6,700 J	6,700 J	NA	2,100	2,500	58	530	4,200	4,800	2,200 UJ	910	2,000 J	3,800 J	590	4,700 [2,300]	2,100	2,500	3,800
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	440	1,700	5,200	50,000 J	220,000 DJ	NA	17,000	30,000	320	1,700	11,000	7,700	130,000 J	5,200	5,900 J	8,900 J	1,800	23,000 [31,000]	3,900	7,200	9,800
86-73-7	Fluorene	ug/kg	17 J	54	120 J	850 J	1,100 J	NA	260 J	440 U	10	34 J	540 J	520	3,500 J	77 J	2,100 UJ	2,700 UJ	45 U	820 [1,000 U]	260 J	680 J	220 J
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	190 J	1,400 J	2,800	25,000 J	31,000 J	NA	6,800	9,600	190	1,500	15,000	17,000	36,000 J	2,500	6,400 J	15,000 J	2,100	19,000 [11,000]	6,500	7,600	13,000
91-20-3	Naphthalene	ug/kg	53	110	450	4,400 J	74,000 DJ	NA	1,500	3,000	40	70	1,600	2,100	1,100 J	700 J	640 J	2,600 J	150	1,200 [970 J]	500	930 U	350
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	580 J	NA	NA	NA	NA	NA	NA	NA	45,000 DJ	30,000 J	17,000 J	2,900	100,000 J	170,000 J	19,000 D	68,000 [60,000]	89,000 DJ	190,000 DJ	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	240	340	1,100	11,000 J	22,000 J	NA	8,600	28,000	200	250	3,200	2,600	10,000 J	1,400	1,700 J	4,300 J	350	3,400 [3,800]	770	640 J	1,500
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	320	1,400	3,900	28,000 J	55,000 J	NA	15,000	22,000	270	1,800	8,000	5,600	130,000 J	5,200	8,300 J	12,000 J	1,400	18,000 [22,000]	12,000	29,000	8,300
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	297	1,990	4,510	48,100	63,000	NA	14,100	18,400	369	3,490	18,700	24,100	74,000	5,310	10,200	20,200	2,730	27,300 [19,000]	7,320	15,100	20,200
	Metals																						
7440-38-2	Arsenic	ug/kg	NA	NA	NA	12,800	17,600	37,600 J	18,000 J	11,500 J	10,300 J	21,000	32,000	16,800	10,100	25,800	22,400	19,500	10,000	25,300 [23,200]	8,000	9,900	7,600
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																						
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	284	161	NA	NA	NA	NA	NA	NA	632 J	214 J	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	53.3	24 J	NA	NA	NA	NA	NA	NA	129 J	34.4 J	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.12	1.82	NA	NA	NA	NA	NA	NA	9.74	2.23	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.12	0.277	NA	NA	NA	NA	NA	NA	1.99	0.223	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.13	0.932	NA	NA	NA	NA	NA	NA	3.18	0.669	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.21	4.37	NA	NA	NA	NA	NA	NA	31.7	7.26	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.901 J	0.228 J	NA	NA	NA	NA	NA	NA	0.916 J	0.167 J	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.73	0.606	NA	NA	NA	NA	NA	NA	3.89	0.571	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.545	0.0228	NA	NA	NA	NA	NA	NA	0.045	0.105	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.221	0.0378	NA	NA	NA	NA	NA	NA	0.445	0.0298	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.239	0.0764	NA	NA	NA	NA	NA	NA	0.0555	0.00991	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.37	0.452	NA	NA	NA	NA	NA	NA	2.38	0.473	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.08	0.221	NA	NA	NA	NA	NA	NA	0.162	0.0289	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0155	0.00259	NA	NA	NA	NA	NA	NA	0.0183 J	0.00168	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0642	0.0117	NA	NA	NA	NA	NA	NA	0.00652	0.00129	NA
3268-87-9	OCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,470 J	1,090 J	NA	NA	NA	NA	NA	NA	1,540 J	1,260 J	NA
39001-02-0	OCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	188 J	111	NA	NA	NA	NA	NA	NA	399 J	167 J	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.29	3.03	NA	NA	NA	NA	NA	NA	13.2	3.92	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	SDD-1-TLB 0 - 0.5 03/06/08	SDD-1-TRB 0 - 0.5 03/06/08	SDD-20 0 - 0.5 03/08/06	SDD-20-15RB 0 - 0.5 03/10/08	SDD-20A 0 - 0.5 03/12/08	SDD-20-TRB 0 - 0.5 03/10/08	SDD-26 0 - 0.5 03/08/06	SDD-26 1.5 - 2 03/08/06	SDD-26-15N 0 - 0.5 03/10/08	SDD-26-15S 0 - 0.5 03/12/08	SDD-26-15S 0.5 - 2 03/12/08	SDD-26-15S 2 - 6 03/12/08	SDD-27 0 - 0.5 03/08/06	SDD-27 1.5 - 2 03/08/06	SDD-28 0 - 0.5 03/06/08	SDD-28-15LB 0 - 0.5 03/06/08	SDD-28-15RB 0 - 0.5 03/06/08	SDD-28-TLB 0 - 0.5 03/06/08	SDD-28-TRB 0 - 0.5 03/06/08	SDD-29 0 - 0.5 03/06/08	SDD-29-15LB 0 - 0.5 03/06/08
	SVOCs																						
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	98 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	98 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,500 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	70 J	15 [15]	110 J	190 J	NA	27	68 J	8.9 U	29 J [15 J]	71 J [46]	8.7 U	8.8 U	200 U	8.2 J [5.7 J]	670	74	140	370	190	580	250
208-96-8	Acenaphthylene	ug/kg	710	400 [290]	1,300	4,200	NA	370	510	8.9 U	360 [210]	1,700 [1,100]	21	4.7 J	1,500	33 [46]	10,000	740	2,800	5,000	3,900	7,100	1,500
120-12-7	Anthracene	ug/kg	890	400 [420]	1,800	4,100	NA	530	1,000	3.1 J	630 [330]	2,000 [1,200]	31	4.3 J	2,000	110 [150]	13,000	740	2,700	6,300	4,400	12,000	4,000
56-55-3	Benzo(a)anthracene	ug/kg	1,500	660 [820]	2,400	13,000	NA	1,000	1,100	3.9 J	450 [360]	3,600 [3,400]	45	5 J	1,400	21 J [43 J]	14,000	1,300	3,000	4,900	3,100	4,700	9,300 D
50-32-8	Benzo(a)pyrene	ug/kg	960	640 [470]	3,500	12,000	NA	800	1,200	3.9 J	590 [390]	3,600 [2,900]	38	7.7 J	1,100	12 J [43 J]	13,000	1,300	3,500 J	5,900 J	3,100	4,800 J	3,500 J
205-99-2	Benzo(b)fluoranthene	ug/kg	3,200	1,400 [1,300]	6,700	22,000	NA	2,200 JX	3,300	7.6 J	1,500 JX [1,000 JX]	11,000 JX [8,100 JX]	130 JX	22 JX	3,400	64 [84]	29,000	4,200 JX	10,000 DJ	13,000 J	5,900	12,000 J	6,400 J
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	1,200	650 [530]	3,400	8,800	NA	1,000 J	1,700	7 J	930 J [480]	3,400 [2,600]	48	8.6 J	1,600	34 J [67 J]	14,000	1,400 J	6,500 J	6,900 J	5,400	8,100 J	4,400 J
207-08-9	Benzo(k)fluoranthene	ug/kg	1,400	620 [480]	2,200	12,000	NA	2,400 JX	1,000	8.9 U	1,700 JX [1,100 JX]	11,000 JX [8,000 JX]	120 JX	22 JX	1,000	8.5 UJ [29 J]	12,000	4,100 JX	8,800 JX	6,200 J	2,600	5,500 J	5,300 J
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	2,200	860 [1,100]	4,200	17,000	NA	1,300	1,600	5.1 J	710 [570]	5,900 [4,400]	62	16	2,900	43 [64]	17,000	2,200	4,800	8,000	3,600	6,100	12,000 D
53-70-3	Dibenzo(a,h)anthracene	ug/kg	400	170 [140]	970	3,100	NA	340	430	8.9 U	240 [130]	1,200 [820]	13	8.8 U	460	8.9 [18]	4,200	530 J	42 UJ	1,900 J	1,200	1,900 J	42 UJ
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	2,400	1,100 [1,500]	4,000	26,000	NA	2,000	2,100	12	870 [1,100]	4,700 [3,400]	56	12	3,500	62 [57]	35,000	3,100	7,400	16,000	12,000	12,000	40,000 D
86-73-7	Fluorene	ug/kg	110 J	33 [33]	160 J	520	NA	43	74 J	8.9 U	44 [21]	100 [94]	3.4 J	8.8 U	260	27 [16]	920	97	170	480	330	710	240
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	1,200	580 [470]	3,300	8700	NA	950	1,500	4 J	820 [430]	3,400 [2,500]	47	8.1 J	1,500	42 J [71 J]	14,000	1,600 J	5,500 J	6,600 J	4,200	7,900 J	3,200 J
91-20-3	Naphthalene	ug/kg	60 J	30 J [33 J]	140 J	1,500	NA	140	140	8.9 U	43 [30]	160 [110]	4.6 J	8.8 U	83 J	49 J [23 J]	3,000 J	700	1,200	920 J	1,600 J	830 J	6,200
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	98 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	510 J	NA	NA	320	2,800 J	44 UJ	NA	1,500	NA	NA	33,000 DJ	1,400 DJ [1,200 DJ]	NA	NA	NA	NA	NA	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	320	320 [160]	550	11,000	NA	380	640	7 J	160 [230]	640 [400]	19	6.3 J	1,100	230 [140]	13,000	2,400	3,800	3,800	6,600	3,900	29,000 D
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	98 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	1,800 J	620 J [850 J]	3,700	21,000	NA	1,300	1,900	8.5 J	660 [710]	6,000 [4,100]	66	13	2,700	42 [42]	17,000 J	2,200	6,100	7,900 J	5,400 J	6,900 J	25,000 D
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	1,970	1,080 [875]	5,740	19,600	NA	1,580	2,230	9.95	1,120 [711]	6,720 [5,200]	74.5	15.8	2,200	33.7 [81.2]	23,000	2,580	5,460	10,300	5,650	9,220	5,480
	Metals																						
7440-38-2	Arsenic	ug/kg	6,700	1,900 [3,500]	NA	NA	18,700 J	8,800	38,200	10,000	28,900 [23,800]	23,000 J [13,400 J]	15,100 J	14,100 J	23,500	10,300 [7,100]	25,100	16,400	NA	16,200	6,300	26,500	29,900
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																						
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	NA	NA	NA	NA	NA	39.1 J	0.085	NA	NA	NA	NA	277	67.3 [54.2]	NA	NA	NA	NA	NA	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	5.22	0.00896	NA	NA	NA	NA	40.4 J	7.37 J [7.43]	NA	NA	NA	NA	NA	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.337	0.000707 J	NA	NA	NA	NA	2.86	0.551 [0.475]	NA	NA	NA	NA	NA	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	0.187	0.0005 U	NA	NA	NA	NA	4.33	0.504 [0.419]	NA	NA	NA	NA	NA	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.13	0.000345 UJ	NA	NA	NA	NA	2.35	0.476 J [0.382]	NA	NA	NA	NA	NA	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	1.17	0.00193 J	NA	NA	NA	NA	9.27	1.71 [1.39]	NA	NA	NA	NA	NA	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.0422	0.000124 U	NA	NA	NA	NA	0.929	0.163 J [0.129]	NA	NA	NA	NA	NA	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	0.205	0.000928 J	NA	NA	NA	NA	3.88	0.503 [0.415]	NA	NA	NA	NA	NA	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.00623	0.000197 U	NA	NA	NA	NA	0.917	0.148 [0.12]	NA	NA	NA	NA	NA	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	NA	NA	NA	NA	NA	0.0468	0.000192 U	NA	NA	NA	NA	1.22	0.0854 [0.0753]	NA	NA	NA	NA	NA	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.00624	0.000108 U	NA	NA	NA	NA	0.476	0.0787 [0.0735]	NA	NA	NA	NA	NA	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.0799	0.000133 U	NA	NA	NA	NA	1.67	0.267 [0.199]	NA	NA	NA	NA	NA	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.0148	0.0001 U	NA	NA	NA	NA	1.64	0.235 [0.256]	NA	NA	NA	NA	NA	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	NA	NA	NA	NA	NA	0.00519	0.000177 U	NA	NA	NA	NA	0.147	0.00709 [0.00872]	NA	NA	NA	NA	NA	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	NA	NA	NA	NA	NA	0.000952 U	0.000088 U	NA	NA	NA	NA	0.167	0.0234 [0.0336]	NA	NA	NA	NA	NA	NA	NA
3268-87-9	OCDD	ug/kg	NA	NA	NA	NA	NA	NA	360 J	4.92	NA	NA	NA	NA	1,470 J	1,030 [1,110 J]	NA	NA	NA	NA	NA	NA	NA
39001-02-0	OCDF	ug/kg	NA	NA	NA	NA	NA	NA	10.5 J	0.0509	NA	NA	NA	NA	193	46.9 J [53]	NA	NA	NA	NA	NA	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	NA	NA	NA	NA	NA	0.796	0.00299	NA	NA	NA	NA	7.93	1.62 [1.44]	NA	NA	NA	NA	NA	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	SDD-29-15RB 0 - 0.5 03/06/08	SDD-29-TLB 0 - 0.5 03/06/08	SDD-29-TRB 0 - 0.5 03/06/08	SDD-30 0 - 0.5 03/10/08	SDD-31 0 - 0.5 03/10/08	SDD-32 0 - 0.5 03/12/08	SDD-32 0.5 - 2 03/12/08	SDD-32 2 - 6 03/12/08	SDD-33 0 - 0.5 03/10/08	SDD-34 0 - 0.5 03/11/08	SDD-34 0.5 - 2 03/11/08	SDD-34 2 - 6 03/11/08	SDD-35 0 - 0.5 03/10/08	SDD-36 0 - 0.5 03/10/08	SDD-37 0 - 0.5 03/11/08	SDD-4 0 - 0.5 03/08/06	SDD-4-15LB 0 - 0.5 03/06/08	SDD-4-15RB 0 - 0.5 03/06/08	SDD-4A 0 - 0.5 03/13/08	SDD-4A 0.5 - 2 06/24/08	SDD-4A 2 - 6 03/13/08	SDD-4-TLB 0 - 0.5 03/06/08	SDD-4-TRB 0 - 0.5 03/06/08
	SVOCs																								
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	44	120 J	1,200	200 U	160 J	630 J	35 J [26 J]	8.7 U	55 J	360 U	92 U	8.8 U	990 U	300 J	14 J [13 J]	390 J	47	31 J	NA	920	1,300	670 J	120 J
208-96-8	Acenaphthylene	ug/kg	1,200	1,200	25,000	2,900	3,700	17,000 J	300 [400]	13	1,300	120 J	92 U	8.8 U	830 J	6,200	130 [210]	4,500	1,100	480	NA	2,500	73	8,400	1,700
120-12-7	Anthracene	ug/kg	980	2,800	24,000	2,600	3,900	20,000 J	550 [640]	19	1,400	270 J	59 J	8.8 U	1,400	8,800	210 [290]	7,300	1,100	430	NA	6,900	970	11,000	1,900
56-55-3	Benzo(a)anthracene	ug/kg	1,800	6,900	22,000	6,700	7,100	70,000 J	1,600 [2,000]	62	1,500	140 J	92 U	8.8 U	880 J	17,000	170 [180]	6,100	1,700	570	NA	6,900	880	13,000	2,200
50-32-8	Benzo(a)pyrene	ug/kg	2,000	4,400	29,000 J	6,200	8,700	62,000 J	1,400 [1,700]	53	1,800	360 U	92 U	8.8 U	870 J	16,000	250 [290]	6,700	1,400	560	NA	7,200 J	360	10,000	1,800
205-99-2	Benzo(b)fluoranthene	ug/kg	5,300 JX	5,600	65,000 J	15,000 JX	20,000 JX	150,000 JX	3,600 JX [4,200 JX]	140 JX	4,900 JX	470 JX	140 JX	8.8 U	3,300 JX	44,000 JX	630 JX [670 JX]	13,000	4,300 JX	1,900 JX	NA	17,000 D	660 JX	23,000	4,400
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	3,900 J	3,300	34,000 J	7,100 J	9,700 J	49,000 J	1,100 [1,300]	45	2,600 J	360 U	92 U	8.8 U	1,300	16,000	360 [470 J]	9,800	2,400 J	1,600 J	NA	5,300 J	200	16,000	2,200
207-08-9	Benzo(k)fluoranthene	ug/kg	5,100 JX	3,100	20,000 J	16,000 JX	21,000 JX	150,000 JX	3,600 JX [4,100 JX]	140 JX	5,300 JX	470 JX	140 JX	8.8 U	3,600 JX	49,000 JX	660 JX [670 JX]	4,800	4,200 JX	1,800 JX	NA	17,000 D	730 JX	9,600	1,700
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	2,400	7,500	30,000	7,600	9,700.	81,000 J	2,200 [2,300]	68	2,400	360	74 J	8.8 U	2,000	25,000	270 [300]	9,100	2,200	1,200	NA	11,000 D	1,000	20,000	3,200
53-70-3	Dibenzo(a,h)anthracene	ug/kg	940 J	1,100	9,500 J	2,100	2,800	17,000 J	350 [450]	16	540	360 U	92 U	8.8 U	450 J	3,900	85 [80]	2,500	620 J	260 J	NA	2,000 J	46	3,900	670
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	3,200	23,000	43,000	11,000	11,000	67,000 J	2,200 [2,200]	82	2,900	230 J	92 U	8.8 U	2,600	36,000	200 [320]	12,000	3,200	3,000	NA	22,000 D	5,100 D	28,000	4,900
86-73-7	Fluorene	ug/kg	80	210	1,900	200	300	1,100 J	35 J [37 J]	8.7 U	120	360 U	92 U	8.8 U	990 U	450 J	26 [38]	510 J	89	52	NA	770	1,700	1,200	190
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	3,100 J	2,600	34,000 J	6,800	9,100	48,000 J	1,100 [1,300]	47	2,500	140 J	28 J	8.8 U	1,400	15,000	310 [410]	8,900	2,000 J	1,100 J	NA	5,100 J	190	12,000	2,000
91-20-3	Naphthalene	ug/kg	200	2,600 J	10,000 J	860	840	1,700 J	190 [460]	21	68 J	360 U	92 U	8.8 U	990 U	1,100	25 [30]	1,700	280	61	NA	2,900	1,500	2,000 J	280 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	1,300	NA	990 U	19,000	11,000 UJ	56 J [220 U]	43 U	1,400	20,000	5,800	11 J	45,000	89,000	830 [1,400]	1,100 J	NA	NA	NA	NA	NA	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	690	15,000	21,000	2,800	1,800	12,000 J	620 [1,600]	31	320	360 U	23 J	4.2 J	540 J	3,900	80 [82]	4,100	1,000	600	NA	6,400	6,200 D	8,700	1,100
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	2,800	11,000 J	26,000 J	6,700	7,700	160,000 J	4,300 [5,200]	160	2,200	370	33 J	8.8 U	2,100	27,000	260 [240]	9,800	2,500	2,100	NA	16,000 D	2,600 D	17,000 J	3,300 J
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	4,010	7,050	50,800	11,300	15,300	107,000	2,420 [2,940]	95.4	3,290	440	115	10.2	1,920	28,000	453 [503]	12,100	2,860	1,200	NA	12,300	587	18,800	3,350
	Metals																								
7440-38-2	Arsenic	ug/kg	1,100	26,800	22,600	NA	NA	13,500 J	14,100 J [9,400 J]	5,600 J	27,800	8,300	11,400	11,100	36,400	18,200	10,300 [10,300]	NA	7,600	NA	11,400	15,500	10,200	13,300	4,300
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																								
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3268-87-9	OCDD	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
39001-02-0	OCDF	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	SDD-7 0 - 0.5 03/08/06	SDD-7-15LB 0 - 0.5 03/10/08	SDD-7-15RB 0 - 0.5 03/10/08	SDD-7-TLB 0 - 0.5 03/13/08	SDD-7-TLB 0.5 - 2 03/13/08	SDD-7-TLB 2 - 6 03/13/08	SDD-7-TRB 0 - 0.5 03/10/08	SDD-9 0 - 0.5 03/08/06	SDD-9 1.5 - 2 03/08/06	SDD-9-TRB 0 - 0.5 03/06/08	S13 0 - 0.5 3/3/05
	SVOCs												
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	170,000 D	460 J	120 J	10,000	1,100,000 DJ	180,000 D	24	1,100	110,000 D [68,000 D]	390	1200
208-96-8	Acenaphthylene	ug/kg	16,000	5,500 J	3,000	7,400	81,000 J	8,500	400	6,600	2,100 [1,200]	3,500	34000
120-12-7	Anthracene	ug/kg	87,000	9,000 J	2,600	13,000	500,000 J	97,000 D	460	14,000	53,000 D [27,000 D]	5,400	200000
56-55-3	Benzo(a)anthracene	ug/kg	66,000	19,000 J	7,000	41,000	1,100,000 J	44,000 D	1,100	20,000	23,000 D [14,000 D]	5,500	44000
50-32-8	Benzo(a)pyrene	ug/kg	44,000	11,000 J	9,800	31,000	420,000 J	18,000	1,100	17,000	6,900 [4,100]	5,600	49000
205-99-2	Benzo(b)fluoranthene	ug/kg	62,000	40,000 JX	17,000	73,000 JX	780,000 JX	35,000 JX	2,600 JX	33,000	9,400 [5,700]	15,000	80000
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	34,000	8,100 J	7,400	19,000	220,000 J	9,000	1,300 J	15,000	3,100 [1,800]	5,200	42000
207-08-9	Benzo(k)fluoranthene	ug/kg	28,000	40,000 JX	8,100	77,000 JX	850,000 JX	38,000 JX	2,900 JX	10,000	3,400 [2,000]	7,700	58000
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	81,000	30,000 J	11,000	57,000	930,000 J	50,000 D	1,700	32,000	28,000 D [14,000 D]	9,100	71000
53-70-3	Dibenzo(a,h)anthracene	ug/kg	9,200	2,900 J	2,400	6,200	61,000 J	2,900	320	4,400	940 [550]	1,700	11000
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	380,000 D	33,000 J	9,600	120,000	4,900,000 DJ	260,000 D	2,200	36,000	150,000 D [92,000 D]	9,400	64000
86-73-7	Fluorene	ug/kg	160,000 D	830 J	390	1,500	670,000 J	180,000 D	38	1,400	90,000 D [55,000 D]	520	1700
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	31,000	11,000 J	7,100	20,000	210,000 J	8,900	1,200	14,000	2,900 [1,700]	5,500	53000
91-20-3	Naphthalene	ug/kg	240,000 D	1,800 J	590	510 J	7,000 J	680,000 D	54	2,000	80,000 D [49,000 D]	400 J	6800
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	4,200 J	550 J	NA	8,400	26,000 J	2,000	230	10,000 J	7,200 J [4,300 J]	5,500	2200
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	390,000 D	4,200 J	1,600	3,800	1,800,000 DJ	620,000 D	180	6,600	230,000 D [150,000 D]	1,900	11000
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	220,000 D	18,000 J	11,000	98,000	2,500,000 DJ	150,000 D	1,500	33,000	73,000 D [48,000 D]	7,000 J	72000
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	69,500	21,300	15,400	51,400	699,000	30,100	1,940	28,200	11,400 [6,820]	9,990	78400
	Metals												
7440-38-2	Arsenic	ug/kg	15,600	10,000	NA	18,500	9,400	19,100	9,300	13,500	8,600 [8,800]	32,500	NA
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans												
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	78.5	NA	NA	NA	NA	NA	NA	225	2.57 [2.58]	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	13.6	NA	NA	NA	NA	NA	NA	33.2 J	0.282 [0.259]	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	1.04	NA	NA	NA	NA	NA	NA	2.63	0.0176 [0.0151]	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.34	NA	NA	NA	NA	NA	NA	1.2	0.00713 [0.00607]	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.549	NA	NA	NA	NA	NA	NA	3.9 J	0.0114 [0.0114]	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	2.07	NA	NA	NA	NA	NA	NA	5.91	0.0472 [0.0464]	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.158 J	NA	NA	NA	NA	NA	NA	0.902 J	0.00343 [0.00309 J]	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.683	NA	NA	NA	NA	NA	NA	1.68	0.0153 [0.0152]	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.0241	NA	NA	NA	NA	NA	NA	0.808	0.000535 J [0.000655 J]	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.0789	NA	NA	NA	NA	NA	NA	0.297	0.00133 J [0.00133 J]	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.0191	NA	NA	NA	NA	NA	NA	0.169	0.00114 J [0.00108 J]	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.4	NA	NA	NA	NA	NA	NA	1.3	0.0056 [0.00501]	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.129	NA	NA	NA	NA	NA	NA	1.27	0.00426 [0.00465]	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	0.00666	NA	NA	NA	NA	NA	NA	0.0268	0.000479 J [0.000476 U]	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	0.00418	NA	NA	NA	NA	NA	NA	0.0382	0.000374 J [0.000346 J]	NA	NA
3268-87-9	OCDD	ug/kg	1,030	NA	NA	NA	NA	NA	NA	1,600	104 [98.8]	NA	NA
39001-02-0	OCDF	ug/kg	85	NA	NA	NA	NA	NA	NA	187	2.18 [1.97]	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	1.81	NA	NA	NA	NA	NA	NA	5.43	0.0728 [0.0706]	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equi
NA = not available

APPENDIX A
ON-SITE SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A2-6 0 - 0.5 12/08/09	A5-6 0 - 0.5 03/30/10	A5-7 0 - 0.5 03/30/10	GC-BC-08 0 - 0.5 06/27/08	GC-BC-09 0 - 0.5 06/27/08	GC-BC-10 0 - 0.5 06/26/08	GC-BC-11 0 - 0.5 06/26/08	GC-BC-12 0 - 0.5 06/26/08	GC-BC-13 0 - 0.5 06/26/08	GC-BC-14 0 - 0.5 06/26/08	GC-BC-15 0 - 0.5 06/26/08	LP-SED-1 0-0.5 03/11/08	LP-SED-2 0-0.5 03/11/08	LP-SED-2 0-0.5 06/24/08	SD-BC-01 0 - 0.5 06/24/08	SD-BC-02 06/24/08	SD-BC-03 06/24/08
	SVOCs																		
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	130 [180]	400 DJ	53 UJ [53 UJ]	52 UJ	2,700 J	58 UJ	120 J	44 J	69 J	71 UJ	0.0094 U [0.0091 U]	0.029 U	NA	160	71	14 J
208-96-8	Acenaphthylene	ug/kg	NA	1,800 [2,600]	4,600 DJ	53 UJ [53 UJ]	65 J	1,200 J	170 J	1,500 J	430 J	860 J	240 J	0.0094 U [0.0091 U]	0.058	NA	2,600	1,200	170
120-12-7	Anthracene	ug/kg	NA	2,200 [3,000]	5,600 DJ	53 UJ [53 UJ]	68 J	3,600 J	150 J	1,300 J	370 J	700 J	210 J	0.0094 U [0.0091 U]	0.069	NA	3,300	1,500	210
56-55-3	Benzo(a)anthracene	ug/kg	NA	1,200 [1,700]	2,100 DJ	53 UJ [53 UJ]	250 J	5,300 J	180 J	1,200 J	400 J	650 J	200 J	0.0094 U [0.0043 J]	0.088	NA	1,900 J	800 J	88
50-32-8	Benzo(a)pyrene	ug/kg	NA	2,300 [3,600]	5,600 DJ	53 UJ [39 J]	330 J	4,300 J	400 J	3,300 J	950 J	2,000 J	500 J	0.0094 U [0.0091 U]	0.11	NA	3,700 J	1,600 J	110 J
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	3,300 [5,500]	9,000 DJ	53 UJ [53 UJ]	540 J	7,500 JX	610 JX	5,300 JX	1,600 JX	2,600 J	820 JX	0.0094 U [0.0091 U]	0.23 JX	NA	7,600 JX	3,400 JX	360 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	2,900 [4,200]	8,600 DJ	53 UJ [53 UJ]	210 J	2,600 J	370 J	3,400 J	970 J	2,100 J	560 J	0.0094 U [0.0091 U]	0.11	NA	5,100 J	2,200 J	230 J
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	1,500 [1,900]	2,000 DJ	53 UJ [53 UJ]	210 J	6,900 JX	560 JX	4,900 JX	1,500 JX	890 J	770 JX	0.0094 U [0.0091 U]	0.25 JX	NA	7,800 JX	3,500 JX	370 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	1,700 [3,000]	3,700 DJ	53 UJ [53 UJ]	410 J	4,900 J	220 J	1,700 J	510 J	900 J	270 J	0.0094 U [0.003 J]	0.091	NA	3,200 J	1,300 J	180
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	670 [1,100]	2,000 DJ	53 UJ [53 UJ]	63 J	530 J	110 J	1,000 J	270 J	550 J	100 J	0.0094 U [0.0091 U]	0.027 J	NA	1,500 J	600 J	38 J
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	1,500 [2,200]	4,500 DJ	53 UJ [53 UJ]	420 J	22,000 DJ	400 J	1,000 J	410 J	640 J	260 J	0.0094 U [0.0091 U]	0.11	NA	3,500	1,200	160
86-73-7	Fluorene	ug/kg	NA	200 [270]	530 DJ	53 UJ [53 UJ]	52 UJ	3,100 J	45 J	280 J	100 J	190 J	69 J	0.0094 U [0.0091 U]	0.013 J	NA	270	140	44 U
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	2,400 [3,600]	7,500 DJ	53 UJ [53 UJ]	210 J	2,500 J	330 J	3,200 J	890 J	1,900 J	510 J	0.0094 U [0.0091 U]	0.1	NA	4,800 J	2,000 J	200 J
91-20-3	Naphthalene	ug/kg	NA	89 J [140]	680 DJ	53 UJ [53 UJ]	52 UJ	96 J	58 UJ	150 J	72 UJ	35 J	71 UJ	0.0094 U [0.0091 U]	0.029 U	NA	390	83	44 U
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	400 J [530 J]	2,100 DJ	260 UJ [260 UJ]	260 UJ	660 J	69 J	1,000 J	140 J	250 J	83 J	0.046 U [0.045 U]	0.09 J	NA	2,000	580	93 J
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	350 [500]	2,500 DJ	53 UJ [24 J]	48 J	16,000 DJ	48 J	280 J	120 J	140 J	83 J	0.0053 J [0.0077 J]	0.025 J	NA	1,100	320	47
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	1,700 [2,500]	3,400 DJ	53 UJ [53 UJ]	330 J	13,000 DJ	310 J	1,100 J	390 J	590 J	220 J	0.0094 U [0.0091 U]	0.078	NA	2,500 J	960 J	130
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	3,680 [5,800]	9,480	61.2 [73.7]	496	6,430	628	5,320	1,520	3,070	761	NA	NA	NA	6,710	2,860	217
	Metals																		
7440-38-2	Arsenic	ug/kg	NA	6,500 [6,400]	10,400	9,300 [7,700]	71,500	13,400	11,900	11,200	6,500	8,500	5,200	14.5 [16.2]	5.3	NA	14,300	5,900	10,300
7440-47-3	Chromium	ug/kg	NA	20,200 J [21,200 J]	21,900 J	20,200 [19,800]	27,000	18,200	22,800	23,000	18,800	24,200	16,800	18.8 [17.1]	19.9	NA	10,900 J	19,200 J	18,000 J
7440-50-8	Copper	ug/kg	NA	24,300 [26,800]	26,800	21,900 [21,300]	18,400	15,000	23,900	23,800	18,800	23,500	17,800	20.1 J [21.4 J]	17.7 J	NA	17,100	26,200	20,500
	Dioxins/Furans																		
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	5.26 [6.75]	9.9 EJ [15 EJ]	23.5 EJ	NA	NA	2.85 J	NA	NA	1.29 J	NA	NA	0.0163 [0.0252]	NA	0.00928	29.3 DJ	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.816 [1.05]	1.38 [2.35]	4.34 EJ	NA	NA	0.371 J	NA	NA	0.18 J	NA	NA	0.00125 J [0.00252]	NA	0.000309 UB	4.96	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.0602 J [0.0879]	0.118 [0.173]	0.358	NA	NA	0.0337 J	NA	NA	0.0141 J	NA	NA	0.00015 U [0.000229 U]	NA	0.000129 UX	0.326	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.0208 J [0.0278 J]	0.0812 [0.121]	0.194	NA	NA	0.0326 J	NA	NA	0.0127 J	NA	NA	0.000411 U [0.000255 U]	NA	0.000199 J	0.155	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.0454 J [0.114]	0.0763 [0.105]	0.187	NA	NA	0.0196 J	NA	NA	0.00792 J	NA	NA	0.000138 U [0.000105 U]	NA	0.0000964 UX	0.199	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.104 [0.143]	0.277 [0.405]	0.823	NA	NA	0.0666 J	NA	NA	0.0315 J	NA	NA	0.000415 U [0.000682 J]	NA	0.0002 UX	0.731	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.009 J [0.0218 J]	0.0246 [0.0361]	0.0613	NA	NA	0.00385 J	NA	NA	0.00292 J	NA	NA	0.000145 U [0.000106 U]	NA	0.00012 UB	0.071 J	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.0303 J [0.0373 J]	0.123 [0.19]	0.314	NA	NA	0.0187 J	NA	NA	0.0155 J	NA	NA	0.000406 U [0.000374 J]	NA	0.000276 J	0.246	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.0118 J [0.0247 J]	0.0224 [0.0256]	0.0487	NA	NA	0.00522 J	NA	NA	0.00213 J	NA	NA	0.00021 U [0.000156 U]	NA	0.000159 J	0.0391	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00585 J [0.00501 UX]	0.0325 [0.0443]	0.0756	NA	NA	0.00391 J	NA	NA	0.00352 J	NA	NA	0.000175 UX [0.00014 U]	NA	0.000263 J	0.0469	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000883 UJ [0.00747 J]	0.00621 [0.00719]	0.0115	NA	NA	0.000995 J	NA	NA	0.000611 J	NA	NA	0.000112 U [0.0000897 U]	NA	0.000141 J	0.00854	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.0223 J [0.0356 J]	0.0615 [0.0779]	0.154	NA	NA	0.00979 J	NA	NA	0.00516 J	NA	NA	0.000167 U [0.000119 U]	NA	0.0000966 J	0.123	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.0161 J [0.0248 J]	0.0355 [0.0416]	0.0706	NA	NA	0.00572 J	NA	NA	0.00263 J	NA	NA	0.000125 U [0.0000952 U]	NA	0.000131 J	0.0498	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000802 U [0.0007 U]	0.00399 [0.00434]	0.008	NA	NA	0.000424 UXJ	NA	NA	0.000845 J	NA	NA	0.000137 J [0.000131 J]	NA	0.000114 UX	0.00393	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000568 U [0.00249 J]	0.00155 [0.00188]	0.00281	NA	NA	0.000327 J	NA	NA	0.000545 J	NA	NA	0.0000665 U [0.0000491 U]	NA	0.0000845 J	0.00196	NA	NA
3268-87-9	OCDD	ug/kg	93.2 [126 EJ]	94.9 EJ [167 EDJ]	214 EDJ	NA	NA	41 DJ	NA	NA	29.5 DJ	NA	NA	0.912 [1.17]	NA	1.47	371 D	NA	NA
39001-02-0	OCDF	ug/kg	5 [6.44]	7.43 [8.96 EJ]	17.8 EJ	NA	NA	2.39 J	NA	NA	1.01 J	NA	NA	0.00729 [0.0155]	NA	0.00129 UB	27 D	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.126 [0.17]	0.259 [0.386]	0.635	NA	NA	0.0671	NA	NA	0.037	NA	NA	NA	NA	NA	0.688	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
RAILROAD PROPERTY SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A1-1 0 - 0.5 12/09/09	A1-11 0 - 0.5 12/08/09	A1-15 0 - 0.5 12/08/09	A1-16 0 - 0.5 12/08/09	A1-2 0 - 0.5 12/09/09	A1-20 0 - 0.5 12/08/09	A1-28 0 - 0.5 12/08/09	A1-29 0 - 0.5 12/08/09	A1-3 0 - 0.5 12/09/09	A1-35 0 - 0.5 03/30/10	A1-36 0 - 0.5 03/30/10	A1-37 0 - 0.5 03/30/10	A1-38 0 - 0.5 03/30/10	A1-39 0 - 0.5 03/30/10	A1-40 0 - 0.5 03/30/10	A1-41 0 - 0.5 03/30/10	A1-42 0 - 0.5 03/30/10	A1-45 0 - 0.5 03/30/10	A1-46 0 - 0.5 03/30/10
	SVOCs																				
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	22 J	6.4 J	9.7 U	9.4 U	56 J	11	5.6 J [5.5 J]	8.9 U	3 J	4.2 J	280 DJ	19 J	300	9.8 J	900 DJ	19 U	9.2 U	2.2 J
208-96-8	Acenaphthylene	ug/kg	NA	230	16	14	18	1,200	69	91 [100]	8.9 U	19	23	6,400 DJ	330	130	150	56 DJ	3.9 J	2.8 J	15 J
120-12-7	Anthracene	ug/kg	NA	310	39	41	23	1,500	110	130 [110]	2.9 J	20	34	9,600 DJ	420	200	150	1,800 DJ	4.5 J	3.4 J	17 J
56-55-3	Benzo(a)anthracene	ug/kg	NA	910	100	39	120	3,400	290	500 [520]	13	32	46	31,000 DJ	1,300	1,000	400	6,400 DJ	11 J	9 J	39
50-32-8	Benzo(a)pyrene	ug/kg	NA	780	83	22	95	2,400	310	410 [390]	10	40	45	17,000 DJ	1,100	290	300	6,400 DJ	9.6 J	8 J	45 J
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	2,200	150	87	240	6,200	760	1,100 [1,000]	23	73	130	52,000 DJY	2,900 JY	510 JY	560	7,500 DJ	19	13	76 J
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	840	66	36	75	3,700	360	430 [390]	9.4	36	48	14,000 DJ	830	110	200	4,800 DJ	7.9 J	6 J	35 J
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	23 U	8.6 U	9.7 U	9.4 U	89 U	8.8 U	10 U [9.7 U]	8.9 U	37	57	46,000 DJY	2,700 JY	460 JY	560	4,900 DJ	7.9 J	6 J	26 J
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	1,200	110	80	150	4,200	480	730 [700]	16	56	74	37,000 DJ	1,900	1,500	560	7,200 DJ	12 J	15	55
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	290	19	10	25	930	100	140 [130]	8.9 U	9.4 J	18	5,200 DJ	240	120	70	1,100 DJ	19 U	9.2 U	8.2 J
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	810	130	50	170	6,200	350	520 [580]	13	47	56	85,000 DJ	1,800	1,500	750	25,000 DJ	19	23	73
86-73-7	Fluorene	ug/kg	NA	27	10	4.8 J	9.4 U	93	10	11 [9.7 U]	8.9 U	9.7 U	3 J	590 DJ	31	40 U	18 J	520 DJ	3 J	9.2 U	3.4 J
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	800	64	36	72	3,100	340	400 [350]	5.8 J	32	53	14,000 DJ	800	77	200	4,400 DJ	8.9 J	6.1 J	34 J
91-20-3	Naphthalene	ug/kg	NA	67	14	8.9 J	45	360	50	14 [19]	3.3 J	7.7 J	7.2 J	840 DJ	44	190	34	120 DJ	2.5 J	8 J	10 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	NA	2,200 D	46 U	570	99	17 J [18 J]	44 U	48 U	22 J	8,000 DJ	33 J	260	23 J	790 UJ	93 U	46 U	110 U
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	270	97	40	140	1,700	110	70 [70]	10	29	27	12,000 DJ	220	3,700	94	12,000 DJ	15 J	9.7	31
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	1,100	130	60	170	5,400	390	750 [780]	15	40	53	58,000 DJ	1,800	780	600	13,000 DJ	13 J	16	56
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	1,460	134	48.3	163	4,600	550	751 [708]	18.7	63.5	86.5	32,400	1,870	575	492	9,390	23.1	15.5	68.4
	Metals																				
7440-38-2	Arsenic	ug/kg	NA	36,400	12,200	14,400	NA	8,500	12,500	10,300 [7,800]	10,200	10,500	13,500	9,000	9,300	5,200	10,300	11,500	8,700	12,000	6,500
7440-47-3	Chromium	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	15,500 J	19,400 J	15,300 J	15,800 J	11,900 J	17,800	19,600	17,100	20,700	20,100
7440-50-8	Copper	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,400	21,300	17,600	19,000	12,500	40,100	17,000	17,900	23,400	18,600
	Dioxins/Furans																				
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	181 EJ [127]	NA	NA	201 EJ	NA	42.9	2.64 J	0.781 J	0.23	0.375	0.341	10.6 [15.4 EJ]	0.225	2.51	0.207	2.14	0.16	0.0552	0.0836
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	41.4 [26]	NA	NA	25.7	NA	6.31	0.354 J	0.115 J	0.0187	0.0423	0.0798	3.29 [5.4 EJ]	0.0231	0.402	0.0318	0.546	0.016	0.00536	0.00981
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	4.85 [2.56]	NA	NA	1.63	NA	0.464	0.0289 J	0.00944 J	0.00181 J	0.00198 J	0.00644	0.347 [0.558]	0.00201 J	0.0285	0.00206 J	0.0225	0.000888 UX	0.000801 U	0.00128 U
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.655 [0.581]	NA	NA	1.04	NA	0.292	0.0117 J	0.00719 J	0.00345 J	0.00518	0.00188 J	0.0471 J [0.0668]	0.00232 J	0.0326	0.00442 U	0.0347	0.00189 UX	0.00154 U	0.00396 U
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	22.4 [10.5]	NA	NA	1.95	NA	0.256	0.018 J	0.00392 J	0.00202 J	0.00257 J	0.00243 J	0.0933 [0.137]	0.00197 J	0.0162	0.00197 U	0.0138	0.0012 J	0.000751 J	0.00175 J
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	4.95 [3.23]	NA	NA	5.34	NA	1.13	0.066 J	0.0232 J	0.00736	0.0113	0.0107	0.351 [0.542]	0.00594	0.0749	0.00509	0.0313	0.00418 J	0.00184 U	0.00381 U
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	4.21 [2.16]	NA	NA	0.62	NA	0.0925	0.00489 J	0.00221 J	0.000615 J	0.00118 J	0.000971 UX	0.0394 J [0.0364]	0.000606 J	0.00729	0.00177 U	0.0171	0.00103 U	0.000554 U	0.000673 U
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	1.2 [0.999]	NA	NA	1.61	NA	0.494	0.02 J	0.0122 J	0.00544	0.00834	0.00379 J	0.0669 [0.114]	0.00357 J	0.0519	0.00475 U	0.073	0.00348 J	0.000943 J	0.00421 U
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	4.57 [2.07]	NA	NA	0.793	NA	0.0514 J	0.00439 J	0.000932 J	0.000285 U	0.00149 U	0.00087 U	0.0152 U [0.0231]	0.000757 U	0.00324 J	0.00138 U	0.00226 J	0.000783 U	0.000892 U	0.00102 U
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.228 [0.196]	NA	NA	0.183	NA	0.113	0.00427 J	0.00289 J	0.00174 J	0.00146 UX	0.000697 UX	0.0127 J [0.0165]	0.00135 J	0.0128	0.0029 UX	0.0133	0.000882 UX	0.000967 U	0.000984 U
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.87 [0.457]	NA	NA	0.465	NA	0.0118 J	0.00106 J	0.000467 J	0.000238 J	0.000705 UX	0.000948 U	0.00544 U [0.00287 J]	0.00066 U	0.00116 J	0.000547 U	0.00108 UX	0.00084 U	0.000719 U	0.00116 U
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	4.93 [2.46]	NA	NA	1.06	NA	0.192	0.0118 J	0.00399 J	0.00122 J	0.00168 UX	0.00191 J	0.0969 [0.128]	0.0013 J	0.0127	0.00188 U	0.027	0.00114 J	0.000719 U	0.00146 U
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	9.04 [4.1]	NA	NA	0.462	NA	0.0729	8.22000000000001E-03 J	0.000932 UXJ	0.000536 J	0.00169 J	0.000844 U	0.00611 UX [0.0101]	0.0012 J	0.0045 J	0.000633 J	0.00435 J	0.000778 UX	0.000676 U	0.0013 J
1746-01-6	2,3,7,8-TCDD	ug/kg	0.0298 [0.0247]	NA	NA	0.0188	NA	0.0145	0.000855 J	0.000658 J	0.000213 UX	0.000607 U	0.000593 J	0.00212 UX [0.00191]	0.000672 J	0.00134 UX	0.00805	0.000742 J	0.000316 UX	0.000676 UX	0.00061 U
51207-31-9	2,3,7,8-TCDF	ug/kg	0.157 [0.0834]	NA	NA	0.141	NA	0.0036 J	0.000445 J	0.000339 J	0.000184 J	0.000831 UX	0.000367 U	0.00252 U [0.00144]	0.000332 U	0.000646 J	0.000478 UX	0.000798 U	0.000622 U	0.000477 U	0.000488 U
3268-87-9	OCDD	ug/kg	650 D [411 EDJ]	NA	NA	5,550 EDJ	NA	422 EJ	34.7 EJ	13.3 EJ	7.28	12.5 EJ	8.83 EJ	86 [146 EJ]	5.45	30.8 EJ	6.43	28.3 EJ	9.28 EJ	7.63	4.37
39001-02-0	OCDF	ug/kg	164 EJ [117 EJ]	NA	NA	174 EJ	NA	33.7	2.09 J	0.678 J	0.0763	0.167	0.56	27.2 [41.3 EJ]	0.111	1.96	0.168	1.14	0.0588	0.0207	0.0356
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	9.82 [5.39]	NA	NA	5.61	NA	1.03	0.0626	0.0223	0.00877	0.0126	0.0104	0.261 [0.396]	0.00819	0.074	0.0154	0.0712	0.00651	0.00431	0.00442

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
RAILROAD PROPERTY SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A1-47 0 - 0.5 03/30/10	A1-48 0 - 0.5 03/30/10	A1-5 0 - 0.5 12/08/09	A1-50 08/09/12	A1-62 08/08/12	A1-8 0 - 0.5 12/08/09	A3-33 08/09/12	A3-34 08/09/12	SB-115 0 - 0.5 05/03/05	SB-119 05/03/05	SB-120 05/03/05	SDD-16-SPL 0 - 0.5 03/12/08	SDD-16-SPL 0.5 - 2 03/12/08	SDD-16-SPL 2 - 6 03/12/08	SDD-20-TLB 0 - 0.5 03/12/08	SDD-20-TLB 0.5 - 2 03/12/08	SDD-20-TLB 2 - 6 03/12/08	S1 0 - 0.33 3/3/05	S2 0 - 0.25 3/3/05
	SVOCs																				
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	3.3 J	7.1 J	230 J	NA	NA	NA	NA	NA	83 J	300,000	250 J	110 J	8.6 U	9.2 U	8.5 U [8.5 U]	8.8 U	25	5.3	0.64 U
208-96-8	Acenaphthylene	ug/kg	36	18 J	4,400 J	NA	NA	NA	NA	NA	2,600	50,000 J	7,000	4,100	23	18	3.3 J [3 J]	5.7 J	270	170	5.8
120-12-7	Anthracene	ug/kg	43	30	4,400 J	NA	NA	NA	NA	NA	3,100	840,000	6,900	3,200	22	18	8.5 U [2.5 J]	3.9 J	240	250	9.4
56-55-3	Benzo(a)anthracene	ug/kg	90 J	89	22,000 J	NA	NA	NA	NA	NA	5,600	540,000	11,000	12,000	75	100	2.7 J [3.4 J]	12	760	450	11
50-32-8	Benzo(a)pyrene	ug/kg	91 J	89	18,000 J	NA	NA	NA	NA	NA	6,300	120,000 J	19,000	11,000	71	81	4.1 J [3.8 J]	21	1,000	370	12
205-99-2	Benzo(b)fluoranthene	ug/kg	160 J	150	38,000 J	NA	NA	NA	NA	NA	12,000	400,000	32,000	26,000 JX	170 JX	160 JX	8.2 J [9.1 JX]	40 JX	2,100 JX	730	21
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	69 J	82	14,000 J	NA	NA	NA	NA	NA	3,400	47,000 J	7,100	8,100	57	53	8.5 U [8.5 U]	13	730	290	9.7
207-08-9	Benzo(k)fluoranthene	ug/kg	72 J	46	570 UJ	NA	NA	NA	NA	NA	4,600	150,000 J	14,000	26,000 JX	170 JX	160 JX	2.7 J [9 JX]	40 JX	2,100 JX	530	15
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	120 J	110	26,000 J	NA	NA	NA	NA	NA	6,800	870,000	15,000	14,000	90	110	6.6 J [5.2 J]	15	810	670	19
53-70-3	Dibenzo(a,h)anthracene	ug/kg	23 J	21 J	3,800 J	NA	NA	NA	NA	NA	1,400 J	54,000 J	2,700 J	2,600	17	15	8.5 U [8.5 U]	5.3 J	170	92	3.1
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	160	200	32,000 J	NA	NA	NA	NA	NA	12,000	4,300,000 D	25,000	14,000	100	180	5.8 J [4.9 J]	11	750	820	20
86-73-7	Fluorene	ug/kg	5.7 J	5.8 J	300 J	NA	NA	NA	NA	NA	95 J	140,000 J	400 J	280 U	3.1 J	2.6 J	8.5 U [2.4 J]	8.8 U	22	4	0.64 U
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	72 J	76	13,000 J	NA	NA	NA	NA	NA	3,500	51,000 J	7,200	8,000	54	50	3 J [3.3 J]	17	710	400	13
91-20-3	Naphthalene	ug/kg	49	20 J	2,300 J	NA	NA	NA	NA	NA	3,600	46,000 J	2,600 J	460	3.4 J	4.8 J	8.5 U [8.5 U]	8.8 U	78	110	4.7
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	22 J	130 U	2,800 UJ	NA	NA	NA	NA	NA	3,200 J	870,000 U	20,000 U	540 J	42 U	46 U	NA	NA	NA	510 U	470 U
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	100	100	7,700 J	NA	NA	NA	NA	NA	9,600	2,800,000 D	4,400	1,600	12	15	7.5 J [5.4 J]	6.7 J	170	240	11
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	120 J	130	31,000 J	NA	NA	NA	NA	NA	9,600	2,900,000 D	16,000	14,000	110	190	6.5 J [4.8 J]	11	890	750	19
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	147	142	29,100	NA	NA	NA	NA	NA	9,860	275,000	26,900	18,500	120	129	9.77 [9.73]	33.6	1,550	NA	NA
	Metals																				
7440-38-2	Arsenic	ug/kg	17,600	8,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8,000 J [6,900 J]	6,500 J	3,400 J	NA	NA
7440-47-3	Chromium	ug/kg	18,800	18,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-50-8	Copper	ug/kg	22,800	23,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins/Furans																				
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.226	6.13 EJ	23.7	0.626 [0.781]	81.8 D	204 EJ	43.1 DE	5.16 E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.067	0.98	2.36	0.0588 [0.0491]	17.1 DE	75.1 EJ	7.04 D	0.986	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.00848	0.0878	0.13	0.00482 [0.00424]	1.68 D	5.32	0.586 D	0.076	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.00166 UX	0.0078	0.0464 J	0.00408 [0.00513]	0.306	0.606	0.199	0.0586	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.0325	0.222	0.0413 J	0.00377 [0.00334]	0.435	1.09	0.273	0.0734	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00938	0.11 J	0.413	0.0158 [0.0145]	2.21 E	6.13	1.03	0.167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.00726	0.0407	0.0153 J	0.00225 J [0.00161 J]	0.153	0.297	0.0909	0.0335	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.00339 U	0.0205	0.0975	0.0117 [0.0118]	0.629	1.25	0.36	0.118	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.00932	0.0463	0.00806 J	0.000545 J [0.000345 J]	0.0419	0.15	0.0499	0.00516	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.0012 U	0.00263 J	0.0175 J	0.00251 [0.0019 J]	0.0818	0.103	0.0626	0.0185	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.00218 J	0.0096 J	0.00386 J	0.000752 J [0.000465 J]	0.0108	0.0117 J	0.0123	0.00517	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00982	0.0535	0.0297 J	0.00394 [0.00325]	0.341	0.898	0.184	0.0548	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.0286	0.0969 J	0.0093 J	0.00138 J [0.00138 J]	0.0308 D	0.0187 J	0.0432	0.0167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000425 U	0.000476 U	0.00163 UX	0.000558 [0.000416 J]	0.00535	0.0055 J	0.00384	0.00222	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000716 UX	0.00191	0.00172 UX	0.000633 [0.000436 J]	0.00322	0.00072 U	0.00412 B	0.00352	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3268-87-9	OCDD	ug/kg	4.97	89.1 EDJ	365 EJ	21.1 BE [23.9 BE]	727 DE	1,540 EDJ	487 DE	45.8 BE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
39001-02-0	OCDF	ug/kg	0.263	5.62	17	0.421 [0.351]	123 DE	579 EJ	41.5 DE	4.24 E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.0212	0.183	0.463	0.0211 [0.0224]	1.77	4.64	0.965	0.155	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equ
NA = not available

APPENDIX A
35' SWATH SOIL
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A1-1 0 - 0.5 12/09/09	A1-2 0 - 0.5 12/09/09	A1-20 0 - 0.5 12/08/09	A1-41 0 - 0.5 03/30/10	A1-42 0 - 0.5 03/30/10	A1-44 0 - 0.5 03/30/10	A1-45 0 - 0.5 03/30/10	SB-115 0 - 0.5 05/03/05	S1 0 - 0.33 3/3/05
	SVOCs										
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	9.4 U	56 J	900 DJ	19 U	9.7 J [6.9 J]	9.2 U	83 J	5.3
208-96-8	Acenaphthylene	ug/kg	NA	18	1,200	56 DJ	3.9 J	62 [67]	2.8 J	2,600	170
120-12-7	Anthracene	ug/kg	NA	23	1,500	1,800 DJ	4.5 J	110 [87]	3.4 J	3,100	250
56-55-3	Benzo(a)anthracene	ug/kg	NA	120	3,400	6,400 DJ	11 J	240 [170]	9 J	5,600	450
50-32-8	Benzo(a)pyrene	ug/kg	NA	95	2,400	6,400 DJ	9.6 J	170 [160]	8 J	6,300	370
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	240	6,200	7,500 DJ	19	310 [290]	13	12,000	730
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	75	3,700	4,800 DJ	7.9 J	120 [140]	6 J	3,400	290
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	9.4 U	89 U	4,900 DJ	7.9 J	140 [180]	6 J	4,600	530
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	150	4,200	7,200 DJ	12 J	280 [240]	15	6,800	670
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	25	930	1,100 DJ	19 U	41 [46]	9.2 U	1,400 J	92
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	170	6,200	25,000 DJ	19	630 [390]	23	12,000	820
86-73-7	Fluorene	ug/kg	NA	9.4 U	93	520 DJ	3 J	8.6 J [8.6 J]	9.2 U	95 J	4
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	72	3,100	4,400 DJ	8.9 J	120 [140]	6.1 J	3,500	400
91-20-3	Naphthalene	ug/kg	NA	45	360	120 DJ	2.5 J	120 [86]	8 J	3,600	110
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	46 U	570	790 UJ	93 U	21 J [40 J]	46 U	3,200 J	510 U
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	140	1,700	12,000 DJ	15 J	480 [230]	9.7	9,600	240
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	170	5,400	13,000 DJ	13 J	380 [260]	16	9,600	750
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	163	4,600	9,390	23.1	280 [268]	15.5	9,860	NA
	Metals										
7440-38-2	Arsenic	ug/kg	NA	NA	8,500	11,500	8,700	11,600 [14,100]	12,000	NA	NA
7440-47-3	Chromium	ug/kg	NA	NA	NA	19,600	17,100	18,600 [14,500]	20,700	NA	NA
7440-50-8	Copper	ug/kg	NA	NA	NA	17,000	17,900	12,500 [12,200]	23,400	NA	NA
	Dioxins/Furans										
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	181 EJ [127]	NA	42.9	2.14	0.16	0.67	0.0552	NA	NA
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	41.4 [26]	NA	6.31	0.546	0.016	0.13	0.00536	NA	NA
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	4.85 [2.56]	NA	0.464	0.0225	0.000888 UX	0.0148	0.000801 U	NA	NA
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.655 [0.581]	NA	0.292	0.0347	0.00189 UX	0.00646	0.00154 U	NA	NA
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	22.4 [10.5]	NA	0.256	0.0138	0.0012 J	0.0285	0.000751 J	NA	NA
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	4.95 [3.23]	NA	1.13	0.0313	0.00418 J	0.0242	0.00184 U	NA	NA
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	4.21 [2.16]	NA	0.0925	0.0171	0.00103 U	0.00722	0.000554 U	NA	NA
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	1.2 [0.999]	NA	0.494	0.073	0.00348 J	0.0112	0.000943 J	NA	NA
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	4.57 [2.07]	NA	0.0514 J	0.00226 J	0.000783 U	0.00774	0.000892 U	NA	NA
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.228 [0.196]	NA	0.113	0.0133	0.000882 UX	0.00304 J	0.000967 U	NA	NA
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.87 [0.457]	NA	0.0118 J	0.00108 UX	0.00084 U	0.00227 J	0.000719 U	NA	NA
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	4.93 [2.46]	NA	0.192	0.027	0.00114 J	0.0123	0.000719 U	NA	NA
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	9.04 [4.1]	NA	0.0729	0.00435 J	0.000778 UX	0.0149	0.000676 U	NA	NA
1746-01-6	2,3,7,8-TCDD	ug/kg	0.0298 [0.0247]	NA	0.0145	0.000742 J	0.000316 UX	0.00049 U	0.000676 UX	NA	NA
51207-31-9	2,3,7,8-TCDF	ug/kg	0.157 [0.0834]	NA	0.0036 J	0.000798 U	0.000622 U	0.000589 J	0.000477 U	NA	NA
3268-87-9	OCDD	ug/kg	650 D [411 EDJ]	NA	422 EJ	28.3 EJ	9.28 EJ	10.3 EJ	7.63	NA	NA
39001-02-0	OCDF	ug/kg	164 EJ [117 EJ]	NA	33.7	1.14	0.0588	0.596	0.0207	NA	NA
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	9.82 [5.39]	NA	1.03	0.0712	0.00651	0.0291	0.00431	NA	NA

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
SOIL NORTH AND WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A3-29 08/08/12	A3-30 08/09/12	A4-10 0 - 0.5 03/31/10	A4-2 0 - 0.5 03/31/10	A4-3 0 - 0.5 03/31/10	A4-5 0 - 0.5 03/31/10	A4-6 0 - 0.5 03/31/10	A4-8 0 - 0.5 03/31/10	A4-9 0 - 0.5 03/31/10	A6-4 0 - 0.5 03/31/10	A6-5 0 - 0.5 03/31/10	A6-7 0 - 0.5 03/31/10	A6-8 0 - 0.5 03/31/10
	SVOCs														
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	NA	NA	8.8 U	10	9.3 U	240	54 J	8.9 J [20 U]	10 U	19	9.9 U	11	8.4 U
208-96-8	Acenaphthylene	ug/kg	NA	NA	8.8 U	35	3.2 J	580	290	35 [20]	4.6 J	98	12	53	8.4 U
120-12-7	Anthracene	ug/kg	NA	NA	8.8 U	36	4.3 J	860	350	38 [26]	4.3 J	93	11	51	1.3 J
56-55-3	Benzo(a)anthracene	ug/kg	NA	NA	8.8 U	77	11	1,100	760	110 [81]	9.8 J	200	24	89	8.4 U
50-32-8	Benzo(a)pyrene	ug/kg	NA	NA	2.7 J	85	11	1,100	800	130 [110]	14	220	30	120	8.4 U
205-99-2	Benzo(b)fluoranthene	ug/kg	NA	NA	3.5 J	140	16	2,000 JY	1,600	300 JY [250 JY]	27	350	51	200	2.4 J
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	NA	NA	8.8 U	92	12	1,400	770	140 [120]	16	210	29	110	8.4 U
207-08-9	Benzo(k)fluoranthene	ug/kg	NA	NA	8.8 U	36	6.2 J	1,700 JY	500	260 JY [220 JY]	8.9 J	110	13	71	3.5 J
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	NA	NA	8.8 U	110	13	1,300	1,100	180 [160]	17	260	32	100	8.4 U
53-70-3	Dibenzo(a,h)anthracene	ug/kg	NA	NA	8.8 U	22	2.1 J	190	220	30 [29]	10 U	42	7 J	28	8.4 U
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	NA	NA	6.6 J	220	20	3,200	1,400	260 [230]	25	340	45	150	5.5 J
86-73-7	Fluorene	ug/kg	NA	NA	8.8 U	7.6 J	9.3 U	230	62 U	6 J [6.6 J]	10 U	21	9.9 U	12	8.4 U
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	NA	NA	8.8 U	84	9.3	1,100	800	130 [120]	14	200	28	110	8.4 U
91-20-3	Naphthalene	ug/kg	NA	NA	8.8 U	56	9.3 U	560	190	23 [11 J]	10 U	57	5.4 J	43	8.4 U
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	NA	43 U	45 U	46 U	490 U	310 U	47 U [97 U]	51 U	90 U	49 U	47 U	41 U
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	NA	NA	7.6 J	150	15	2,500	740	110 [87]	15	190	21	120	6.8 J
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	NA	NA	5.2 J	120	12	1,800	890	170 [140]	16	230	33	87	3.8 J
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	NA	NA	8.38	138	16.8	1,730	1,340	217 [186]	24.2	338	47.5	189	9.52
	Metals														
7440-38-2	Arsenic	ug/kg	NA	NA	12,800	10,500	11,900	11,400	13,000	7,100 [6,700]	8,400	8,200	8,000	8,500	10,400
7440-47-3	Chromium	ug/kg	NA	NA	15,000	21,000	20,600	23,900	28,200	18,200 [18,900]	19,600	19,000	14,700	16,800	15,000
7440-50-8	Copper	ug/kg	NA	NA	16,700	38,100	20,700	128,000	46,700	24,600 [23,800]	22,900	38,200	17,200	23,600	15,300
	Dioxins/Furans														
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.249	0.606	0.084	0.352	0.209	0.215	1.35	0.474 [0.431]	0.0596	0.633	0.0916 [0.0975]	0.136	0.0847
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.0147	0.045	0.000582 U	0.0423	0.0196	0.0255	0.204	0.0824 [0.0751]	0.00254 J	0.103	0.00565 [0.00748]	0.019	0.0013 J
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.00131 J	0.00352	0.000429 U	0.00384 J	0.00157 J	0.00205 J	0.0158	0.00579 [0.00603]	0.000676 U	0.00845	0.00126 U [0.000713 U]	0.0014 J	0.000229 U
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.0034	0.00592	0.00204 J	0.00417 J	0.00232 J	0.00344 J	0.0155	0.00766 [0.00705]	0.00145 UX	0.00719	0.00179 J [0.0012 UX]	0.00174 J	0.00146 J
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.0014 J	0.00365	0.000325 U	0.00326 J	0.00129 J	0.0044 J	0.0123	0.00521 [0.00428 J]	0.000413 U	0.00637	0.000502 U [0.000605 U]	0.00105 J	0.000207 U
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00682	0.0131	0.00222 J	0.0102	0.00506	0.00768	0.0394	0.016 [0.0137]	0.00167 J	0.02	0.00266 J [0.00261 UX]	0.00418 J	0.00216 J
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.000675 J	0.00165 J	0.00032 U	0.00199 J	0.00054 UX	0.00675	0.00814	0.00348 J [0.00311 J]	0.000417 U	0.00428 J	0.0005 U [0.000621 U]	0.00114 UX	0.000207 U
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.00666	0.0121	0.00227 J	0.00702	0.00413 J	0.00617	0.0253	0.0131 [0.0114]	0.00182 J	0.0125	0.00258 J [0.00254 J]	0.00295 J	0.00262 J
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.000171 J	0.00027 J	0.000539 U	0.000976 J	0.000399 U	0.00289 J	0.00362 J	0.00137 J [0.00126 J]	0.000363 U	0.00235 J	0.000271 U [0.000401 U]	0.000562 U	0.000329 U
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00156 J	0.00228 J	0.00083 J	0.00144 UX	0.000645 UX	0.00232 J	0.00724	0.00348 J [0.00341 J]	0.00062 U	0.00307 J	0.000786 J [0.000701 J]	0.000761 J	0.00075 UX
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000243 J	0.0004 J	0.000404 U	0.000631 J	0.000581 U	0.00157 J	0.00239 J	0.000528 J [0.000691 J]	0.000512 U	0.00115 J	0.000389 U [0.000406 U]	0.000683 U	0.000421 U
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00102 J	0.00254	0.000407 U	0.00386 J	0.000993 J	0.0195	0.0138	0.00604 [0.00498]	0.000484 U	0.00927	0.00054 J [0.000621 J]	0.00134 J	0.000245 U
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.000351 J	0.00123 J	0.000403 U	0.00576	0.00101 UX	0.0635	0.0129	0.00598 [0.00519]	0.000933 U	0.0169	0.00102 J [0.000761 J]	0.00247 J	0.000373 U
1746-01-6	2,3,7,8-TCDD	ug/kg	0	0.000341 J	0.000211 U	0.000457 UX	0.000551 U	0.00127 UX	0.00173	0.000716 J [0.000635 J]	0.000245 J	0.00046 UX	0.000348 U [0.000344 U]	0.000321 J	0.00114 UX
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000253 J	0.000311 J	0.000349 U	0.000624 UX	0.000387 J	0.00265	0.00236	0.00082 J [0.000873 J]	0.000379 U	0.00131	0.000507 U [0.000642 U]	0.000339 U	0.00025 U
3268-87-9	OCDD	ug/kg	7.77 BE	29.4 BE	3.26	12.1 EJ	9.21 EJ	6.34	21.1 EJ	8.69 EJ [8.57 EJ]	1.57	10.4 EJ	2.84 [3.24]	3.6	3.36
39001-02-0	OCDF	ug/kg	0.0655	0.219	0.00142 UX	0.186	0.0876	0.0574	0.759	0.28 [0.246]	0.00721 J	0.459	0.0207 [0.0259]	0.0791	0.00396 J
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.00871	0.0224	0.00358	0.0135	0.00731	0.0317	0.0472	0.0197 [0.0181]	0.00232	0.0254	0.00395 [0.00376]	0.00573	0.00356

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
SEDIMENT NORTH AND WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	A4-1 0 - 0.5 03/31/10	A4-4 0 - 0.5 03/31/10	A4-7 0 - 0.5 03/31/10	A6-1 0 - 0.5 03/31/10	A6-2 0 - 0.5 03/31/10	A6-3 0 - 0.5 03/31/10	A6-6 0 - 0.5 03/31/10	GC-BC-03 0 - 0.5 06/24/08	GC-BC-04 0 - 0.5 06/25/08	GC-BC-05 0 - 0.5 06/27/08	GC-BC-06 0 - 0.5 06/24/08	GC-BC-07 0 - 0.5 06/24/08	SD-BC-04 07/23/08	SD-BC-04 0 - 0.5 06/26/08
	SVOCs															
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	20 J	22 J	8 J	9.4 J	9.4 J	1,200	11	120	46 J	110 J	900	120	23 J	40 UJ
208-96-8	Acenaphthylene	ug/kg	35 J	45 J	11	140	180	340	79	68 J	82 J	170 J	200	170	190	63 J
120-12-7	Anthracene	ug/kg	62	60 J	13	210	190	460	71	320	160	200 J	360	270	240	85 J
56-55-3	Benzo(a)anthracene	ug/kg	240	220	46	120	410	500	79	1,700	720 J	480 J	490	490	150	62 J
50-32-8	Benzo(a)pyrene	ug/kg	260	300	47	180	610	560	160	1,700 J	850 J	610 J	450 J	430 J	170	83 J
205-99-2	Benzo(b)fluoranthene	ug/kg	420	430	100 JY	370	1,100	1,100 JY	270	2,500 JX	1,600 JX	1,100 JX	890 JX	950 JX	490 JX	230 JX
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	240	330	39	190	380	900	150	1,400 J	890 J	730 J	350 J	430 J	320 J	120 J
207-08-9	Benzo(k)fluoranthene	ug/kg	140	260	88 JY	110	350	970 JY	81	2,600 JX	1,700 JX	1,000 JX	900 JX	980 JX	480 JX	210 JX
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	310	370	64	200	580	530	130	1,900	1,100 J	630 J	550	560	220	96 J
53-70-3	Dibenzo(a,h)anthracene	ug/kg	58	68	8 J	51	130	110	42	330 J	140 J	120 J	91 J	100 J	70 J	31 J
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	560	560	87	190	290	1,600	110	4,600	2,100	1,200 J	980	1,300	190	120 J
86-73-7	Fluorene	ug/kg	14 J	25 J	7.9 J	14 J	20	990	17	89	53 J	120 J	690	110	76 U	40 UJ
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	240	280	37	230	400	850	150	1,200 J	740 J	590 J	320 J	390 J	290	120 J
91-20-3	Naphthalene	ug/kg	50 U	63 U	16	17 J	8.1 J	2,000	28	120	86 U	340 J	640	200	76 U	40 UJ
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	250 U	310 U	50 U	190	130	230 U	54 U	350 U	420 U	520 UJ	360 U	310 U	220 J	82 J
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	190	170	51	68	67	2,100	59	1,500	560	670 J	900	790	100	37 J
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	360	370	69	180	340	1,100	81	2,600	1,200 J	900 J	620	800	240	92 J
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	410	464	74.2	304	935	925	253	2,600	1,310	958	721	723	338	157
	Metals															
7440-38-2	Arsenic	ug/kg	8,300	7,000	9,300	7,400	11,900	16,500	21,500	11,200	6,700	7,400	29,200	11,700	9,500	8,900
7440-47-3	Chromium	ug/kg	60,500	20,600	18,000	15,400	15,100	22,200	19,500	14,600 J	20,500 J	19,600	25,900 J	26,000 J	15,200 J	15,700
7440-50-8	Copper	ug/kg	27,100	36,800	21,900	16,200	15,600	31,200	24,000	28,900	39,200	34,500	26,500	33,800	14,400	12,500
	Dioxins/Furans															
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.248	0.755	0.106	2.14	0.728	0.341	0.358	NA	NA	NA	0.457	NA	NA	5.55 J
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.0237	0.132	0.0118	0.382 J	0.123	0.0417	0.0426	NA	NA	NA	0.0436	NA	NA	1.1 J
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.00237 J	0.0104	0.00122 J	0.0297	0.00903	0.00249 UX	0.0026 J	NA	NA	NA	0.00369	NA	NA	0.0722 J
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.00332 J	0.0106	0.00143 J	0.0194	0.00641	0.00476 J	0.00372 J	NA	NA	NA	0.00586	NA	NA	0.039 J
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.00201 J	0.00765	0.000767 J	0.0169	0.00393 J	0.00334 J	0.00187 J	NA	NA	NA	0.00204 J	NA	NA	0.0319 J
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00692	0.0246	0.00287 J	0.0692	0.0218	0.0101	0.0107	NA	NA	NA	0.0114	NA	NA	0.167 J
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.00174 J	0.00601	0.000579 J	0.00723	0.00177 J	0.00192 J	0.00114 UX	NA	NA	NA	0.00181 J	NA	NA	0.0119 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.0067	0.018	0.00253 J	0.0302	0.0108	0.00764	0.007	NA	NA	NA	0.0105	NA	NA	0.0685 J
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.00115 U	0.00245 J	0.000546 U	0.0043 J	0.000931 U	0.000822 J	0.000666 U	NA	NA	NA	0.000858 J	NA	NA	0.00688 J
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00207 J	0.00465 J	0.000623 J	0.00746	0.0026 J	0.00224 J	0.00187 J	NA	NA	NA	0.00244 J	NA	NA	0.0133 J
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000583 J	0.00116 J	0.00066 U	0.0013 J	0.000532 J	0.000412 J	0.000311 J	NA	NA	NA	0.000365 UX	NA	NA	0.00155 J
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00251 J	0.00971	0.000912 J	0.0155	0.0041 J	0.0032 J	0.00246 J	NA	NA	NA	0.00253	NA	NA	0.0308 J
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.00339 J	0.00987	0.000971 J	0.00612	0.00182 J	0.00445 J	0.00234 J	NA	NA	NA	0.00156 J	NA	NA	0.00837 J
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000651 J	0.00146	0.000247 U	0.000944 J	0.000562 J	0.00046 J	0.000468 J	NA	NA	NA	0.000377 J	NA	NA	0.000981 UXJ
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000756 J	0.00132	0.000271 U	0.000794 U	0.000249 J	0.0005 J	0.000299 UX	NA	NA	NA	0.000464 J	NA	NA	0.000641 J
3268-87-9	OCDD	ug/kg	10.6 EJ	15.9 EJ	5.03	26 EJ	15.2 EJ	12.8 EJ	11.5 EJ	NA	NA	NA	25.3 D	NA	NA	76.5 DJ
39001-02-0	OCDF	ug/kg	0.0764	0.477	0.0421	1.77	0.575	0.149	0.175	NA	NA	NA	0.183	NA	NA	5.49 J
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.0122	0.031	0.00471	0.0604	0.022	0.015	0.0133	NA	NA	NA	0.0195	NA	NA	0.144

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-FPT6-33%L 0 - 0.5 03/12/08	GC-BC-FPT6-33%L 0.5 - 2 03/12/08	GC-BC-FPT6-33%R 0 - 0.5 03/12/08	GC-BC-FPT6-33%R 0.5 - 2 03/12/08	GC-BC-FPT6-5L 0 - 0.5 03/12/08	GC-BC-FPT6-5L 0.5 - 2 03/12/08	GC-BC-FPT6-5R 0 - 0.5 03/12/08	GC-BC-FPT6-5R 0.5 - 2 03/12/08
	SVOCs									
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	3.2 J	8.7 U	5.1 J	9.1 U	4.4 J	3.3 J	7.3 J	3.7 J [3.4 J]
208-96-8	Acenaphthylene	ug/kg	23	19	16	10	37	67	41	38 [39]
120-12-7	Anthracene	ug/kg	32	27	25	15	49	80	48	50 [52]
56-55-3	Benzo(a)anthracene	ug/kg	56	25	95	44	91	80	110	88 [83]
50-32-8	Benzo(a)pyrene	ug/kg	80	39	130	49	120	140	140	120 [130]
205-99-2	Benzo(b)fluoranthene	ug/kg	150 JX	71 JX	230 JX	86 JX	220 JX	250 JX	260 JX	180 [220 JX]
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	71	49	140	48	120	200	160	130 [130]
207-08-9	Benzo(k)fluoranthene	ug/kg	150 JX	77 JX	230 JX	93 JX	220 JX	280 JX	260 JX	50 [240 JX]
92-52-4	Biphenyl	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	83	32	140	49	120	110	140	95 [110]
53-70-3	Dibenzo(a,h)anthracene	ug/kg	20	12	32	9.9	24	42	36	26 [27]
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	34	21	160	58	85	49	130	88 [79]
86-73-7	Fluorene	ug/kg	7.6 J	4 J	7.5 J	3.7 J	12	11	14	8 J [7.7 J]
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	62	42	120	41	100	180	140	110 [120]
91-20-3	Naphthalene	ug/kg	3.4 J	3.1 J	6 J	4.2 J	4.6 J	8.6 J	9.4	8.5 J [9.5]
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	NA	52	NA	8 J	8.7 J	NA	7.2 J	NA
198-55-0	Perylene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	17	13	53	29	30	26	52	36 [30]
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	47	22	160	49	94	54	140	72 [76]
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	128	65.6	209	77	187	236	230	184 [202]
	Metals									
7440-38-2	Arsenic	ug/kg	7,600	9,400	7,200	7,700	6,300	7,500	6,400	8,000 [8,300]
7440-47-3	Chromium	ug/kg	18,900	20,400	16,600	27,400	15,800	21,700	16,500	22,800 [21,800]
7440-50-8	Copper	ug/kg	18,200	19,400	18,700	27,600	16,000	22,800	17,000	24,700 [23,600]
	Dioxins/Furans									
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.603	NA	0.436	NA	NA	7.34	NA	2.1 [1.27]
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.099	NA	0.0696	NA	NA	1.57	NA	0.328 [0.22]
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.0078	NA	0.00525	NA	NA	0.115	NA	0.0208 [0.0163]
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.00526	NA	0.0041	NA	NA	0.0283	NA	0.0135 [0.0102]
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.00444	NA	0.00312	NA	NA	0.0481	NA	0.011 [0.00852]
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.0182	NA	0.0126	NA	NA	0.232	NA	0.0519 [0.0316]
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.00168 J	NA	0.00168 J	NA	NA	0.0163 J	NA	0.0037 [0.0027]
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.00703	NA	0.00696	NA	NA	0.0546	NA	0.0184 [0.0108]
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.00111 J	NA	0.000768 J	NA	NA	0.00825	NA	0.0025 J [0.00223 J]
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.0016 J	NA	0.00148 J	NA	NA	0.00521	NA	0.0029 [0.00177 J]
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000435 J	NA	0.000492 J	NA	NA	0.00202 J	NA	0.00101 J [0.000755 J]
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00374	NA	0.00255	NA	NA	0.0303	NA	0.00776 [0.00578]
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.00233 J	NA	0.00155 J	NA	NA	0.0123	NA	0.00567 [0.00458]
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000313 J	NA	0.00032 UX	NA	NA	0.000416 J	NA	0.000575 [0.000387 J]
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000529	NA	0.000609	NA	NA	0.0012	NA	0.000974 [0.000741]
3268-87-9	OCDD	ug/kg	8.82	NA	8.69	NA	NA	68.1 D	NA	29.7 [18.3]
39001-02-0	OCDF	ug/kg	0.55	NA	0.328	NA	NA	8.66	NA	1.88 [1.31]
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.0167	NA	0.0132	NA	NA	0.165	NA	0.0501 [0.0318]

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
CRAB ORCHARD CREEK AND PILES FORK SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	COC-BC-04 0 - 0.5 06/25/08	COC-BC-04-DEL 0 - 0.5 06/26/08	COC-BC-04 0 - 0.5 07/15/10	COC-BC-05 0 - 0.5 06/25/08	COC-BC-05 0 - 0.5 07/15/10	COC-BC-06 0 - 0.5 06/25/08	COC-BC-07 0 - 0.5 06/25/08	COC-BC-07 0 - 0.5 07/14/10	COC-BC-08 0 - 0.5 06/26/08	COC-BC-09 0 - 0.5 06/26/08	COC-BC-10 0 - 0.5 06/26/08	COC-BC-11 0 - 0.5 06/26/08	COC-BC-12 0 - 0.5 07/13/10	COC-BC-13 0 - 0.5 07/13/10	COC-BC-14 0 - 0.5 07/13/10
	SVOCs																
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	35 [41]	NA	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	32 [46]	NA	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	16 [18]	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	21 [29]	NA	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	23 [31]	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	7,300 J [4,900 J]	79,000 J	47 [80]	86 J	20	140 J	210 J	130	240 J	64 J [420 J]	72 J	29 J	NA	NA	NA
208-96-8	Acenaphthylene	ug/kg	390 J [290 J]	5,700 J	6 [9.4]	160 J	8.8	3.8 J	84 J	280	90 J	180 J [200 J]	100 J	85 J	NA	NA	NA
120-12-7	Anthracene	ug/kg	4,700 J [2,900 J]	54,000 J	51 [150]	440 J	26	5.2 J	210 J	360	200 J	250 J [410 J]	130 J	110 J	NA	NA	NA
56-55-3	Benzo(a)anthracene	ug/kg	4,300 J [3,400 J]	51,000 J	140 [230]	1,800 J	170	12 J	630 J	940	560 J	1,300 J [1,400 J]	590 J	240 J	NA	NA	NA
50-32-8	Benzo(a)pyrene	ug/kg	2,100 J [2,000 J]	24,000 J	170 [320 DJ]	1,600 J	220	20 J	530 J	1,100	700 J	1,200 J [1,100 J]	550 J	370 J	NA	NA	NA
205-99-2	Benzo(b)fluoranthene	ug/kg	3,300 JX [3,200 JX]	39,000 JX	240 [420 DJ]	3,200 JX	380 DJ	27 JX	920 JX	1,900 JY	1,200 JX	1,900 JX [1,900 JX]	920 JX	630 JX	NA	NA	NA
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	130 [190]	NA	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	900 J [980 J]	8,100 J	120 [170]	770 J	120	15 J	300 J	650	420 J	720 J [710 J]	350 J	280 J	NA	NA	NA
207-08-9	Benzo(k)fluoranthene	ug/kg	3,100 JX [3,300 JX]	41,000 JX	110 [190]	3,300 JX	130	28 JX	950 JX	1,800 JY	1,200 JX	2,000 JX [1,900 JX]	950 JX	650 JX	NA	NA	NA
92-52-4	Biphenyl	ug/kg	NA	NA	1.9 [2.8]	NA	1.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	4,200 J [3,100 J]	51,000 J	320 DJ [530 DJ]	2,300 J	310 DJ	17 J	620 J	1,300	670 J	1,400 J [1,300 J]	660 J	310 J	NA	NA	NA
53-70-3	Dibenzo(a,h)anthracene	ug/kg	200 J [310 J]	6,000 UJ	27 [39]	200 J	32 J	9.6 UJ	63 J	200	130 J	160 J [170 J]	79 J	64 J	NA	NA	NA
132-65-0	Dibenzothiophene	ug/kg	NA	NA	24 [32]	NA	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
206-44-0	Fluoranthene	ug/kg	23,000 DJ [14,000 DJ]	250,000 J	460 DJ [650 DJ]	3,300 J	300 DJ	15 J	1,300 J	1,000	830 J	1,900 J [2,000 J]	610 J	270 J	NA	NA	NA
86-73-7	Fluorene	ug/kg	7,700 J [4,600 J]	78,000 J	52 [89]	150 J	20	49 J	220 J	160	300 J	66 J [410 J]	81 J	41 J	NA	NA	NA
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	920 J [960 J]	8,200 J	98 [140]	720 J	110	14 J	310 J	580	390 J	630 J [680 J]	300 J	240 J	NA	NA	NA
91-20-3	Naphthalene	ug/kg	190 J [220 J]	4,500 J	12 J [18 J]	49 J	8.5 J	5.4 J	17 J	58	410 J	51 J [350 J]	57 J	21 J	NA	NA	NA
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	270 UJ [260 UJ]	29,000 UJ	160 U	250 UJ	180 U	47 UJ	260 UJ	120	280 UJ	240 UJ [240 UJ]	260 UJ	250 UJ	NA	NA	NA
198-55-0	Perylene	ug/kg	NA	NA	48 [71]	NA	57 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
85-01-8	Phenanthrene	ug/kg	40,000 DJ [20,000 DJ]	280,000 J	320 DJ [490 DJ]	810 J	130	27 J	760 J	470	450 J	170 J [760 J]	190 J	84 J	NA	NA	NA
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	13,000 DJ [8,500 J]	150,000 J	350 DJ [500 DJ]	2,900 J	210	21 J	1,400 J	920	810 J	1,900 J [1,700 J]	560 J	250 J	NA	NA	NA
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	3,190 [3,100]	37,300	NA	2,410	NA	30.4	789	NA	1,060	1,760 [1,690]	820	552	NA	NA	NA
	Metals																
7440-38-2	Arsenic	ug/kg	8,000 [6,300]	8,800	10,300 [8,400]	7,100	10,800	6,500	6,100	16,600	8,300	9,400 [8,300]	7,500	7,000	NA	NA	NA
7440-47-3	Chromium	ug/kg	13,500 [19,000]	22,500	12,800 J [14,300 J]	13,900	18,900 J	16,300	13,900	18,600 J	12,600	12,300 [17,000]	14,400	14,200	NA	NA	NA
7440-50-8	Copper	ug/kg	14,400 [17,200]	18,800	22,500 [17,900]	13,100	19,900	13,900	14,100	15,700	14,400	11,800 [14,300]	12,400	13,800	NA	NA	NA
	Dioxins/Furans																
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	0.183 J [0.574 J]	NA	0.136 J [0.123]	0.0676 J	0.103	NA	0.528 J	1.27	NA	0.412 J [0.54 J]	NA	0.872 J	0.601	0.593	0.198
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.0192 J [0.0552 J]	NA	0.0168 [0.0135]	0.0018 J	0.0106	NA	0.0526 J	0.169	NA	0.0398 J [0.0804 J]	NA	0.103 J	0.0664	0.0751	0.0177
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.00207 J [0.00508 J]	NA	0.00138 J [0.00113 J]	0.000221 J	0.00079 J	NA	0.00606 J	0.0145	NA	0.00408 J [0.00813 J]	NA	0.0109 J	0.00573	0.00426 J	0.00155 J
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.00196 J [0.00472 J]	NA	0.00131 J [0.00139 J]	0.000833 J	0.000943 J	NA	0.00481 J	0.00881	NA	0.00355 J [0.00464 J]	NA	0.0069 J	0.00584	0.00233 J	0.00175 J
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.00116 J [0.0029 J]	NA	0.000902 J [0.000742 J]	0.000166 J	0.000506 J	NA	0.0029 J	0.00868	NA	0.0021 J [0.0031 J]	NA	0.00518 J	0.0046 J	0.00153 J	0.000929 J
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.00445 J [0.0105 J]	NA	0.00307 J [0.00279 J]	0.0013 J	0.00221 J	NA	0.0113 J	0.0259	NA	0.00789 J [0.0134 J]	NA	0.0222 J	0.0146	0.0118	0.00405 J
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.000539 J [0.00141 J]	NA	0.000512 J [0.000328 UX]	0.000109 UJ	0.000302 J	NA	0.00136 J	0.00254 J	NA	0.000868 J [0.00144 J]	NA	0.00268 J	0.00133 J	0.000678 J	0.000543 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.00291 J [0.00537 J]	NA	0.00179 J [0.00181 J]	0.00145 J	0.00144 J	NA	0.00508 J	0.00911	NA	0.00313 J [0.00508 J]	NA	0.008 J	0.00589	0.0037 J	0.00246 J
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.000535 J [0.000796 J]	NA	0.000336 UX [0.000196 U]	0.00012 UJ	0.000192 U	NA	0.000919 J	0.00195 J	NA	0.00079 J [0.00104 J]	NA	0.00168 J	0.00204 J	0.000277 U	0.000311 U
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00089 J [0.00105 J]	NA	0.000471 UX [0.000479 J]	0.000337 J	0.000445 J	NA	0.001 J	0.00131 J	NA	0.000696 J [0.00111 J]	NA	0.00169 J	0.000732 J	0.000602 J	0.000572 J
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000259 J [0.000303 UXJ]	NA	0.000186 J [0.000112 UX]	0.000163 UJ	0.0000954 UX	NA	0.000294 J	0.000718 J	NA	0.000247 J [0.000294 J]	NA	0.000565 J	0.000967 J	0.000117 J	0.000178 UX
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00139 J [0.00208 J]	NA	0.000802 J [0.000605 J]	0.000191 J	0.000613 J	NA	0.00242 J	0.00433 J	NA	0.00166 J [0.00264 J]	NA	0.00423 J	0.00282 J	0.00123 J	0.00098 J
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.00143 J [0.00136 J]	NA	0.000516 UX [0.000387 J]	0.000144 J	0.00112 J	NA	0.000999 J	0.00291 J	NA	0.00121 J [0.0014 J]	NA	0.00226 J	0.00355 J	0.000537 J	0.000526 J
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000378 J [0.000247 UXJ]	NA	0.00024 UX [0.000197 UX]	0.00013 UJ	0.000154 UX	NA	0.000283 J	0.00026 UX	NA	0.000227 UJ [0.000321 UXJ]	NA	0.000321 UXJ	0.000377 UX	0.000372 J	0.000222 U
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000639 J [0.00047 J]	NA	0.000268 J [0.000259 J]	0.00013 UJ	0.000242 J	NA	0.000298 J	0.000456 J	NA	0.000428 J [0.000521 J]	NA	0.000713 J	0.000509 J	0.000204 J	0.000241 J
3268-87-9	OCDD	ug/kg	3.57 J [8.98 J]	NA	3.46 [3.71]	3.04 J	3.31 B	NA	10.4 J	25 EJ	NA	5.7 J [8.7 J]	NA	16.3 J	9.04 EJ	15.3 EJ	8.79 EJ
39001-02-0	OCDF	ug/kg	0.0898 J [0.282 J]	NA	0.0835 [0.0715]	0.00761 J	0.0542	NA	0.294 J	0.958	NA	0.208 J [0.461 J]	NA	0.542 J	0.385	0.475	0.0885
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.0062 [0.0135]	NA	0.00393 [0.00399]	0.00247	0.00365	NA	0.0136	0.0308	NA	0.00955 [0.0139]	NA	0.0226	0.0153	0.0148	0.00679

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents
NA = not available

APPENDIX A
CRAB ORCHARD CREEK AND PILES FORK SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-16 0 - 0.5 06/26/08	GC-BC-17 0 - 0.5 06/26/08	PF-BC-03 0 - 0.5 06/26/08	PF-BC-03 0 - 0.5 07/21/10	PF-BC-03-NAPL 07/22/10	PF-BC-04 0 - 0.5 06/26/08	PF-BC-04 0 - 0.5 07/15/10
	SVOCs								
120-82-1	1,2,4-Trichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	ug/kg	NA	NA	NA	NA	NA	NA	NA
90-12-0	1-Methylnaphthalene	ug/kg	NA	NA	NA	92	1,000	NA	NA
832-69-9	1-Methylphenanthrene	ug/kg	NA	NA	NA	110	1,500	NA	NA
2245-38-7	2,3,5-Trimethylnaphthalene	ug/kg	NA	NA	NA	37	460	NA	NA
121-14-2	2,4-Dinitrotoluene	ug/kg	NA	NA	NA	NA	NA	NA	NA
28804-88-8	2,6-Dimethylnaphthalene	ug/kg	NA	NA	NA	65	890	NA	NA
95-57-8	2-Chlorophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	ug/kg	NA	NA	NA	32	560	NA	NA
101-55-3	4-Bromophenyl Phenyl Ether	ug/kg	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol	ug/kg	NA	NA	NA	NA	NA	NA	NA
100-02-7	4-Nitrophenol	ug/kg	NA	NA	NA	NA	NA	NA	NA
83-32-9	Acenaphthene	ug/kg	83 UJ	56 UJ [55 UJ]	720 J	450 D	2,600	140 J	82
208-96-8	Acenaphthylene	ug/kg	280 J	32 J [29 J]	120 J	11	110	76 J	110
120-12-7	Anthracene	ug/kg	240 J	41 J [57 J]	530 J	170	2,300	150 J	210
56-55-3	Benzo(a)anthracene	ug/kg	320 J	180 J [200 J]	2,000 J	410 DJ	4,000	410 J	950
50-32-8	Benzo(a)pyrene	ug/kg	630 J	270 J [270 J]	1,800 J	400 DJ	3,100	480 J	720
205-99-2	Benzo(b)fluoranthene	ug/kg	800 J	470 JX [520 JX]	2,900 JX	490 DJ	4,100	850 JX	1,300 JY
192-97-2	Benzo(e)pyrene	ug/kg	NA	NA	NA	230	2,100	NA	NA
191-24-2	Benzo(ghi)perylene	ug/kg	700 J	280 J [330 J]	1,200 J	180	1,100	420 J	530
207-08-9	Benzo(k)fluoranthene	ug/kg	300 J	440 JX [540 JX]	2,700 JX	200	1,500	800 JX	1,300 JY
92-52-4	Biphenyl	ug/kg	NA	NA	NA	1.4	50 U	NA	NA
85-68-7	Butyl Benzyl Phthalate	ug/kg	NA	NA	NA	NA	NA	NA	NA
86-74-8	Carbazole	ug/kg	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	ug/kg	450 J	330 J [370 J]	2,100 J	570 DJ	5,800	640 J	1,200
53-70-3	Dibenzo(a,h)anthracene	ug/kg	160 J	57 J [54 J]	360 J	44	250	75 UJ	130
132-65-0	Dibenzothiophene	ug/kg	NA	NA	NA	94	1,000	NA	NA
206-44-0	Fluoranthene	ug/kg	480 J	640 J [460 J]	6,500 J	1,600 DJ	15,000 DJ	1,500 J	2,100
86-73-7	Fluorene	ug/kg	64 J	56 UJ [20 J]	590 J	300 DJ	2,700	180 J	130
67-72-1	Hexachloroethane	ug/kg	NA	NA	NA	NA	NA	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	ug/kg	640 J	230 J [270 J]	1,200 J	150	980	380 J	450
91-20-3	Naphthalene	ug/kg	83 UJ	56 UJ [55 UJ]	37 J	14 J	1,000 U	75 UJ	13 J
621-64-7	N-nitrosodi-n-propylamine	ug/kg	NA	NA	NA	NA	NA	NA	NA
87-86-5	Pentachlorophenol	ug/kg	97 J	280 UJ [270 UJ]	280 UJ	950 UJ	150 J	370 UJ	290 U
198-55-0	Perylene	ug/kg	NA	NA	NA	86	490	NA	NA
85-01-8	Phenanthrene	ug/kg	130 J	210 J [200 J]	3,400 J	1,400 DJ	15,000 DJ	610 J	840
108-95-2	Phenol	ug/kg	NA	NA	NA	NA	NA	NA	NA
129-00-0	Pyrene	ug/kg	370 J	410 J [390 J]	4,100 J	1,100 DJ	12,000	930 J	1,700
50-32-8	BaP-TE (NDs = 1/2 DL)	ug/kg	969	420 [429]	2,800	NA	NA	690	NA
	Metals								
7440-38-2	Arsenic	ug/kg	6,700	5,800 [6,100]	6,000	10,200	15,300	8,100	12,800
7440-47-3	Chromium	ug/kg	22,500	15,000 [13,400]	13,900	14,800 J	12,700 J	16,100	15,000 J
7440-50-8	Copper	ug/kg	23,500	15,100 [14,000]	14,000	15,800	15,600	17,400	15,600
	Dioxins/Furans								
35822-46-9	1,2,3,4,6,7,8-HpCDD	ug/kg	2.06 J	NA	0.24 J	0.41	NA	1.89 J	1.27
67562-39-4	1,2,3,4,6,7,8-HpCDF	ug/kg	0.276 J	NA	0.0276 J	0.034	NA	0.272 J	0.167
55673-89-7	1,2,3,4,7,8,9-HpCDF	ug/kg	0.0194 J	NA	0.0025 J	0.00346 J	NA	0.0288 J	0.012
39227-28-6	1,2,3,4,7,8-HxCDD	ug/kg	0.0171 J	NA	0.00249 J	0.00403 J	NA	0.0197 J	0.00827
70648-26-9	1,2,3,4,7,8-HxCDF	ug/kg	0.0102 J	NA	0.00146 J	0.0023 J	NA	0.012 J	0.00676
57653-85-7	1,2,3,6,7,8-HxCDD	ug/kg	0.0464 J	NA	0.00554 J	0.00994	NA	0.0385 J	0.0262
57117-44-9	1,2,3,6,7,8-HxCDF	ug/kg	0.00391 J	NA	0.00108 J	0.000619 J	NA	0.00577 J	0.0025 J
19408-74-3	1,2,3,7,8,9-HxCDD	ug/kg	0.0202 J	NA	0.00423 J	0.00297 J	NA	0.0162 J	0.00914
72918-21-9	1,2,3,7,8,9-HxCDF	ug/kg	0.0023 J	NA	0.000546 J	0.00082 J	NA	0.00356 J	0.00156 J
40321-76-4	1,2,3,7,8-PeCDD	ug/kg	0.00432 J	NA	0.00102 J	0.000928 J	NA	0.00262 J	0.00166 J
57117-41-6	1,2,3,7,8-PeCDF	ug/kg	0.000925 J	NA	0.000283 J	0.000243 UX	NA	0.000953 J	0.000379 UX
60851-34-5	2,3,4,6,7,8-HxCDF	ug/kg	0.00702 J	NA	0.00154 J	0.00156 J	NA	0.011 J	0.00407 J
57117-31-4	2,3,4,7,8-PeCDF	ug/kg	0.003 J	NA	0.000847 J	0.00147 J	NA	0.00369 J	0.00261 J
1746-01-6	2,3,7,8-TCDD	ug/kg	0.000701 J	NA	0.000295 UXJ	0.000263 UX	NA	0.000518 J	0.000362 UX
51207-31-9	2,3,7,8-TCDF	ug/kg	0.000689 J	NA	0.000354 J	0.000341 J	NA	0.00132 J	0.000568 J
3268-87-9	OCDD	ug/kg	47.3 J	NA	8.21 J	5.57	NA	23.8 DJ	24.2 EJ
39001-02-0	OCDF	ug/kg	1.62 J	NA	0.105 J	0.212	NA	1.33 J	0.992
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	ug/kg	0.055	NA	0.00835	0.00997	NA	0.0445	0.0306

ug/kg = microgram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
NDs = non-detects
DL = detection limit
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalent
NA = not available

APPENDIX A
CRAB OCHARD CREEK AND PILES FORK SURFACE WATER
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	GC-BC-05 06/27/08	GC-BC-08 06/27/08	GC-BC-10 06/26/08	GC-BC-11 06/26/08
	SVOCs					
87-86-5	Pentachlorophenol	ug/L	0.76 J	0.98 UJ	1.1 UJ	0.94 UJ [0.94 UJ]
83-32-9	Acenaphthene	ug/L	0.22 J	0.2 UJ	0.24 J	0.18 J [0.18 J]
208-96-8	Acenaphthylene	ug/L	0.15 J	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
120-12-7	Anthracene	ug/L	0.27 J	0.22 J	0.23 J	0.19 UJ [0.22 J]
56-55-3	Benzo(a)anthracene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
50-32-8	Benzo(a)pyrene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
205-99-2	Benzo(b)fluoranthene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
191-24-2	Benzo(ghi)perylene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
207-08-9	Benzo(k)fluoranthene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
218-01-9	Chrysene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
53-70-3	Dibenzo(a,h)anthracene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
206-44-0	Fluoranthene	ug/L	0.38 J	0.2 UJ	0.37 J	0.33 J [0.34 J]
86-73-7	Fluorene	ug/L	0.44 J	0.2 UJ	0.21 UJ	0.37 J [0.36 J]
193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
91-20-3	Naphthalene	ug/L	0.21 UJ	0.2 UJ	0.21 UJ	0.19 UJ [0.19 UJ]
85-01-8	Phenanthrene	ug/L	0.37 J	0.23 J	0.28 J	0.31 J [0.25 J]
129-00-0	Pyrene	ug/L	0.074 J	0.2 UJ	0.071 J	0.064 J [0.071 J]
	Metals					
7440-38-2	Arsenic	ug/L	4.1 B	2.6 B	3 B	3 B [2.3 B]
7440-47-3	Chromium	ug/L	1.8 B	1.8 B	1.3 B	5 U [5 U]
7440-50-8	Copper	ug/L	2.8 B	2.9 B	2.5 B	1.4 B [1.4 B]
	Miscellaneous					
NA	Total Suspended Solids	mg/L	38	22	11.6	6 [4 U]

ug/L = microgram per liter

COPC = constituent of potential concern

SVOCs = semi-volatile organic compounds

APPENDIX A
CATFISH
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

CAS	Parameter	Units	COC-BC-04-EDCAT 03/12/08	COC-BC-07-EDCAT 03/12/08	COC-BC-09-EDCAT 03/12/08
	SVOCs				
87-86-5	Pentachlorophenol	mg/kg wet	0.03 U	0.03 U	0.03 U
83-32-9	Acenaphthene	mg/kg wet	0.0047 J	0.022	0.019
208-96-8	Acenaphthylene	mg/kg wet	0.00069 U	0.0018 J	0.00092 J
120-12-7	Anthracene	mg/kg wet	0.0016 J	0.0077	0.005
56-55-3	Benzo(a)anthracene	mg/kg wet	0.00066 U	0.0059	0.00063 U
50-32-8	Benzo(a)pyrene	mg/kg wet	0.0008 U	0.0023 J	0.00077 U
205-99-2	Benzo(b)fluoranthene	mg/kg wet	0.0007 U	0.0027 J	0.00067 U
191-24-2	Benzo(ghi)perylene	mg/kg wet	0.00073 U	0.0025 J	0.0007 U
207-08-9	Benzo(k)fluoranthene	mg/kg wet	0.00056 U	0.003 J	0.00054 U
218-01-9	Chrysene	mg/kg wet	0.00076 U	0.0032 J	0.00072 U
53-70-3	Dibenzo(a,h)anthracene	mg/kg wet	0.00059 U	0.0018 J	0.00056 U
206-44-0	Fluoranthene	mg/kg wet	0.006	0.02	0.019
86-73-7	Fluorene	mg/kg wet	0.0032 J	0.015	0.011
193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg wet	0.00064 U	0.0026 J	0.00061 U
91-20-3	Naphthalene	mg/kg wet	0.004 U	0.0038 U	0.0038 U
85-01-8	Phenanthrene	mg/kg wet	0.0064	0.024	0.016
108-95-2	Phenol	mg/kg wet	0.0019 J	0.0081	0.0063
129-0-00	Pyrene	mg/kg wet	0.028865	0.1245	0.08172
50-32-8	BaP-TE (NDs = 1/2 DL)		0.0016 U	0.0053	0.0015 U
	Metals				
7440-38-2	Arsenic	mg/kg wet	0.06 B	0.17958	0.17802
7440-47-3	Chromium	mg/kg wet	0.03 B	0.01533 U	0.01449 U
7440-50-8	Copper	mg/kg wet	0.24	0.42924	0.30429
	Dioxins/Furans				
35822-46-9	1,2,3,4,6,7,8-HPCDD	mg/kg wet	0.000000594	6.789E-07	2.8359E-06
67562-39-4	1,2,3,4,6,7,8-HPCDF	mg/kg wet	0.0000000638 J	0.000000046647 J	0.00000027738 J
55673-89-7	1,2,3,4,7,8,9-HPCDF	mg/kg wet	0.0000000216 U	0.000000031317 U	0.000000027117 U
39227-28-6	1,2,3,4,7,8-HXCDD	mg/kg wet	0.0000000856 U	0.000000088914 U	0.000000126477 J
70648-26-9	1,2,3,4,7,8-HXCDF	mg/kg wet	0.0000000266 U	0.000000026937 J	0.000000029601 J
57653-85-7	1,2,3,6,7,8-HXCDD	mg/kg wet	0.00000026 J	0.00000032631 J	0.0000003933 J
57117-44-9	1,2,3,6,7,8-HXCDF	mg/kg wet	0.0000000266 U	0.0000000177171 U	0.0000000176157 U
19408-74-3	1,2,3,7,8,9-HXCDD	mg/kg wet	0.0000000776 U	0.000000095922 J	0.000000090666 J
72918-21-9	1,2,3,7,8,9-HXCDF	mg/kg wet	0.0000000145 U	0.000000027594 U	0.000000027324 U
40321-76-4	1,2,3,7,8-PECDD	mg/kg wet	0.0000001316 U	0.000000167973 J	0.000000138483 J
57117-41-6	1,2,3,7,8-PECDF	mg/kg wet	0.00000000842 U	0.000000030003 U	0.000000028152 U
60851-34-5	2,3,4,6,7,8-HXCDF	mg/kg wet	0.000000127 J	0.0000000206298 U	0.0000000207 U
57117-31-4	2,3,4,7,8-PECDF	mg/kg wet	0.0000000556 J	0.000000056064 J	0.000000057339 J
1746-01-6	2,3,7,8-TCDD	mg/kg wet	0.0000000402 U	0.000000061977 J	0.000000062514 J
51207-31-9	2,3,7,8-TCDF	mg/kg wet	0.0000000228 J	0.000000027594 U	0.0000000206379 U
3268-87-9	OCDD	mg/kg wet	0.00000312	3.6573E-06	0.000056097
39001-02-0	OCDF	mg/kg wet	0.00000001074 U	0.000000077526 U	1.40139E-06
1746-01-6	TCDD-TEQ (NDs = 1/2 DL)	mg/kg wet	1.62855E-07	3.09779E-07	1.60405E-07
	Miscellaneous				
NA	Solids, Total	%	20	21.9	20.7
NA	Lipids, Total	%	3.1	2.9	2.3

mg/kg = miligram per kilogram
COPC = constituent of potential concern
SVOCs = semi-volatile organic compounds
BaP-TE = benzo(a)pyrene toxic equivalents
TCDD-TEQ = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxic equivalents

ARCADIS

Appendix B

USEPA March 14, 2014 Letter, Work Plans and Characterization Data for the Neighborhood South of the Site

C. Bury

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RZ2.R05902.20.ID.726

June 2, 2005

Mr. Allen Wojtas
U.S. Environmental Protection Agency
Region 5, DM-7J
77 W. Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W-02-019; EPA Work Assignment No. R05902; Corrective Action Support; Beazer East, Inc. (former Koppers Company, Inc.), Carbondale, IL; EPA ID No. ILD 000819946; Field Sampling Activity Report; Task 4 Deliverable

Dear Mr. Wojtas:

Please find enclosed a Field Sampling Activity Report that describes soil sample collection and analysis activities associated with the Former Koppers Company, Inc. facility in Carbondale, Illinois. The soil samples were collected in the field by a team consisting of U.S. EPA, Illinois EPA and TechLaw representatives. The samples were collected on March 3, 2005 and were transferred (via chain of custody) to the U.S. EPA Region 5 Central Regional Laboratory (CRL) on March 4, 2005. TechLaw performed data validation (DV) on the CRL analytical data package and the resulting DV Report is included as Attachment 4 of the enclosed deliverable. For your convenience, this report has also been E-mailed to both you and Ms. Carolyn Bury in Word Perfect for Windows, Excel (analytical table) and Adobe pdf (sample location map and entire report) formats. Please note that due to the size of the electronic version of the Photographic Log, the Word Perfect for Windows version of the Log was not forwarded electronically, but has been included on the enclosed computer diskette.

If you have any questions, please contact me at (312) 345-8966 or Ms. Kristi Hogan, TechLaw's Work Assignment Manager, at (312) 345-8963.

Sincerely,

Robert Young
Regional Project Manager

cc: F. Norling, EPA Region 5 RPO, w/out attachment
C. Bury, EPA Region 5
P. Brown-Derocher/Central Files
K. Hogan
Chicago Central Files

FIELD SAMPLING ACTIVITY REPORT

FORMER KOPPERS WOOD-TREATING FACILITY
BEAZER EAST, INC.
CARBONDALE, ILLINOIS
EPA ID No. ILD000819946

Submitted to:

Mr. Allen Wojtas
Work Assignment Manager
U.S. Environmental Protection Agency
Region 5, DM-7J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
105 West Madison
Suite 900
Chicago, Illinois 60602

EPA Work Assignment No.	R05902
Contract No.	68-W-02-019
EPA WAM	Allen Wojtas
Telephone No.	(312) 886-6194
EPA Technical Advisor	Carolyn Bury
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June 2, 2005

FIELD SAMPLING ACTIVITY REPORT

FORMER KOPPERS WOOD-TREATING FACILITY
BEAZER EAST, INC.
CARBONDALE, ILLINOIS
EPA ID No. ILD000819946

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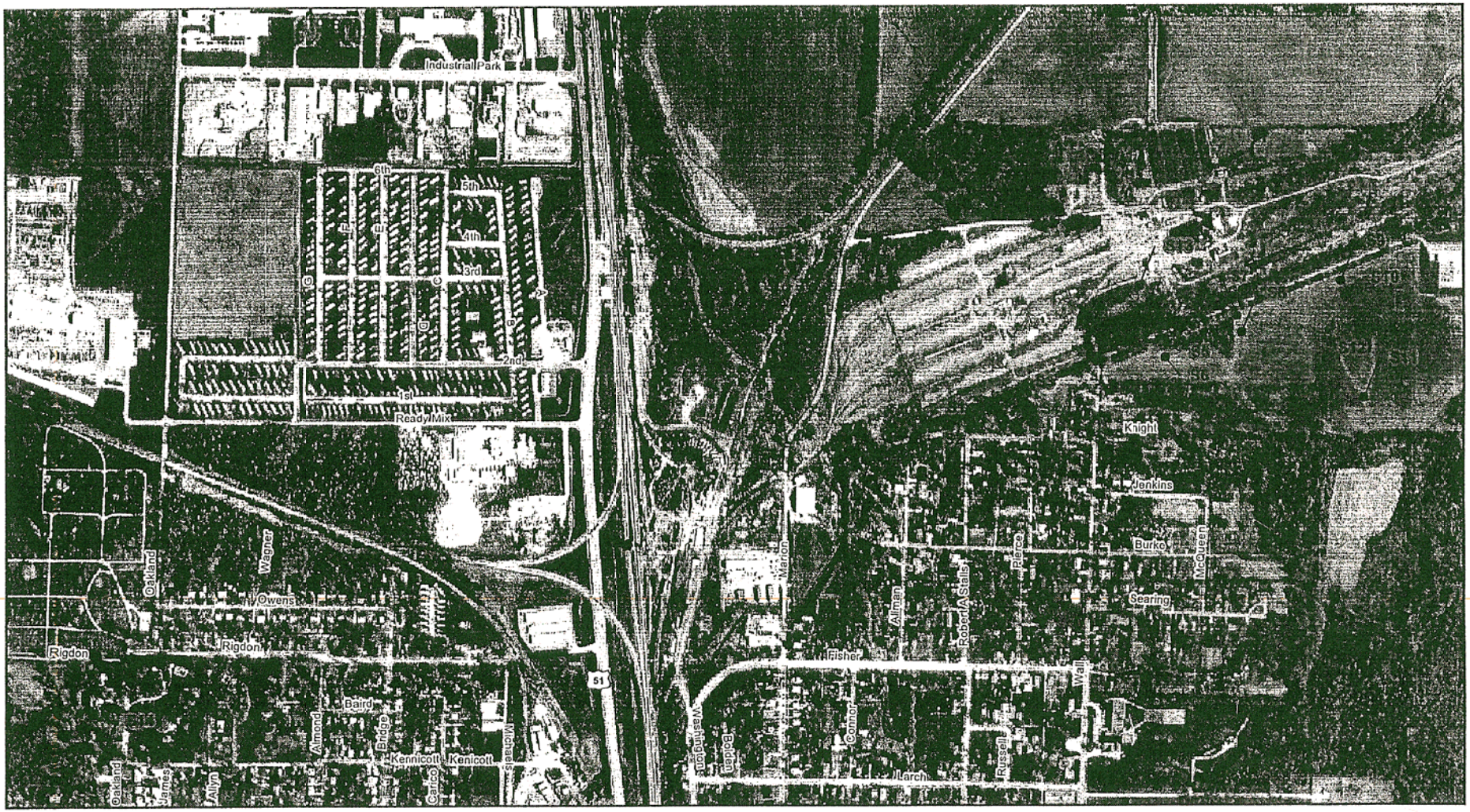

100 50 0 100 Meters

400 200 0 400 Feet

Figure 1
Soil Sampling Locations
Former Koppers Facility, Carbondale, IL

● Soil Sample Location

TechLaw

Note:
Aerial Source: USGS
Aerial Date: 1998
Sample Locations were GPS'd utilizing a submeter system

FIELD SAMPLING ACTIVITY REPORT

FORMER KOPPERS WOOD-TREATING FACILITY
BEAZER EAST, INC.
CARBONDALE, ILLINOIS
EPA ID No. ILD000819946

1. INTRODUCTION

The purpose of this report is to summarize sample collection procedures and present analytical results for samples collected in the vicinity of the Former Koppers Wood Treating facility in Carbondale, Illinois (Koppers Facility), currently owned by Beazer East, Inc. (Beazer). The sampling took place on March 3, 2005. Fourteen soil samples were collected by the Sampling Team, including one sample from the Koppers Facility in an area of known contamination and one background sample from a residential area in north-central Carbondale. The Sampling Team was comprised of U.S. EPA, Illinois EPA and TechLaw representatives. The samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP) to determine whether contamination from the Koppers Facility had migrated offsite. Chemical analysis of the samples was conducted by the U.S. EPA Region 5 Central Regional Laboratory (CRL) in Chicago, Illinois. Results were compared to U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) and the Illinois Tiered Approach to Corrective Action Objectives (TACO) for residential properties to determine if the concentrations of PAHs and PCP detected in the soils could be potentially harmful to residents. This report describes the sample collection and preparation procedures, presents the results of the chemical analyses, and provides an evaluation of the results.

The Field Log Book for the sampling event is presented in Attachment 1. A Photographic Log depicting the sampling activities is provided in Attachment 2. Attachment 3 contains copies of the applicable Chain of Custody Form and Attachment 4 includes the Data Validation (DV) Report prepared by TechLaw.

2.0 SITE DESCRIPTION AND HISTORY

The Former Koppers Wood Treating facility is located at 1555 North Marion Street, Carbondale, Illinois. The facility operated as a wood-treating facility from 1905 until 1991. A variety of chemicals were used during the wood treating process, including creosote and PCP. In 1991, wood-treating activities at the site were discontinued. Previous investigations indicate that surface and subsurface soils within the site property are contaminated with PAHs and PCP. Ongoing site remediation activities include the relocation of Glade Creek, installation of a dense non-aqueous phase liquid (DNAPL) barrier trench upgradient of the creek, the removal of sediments from downstream areas of Glade Creek and the disposal of remediation wastes in an

on-site Corrective Action Management Unit (CAMU). A surface cover is also being constructed over a portion of the former process area to reduce the potential for exposure to contaminated soils.

Previous soil sampling conducted as part of the Remedial Investigation (RI) and Feasibility Study (FS) indicates on-site soils contain PAHs and PCP at concentrations that exceed PRGs and Illinois TACO criteria for industrial and residential exposures. This additional off-site soil sampling event was conducted in response to concerns expressed by residents that contamination may have migrated from the facility into their neighborhood. The sampling team met with representatives of the neighboring community the day before the sampling event. The community representatives input was used in establishing the soil sample locations.

3.0 SAMPLE COLLECTION

On March 3, 2005, 14 soil samples were collected for PAH and PCP analysis. In addition, two duplicate soil samples were also collected. The samples were analyzed using SW-846 Method 8270. The Sampling Team consisted of Ms. Carolyn Bury of U.S. EPA, Mr. Tom Edmundson of the Illinois EPA and Mr. Rob Young of TechLaw. The samples were collected from depths of approximately 0 to 6-inches below ground surface (bgs). The location of each sample was recorded using a Global Positioning System (GPS) unit with sub-meter accuracy. The locations were downloaded and plotted a USGS topographic map, as shown on Figure 1. Representatives of Beazer accompanied the Sampling Team and collected split samples at each location.

The location for each of the14 samples is described below. The sample locations were determined based on a review of the existing on-site soil data and input from community representatives (as discussed above).

Sample S1: This surface soil sample was collected from the area immediately south of historical onsite sample location SL-324, in a 35-foot strip of land which was apparently previously owned by Koppers, as indicated on the base map used in the RI Report. Historical documents, including the RI Report, indicate that soils in the boring collected at SL-324 contained visible staining. The sample was collected approximately five feet north of a large drainage swale/ditch that runs west of, and parallel to, Knight Street.

Sample S2: This surface soil sample was collected approximately 30 feet south of Sample S1, to the south of the drainage swale/ditch, in the 35-foot strip of land marked as "Koppers" on the RI Report base map.

Sample S3: This surface soil sample was collected south of an area that contained ponded water (north of Knight Street, between Robert A. Stalls and Pierce Streets), on the south side of the 35-foot strip of land marked as "Koppers" on the RI Report base map. This sample was collected south of historical sample SL-342, which was

collected on-site during the RI. According to historical documents, soils in Sl-342 contained elevated concentrations of PAHs and PCP. Sample S21 was collected as a duplicate at this location.

Sample S4: This surface soil sample was collected approximately 60 feet south of Sample 3, in a grassy area, approximately 65 feet north of Knight Street. The lot from which S3 and S4 were collected was a vacant, grass-covered area.

Sample S5: This surface soil sample was collected immediately south of the Former Process Area, approximately 125 feet south of the Koppers facility property line. The Former Process Area contained many of the highest historical PAH and PCP concentrations found in soils at the facility.

Sample S6: This surface soil sample was collected directly south of the Koppers Former Process Area, and 75 feet south of Sample S5.

Sample S7: This surface soil sample was collected to the southeast of the Koppers Former Process Area, approximately 105 feet south of the property line and approximately 150 feet west of the MW102 well cluster. A community representative indicated that a large area southeast of the Former Process Area, and south of the property line, had reportedly been used to store treated railroad ties several years ago. The Sampling Team collected samples S7, S8, S9 and S10 from this reported storage area. A community representative also reported that the area surrounding soil sample S7 had recently been used for agricultural purposes.

Sample S8: This surface soil sample was collected approximately 110 feet south of Sample S7. Sample S8 was collected from an area that a community representative indicated had recently been used for agricultural purposes.

Sample S9: This surface soil sample was collected approximately 700 feet east of Sample S7 and approximately 80 feet south of the access road that runs along the south property line of the Koppers Site. Sample S9 was collected from an area that a community representative indicated had recently been used for agricultural purposes.

Sample S10: This surface soil sample was collected approximately 80 feet south of Sample S9. Sample S10 was collected from an area that a community representative indicated had recently been used for agricultural purposes.

Sample S11: This surface soil sample was collected between two drainage features (gullies), approximately 1,000 feet south of the property line. The drainage features did not appear to be man-made, and appeared to drain a large field south of the area where soil samples S9 and S10 were collected.

Sample S12: This surface soil sample was collected along the north edge of a tree line, about 400 feet west of Sample S11. The sample was collected adjacent to a drainage feature which did not appear to be man-made. Sample S22 was collected as a duplicate at this location.

Sample S13: This surface soil sample was collected in the Koppers Former Process Area, from soils that appeared to be visibly impacted by creosote.

Sample S14: This surface soil sample was collected from Oakdale Park, a recreation area located in north-central Carbondale. The sample was collected approximately 125 feet west of North Oakland Street. This location was considered a background sample, and was located approximately one mile west of the facility.

4.0 SAMPLING ACTIVITIES

The Sampling Team collected, handled, prepared, and delivered the soil samples to the U.S. EPA Region 5 CRL. Each sample was collected in an 8- or 16-ounce, unpreserved glass container with a Teflon-lined lid. The pre-cleaned sample containers were provided to the Sampling Team by the U.S. EPA Region 5 CRL. An additional 8-ounce unpreserved glass container was also collected at each location and immediately transferred to Beazer representatives as a split sample. All soil samples were analyzed for PAHs and PCP using SW-846 Method 8270. During the sampling activities, appropriate quality control samples were collected in accordance with TechLaw's U.S. EPA-approved Region 5 Generic Quality Assurance Project Plan (QAPP). One matrix spike/matrix duplicate (MS/MSD) and two duplicate samples were collected. The Sampling Team used disposable sampling equipment to collect the samples, minimizing the need for decontamination.

As discussed previously, soil samples were collected from the 0-inch to 6-inch bgs depth interval at each surface soil sampling location. Separate pre-cleaned stainless steel trowels were used at each location. The samples were scooped into a stainless steel bowl, homogenized, and then transferred into the sample containers. Large organic material, rock, and slag were removed from the bowl or avoided when placing the material into the sample containers. The bowls were lined with clean aluminum foil at each location, and the foil was disposed of after sample collection.

As necessary, the outside of the sample containers were cleaned following sample collection to avoid any potential cross-contamination between samples and sample containers. Samples remained in the custody of the Sampling Team until relinquished to the U.S. EPA Region 5 CRL. The sample containers were appropriately labeled (directly on the face of the bottle). In addition, sample tags were affixed to each container. The samples were placed in a cooler with ice and were hand delivered to the U.S. EPA Region 5 CRL on March 4, 2005. A chain-of-custody (COC) form accompanied the samples from the point of origin to the laboratory. A copy of the COC form is presented in Attachment 3.

5.0 ANALYTICAL RESULTS

Analytical results for soil samples are summarized in Table 1. TechLaw performed data validation on all the PAH and PCP laboratory data. A copy of the Data Validation Report is included in Attachment 4. Results of the PAH and PCP analyses are discussed below.

Results of PAH Analyses

PAHs were either not detected or were present at concentrations below PRGs and/or Illinois TACO criteria for residential exposures at each sample location, with the exception of samples S1 and S13. These exceptions are discussed below:

- Benzo(a)pyrene was detected above the PRG and Illinois TACO criteria for residential exposures at S1. Benzo(b)fluoranthene was detected above the PRG, but below the TACO criteria for residential exposures at S1. The following factors should be noted with respect to the PRG/TACO exceedences. First, S1 was collected adjacent to a large drainage feature that appeared to potentially convey stormwater runoff from ditches in the community. Overtopping of the drainage feature could have contributed PAHs to the soils near S1. Second, soil sample S2 was collected as a "step-out" location to determine if potential contaminants were migrating from the Former Koppers facility to the south of S1. All PAHs were below the PRGs and TACO criteria for residential exposures at soil sample location S2.

- Soil sample S13 was collected from the Former Process Area, within the facility's boundaries. The sample was collected from soils that contained visible creosote staining. The objective of the sample was to obtain a "signature" of the PAHs present in the creosote-impacted soils at the facility.

Results of PCP Analyses

PCP was only detected in one sample (S13) at a concentration exceeding PRGs and Illinois TACO criteria. The exceedence was expected, since sample S13 was collected from on-site soil material that contained visible creosote. PCP results were rejected (indicated as "R" in Table 1) in six of the soil samples, including S5, S9, S10, S12, S21 and S22 (as discussed above, S21 and S22 are duplicate samples of S3 and S12, respectively). The laboratory rejected these results because of low surrogate recoveries or low calibration response, as shown in the laboratory quality control data.

6.0 CONCLUSIONS

Soil sample S1 was the only location outside the Former Koppers facility that contained PAHs or PCP at concentrations exceeding PRGs and Illinois TACO criteria for residential exposures. As

discussed above, sample S1 was collected adjacent to a large drainage feature, and an associated sample (S2) collected in a "step-out" pattern to the south of S1 did not contain PAHs or PCP at concentrations exceeding the residential criteria.

With the exception of S1 and S13, the soil samples collected outside the boundaries of the Former Koppers facility appeared to contain concentrations of PAHs that were comparable to background concentrations (in S14). PCP was not detected in the background sample, nor was the chemical detected in any soil supplies collected outside the boundaries of the Former Koppers facility.

TABLE 1
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS
FORMER KOPPERS COMPANY, CARBONDALE, IL
March 3, 2005 Sampling Event

ANALYTE	Residential Soil PRGs (ug/kg)	Tier I Soil Remediation Objectives for Residential Properties (via Ingestion) (ug/kg)	S1		S2		S3		S4		S5	
			RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q
Semivolatile Organics												
Naphthalene (ug/Kg)	5.60E+04	1.60E+06	74.4	J	60	U	236	U	236	U	55.2	U
2-Methylnaphthalene (ug/Kg)*	NA	3.10E+05	61	UJ	60	U	236	U	236	U	55.2	U
Acenaphthylene (ug/Kg)*	NA	2.30E+06	70.2	J	60	U	236	U	236	U	55.2	U
Acenaphthene (ug/Kg)	3.70E+06	4.70E+06	61	UJ	60	U	236	U	236	U	55.2	U
Fluorene (ug/Kg)	2.70E+06	3.10E+06	61	UJ	60	U	236	U	236	U	55.2	U
Phenanthrene (ug/Kg)*	NA	2.30E+06	286	J	40.3	J	274		205	J	55.2	U
Anthracene (ug/Kg)	2.20E+07	2.30E+07	93.4	J	60	U	236	U	236	U	55.2	U
Fluoranthene (ug/Kg)	2.30E+06	3.10E+06	527	J	60	U	236	U	236	U	44.8	J
Pyrene (ug/Kg)	2.30E+06	2.30E+06	531	J	43.3	J	168	J	236	U	55.2	U
Chrysene (ug/Kg)	6.20E+04	8.80E+04	536	J	43.3	J	118	J	84.9	J	47.6	J
Benzo(a)anthracene (ug/Kg)	620	900	309	J	30.0	J	123	J	236	U	55.2	U
Benzo(b)fluoranthene (ug/Kg)	620	900	**719**	J	53.5	J	236	U	236	U	55.2	U
Benzo(k)fluoranthene (ug/Kg)	6,200	9,000	299	J	60	U	236	U	236	U	55.2	U
Benzo(a)pyrene (ug/Kg)	62	90	**301**	J	24.0	J	236	U	236	U	55.2	U
Indeno(1,2,3-cd)pyrene (ug/Kg)	620	900	239	J	60	U	236	U	236	U	55.2	U
Dibenzo(a,h)anthracene (ug/Kg)	62	90	61	UJ	60	U	236	U	236	U	55.2	U
Benzo(g,h,i)perylene (ug/Kg)*	NA	2.30E+06	266	J	60	U	236	U	236	U	55.2	U
Pentachlorophenol (ug/Kg)	3,000	NA	732	U	721	U	1180	U	2830	U	664	R

NOTES:

Bold numbers = Exceeded PRGs or TACO criteria for Residential Exposures

* = Soil Remediation Objectives for Residential Properties, Non-TACO Chemicals. Prepared by the Illinois EPA Toxicity Unit, October 1, 2004

Q = Qualification or description.

R = The analyte is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
The associated value is either the sample quantitation limit or the sample detection limit.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitaiton limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND=Not determined

a=Sample S21 is a duplicate of Sample S3

b-Sample S22 is a duplicate of Sample S12

TABLE 1
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS
FORMER KOPPERS COMPANY, CARBONDALE, IL
March 3, 2005 Sampling Event

ANALYTE	Residential Soil PRGs (ug/kg)	Tier I Soil Remediation Objectives for Residential Properties (via Ingestion) (ug/kg)	S6		S7		S8		S9		S10	
			RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q
Semivolatile Organics												
Naphthalene (ug/Kg)	5.60E+04	1.60E+06	61	U	59	U	59.6	U	58.2	U	59.8	U
2-Methylnaphthalene (ug/Kg)*	NA	3.10E+05	61	U	59	U	59.6	U	58.2	U	59.8	U
Acenaphthylene (ug/Kg)*	NA	2.30E+06	61	U	59	U	59.6	U	58.2	U	59.8	U
Acenaphthene (ug/Kg)	3.70E+06	4.70E+06	61	U	59	U	59.6	U	58.2	U	59.8	U
Fluorene (ug/Kg)	2.70E+06	3.10E+06	61	U	59	U	59.6	U	58.2	U	59.8	U
Phenanthrene (ug/Kg)*	NA	2.30E+06	61	U	181	J	59.6	U	58.2	U	59.8	U
Anthracene (ug/Kg)	2.20E+07	2.30E+07	61	U	59	U	59.6	U	58.2	U	59.8	U
Fluoranthene (ug/Kg)	2.30E+06	3.10E+06	61	U	141	J	51.9	J	46.6	J	59.8	U
Pyrene (ug/Kg)	2.30E+06	2.30E+06	61	U	109	J	37.0	J	38.4	J	59.8	U
Chrysene (ug/Kg)	6.20E+04	8.80E+04	61	U	118	J	52.5	J	42.5	J	29.4	J
Benzo(a)anthracene (ug/Kg)	620	900	61	U	52.0	J	59.6	U	58.2	U	59.8	U
Benzo(b)fluoranthene (ug/Kg)	620	900	61	U	119	J	53.0	J	60.5	J	40.8	J
Benzo(k)fluoranthene (ug/Kg)	6,200	9,000	61	U	49.0	J	59.6	U	58.2	U	59.8	U
Benzo(a)pyrene (ug/Kg)	62	90	61	U	46.7	J	59.6	U	58.2	U	59.8	U
Indeno(1,2,3-cd)pyrene (ug/Kg)	620	900	61	U	44.9	J	59.6	U	58.2	U	59.8	U
Dibenzo(a,h)anthracene (ug/Kg)	62	90	61	U	59	U	59.6	U	58.2	U	59.8	U
Benzo(g,h,i)perylene (ug/Kg)*	NA	2.30E+06	61	U	37.8	J	59.6	U	58.2	U	59.8	U
Pentachlorophenol (ug/Kg)	3,000	NA	734	U	709	UJ	715	UJ	699	R	719	R

NOTES:

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U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
The associated value is either the sample quantitation limit or the sample detection limit.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitaiton limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND=Not determined

a=Sample S21 is a duplicate of Sample S3

b-Sample S22 is a duplicate of Sample S12

TABLE 1
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS
FORMER KOPPERS COMPANY, CARBONDALE, IL
March 3, 2005 Sampling Event

ANALYTE	Residential Soil PRGs (ug/Kg)	Tier I Soil Remediation Objectives for Residential Properties (via Ingestion) (ug/Kg)	S11		S12		(Soil Collected from within Facility Property) S13		(Background Sample) S14		S21[a]	
			RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q
Semivolatile Organics												
Naphthalene (ug/Kg)	5.60E+04	1.60E+06	61.8	U	60	UJ	5120		60.4	UJ	232	UJ
2-Methylnaphthalene (ug/Kg)*	NA	3.10E+05	61.8	U	60	UJ	1770		62.3	J	232	UJ
Acenaphthylene (ug/Kg)*	NA	2.30E+06	61.8	U	60	UJ	10100		60.4	UJ	232	UJ
Acenaphthene (ug/Kg)	3.70E+06	4.70E+06	61.8	U	60	UJ	643		60.4	UJ	232	UJ
Fluorene (ug/Kg)	2.70E+06	3.10E+06	61.8	U	60	UJ	931		60.4	UJ	232	UJ
Phenanthrene (ug/Kg)*	NA	2.30E+06	61.8	U	60	UJ	9070		122	J	305	J
Anthracene (ug/Kg)	2.20E+07	2.30E+07	61.8	U	60	UJ	17000		60.4	UJ	232	UJ
Fluoranthene (ug/Kg)	2.30E+06	3.10E+06	61.8	U	60	UJ	28200		64.7	J	232	UJ
Pyrene (ug/Kg)	2.30E+06	2.30E+06	61.8	U	60	UJ	33000		58.1	J	140	J
Chrysene (ug/Kg)	6.20E+04	8.80E+04	61.8	U	60	UJ	25600		48.4	J	116	J
Benzo(a)anthracene (ug/Kg)	620	900	61.8	U	60	UJ	**17500**		51.4	J	97.7	J
Benzo(b)fluoranthene (ug/Kg)	620	900	61.8	U	60	UJ	**48800**		45.4	J	107	J
Benzo(k)fluoranthene (ug/Kg)	6,200	9,000	61.8	U	60	UJ	**15800**		60.4	UJ	232	UJ
Benzo(a)pyrene (ug/Kg)	62	90	61.8	U	60	UJ	**23000**		35.1	J	232	UJ
Indeno(1,2,3-cd)pyrene (ug/Kg)	620	900	61.8	U	60	UJ	**7730**		60.4	UJ	232	UJ
Dibenzo(a,h)anthracene (ug/Kg)	62	90	61.8	U	60	UJ	364	U	60.4	UJ	232	UJ
Benzo(g,h,i)perylene (ug/Kg)*	NA	2.30E+06	61.8	U	60	UJ	6640		42.3	J	232	UJ
Pentachlorophenol (ug/Kg)	3,000	NA	742	UJ	721	R	**19400**	J	726	UJ	2790	R

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UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitaiton limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND=Not determined

a=Sample S21 is a duplicate of Sample S3

b-Sample S22 is a duplicate of Sample S12

TABLE 1
SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS
FORMER KOPPERS COMPANY, CARBONDALE, IL
March 3, 2005 Sampling Event

ANALYTE	Residential Soil PRGs (ug/kg)	Tier I Soil Remediation Objectives for Residential Properties (via Ingestion) (ug/kg)	S22[b]	
			RESULT	Q
Semivolatile Organics				
Naphthalene (ug/Kg)	5.60E+04	1.60E+06	59.2	UJ
2-Methylnaphthalene (ug/Kg)*	NA	3.10E+05	59.2	UJ
Acenaphthylene (ug/Kg)*	NA	2.30E+06	59.2	UJ
Acenaphthene (ug/Kg)	3.70E+06	4.70E+06	59.2	UJ
Fluorene (ug/Kg)	2.70E+06	3.10E+06	59.2	UJ
Phenanthrene (ug/Kg)*	NA	2.30E+06	59.2	UJ
Anthracene (ug/Kg)	2.20E+07	2.30E+07	59.2	UJ
Fluoranthene (ug/Kg)	2.30E+06	3.10E+06	59.2	UJ
Pyrene (ug/Kg)	2.30E+06	2.30E+06	59.2	UJ
Chrysene (ug/Kg)	6.20E+04	8.80E+04	59.2	UJ
Benzo(a)anthracene (ug/Kg)	620	900	59.2	UJ
Benzo(b)fluoranthene (ug/Kg)	620	900	20.7	J
Benzo(k)fluoranthene (ug/Kg)	6,200	9,000	59.2	UJ
Benzo(a)pyrene (ug/Kg)	62	90	59.2	UJ
Indeno(1,2,3-cd)pyrene (ug/Kg)	620	900	59.2	UJ
Dibenzo(a,h)anthracene (ug/Kg)	62	90	59.2	UJ
Benzo(g,h,i)perylene (ug/Kg)*	NA	2.30E+06	59.2	UJ
Pentachlorophenol (ug/Kg)	3,000	NA	711	R

NOTES:

Bold numbers = Exceeded PRGs or TACO criteria for Residential Exposures

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R = The analyte is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria.

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The associated value is either the sample quantitation limit or the sample detection limit.

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J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

ND=Not determined

a=Sample S21 is a duplicate of Sample S3

b-Sample S22 is a duplicate of Sample S12

DATA VALIDATION REPORT

To: Robert Young – TechLaw, Inc
From: Bill Fear – TechLaw, Inc.
Report Date: June 1, 2005
Project/Site: Koppers, Carbondale
Laboratory No: 0503003

This memo presents the organic data validation report for the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a technical validation of the semivolatile organic results for polyaromatic hydrocarbons (PAH) and pentachlorophenol (PCP) by GC/MS method SW-846 Method 8270C for Laboratory No. 0503003 from the Region 5 Central Regional Laboratory. This report consists of the validation of 16 soil samples collected on March 3, 2005 and analyzed on March 17, 18, 29 and April 28 and 29, 2005 by the Region 5 Central Regional Laboratory. The field sample numbers and corresponding laboratory numbers are presented below:

Field Sample Number	Laboratory Sample Number
S1	0503003-01
S2	0503003-02
S3	0503003-03
S4	0503003-04
S5	0503003-05
S6	0503003-06
S7	0503003-07
S8	0503003-08
S9	0503003-09
S10	0503003-10
S11	0503003-11
S12	0503003-12
S13	0503003-13
S14	0503003-14
S21	0503003-15
S22	0503003-16

Data validation was conducted in accordance with the documents "Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition," (Third update 1996), and the "USEPA CLP National Functional Guidelines for Evaluating Organics Analyses," October 1999.

Full validation was performed on all samples. The data were evaluated based on the following parameters:

* Data Completeness
  Holding Times and Preservation
* GC/MS Instrument Tune
  Calibrations
* Blanks
  Surrogate Recoveries
* Internal Standard Criteria
* Matrix Spike/Matrix Spike Duplicates
* Blank Spikes (Laboratory Control Samples)
* Compound Identification (full validation only)
  Compound Quantitation and Reporting Limits (full validation only)

* **All criteria were met for this parameter**

Data Completeness

All data necessary to complete data validation on the samples were provided with the following exceptions.

A tune summary form was not provided for 3/25/05 (7:45) tune. However, no action was taken as the raw data were available for evaluation.

The acid surrogate recoveries were not listed on the sample results summary form. No action was required as the recoveries were listed on the surrogate recovery Form 2 and were verified from the raw data.

Holding Times and Preservation

Analytical holding times were assessed to determine whether the holding time requirements were met by the laboratory. These soil samples were extracted within 14 days of sample collection and the extracts were analyzed within 40 days of extraction with the exceptions noted below. The laboratory case narrative did not indicate any problems with sample receipt.

Samples S12 and 14 were analyzed 48 days after extraction and sample S22 was analyzed 49 days after extraction which exceeds the 40 day holding time by eight and nine days, respectively. The following sample results are qualified as estimated (J/UJ) because the sample extracts were not analyzed with 40 days of extraction:

- All results in samples S12, S14, and S22

Note, the non-detected results for PCP in samples S12 and S22 were ultimately rejected because of extremely low surrogate recoveries.

GC/MS Instrument Tune

Decafluorotriphenylphosphine (DFTPP) instrument performance checks were run for each 12 hours of analysis. Ion abundance technical criteria were met and were verified from the raw data for all associated DFTPP tunes.

Calibrations

The instruments were calibrated at the required frequency. Continuing calibrations were analyzed with each 12-hour period of analysis. No calculation errors or transcription errors were found.

Initial Calibration

The percent relative standard deviations (%RSDs) for all target PAH compounds in the initial calibrations were less than or equal to 30% (and less than the method criteria of 15%) with the exception noted below. The average relative response factors (RRFs) for all target compounds were greater than or equal to 0.05.

The % RSD for pentachlorophenol at 39.2% exceeded 30% in the March 25, 2005 initial calibration. As a result the following detected result was qualified as estimated (J):

- Pentachlorophenol in sample S13

Sample S21 was also associated with this calibration; however, the result for PCP is ultimately rejected due to a low RRF.

Continuing Calibration

The percent differences (%Ds) for all target compounds in the continuing calibrations were less than or equal to 25% and the RRFs for all target compounds were greater than or equal to 0.05 with the exception noted below.

The following non-detected result was rejected (R) and the detected result was qualified as estimated (J) because the RRF at 0.002 in the March 29, 2005 continuing calibration was well below 0.05:

- Pentachlorophenol in sample S21 (R)
- Pentachlorophenol in sample S13 (J)

Note, the associated %D for pentachlorophenol exceeded 25% which would also lead to estimating the detected result in sample S13.

A 1PPM standard was analyzed on April 29, 2005. The results for all target compounds with the exception of pentachlorophenol were within 0.75 and 1.25 PPM (25% criteria). Pentachlorophenol was not found in this standard. This compound is reported at a higher reporting limit.

Blanks

The method blank was extracted and analyzed at the required frequency. No contamination was found in the method blank. Summary forms and raw data were evaluated.

Although the samples were analyzed on one instrument, the samples were analyzed over three different analytical sequences. However the blank was not analyzed with each sequence. No action is required.

Surrogate Recoveries

Surrogate compounds were added to the samples and QC samples. The surrogate percent recoveries were within the laboratory QC limits, with the exception noted below. The recoveries were verified from the raw data.

Various surrogate recoveries were below laboratory QC limits in the samples. Action is taken when at least two surrogate recoveries per fraction (bas/neutral or acid) were outside QC limits or when one recovery was less than 10%. The PAH compounds were qualified using the base/neutral surrogates and pentachlorophenol was qualified using the acid surrogates.

The following non-detected results were rejected (R) because the recoveries of the acid surrogates 2-fluorphenol and/or phenol-d5 were less than 10%:

- Pentachlorophenol in samples S5, S9, S10, S12, and S22

The following detected result was qualified as estimated (J) because the recoveries of the acid surrogate 2-fluorphenol at 7% was less than 10% and the recovery for phenol-d5 at 14% was less than the QC limit:

- Pentachlorophenol in sample S13

The following non-detected results were qualified as estimated (UJ) because the recoveries of the acid surrogates 2-fluorphenol and phenol-d5 were less than the QC limits but greater than 10%:

- Pentachlorophenol in samples S7, S8, S11, and S14

The following results were qualified as estimated (J/UJ) because the recoveries of two of the three base/neutral surrogates (nitrobenezene-d5, terphenyl-d14, or 2-fluorobipheny) were less than the QC limits but greater than 10%:

- All PAH compounds in samples S1 and S14
-

(The surrogate recovery for terphenyl-d14 was listed as 62.9% in sample S14; however, the actual raw data recovery was 62.8 which is just below the QC limit of 63%.)

The recoveries for the base/neutral surrogate 2-fluorobiphenyl in samples S3, S10, S12, and S22 and for acid surrogate phenol-d5 in samples S6 and S21 were below the QC limits but greater than 10%. No qualification was required for these low recoveries because only one surrogate recovery per fraction was outside QC limits. (Note, pentachlorophenol was however, rejected in sample S21 due to a low calibration RRF.)

The surrogate compounds from the dilution of sample S13 were diluted below the calibration range and no action was taken on diluted out surrogate compounds.

Internal Standard Criteria

Internal standard area counts did not vary by more than a factor of two from the associated 12-hour calibration standard. The internal standard retention times did not vary more than ± 30 seconds from the retention time of the associated 12-hour calibration standards. Summary forms and raw data were evaluated.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on sample S8. All percent recoveries and relative percent differences (RPDs) were within laboratory QC limits. Summary forms and raw data were evaluated.

The laboratory indicated that the RPDs for naphthalene and benzo(k)fluoranthene exceeded the QC limits. However, because different sample sizes were used for the spike and spike duplicate, different spike amounts were reported. This resulted in the discrepancy for the found amounts. Review of the actual raw data indicated that precision was met and the RPDs were within QC limits.

Blank Spikes (Laboratory Control Samples)

Precision and accuracy criteria were met as the percent recoveries and RPDs of the laboratory control sample and laboratory control sample duplicate were within laboratory QC limits. No calculation errors or transcription errors were found.

Compound Identification (Full Validation Only)

Compound identification was evaluated for the samples. Sample relative retention times (RRTs) were within ± 0.06 RRT units of the standard RRT. Ions present in the standard mass spectrum at a relative intensity greater than 10% were present in the sample spectrum. Relative intensities of ions agreed within ± 30% between standard and sample spectra.

Tentatively identified compounds (TICs) were not reported for this analysis.

Compound Quantitation and Reporting Limits (Full Validation Only)

Compound quantitation and reporting limits were evaluated for the samples. The results and reporting limits were correctly reported.

The laboratory reporting limits are based on the concentration of the low standard from the initial calibration (5.0 ppm) and are corrected for the initial sample size, extraction final volumes, percent solids, and analytical dilution. Laboratory MDLs were compound specific and were not verified other than by the analysis of one 1 PPM standard. In order to meet project requirements the laboratory reporting limits were lowered by a factor of five to reflect the 1 ppm standard. All non-detected results are reported to this adjusted reporting limit on the data validation summary table. Several samples had a 4 ml final volume which resulted in elevated reporting limits. The new reporting limit is adjusted for this sample volume.

The laboratory did not estimate the detected results reported between the MDL and reporting limit. Therefore all detected results reported between the MDL and new adjusted reporting limit are considered estimated quantities and are qualified (J).

Sample S13 was analyzed at a secondary dilution because the result for benzo(b)fluoranthene exceeded the linear calibration in the initial analysis. The laboratory reported the result for this compound from the 4 times dilution and all other results from the initial undiluted analysis.

Overall Assessment

The majority of the pentachlorophenol sample results were qualified as estimated (with low bias) or rejected because of low surrogate recoveries or calibration problems. Six results were rejected and five were estimated.

All results in three samples were qualified as the extracts were analyzed outside holding times.

All PAH results in two samples were qualified as estimated (with low bias) due to low surrogate recoveries

The various detected sample results which were below the new adjusted reporting limits were qualified as estimated.

The laboratory rejected the result for pentachlorophenol in sample S1; however, there was no apparent reasoning for this action. The others samples with rejected pentachlorophenol results had extremely low acid surrogate recoveries.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality.

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - Estimated value of a tentatively identified compound. (Identified with a CAS number.) ORGANICS analysis only.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

NR - Result was not used from a particular sample analysis. This typically occurs when more than one result for a compound is reported due to dilutions and reanalyses.

HR
HURST-ROSCHE
ENGINEERS, INC.

July 25, 2006
Revised August 4, 2006

COPY

SUBJECT: Supplemental Investigation
Former Koppers Wood Treating Facility
Carbondale, Jackson County, IL re: H-R 180-3285

Mr. Donald D. Monty
Assistant City Manager
City of Carbondale, Illinois
200 S. Illinois Avenue
P. O. Box 2047
Carbondale, Illinois 62902-2047

1400 East Tremont St.
P. O. Box 130
Hillsboro, IL 62049
Telephone 217-532-3959
Facsimile 217-532-3212
E-Mail hillsboro@hurst-rosche.com
Web Page—www.hurst-rosche.com

Rec'd			
Sent 8-4-06			
Routing	Date	Read	Attn:
TEC			
DHK			✓
MAR			
JBL			
MAR2			
SLH			
SKK			
E.S.L.			
Marion			
Sprfld			

East St. Louis, Illinois
Marion, Illinois
Springfield, Illinois
Barnhart, Missouri
Joplin, Missouri

Dear Mr. Monty:

At the request of the City of Carbondale, we have completed a supplemental investigation to assess off site impacts of potential past and/or present contamination from the former Koppers Wood Treating Facility. Specifically, a supplemental investigation has been completed in the residential area directly south of the Koppers facility.

In March 2005, USEPA coordinated an investigation in which 13 surface soil samples were collected at locations south of the Koppers facility. Soil samples were collected within 6 inches of ground surface at each of the designated locations. A majority of these samples were collected northeast of the residential neighborhood. The collected samples were analyzed for indicator parameters, and results suggested minimal if any presence of the parameters.

A supplemental investigation has been completed in which 11 subsurface soil samples were collected at six locations throughout the local neighborhood. Sample locations were designated by city personnel. Approximate sample locations have been identified on a site map developed by city personnel and presented in Attachment A. Actual sample locations have been described in the written narrative below.

Sample Collection

Soil sampling was completed on July 11, 2006. Sample collection was completed by Mr. Cody Greenwood and Mr. David Kimmle with Hurst-Rosche Engineers, Inc. Ms. Jennifer Sandorf with Blasland, Bouck, and Lee, Inc. (BBL) was present during sample collection. Ms. Sandorf collected split samples on behalf of Beazer East, Inc. Mr. Don Monty, Assistant City Manager, also accompanied the sampling team.

In general, a post-hole digger was used to dig down to the 1 ft. depth at each designated location. A soil sample was obtained from this depth and split with Ms. Sandorf. An auger was then used to auger down to the 2 ft. depth, where a second soil sample was obtained and split with Ms. Sandorf. The post-hole digger and auger were cleaned with distilled water prior to initiating work at each boring location. New plastic gloves were used by the person collecting the soil samples. Each hole was backfilled with soil cuttings following sampling activities.

Each sample was placed in an 8 oz., unpreserved glass container with a Teflon-lined lid. The sample containers were provided by the laboratory. Each sample jar was appropriately labeled following sample collection. All samples were delivered to Teklab, Inc., Collinsville, Illinois the same day for testing. A chain of custody (COC) form accompanied the samples from the point of origin to the laboratory. A copy of the COC form is presented in Attachment No. 2.

Photographs taken at the time of sampling have been presented in Attachment No. 3

Analytical Testing

All collected samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP). These are the same parameters analyzed during the March 2005 investigation. These parameters have also been identified as being present on the Koppers facility property at concentrations above regulatory limits. Analysis of PAH concentrations was completed using SW-846 Method 8310. Analysis of PCP concentrations was completed using SW-846 Method 8270. Analytical results have been presented in Attachment No. 2. A summary of the analytical results has also been presented in Attachment No. 2.

Analytical Results

Following are comments regarding sampling and analytical results for each of the six locations. Analytical results have been compared to Tier 1 remediation objectives presented in 35 IAC Part 742 for residential properties.

Location A: This boring was originally designated to be completed in the northern half of open Lot 400 along Birch St. (see Photos 16 through 18). It is understood there use to be a few homes located on the property that have since been raised. Several initial borings were completed throughout the lot, and apparent fill consisting of soil, rock, brick, cinders, etc. was encountered at each of the locations. Considering this, it was decided to complete the boring at the southeast corner of Lot 441, which is the Erma Hayes Center (see Photos 19 & 20). Soil encountered at this location

consisted of a light brown, dry, very hard, silty clay (CL) with traces of aggregate and brick remnants down to approximately 12 inches. This was apparent fill material. Considering this, no sample was taken from the 1 ft. depth at this location. Soil below 12 inches was light brown, dry, hard, silty clay (CL). This appeared to be native soil, and a sample was taken at the 24 inch depth. There were no visible signs of contamination at this location. Trace amounts of several parameters were detected in the collected soil sample, however the parameter concentrations were below remediation objectives established for the respective parameters.

Location B: This location is at the eastern edge of Lot 1209 on Allman St. (see Photos 10 through 12). The boring location was initially established within the dedicated allyway, however cinders and apparent fill were identified at the initial location. The boring location was moved approximately 20 ft. westward. Soil encountered at this location was a light brown, dry to moist, firm, silty clay (CL) down to the 24 inch depth. There were no visible signs of contamination at the final boring location. PAHs and PCP were not detected in either soil sample collected at this location.

Location C: This location is along the northern edge of Lot 608 on East Jenkins St. (see Photos 3 through 6). The boring location is at the northern edge of the residential lot. Soil encountered at this location included approximately 10 inches of gray/brown silty clay (CL) with cinders and rock. This soil appeared to be fill. From the approximate 10 inch to 14 inch depth, a gray/brown, moist to wet, silty clay (CL) was present. This appeared to be native soil and is what was sampled. Below 14 inches the soil was a gray/brown, mottled, moist, silty clay (CL). There were no visible signs of contamination at this location. Based on analytical results, trace amounts of benzopyrene, chrysene, and pyrene were detected in the soil sample collected from the 12 inch depth, however the parameter concentrations were below remediation objectives established for the respective parameters.

Location D: This location is at the eastern edge of an open lot immediately south of Lot 1201 on Pierce St. (see Photos 7 through 9). The boring location is at the northeastern corner of the open lot. Soil encountered at this location included approximately 10 inches of light brown/gray, mottled, moist, silty clay (CL). Below 10 inches was a light gray/brown, mottled, moist silty clay (CL). There were no visible signs of contamination at this location. PAHs or PCP were not detected in either soil sample collected at this location.

Location E: This location is adjacent to the northwest corner of Lot 1004 on Robert A. Stalls Ave. (formerly Barnes St.) (see Photos 13 through 15). The boring was completed in the open lot. Soil encountered at this location was a light brown, dry to moist, firm, silty clay (CL) down to the 24 inch depth. There were no visible signs of contamination at this location. PAHs and PCP were not detected in either soil sample collected at this location.

Location F: This location is at the eastern edge of the open lot behind Thomas School. The actual sample location was approximately 100 ft. south of the location shown on the site map (see Photos 1 & 2). Soil encountered at this location consisted of a light brown, dry, hard, silty clay (CL) down to approximately 16 inches. Below 16 inches, the soil was a light brown, moist, hard, silty clay (CL). There were no visible signs of contamination at this location. PAHs or PCP were not detected in either soil sample collected at this location.

Summary

Soil samples were collected from the 1 ft. and 2 ft. depths at five locations throughout the neighborhood located directly south of the former Koppers facility. A soil sample was collected from the 2 ft. depth at a sixth location in the neighborhood. Collected samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP) concentrations. Test results indicate that no PAH concentrations in excess of statewide remediation objectives established by the IEPA for residential properties were detected in any of the collected soil samples. A statewide remediation objective has not been established for PCP.

If you have any questions or require additional information, please let us know.

Sincerely,

HURST-ROSCHE ENGINEERS, INC.

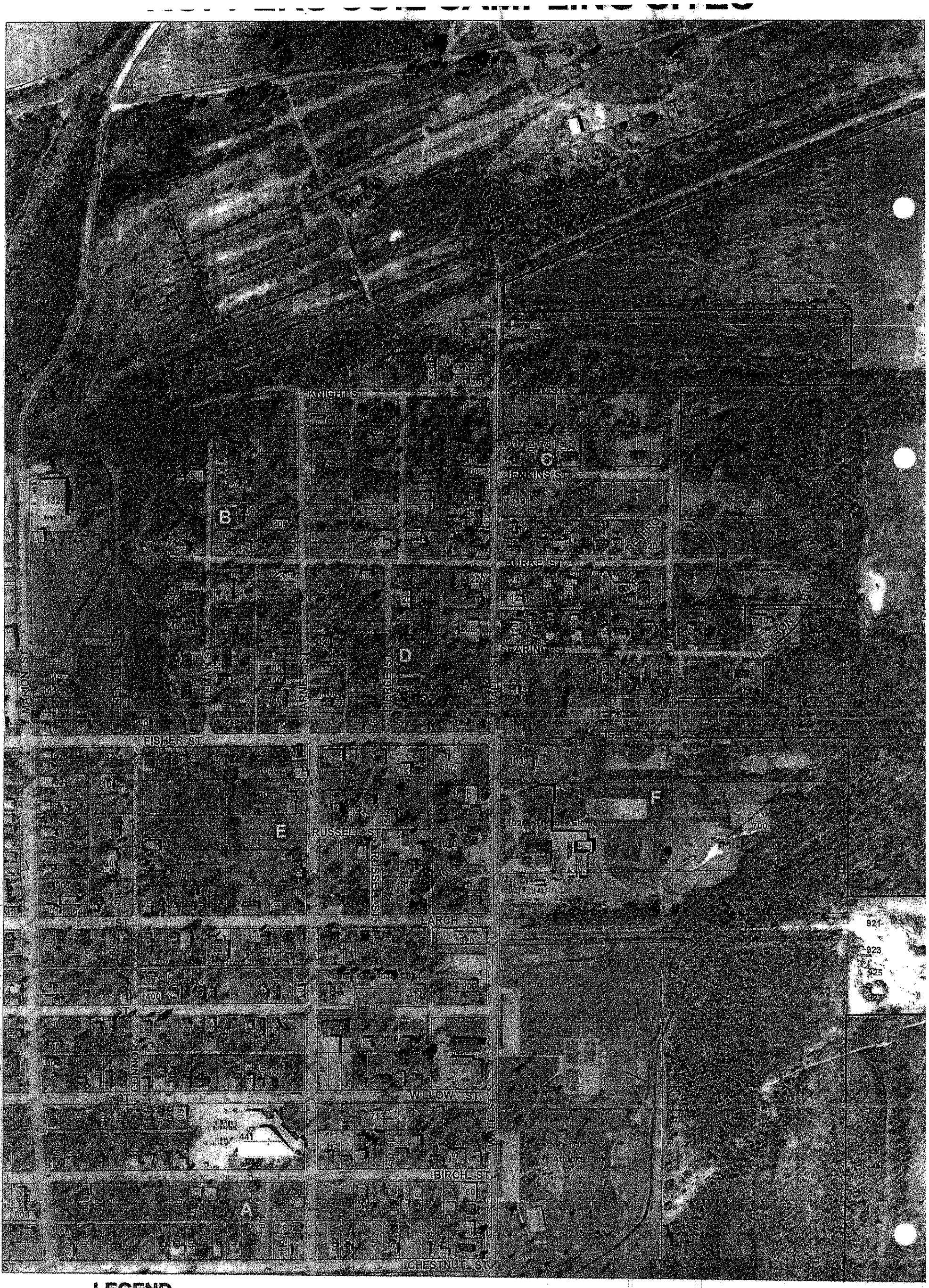
David H. Kimmle, P.E.

DHK:bz
Enclosures

Attachment 1

Sample Location Maps

KOPPERS SOIL SAMPLING SITES



LEGEND

- KOPPERS SOIL SAMPLE SITES
- PROPOSED SOIL SAMPLE SITES
- CITY LIMITS

A) CITY OF CARBONDALE
15-16-478-015

B) MAE GULLY
15-16-276-011,12

C) VIRGINIA NESBITT
15-15-151-016

D) WILLIE JAMES
15-16-282-005 TO 007

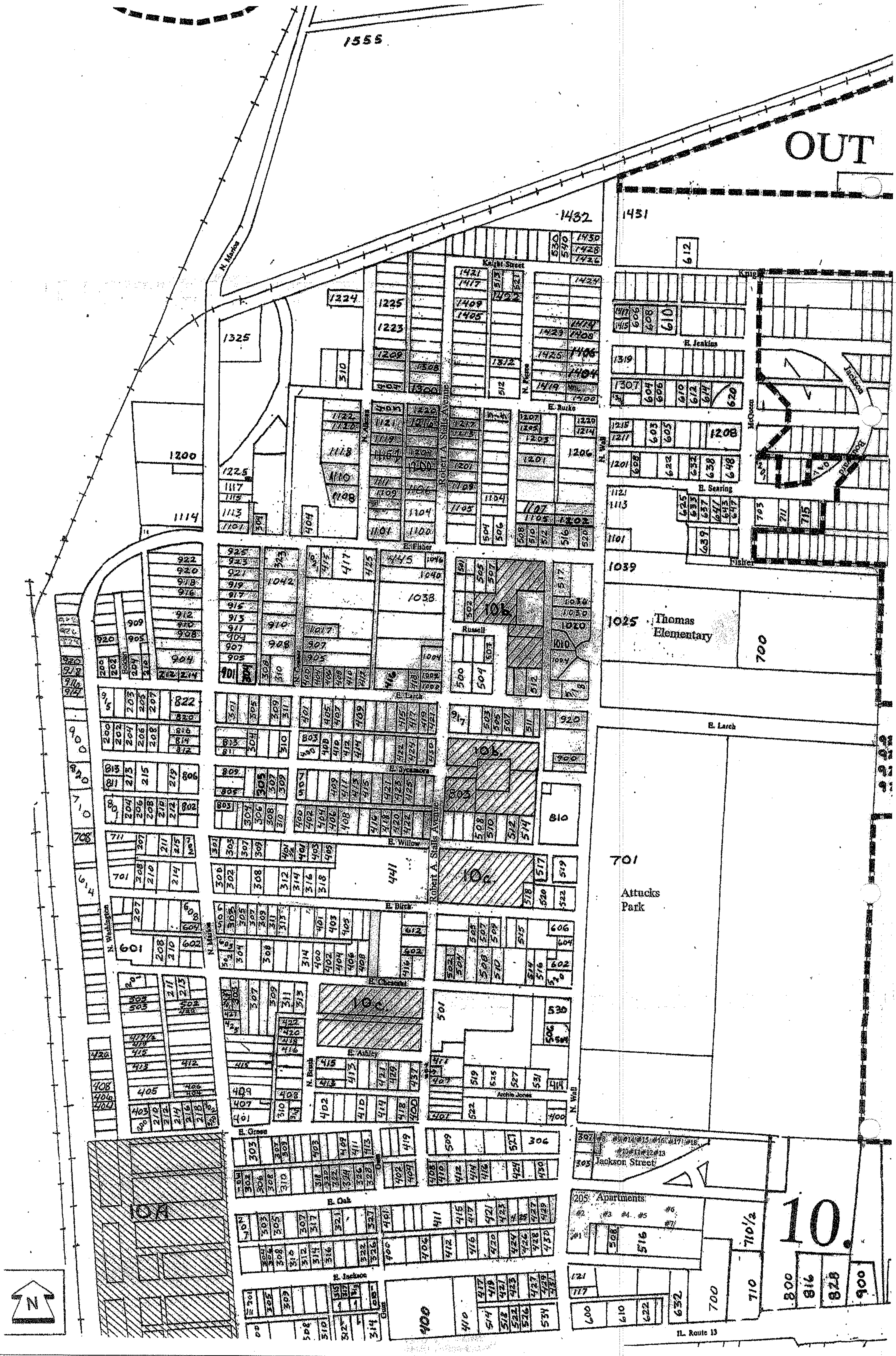
E) CITY OF CARBONDALE - RIGHT OF WAY
15-16-426-019

F) SCHOOL DISTRICT #95
15-15-301-002

SCALE: 1 INCH =350 FT

Carbondale ILLINOIS.

Y:\GIS FILES\GIS SPECIALIST CONSTRUCTION FILES\CLIENTS\Pat\KOPPER SOIL Sites.dwg, KOPPERS 11X17, 6/15/2006 2:59:59 PM, tommer


OUT
10.
10A
10b
10c
Thomas Elementary
Attucks Park
205 Apartments
Jackson Street
N. Marion
Knight Street
E. Jenkins
E. Burke
E. Searing
McQueen
Jackson Boulevard
N. Pierce
N. Wall
N. Allen
Robert A. Stalls Avenue
E. Fisher
Russell
E. Larch
E. Sycamore
E. Willow
E. Birch
N. Washington
E. Chestnut
E. Ashley
N. Brush
Archie Jones
E. Green
E. Oak
E. Jackson
IL. Route 13
N

Attachment 2

Summary of Analytical Results
Analytical Results
Chain of Custody

Summary of Analytical Results
Supplemental Investigation
Former Koppers Wood Treating Facility
Carbondale, Jackson County, IL

Parameter	Units	Remediation Objective[1]	Sample Location A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Pentachlorophenol	mg/Kg	[2]	<4.70	<2.24	<2.42	<2.50	<2.46	<2.50	<2.63	<2.39	<2.51	<2.28	<2.40
Acenaphthene	mg/Kg	570	<0.033	<0.034	<0.038	<0.036	<0.038	<0.037	<0.039	<0.036	<0.037	<0.034	<0.037
Acenaphthylene	mg/Kg	15	<0.033	<0.034	<0.038	<0.036	<0.038	<0.037	<0.039	<0.036	<0.037	<0.034	<0.037
Anthracene	mg/Kg	12,000	<0.011	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Benzo(a)anthracene	mg/Kg	0.9	0.026	<0.009	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.009	<0.010
*Benzo(a)pyrene	mg/Kg	0.09	0.031	<0.011	<0.013	0.021	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Benzo(b)fluoranthene	mg/Kg	9	0.040	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
Benzo(g,h,I)perylene	mg/Kg	2,300	0.064	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Benzo(k)fluoranthene	mg/Kg	9	0.014	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Chrysene	mg/Kg	88	0.040	<0.011	<0.013	0.014	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Dibenzo(a,h)anthracene	mg/Kg	0.09	<0.011	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
Fluoranthene	mg/Kg	3,100	0.081	<0.022	<0.013	<0.024	<0.025	<0.025	<0.026	<0.024	<0.024	<0.023	<0.025
Fluorene	mg/Kg	560	<0.011	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
*Indeno(1,2,3-cd)pyrene	mg/Kg	0.9	0.026	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
Naphthalene	mg/Kg	84	<0.044	<0.045	<0.051	<0.048	<0.050	<0.049	<0.052	<0.048	<0.049	<0.046	<0.050
Phenanthrene	mg/Kg	140	0.066	<0.011	<0.013	<0.012	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012
Pyrene	mg/Kg	2,300	0.057	<0.011	<0.013	0.017	<0.013	<0.012	<0.013	<0.012	<0.012	<0.011	<0.012

Notes:

1. Tier 1 soil remediation objectives for residential properties as presented in 35 IAC Part 742, Appendix B, Table A. Objectives for ingestion, inhalation, and migration have been considered with the lowest value presented.
2. No remediation objective has been established for pentachlorophenol in 35 IAC Part 742. Documentation indicates a preliminary remediation goal of 3 mg/Kg has been established for this parameter for the former Koppers Wood Treating Facility.

* Denotes carcinogen.

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

August 03, 2006

David Kimmle
Hurst-Rosche Engineers, Inc.
1400 E. Tremont
P.O. Box 130
Hillsboro, IL 62049
TEL: (217) 532-3959
FAX: (217) 532-3212

ACCREDITED IN ACCORDANCE WITH nelac
NELAP Accredited #100226

RE: Koppers Facility/ 180-3285 OrderNo. 06070246

Dear David Kimmle:

TEKLAB, INC received 11 samples on 7/11/2006 3:45:00 PM for the analysis presented in the following report. A list of report contents can be found on the following page.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest that have been tested. IL ELAP and NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted in the Case Narrative. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kelly A. Klostermann

Kelly A. Klostermann
Project Manager
618-344-1004 ex.11

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Client: Hurst-Rosche Engineers, Inc.
Project: Koppers Facility/ 180-3285
LabOrder: 06070246
Report Date: August 03, 2006

REPORT CONTENTS

This reporting package includes the following:

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Client: Hurst-Rosche Engineers, Inc.
Project: Koppers Facility/ 180-3285
LabOrder: 06070246
Report Date: August 03, 2006

CASE NARRATIVE

Cooler Receipt Temp 17.4 °C

This is a revised report to lower the calculated reporting limit for pentachlorophenol by SW846 Method 8270 on sample "A2" to reflect the lowest standard of the calibration curve. Please replace your original report dated 7/18/06 for this work order with this revised report.

Qualifiers

DF - Dilution Factor	**B** - Analyte detected in the associated Method Blank	**E** - Value above quantitation range
RL - Reporting Limit	**J** - Analyte detected below reporting limits	**H** - Holding time exceeded
ND - Not Detected at the Reporting Limit	**R** - RPD outside accepted recovery limits	**D** - Diluted out of sample
Surr - Surrogate Standard added by lab	**S** - Spike Recovery outside accepted recovery limits	**MI** - Matrix interference
TNTC - Too numerous to count	**X** - Value exceeds Maximum Contaminant Level	**DNI** Did Not Ignite
IDPH - Illinois Department of Public Health	**NELAP** - IL ELAP and NELAP Accredited Field of Testing	

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	A2
Lab ID:	06070246-001	**Collection Date:**	7/11/2006 12:50:00 PM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		**11.3**	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		**88.7**	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	4.70		**ND**	mg/Kg-dry	25	7/13/2006 10:29:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		**49.3**	%REC	25	7/13/2006 10:29:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		**68.9**	%REC	25	7/13/2006 10:29:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		**53.6**	%REC	25	7/13/2006 10:29:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		**51.9**	%REC	25	7/13/2006 10:29:00 PM	TDN
Surr: Phenol-d5		34.9-110		**59.1**	%REC	25	7/13/2006 10:29:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		**71.4**	%REC	25	7/13/2006 10:29:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.033		**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Acenaphthylene	NELAP	0.033		**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Anthracene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Benzo(a)anthracene	NELAP	0.009		**0.026**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Benzo(a)pyrene	NELAP	0.011		**0.031**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Benzo(b)fluoranthene	NELAP	0.011		**0.040**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.011	R	**0.064**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Benzo(k)fluoranthene	NELAP	0.011		**0.014**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Chrysene	NELAP	0.011		**0.040**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.011	R	**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Fluoranthene	NELAP	0.022		**0.081**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Fluorene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.011	R	**0.026**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Naphthalene	NELAP	0.044		**ND**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Phenanthrene	NELAP	0.011		**0.066**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Pyrene	NELAP	0.011		**0.057**	mg/Kg-dry	1	7/12/2006 3:01:57 PM	MAM
Surr: Terphenyl-d14		29.2-141		**77.4**	%REC	1	7/12/2006 3:01:57 PM	MAM

Sample Narrative

SW-846 3550B, 8270C, Semi-Volatile Organic Compounds by GC/MS

Elevated reporting limit due to high levels of target and/or non-target analytes.

SW-846 3550B, 8310, PolyNuclear Aromatic Hydrocarbons by HPLC

RPD for spikes was not within acceptable limits because of sample composition.

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	B1
Lab ID:	06070246-002	**Collection Date:**	7/11/2006 11:30:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		**11.0**	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED, 2540 G								
Total Solids		0.1		**89.0**	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.24		**ND**	mg/Kg-dry	1	7/13/2006 1:31:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		**67.3**	%REC	1	7/13/2006 1:31:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		**57.7**	%REC	1	7/13/2006 1:31:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		**46.0**	%REC	1	7/13/2006 1:31:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		**46.3**	%REC	1	7/13/2006 1:31:00 PM	TDN
Surr: Phenol-d5		34.9-110		**52.2**	%REC	1	7/13/2006 1:31:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		**70.6**	%REC	1	7/13/2006 1:31:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.034		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Acenaphthylene	NELAP	0.034		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Anthracene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Benzo(a)anthracene	NELAP	0.009		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Benzo(a)pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Benzo(b)fluoranthene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Benzo(k)fluoranthene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Chrysene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Fluoranthene	NELAP	0.022		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Fluorene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Naphthalene	NELAP	0.045		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Phenanthrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 3:54:22 PM	MAM
Surr: Terphenyl-d14		29.2-141		**79.4**	%REC	1	7/12/2006 3:54:22 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	B2
Lab ID:	06070246-003	**Collection Date:**	7/11/2006 11:40:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		19.9	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		80.1	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.42		ND	mg/Kg-dry	1	7/13/2006 3:20:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		69.0	%REC	1	7/13/2006 3:20:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		66.7	%REC	1	7/13/2006 3:20:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		57.0	%REC	1	7/13/2006 3:20:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		57.7	%REC	1	7/13/2006 3:20:00 PM	TDN
Surr: Phenol-d5		34.9-110		59.0	%REC	1	7/13/2006 3:20:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		70.8	%REC	1	7/13/2006 3:20:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.038		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Acenaphthylene	NELAP	0.038		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Benzo(a)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Benzo(b)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Benzo(k)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Chrysene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Fluoranthene	NELAP	0.025		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Fluorene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Naphthalene	NELAP	0.051		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Phenanthrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:11:52 PM	MAM
Surr: Terphenyl-d14		29.2-141		67.4	%REC	1	7/12/2006 4:11:52 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	C1
Lab ID:	06070246-004	**Collection Date:**	7/11/2006 10:35:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		18.9	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		81.1	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.50		ND	mg/Kg-dry	1	7/13/2006 3:56:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		75.0	%REC	1	7/13/2006 3:56:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		69.2	%REC	1	7/13/2006 3:56:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		60.6	%REC	1	7/13/2006 3:56:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		57.2	%REC	1	7/13/2006 3:56:00 PM	TDN
Surr: Phenol-d5		34.9-110		63.4	%REC	1	7/13/2006 3:56:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		74.1	%REC	1	7/13/2006 3:56:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.036		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Acenaphthylene	NELAP	0.036		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Benzo(a)pyrene	NELAP	0.012		0.021	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Benzo(b)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Benzo(k)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Chrysene	NELAP	0.012		0.014	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Fluoranthene	NELAP	0.024		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Fluorene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Naphthalene	NELAP	0.048		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Phenanthrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Pyrene	NELAP	0.012		0.017	mg/Kg-dry	1	7/12/2006 4:29:20 PM	MAM
Surr: Terphenyl-d14		29.2-141		77.6	%REC	1	7/12/2006 4:29:20 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	C2
Lab ID:	06070246-005	**Collection Date:**	7/11/2006 10:42:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		20.2	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		79.8	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.46		ND	mg/Kg-dry	1	7/13/2006 4:32:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		66.7	%REC	1	7/13/2006 4:32:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		59.0	%REC	1	7/13/2006 4:32:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		47.7	%REC	1	7/13/2006 4:32:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		47.6	%REC	1	7/13/2006 4:32:00 PM	TDN
Surr: Phenol-d5		34.9-110		52.7	%REC	1	7/13/2006 4:32:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		71.5	%REC	1	7/13/2006 4:32:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.038		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Acenaphthylene	NELAP	0.038		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Benzo(a)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Benzo(b)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Benzo(k)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Chrysene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Fluoranthene	NELAP	0.025		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Fluorene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Naphthalene	NELAP	0.050		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Phenanthrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 4:46:49 PM	MAM
Surr: Terphenyl-d14		29.2-141		71.3	%REC	1	7/12/2006 4:46:49 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	D1
Lab ID:	06070246-006	**Collection Date:**	7/11/2006 11:00:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		**18.9**	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		**81.1**	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.50		**ND**	mg/Kg-dry	1	7/13/2006 5:08:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		**75.3**	%REC	1	7/13/2006 5:08:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		**67.1**	%REC	1	7/13/2006 5:08:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		**59.4**	%REC	1	7/13/2006 5:08:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		**57.6**	%REC	1	7/13/2006 5:08:00 PM	TDN
Surr: Phenol-d5		34.9-110		**64.1**	%REC	1	7/13/2006 5:08:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		**72.7**	%REC	1	7/13/2006 5:08:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.037		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Acenaphthylene	NELAP	0.037		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Anthracene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Benzo(a)anthracene	NELAP	0.010		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Benzo(a)pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Benzo(b)fluoranthene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Benzo(k)fluoranthene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Chrysene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Fluoranthene	NELAP	0.025		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Fluorene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Naphthalene	NELAP	0.049		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Phenanthrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 5:04:17 PM	MAM
Surr: Terphenyl-d14		29.2-141		**69.0**	%REC	1	7/12/2006 5:04:17 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	D2
Lab ID:	06070246-007	**Collection Date:**	7/11/2006 11:05:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		23.2	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		76.8	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.63		ND	mg/Kg-dry	1	7/13/2006 5:43:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		68.3	%REC	1	7/13/2006 5:43:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		59.8	%REC	1	7/13/2006 5:43:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		51.2	%REC	1	7/13/2006 5:43:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		49.8	%REC	1	7/13/2006 5:43:00 PM	TDN
Surr: Phenol-d5		34.9-110		55.1	%REC	1	7/13/2006 5:43:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		72.5	%REC	1	7/13/2006 5:43:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.039		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Acenaphthylene	NELAP	0.039		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Benzo(a)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Benzo(b)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Benzo(k)fluoranthene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Chrysene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Fluoranthene	NELAP	0.026		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Fluorene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Naphthalene	NELAP	0.052		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Phenanthrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Pyrene	NELAP	0.013		ND	mg/Kg-dry	1	7/12/2006 5:21:46 PM	MAM
Surr: Terphenyl-d14		29.2-141		66.9	%REC	1	7/12/2006 5:21:46 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	E1
Lab ID:	06070246-008	**Collection Date:**	7/11/2006 11:55:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		16.9	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		83.1	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.39		ND	mg/Kg-dry	1	7/13/2006 6:19:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		74.3	%REC	1	7/13/2006 6:19:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		64.2	%REC	1	7/13/2006 6:19:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		55.3	%REC	1	7/13/2006 6:19:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		53.1	%REC	1	7/13/2006 6:19:00 PM	TDN
Surr: Phenol-d5		34.9-110		59.0	%REC	1	7/13/2006 6:19:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		72.1	%REC	1	7/13/2006 6:19:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.036		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Acenaphthylene	NELAP	0.036		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Benzo(a)pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Benzo(b)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Benzo(k)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Chrysene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Fluoranthene	NELAP	0.024		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Fluorene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Naphthalene	NELAP	0.048		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Phenanthrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:39:14 PM	MAM
Surr: Terphenyl-d14		29.2-141		74.8	%REC	1	7/12/2006 5:39:14 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	E2
Lab ID:	06070246-009	**Collection Date:**	7/11/2006 12:03:00 PM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		19.1	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		80.9	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.51		ND	mg/Kg-dry	1	7/13/2006 6:55:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		77.3	%REC	1	7/13/2006 6:55:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		76.1	%REC	1	7/13/2006 6:55:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		61.3	%REC	1	7/13/2006 6:55:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		59.0	%REC	1	7/13/2006 6:55:00 PM	TDN
Surr: Phenol-d5		34.9-110		65.6	%REC	1	7/13/2006 6:55:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		78.5	%REC	1	7/13/2006 6:55:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.037		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Acenaphthylene	NELAP	0.037		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Benzo(a)anthracene	NELAP	0.010		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Benzo(a)pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Benzo(b)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Benzo(k)fluoranthene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Chrysene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Fluoranthene	NELAP	0.024		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Fluorene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Naphthalene	NELAP	0.049		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Phenanthrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Pyrene	NELAP	0.012		ND	mg/Kg-dry	1	7/12/2006 5:56:43 PM	MAM
Surr: Terphenyl-d14		29.2-141		69.1	%REC	1	7/12/2006 5:56:43 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	F1
Lab ID:	06070246-010	**Collection Date:**	7/11/2006 9:55:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		**11.9**	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		**88.1**	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.28		**ND**	mg/Kg-dry	1	7/13/2006 7:31:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		**75.6**	%REC	1	7/13/2006 7:31:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		**68.7**	%REC	1	7/13/2006 7:31:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		**53.5**	%REC	1	7/13/2006 7:31:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		**53.7**	%REC	1	7/13/2006 7:31:00 PM	TDN
Surr: Phenol-d5		34.9-110		**59.5**	%REC	1	7/13/2006 7:31:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		**74.8**	%REC	1	7/13/2006 7:31:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.034		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Acenaphthylene	NELAP	0.034		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Anthracene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Benzo(a)anthracene	NELAP	0.009		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Benzo(a)pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Benzo(b)fluoranthene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Benzo(k)fluoranthene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Chrysene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Fluoranthene	NELAP	0.023		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Fluorene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Naphthalene	NELAP	0.046		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Phenanthrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Pyrene	NELAP	0.011		**ND**	mg/Kg-dry	1	7/12/2006 6:14:12 PM	MAM
Surr: Terphenyl-d14		29.2-141		**81.0**	%REC	1	7/12/2006 6:14:12 PM	MAM

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Laboratory Results

CLIENT:	Hurst-Rosche Engineers, Inc.	**Client Project:**	Koppers Facility/ 180-3285
WorkOrder:	06070246	**Client Sample ID**	F2
Lab ID:	06070246-011	**Collection Date:**	7/11/2006 10:14:00 AM
Report Date:	03-Aug-06	**Matrix:**	SOLID

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
ASTM D2974								
Percent Moisture		0.1		**18.7**	%	1	7/12/2006	CDH
STANDARD METHODS 18TH ED. 2540 G								
Total Solids		0.1		**81.3**	%	1	7/12/2006	CDH
SW-846 3550B, 8270C, SEMI-VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Pentachlorophenol	NELAP	2.40		**ND**	mg/Kg-dry	1	7/13/2006 8:06:00 PM	TDN
Surr: 2,4,6-Tribromophenol		32.7-130		**74.0**	%REC	1	7/13/2006 8:06:00 PM	TDN
Surr: 2-Fluorobiphenyl		34.1-116		**58.5**	%REC	1	7/13/2006 8:06:00 PM	TDN
Surr: 2-Fluorophenol		30.5-99		**54.1**	%REC	1	7/13/2006 8:06:00 PM	TDN
Surr: Nitrobenzene-d5		34.1-101		**52.0**	%REC	1	7/13/2006 8:06:00 PM	TDN
Surr: Phenol-d5		34.9-110		**60.3**	%REC	1	7/13/2006 8:06:00 PM	TDN
Surr: p-Terphenyl-d14		41.7-124		**70.3**	%REC	1	7/13/2006 8:06:00 PM	TDN
SW-846 3550B, 8310, POLYNUCLEAR AROMATIC HYDROCARBONS BY HPLC								
Acenaphthene	NELAP	0.037		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Acenaphthylene	NELAP	0.037		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Anthracene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Benzo(a)anthracene	NELAP	0.010		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Benzo(a)pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Benzo(b)fluoranthene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Benzo(g,h,i)perylene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Benzo(k)fluoranthene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Chrysene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Dibenzo(a,h)anthracene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Fluoranthene	NELAP	0.025		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Fluorene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Indeno(1,2,3-cd)pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Naphthalene	NELAP	0.050		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Phenanthrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Pyrene	NELAP	0.012		**ND**	mg/Kg-dry	1	7/12/2006 6:31:40 PM	MAM
Surr: Terphenyl-d14		29.2-141		**54.6**	%REC	1	7/12/2006 6:31:40 PM	MAM

Sample Narrative

CHAIN OF CUSTODY

pg. 1 of 2 Work Order # 0610246

TEKLAB, INC. 5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618) 344-1004 ~ Fax: (618) 344-1005

Client: Hurst - Rochee Engineers, Inc.
Address: 1400 E. Tremont St.
City / State / Zip: Hillsboro, IL 62049
Contact: D. Kimmle Phone: 217/532-3959
E-Mail: Fax: 217/532-3212

Samples on: ☒ Ice ☐ Blue Ice ☐ No Ice 17.4 °C
Preserved in: ☐ Lab ☐ Field
Lab Notes:

Comments:

- Are these samples known to be involved in litigation? If yes, a surcharge will apply. ☐ Yes ☒ No
- Are these samples known to be hazardous? ☐ Yes ☒ No
- Are there any required reporting limits to be met on the requested analysis? If yes, please provide limits in comment section. ☐ Yes ☐ No

Project Name / Number	Sample Collector's Name
Koppers Facility / 180-3285	David Kimmle

Results Requested: ☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other_____ ☐ 3 Day (50% Surcharge)

Billing Instructions:

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO_3	NaOH	H_2SO_4	HCL	MeOH	$NaHSO_4$	Other	MATRIX: Water	Drinking Water	Soil	Sludge	Sp. Waste	INDICATE ANALYSIS REQUESTED: PAH's	PCP
0610246-001	A2	7/11/06 12:50 pm											X			X	X
-002	D1	7/11/06 11:30 am											X			X	X
-003	B2	7/11/06 11:40 am											X			X	X
-004	C1	7/11/06 10:35 am											X			X	X
-005	C2	7/11/06 10:42 am											X			X	X
-006	D1	7/11/06 11:00 am											X			X	X
-007	D2	7/11/06 11:05 am											X			X	X
-008	E1	7/11/06 11:55 am											X			X	X
-009	E2	7/11/06 12:03 pm											X			X	X

Relinquished By	Date / Time	Received By	Date / Time
Dave Hicks	7/11/06 ~~7:00 pm~~ 1545	Shelley Hennessy	~~7/11/06~~ 7/11/06 1545

The individual signing this agreement on behalf of client acknowledges that he/she has read and understands the terms and conditions of this agreement, on the reverse side, and that he/she has the authority to sign on behalf of client.

WHITE & YELLOW – LAB PINK – SAMPLER'S COPY

CHAIN OF CUSTODY

pg. 2 of 2 Work Order # 06070246

TEKLAB, INC. 5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618) 344-1004 ~ Fax: (618) 344-1005

Client: Hurst-Rosche Engineers, Inc.
Address: 1400 E. Tremont St.
City / State / Zip: Hillsboro, IL 62049
Contact: D. Kinnike Phone: 217/532-3959
E-Mail: Fax: 217/532-3212

Samples on: ☒ Ice ☐ Blue Ice ☐ No Ice _____ °C
Preserved in: ☐ Lab ☐ Field
Lab Notes:

Comments:

- Are these samples known to be involved in litigation? If yes, a surcharge will apply. ☐ Yes ☒ No
- Are these samples known to be hazardous? ☐ Yes ☒ No
- Are there any required reporting limits to be met on the requested analysis? If yes, please provide limits in comment section. ☐ Yes ☐ No

Project Name / Number	Sample Collector's Name
Koppers Facility / 180-3285	David Kinnike

Results Requested
☒ Standard ☐ 1-2 Day (100% Surcharge)
☐ Other_____ ☐ 3 Day (50% Surcharge)

Billing Instructions

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO_3	NaOH	H_2SO_4	HCL	MeOH	$NaHSO_4$	Other	MATRIX: Water	Drinking Water	Soil	Sludge	Sp. Waste	INDICATE ANALYSIS REQUESTED: PAH's	PCP
06070246-010	F1	7/11/06 9:55am											X			X	X
-011	F2	7/11/06 10:14am											X			X	X

Relinquished By	Date / Time	Received By	Date / Time
[signature]	7/11/06 ~~3:00pm~~ 1545	Shelly Hennessy	7/11/06 1545

The individual signing this agreement on behalf of client acknowledges that he/she has read and understands the terms and

WHITE & YELLOW - LAB PINK - SAMPLER'S COPY

Attachment 3

Photographs

Note: Photographs have been presented in the order taken.

No. 1 Looking west. Thomas School is in the background.
Location F

No. 2 Looking south along eastern edge of open lot behind Thomas School.
Location F

No. 3 Looking west along northern edge of residential lot #608 on E. Jenkins Street. Location C

No. 4 Looking north at Location C.

No. 5 Looking north at Location C.

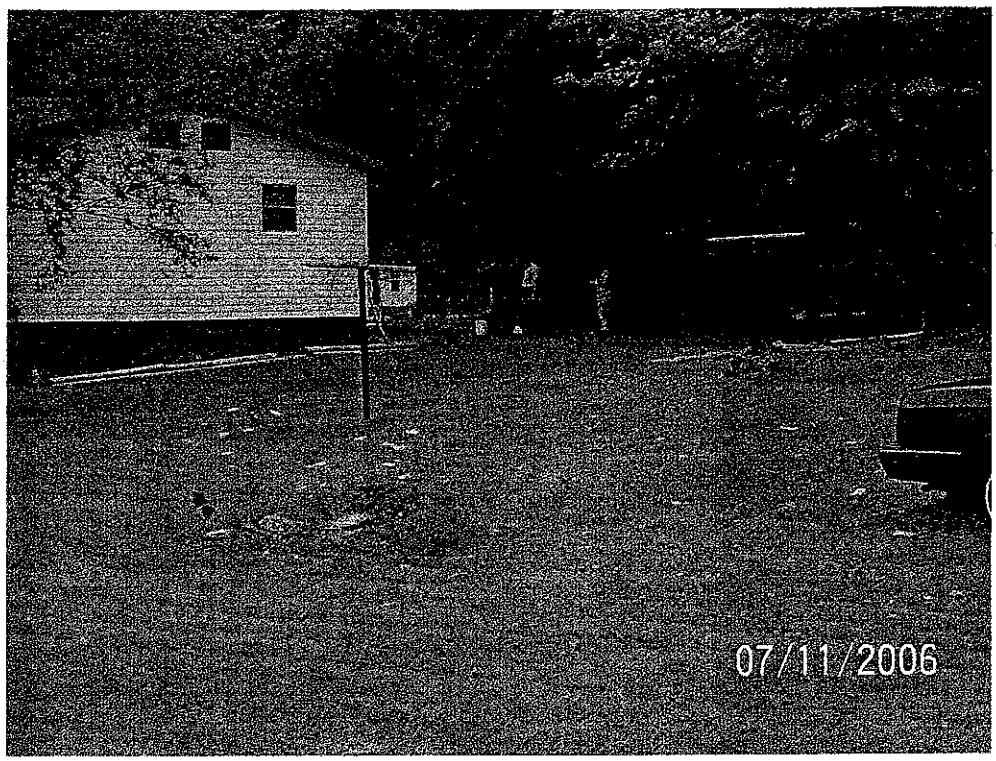
No. 6 Looking northwest at home located on Lot 608 on E. Jenkins Street. Location C.

No. 7 Looking west at Location D.

No. 8 Looking northeast at Location D (in the background) from Pierce St.

No. 9 Looking northwest at Location D.

No. 10 Looking north along eastern edge of Lot 1209. Location B. Stake laying on ground to the right is the original/proposed boring location.



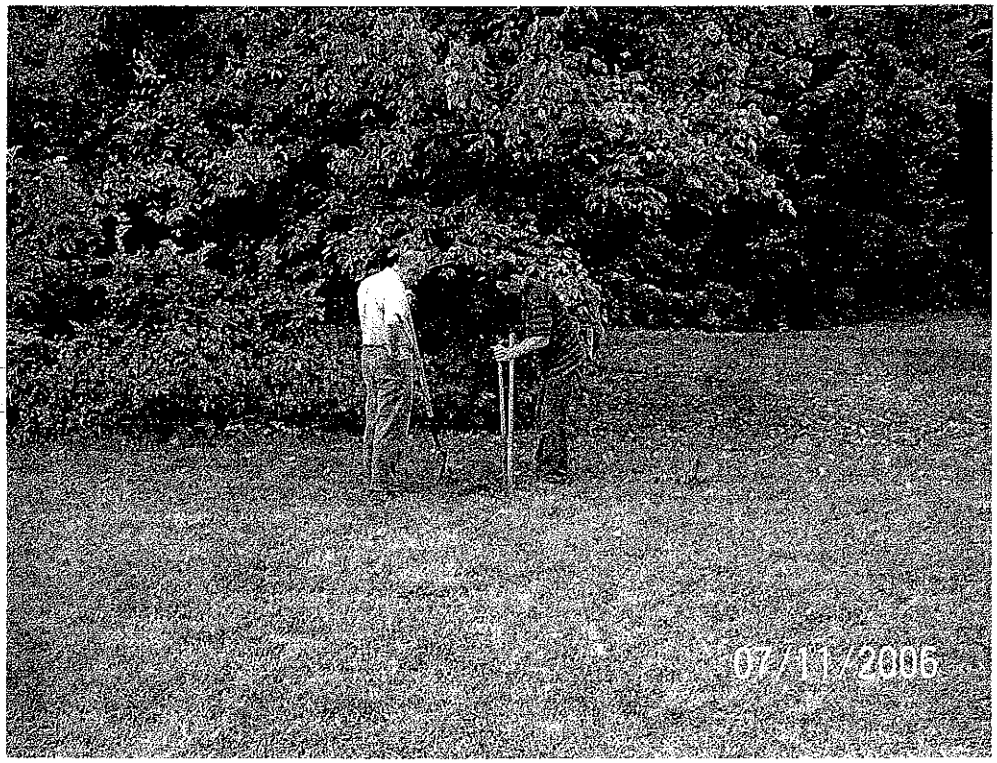
No. 11 Looking northeast at Location B.

No. 12 Looking northeast at home located on Lot 1209 on Allman St. Location B.

No. 13 Looking east at Location E.

No. 14 Looking southeast at Location E.

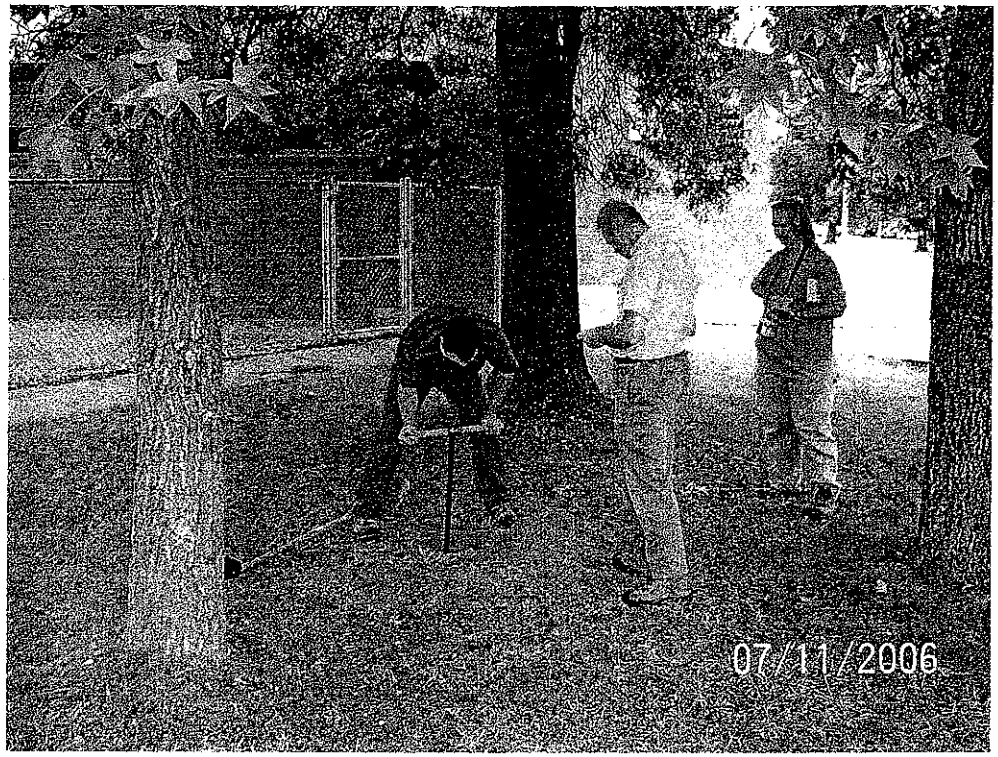
No. 15 Looking southwest at Location E from Robert A. Stalls Ave. (formerly Barnes St.)



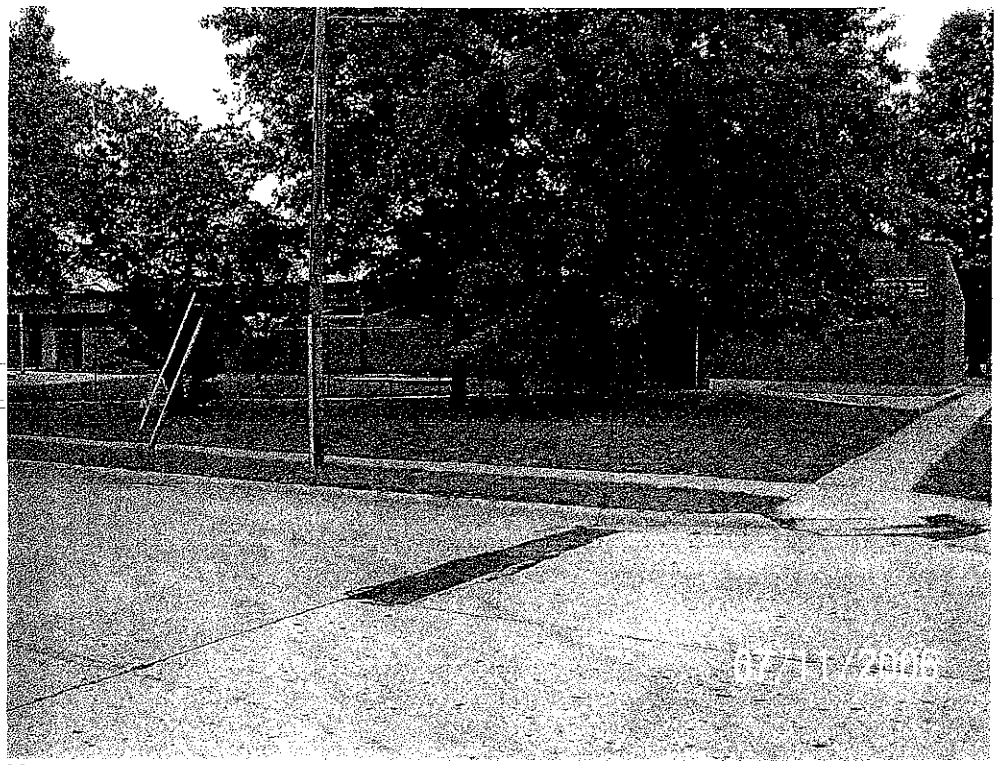
No. 16 Looking southwest at planned Location A. Apparent fill was encountered at this location, so boring location was moved.

No. 17 Looking north at Lot 400 (Location A). Probes were completed on north side of lot and apparent fill was encountered.

No. 18 Looking northwest at Lot 400 (Location A).



No. 19 Looking north at new Location A at the southeast corner of the Erma Hayes Center.



No. 20. Looking north across Birch St. at the new Location A.

FINAL DRAFT

WORK PLAN FOR ADDITIONAL PCDD/PCDF SAMPLING

BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Introduction/Purpose

As a follow-up to a letter submitted to the United States Environmental Protection Agency (USEPA) dated June 30, 2010 and discussions during a September 9, 2010 conference call, Beazer East, Inc. (Beazer) has prepared this Work Plan for additional soil sampling activities within and south of the southern drainage ditches area and at the western end of the Former Koppers Wood-Treating Site in Carbondale, Illinois (the Site; Figure 1). The proposed scope of work is a follow-up to sampling conducted in these areas in December 2009 and March 2010, and incorporates USEPA's comments received in a letter dated January 5, 2011.

Background

Surficial soil samples from within, near and south of the southern drainage ditches area and the western end of the Site have been collected on multiple occasions over the last several years:

- In March 2005, USEPA collected surficial soil samples from residential areas south of the Site; samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol
- In May 2005, Beazer collected surficial soil samples to confirm/modify the proposed Former Process Area surface cover limits; samples were analyzed for PAHs and pentachlorophenol
- In March 2006, March 2008 and June 2008, Beazer collected surficial soil samples to characterize the nature and extent of impacts in the southern drainage ditches area; samples were analyzed for PAHs, pentachlorophenol, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs), and/or arsenic
- In July 2006, the City of Carbondale collected surficial soil samples from residential areas south of the Site; samples were analyzed for PAHs and pentachlorophenol
- In December 2009 and March 2010, Beazer collected additional samples to characterize and delineate the extent of Site-related constituents in the southern drainage ditches area and western end of the Site, among other areas; samples were analyzed for PAHs, pentachlorophenol, PCDDs/PCDFs, and/or arsenic

The sample locations associated with these sampling events, and that lie near or within areas where additional investigations are proposed herein, are shown on Figure 1.

Scope/Procedures

Additional soil sampling is proposed at a total of 22 locations (Figure 1), including:

- Four locations (A1-50, A1-51, A1-56 and A1-57) in the vicinity of previous sample locations A1-37 and A1-48, as initially proposed on Beazer's June 30, 2010 letter to the USEPA;
- Two locations (A3-33 and A3-34) north and northeast of previous sample location A1-48, as requested in USEPA's January 5, 2011 letter;

- Four locations (A3-29 through A3-32) north of the main Site access road as described/requested by USEPA during a conference call on September 9, 2010[1] (the locations of three of these were subsequently moved approximately 100 feet north per USEPA's January 5, 2011 letter);
- Four locations (A3-25 through A3-28) at the western end of the Site to further characterize an area noted by USEPA in email correspondence to Beazer dated September 10, 2010;
- Three locations (A1-58 through A1-60) within and adjacent to Glade Creek upstream of the western end of the Site, one of which (A1-59) also represents the residential area south of the Site, to further characterize an area noted by USEPA in email correspondence to Beazer dated September 10, 2010; and
- Five additional locations (A1-52 through A1-55, and A1-61) in the residential area south of the Site, one of which corresponds to a 2005 soil sample collected by the USEPA and analyzed for other Site-related constituents

The location description and rationale for each sample location are summarized in Table 1. Note that a residential area in closest proximity to the southern portion of the Site was identified for further investigation during the September 9, 2010 conference call. An appropriate number of samples to be collected from this area was not stated on the call, although USEPA indicated that the number of samples should be consistent with the prior sampling conducted in 2006 by the City of Carbondale. Based on this suggestion, Beazer reviewed the prior scopes of work associated with the USEPA's 2005 and the City's 2006 sampling south of the Site. Recall that neither of these sampling events indicated the presence of Site-related constituents (PAHs and pentachlorophenol) at concentrations above Illinois Tiered Approach to Corrective Action Objectives (TACO) criteria for residential properties. In total, the City collected 11 samples from six locations in 2006, of which one location was within the area identified for sampling during the September 9, 2010 call. The USEPA collected 13 off-site samples in 2005, 12 of which were south of the Site property line near the residential area, and four of those were within the area identified for sampling during the September 9, 2010 call. Based on these prior investigations, Beazer proposed five additional sample locations within the area identified for sampling during the September 9, 2010 call (i.e., exceeding the scope of either prior investigation within this area). A sixth sample was added to this area based on USEPA's January 5, 2011 letter. These samples are also in addition to the nine locations that have been previously sampled along the Beazer and/or railroad property lines that abut this residential area.

At each of the proposed 22 sample locations, soils will be collected from the 0- to 0.5-foot depth interval using a stainless-steel trowel. At each of the 16 non-residential sample locations, a single, discrete soil sample will be collected. At each of the six residential sample locations (A1-52 through A1-55, A1-59 and A1-61), soils will be collected at a minimum of five[2] discrete locations spatially distributed throughout the parcel, and composited into a single sample for laboratory analysis.

Soil types/characteristics and descriptions of any non-aqueous phase liquid (NAPL), staining, odors and/or sheens will be recorded in a field notebook. Recovered soils will be homogenized prior to placing them into sample containers. Excess soils will be placed back into the hole following sample collection. All sample locations will be staked and surveyed (or GPS-located) so that they can be accurately depicted

[1] One of the proposed locations, A3-32 was moved from the location discussed with USEPA on September 9, 2010, to a location outside of the re-worked soil area near the office building, construction trailers and wastewater treatment system.

[2] Sampling densities may be adjusted upward once individual residential access agreements are obtained, and in the event that a particular parcel is larger than average. Efforts will be made to avoid collecting discrete samples from any visibly evident potential property-specific sources (e.g., burn pits or barrels).

on the site plan and re-established in the future, if necessary. Samples will be analyzed for PCDDs/PCDFs via USEPA SW-846 Method 8290.

Property Access

Sixteen of the 22 proposed sample locations are located on non-Beazer-owned properties. Following USEPA approval of the proposed sample locations and prior to mobilizing for the sampling work, Beazer will attempt to obtain permission from the associated property owners to collect samples from these locations. Any difficulties in obtaining property access will be communicated to USEPA.

Quality Assurance/Quality Control

PCDD/PCDF samples will be analyzed by Vista Analytical Laboratory in El Dorado Hills, California. Quality assurance/quality control (QA/QC) samples will be collected at the frequencies specified in the Quality Assurance Project Plan (QAPP; ARCADIS, February 2008). Analytical data will be validated in accordance with USEPA National Functional Guidelines for Data Review, as discussed in the QAPP.

Equipment Cleaning and Waste Management

Non-dedicated/non-disposable sampling equipment will be cleaned prior to use at each sample location following procedures outlined in the QAPP (i.e., non-phosphate detergent wash, distilled/deionized water rinse, and triple rinse sequence of solvent followed by distilled/deionized water).

Equipment cleaning fluids will be collected for treatment at the onsite wastewater treatment system (WWTS). Used personal protective equipment, disposable sampling equipment, and other miscellaneous wastes will be placed into a 55-gallon drum and staged at a designated area near the WWTS for subsequent characterization and disposal by Beazer.

Data Review and Reporting

Following completion of the sampling and receipt/validation of the laboratory analytical data, Beazer will prepare data summary tables and sample locations maps for review/discussion with USEPA. Data summary tables will include 2,3,7,8-TCDD Toxic Equivalents (TEQ; calculated using WHO-2005 Toxic Equivalency Factors).

Schedule

It is anticipated that the field work will be initiated within approximately two weeks following USEPA approval of the sampling scope and the receipt of necessary access approvals, pending suitable weather and field conditions. The work described herein will require approximately three days to complete once all access approvals are obtained. To account for the data validation timeframe, data summary tables and sample location maps will be submitted to the USEPA within approximately six weeks following receipt of all associated laboratory analytical data.

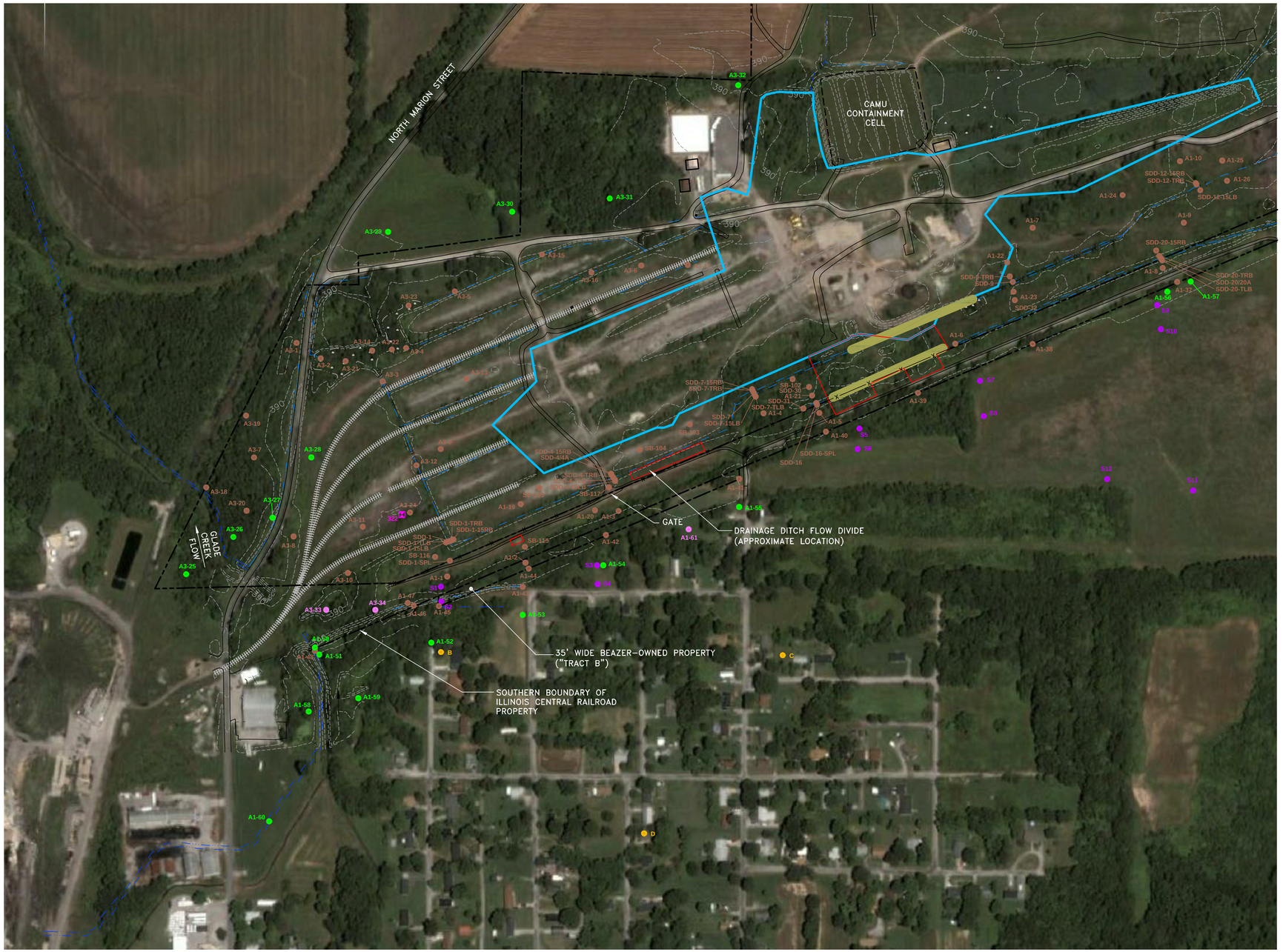
TABLE 1
PROPOSED SAMPLING SCOPE AND RATIONALE

Beazer East, Inc.
Former Koppers Wood-Treating Site
Carbondale, Illinois

Sample ID	Location Description	Depth Interval (ft)	Rationale
A1-50	Approximately 10 feet north of the top of ditch bank at A1-48	0-0.5	Delineate PCDD/PCDFs near A1-48 as proposed in 6/30/2010 letter
A1-51	Approximately 10 feet south of the top of ditch bank at A1-48	0-0.5	Delineate PCDD/PCDFs near A1-48 as proposed in 6/30/2010 letter
A1-52*	Approximately 150 feet south/southeast of A1-45 at north end of N. Allman St	0-0.5	Assess the presence of PCDDs/PCDFs in residential area south of the Site
A1-53*	Approximately 100 feet south of A1-43 along west side of N. Robert A Stalls Ave	0-0.5	Assess the presence of PCDDs/PCDFs in residential area south of the Site
A1-54*	Approximately 100 feet south of A1-42 adjacent to 2005 USEPA sample location S3	0-0.5	Assess the presence of PCDDs/PCDFs in residential area south of the Site; corresponds to prior USEPA sample location
A1-55*	Approximately 100 feet south of A1-41 along west side of N. Wall St	0-0.5	Assess the presence of PCDDs/PCDFs in residential area south of the Site
A1-56	Approximately 50 feet southwest of A1-37	0-0.5	Delineate PCDD/PCDFs near A1-37 as proposed in 6/30/2010 letter
A1-57	Approximately 50 feet east of A1-37	0-0.5	Delineate PCDD/PCDFs near A1-37 as proposed in 6/30/2010 letter
A1-58	Approximately 50 feet west of Glade Creek, approximately 450 feet downstream of A1-60	0-0.5	Assess the presence of PCDDs/PCDFs along Glade Creek upstream of the Site; characterize area noted by USEPA via email on 9/10/2010
A1-59*	Approximately 200 feet south and 425 feet west of A1-52	0-0.5	Assess the presence of PCDDs/PCDFs toward residential area south of the Site; characterize area noted by USEPA via email on 9/10/2010
A1-60	In Glade Creek, approximately 180 feet downstream of North Marion Street crossing	0-0.5	Supplement existing PCDD/PCDF dataset for Glade Creek sediment upstream of the Site; characterize area noted by USEPA via email on 9/10/2010
A1-61*	Between samples A1-54 and A1-55 (on a separate residential property)	0-0.5	Assess the presence of PCDDs/PCDFs in residential area south of the Site, as requested by USEPA's 1/5/2011 letter
A3-25	In southwest corner of Beazer's property on west side of North Marion Street	0-0.5	Supplement existing PCDD/PCDF dataset for western portion of the Site; assess potential migration beyond Glade Creek; characterize area noted by USEPA via email on 9/10/10
A3-26	Approximately midway between A3-25 and A3-27, on east side of Glade Creek	0-0.5	Supplement existing PCDD/PCDF dataset for western portion of the Site, specifically near prior location A3-20; characterize area noted by USEPA via email on 9/10/2010
A3-27	Approximately midway between A3-8 and A3-20, on west side of North Marion Street	0-0.5	Supplement existing PCDD/PCDF dataset for western portion of the Site, specifically near prior location A3-20; characterize area noted by USEPA via email on 9/10/2010
A3-28	Approximately 300 feet north/northwest of A3-8, between North Marion Street and former RR tracks	0-0.5	Supplement existing PCDD/PCDF dataset for western portion of the Site adjacent to public roadway; characterize area noted by USEPA via email on 9/10/2010
A3-29	Approximately 120 feet north of main Site access road	0-0.5	Assess the presence of PCDDs/PCDFs in previously unsampled area north of main Site access road; location specifically identified by USEPA on 9/9/2010, and revised as requested by USEPA's 1/5/2011 letter
A3-30	Approximately 120 feet north of main Site access road	0-0.5	Assess the presence of PCDDs/PCDFs in previously unsampled area north of main Site access road; location specifically identified by USEPA on 9/9/2010, and revised as requested by USEPA's 1/5/2011 letter
A3-31	Approximately 120 feet north of main Site access road	0-0.5	Assess the presence of PCDDs/PCDFs in previously unsampled area north of main Site access road; location specifically identified by USEPA on 9/9/2010, and revised as requested by USEPA's 1/5/2011 letter
A3-32	Near intersection of Site access road and Beazer property line	0-0.5	Assess the presence of PCDDs/PCDFs in previously unsampled area north of main Site access road; location specifically identified by USEPA on 9/9/2010, but modified to account for presence of the office building, construction trailers and WWTS.
A3-33	Within the 390-foot contour southwest of the Site	0-0.5	As requested by USEPA's 1/5/2011 letter
A3-34	Approximately 175 feet east of sample A3-33	0-0.5	As requested by USEPA's 1/5/2011 letter

PCDDs/PCDFs = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (USEPA SW-846 Method 8290)
* - indicates sample will be composited from a minimum of five locations on the target property

January 24, 2011



LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- PROPERTY BOUNDARY (SEE NOTE 2)
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- S1 2005 RESIDENTIAL SAMPLE LOCATIONS (USEPA)
- SB-102 2005–2010 SAMPLE LOCATIONS (BEAZER)
- B 2006 RESIDENTIAL SAMPLE LOCATIONS (CITY OF CARBONDALE)
- A1-30 PROPOSED SAMPLE LOCATIONS
- A3-33 NEW EPA–PROPOSED LOCATIONS (JANUARY 5, 2011)

NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THE 2006 RESIDENTIAL SAMPLE LOCATIONS ARE APPROXIMATE.
4. FIVE RESIDENTIAL SAMPLES (A1–52 THROUGH A1–55, AND A1–61) WILL EACH BE COMPOSITES FROM FIVE LOCATIONS ON THE RESPECTIVE PROPERTIES.

0 200' 400'
GRAPHIC SCALE

FINAL DRAFT

BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

PROPOSED ADDITIONAL PCDD/PCDF SAMPLE LOCATIONS

ARCADIS

FIGURE 1

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER LD: PIC: R. ANDERSON PM: J. HOLDEN TM: D. BESSINGPAS LYR: ON=*; OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVITY\B003914302010000011\DWG\PCDD-PCDF\39143G01.DWG LAYOUT: 1 SAVED: 1/24/2011 11:27 AM ACADVER: 18.0S (LMS TECH) PAGESETUP: C:\LD-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 1/24/2011 4:30 PM BY: FORAKER, LYDIA
XREFS: IMAGES: PROJECTNAME: ----
39143X01 39143X01.jpg
39143X02

Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.
MANOR OAK ONE, SUITE 200, 1910 COCHRAN ROAD, PITTSBURGH, PA 15220

October 17, 2012

Ms. Carolyn Bury
U.S. Environmental Protection Agency, Region V
77 West Jackson Boulevard
Mail Code DE-9J
Chicago, IL 60604-3590

Re: Former Koppers Wood-Treating Site – Carbondale, Illinois
August 2012 Dioxin Sampling Final/Validated Data Submittal

Dear Ms. Bury:

In accordance with the January 24, 2011 *Final Draft Work Plan for Additional PCDD/PCDF Sampling*, which was conditionally approved by the USEPA on June 1, 2012 and subsequently expanded,[1] Beazer conducted sampling at and near the Former Koppers Wood-Treating Site in Carbondale, Illinois on August 8 and 9, 2012. The purpose of this letter is to transmit the final/validated laboratory analytical data associated with the August 2012 sampling to the USEPA. The following are attached to this letter:

- Attachment 1 – Validated Analytical Data Summary Table
- Attachment 2 – Sample Location Maps
- Attachment 3 – Data Validation Reports (includes validated laboratory analytical data sheets)

Please feel contact me at 412-208-8867 if you have any questions or comments regarding this submittal.

Sincerely,

Michael Slenska, P.E.
Environmental Manager

Enclosure

cc: James Moore, IEPA
Jeffrey Holden, ARCADIS
Paul Anderson, ARCADIS
David Bessingpas, ARCADIS

[1] Revised/alternate locations for residential sample locations were discussed with USEPA during a June 19, 2012 conference call, were documented in an e-mail from Jeffrey Holden (ARCADIS) to USEPA, and were approved in an e-mail from Carolyn Bury (USEPA) dated June 22, 2012.

Writer's Direct Dial: 412/208-8867

Attachment 1

Validated Analytical Data
Summary Table

TABLE 1
VALIDATED ANALYTICAL DATA SUMMARY - AUGUST 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Sample ID:		A1-50	A1-51	A1-52	A1-53	A1-54	A1-55	A1-56	A1-57	A1-58	A1-59	A1-60
Depth (ft bgs):		0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Sample Date:	Units	08/09/12	08/09/12	08/08/12	08/08/12	08/08/12	08/08/12	08/08/12	08/08/12	08/09/12	08/08/12	08/08/12
PCDDs/PCDFs												
1,2,3,4,6,7,8-HpCDD	ug/kg	0.626 [0.781]	0.918	0.309 [0.325]	1.59	0.545	1.47	0.541	0.488	0.602	2.85 EJ	0.00423
1,2,3,4,6,7,8-HpCDF	ug/kg	0.0588 [0.0491]	0.136	0.062 [0.0721]	0.194	0.0639	0.165	0.0613	0.0465	0.0839	0.452	0.000297 J
1,2,3,4,7,8,9-HpCDF	ug/kg	0.00482 [0.00424]	0.0107	0.00397 [0.00563]	0.00883	0.00425	0.0122	0.00543	0.0042	0.00415	0.0279	0.000115 U
1,2,3,4,7,8-HxCDD	ug/kg	0.00408 [0.00513]	0.0114	0.00357 [0.00364]	0.0264	0.00367	0.0159	0.00563	0.00554	0.00568	0.0241	0.000129 U
1,2,3,4,7,8-HxCDF	ug/kg	0.00377 [0.00334]	0.00889	0.00585 [0.0121]	0.00597	0.00415	0.00635	0.00409	0.00334	0.00429	0.016	0.0000584 U
1,2,3,6,7,8-HxCDD	ug/kg	0.0158 [0.0145]	0.0311	0.0101 [0.0121]	0.0579	0.0129	0.05	0.0133	0.0128	0.014	0.0834	0.000153 U
1,2,3,6,7,8-HxCDF	ug/kg	0.00225 J [0.00161 J]	0.00775	0.00339 [0.00681]	0.0067	0.00289	0.0043	0.00148 J	0.00121 J	0.00291	0.00951	0.0000556 U
1,2,3,7,8,9-HxCDD	ug/kg	0.0117 [0.0118]	0.0257	0.00761 [0.00847]	0.0664	0.00893	0.0315	0.0104	0.01	0.0113	0.0536	0.00024 J
1,2,3,7,8,9-HxCDF	ug/kg	0.000545 J [0.000345 J]	0.000793 J	0.000312 J [0.000913 J]	0.000585 J	0.000614 J	0.000928 J	0.000296 J	0.00019 UX	0.000638 J	0.00152 J	0.0000858 U
1,2,3,7,8-PeCDD	ug/kg	0.00251 [0.0019 J]	0.00597	0.00235 J [0.00295]	0.0157	0.00197 J	0.00859	0.00244 J	0.00247 J	0.00261	0.0096	0.000188 J
1,2,3,7,8-PeCDF	ug/kg	0.000752 J [0.000465 J]	0.0016 J	0.00214 J [0.00811 J]	0.000782 J	0.00102 J	0.00121 J	0.00037 UX	0.000326 J	0.000889 J	0.00164 J	0.0000424 U
2,3,4,6,7,8-HxCDF	ug/kg	0.00394 [0.00325]	0.0135	0.00417 [0.00582]	0.00926	0.004	0.00721	0.00235 J	0.00202 J	0.00522	0.0164	0.0000644 U
2,3,4,7,8-PeCDF	ug/kg	0.00138 J [0.00138 J]	0.00357	0.00229 J [0.00456]	0.00149 J	0.00144 J	0.00243 J	0.00107 J	0.000711 J	0.00366	0.00291	0.0000449 U
2,3,7,8-TCDD	ug/kg	0.000558 [0.000416 J]	0.00162	0.000491 J [0.000675]	0.00118	0.000654	0.0013	0.000699	0.000636	0.000587	0.000761	0.000291 J
2,3,7,8-TCDF	ug/kg	0.000633 [0.000436 J]	0.00184	0.0025 [0.00638]	0.000333 J	0.001	0.000999	0.000362 U	0.000305 J	0.00108	0.00144	0.0000579 U
OCDD	ug/kg	21.1 EJ [23.9 EJ]	24.5 EJ	7.67 EJ [8.5 EJ]	25.7 EJ	15.7 EJ	26.8 EJ	14.8 EJ	13.4 EJ	31.3 EJ	47.2 EDJ	0.214
OCDF	ug/kg	0.421 [0.351]	0.523	0.186 [0.187]	0.706	0.238	0.819	0.327	0.254	0.233	1.99	0.000995 J
Total HpCDD	ug/kg	1.47 [2.46]	1.81	0.604 [0.648]	3.07	1.12	2.67	1.16	1.09	1.31	5.29	0.00911
Total HpCDF	ug/kg	0.295 [0.24]	0.483	0.168 [0.187]	0.518	0.197	0.645	0.25	0.192	0.27	1.55	0.000876
Total HxCDD	ug/kg	0.164 [0.235]	0.254	0.0977 [0.124]	0.52	0.124	0.43	0.146	0.15	0.142	0.603	0.0119
Total HxCDF	ug/kg	0.0909 [0.0777]	0.253	0.0796 [0.106]	0.206	0.0837	0.192	0.0717	0.056	0.115	0.453	0.000392
Total PeCDD	ug/kg	0.0227 [0.0203]	0.046	0.0365 [0.0459]	0.0683	0.0211	0.108	0.0209	0.021	0.0239	0.0759	0.0115
Total PeCDF	ug/kg	0.0504 [0.0339]	0.168 PJ	0.0534 [0.0948 J]	0.0436	0.0181	0.0572	0.0114	0.0104	0.0556	0.0984	0.000148
Total TCDD	ug/kg	0.0126 [0.0104]	0.0153	0.0341 [0.0337]	0.00719	0.00729	0.0286	0.00686	0.00589	0.00914	0.0301	0.00468
Total TCDF	ug/kg	0.018 [0.0135]	0.0576	0.0576 [0.104]	0.00874	0.021	0.0272	0.00348	0.0052	0.0229	0.042	0.0000887
2,3,7,8-TCDD TEQ	ug/kg	0.0211 [0.0224]	0.037	0.0134 [0.0175]	0.0606	0.0178	0.0471	0.0178	0.0163	0.0252	0.0799	0.000613

See Notes on Page 3

TABLE 1
VALIDATED ANALYTICAL DATA SUMMARY - AUGUST 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Sample ID:		A1-61	A1-62	A1-63	A3-25	A3-26	A3-27	A3-28	A3-29	A3-30	A3-31	A3-32	A3-33	A3-34
Depth (ft bgs):		0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Sample Date:	Units	08/08/12	08/08/12	08/08/12	08/09/12	08/09/12	08/09/12	08/09/12	08/08/12	08/09/12	08/09/12	08/08/12	08/09/12	08/09/12
PCDDs/PCDFs														
1,2,3,4,6,7,8-HpCDD	ug/kg	3.12 EJ	81.8 D	0.446	0.715	5 EJ	0.532	343 EDJ	0.249	0.606	1.46	23.9 EDJ [28.6 EJ]	43.1 EDJ	5.16 EJ
1,2,3,4,6,7,8-HpCDF	ug/kg	0.309 J	17.1 EDJ	0.0401	0.0349	0.864	0.0692	68.9 EDJ	0.0147	0.045	0.14	5.5 EJ [5.81 EJ]	7.04 D	0.986
1,2,3,4,7,8,9-HpCDF	ug/kg	0.0234	1.68 D	0.00359	0.00351	0.0697	0.00537	6.06 D	0.00131 J	0.00352	0.00994	0.379 [0.423]	0.586 D	0.076
1,2,3,4,7,8-HxCDD	ug/kg	0.052	0.306	0.00472	0.00533	0.039	0.0069	1.82	0.0034	0.00592	0.0198	0.233 [0.28]	0.199	0.0586
1,2,3,4,7,8-HxCDF	ug/kg	0.0229	0.435	0.00311	0.00257	0.0476	0.00701	1.84	0.0014 J	0.00365	0.00748	0.229 [0.242]	0.273	0.0734
1,2,3,6,7,8-HxCDD	ug/kg	0.123	2.21 EJ	0.0108	0.0145	0.16	0.0179	6.66 EJ	0.00682	0.0131	0.0585	1.01 [1.22]	1.03	0.167
1,2,3,6,7,8-HxCDF	ug/kg	0.00772	0.153	0.00122 J	0.00116 J	0.0255	0.0042	0.98 PJ	0.000675 J	0.00165 J	0.00386	0.132 [0.142]	0.0909	0.0335
1,2,3,7,8,9-HxCDD	ug/kg	0.0801	0.629	0.00923	0.0104	0.0861	0.011	3.02 EJ	0.00666	0.0121	0.0475	0.514 [0.632]	0.36	0.118
1,2,3,7,8,9-HxCDF	ug/kg	0.00211 J	0.0419	0.00034 J	0.000317 UX	0.00997	0.000638 J	0.125	0.000171 J	0.00027 J	0.000771 J	0.0558 [0.0324]	0.0499	0.00516
1,2,3,7,8-PeCDD	ug/kg	0.0229	0.0818	0.00233 J	0.00224 J	0.0175	0.00466	0.616	0.00156 J	0.00228 J	0.0123	0.0837 [0.0968]	0.0626	0.0185
1,2,3,7,8-PeCDF	ug/kg	0.00194 J	0.0108	0.000281 UX	0.000402 J	0.0043	0.00172 J	0.0667	0.000243 J	0.0004 J	0.000973 J	0.0209 [0.0229]	0.0123	0.00517
2,3,4,6,7,8-HxCDF	ug/kg	0.0114	0.341	0.00175 J	0.00203 J	0.049	0.00608	1.84	0.00102 J	0.00254	0.00568	0.24 [0.248]	0.184	0.0548
2,3,4,7,8-PeCDF	ug/kg	0.0031	0.0308 D	0.000772 J	0.000519 UX	0.013	0.00368	0.11	0.000351 J	0.00123 J	0.00161 J	0.0422 [0.0819]	0.0432	0.0167
2,3,7,8-TCDD	ug/kg	0.0036	0.00535	0.000478 UX	0.000361 J	0.00372	0.000808	0.0388	0.000225 UX	0.000341 J	0.00135	0.00305 [0.00375]	0.00384	0.00222
2,3,7,8-TCDF	ug/kg	0.000859	0.00322	0.000233 U	0.000233 UX	0.00369	0.00181	0.00931	0.000253 J	0.000311 J	0.00081	0.00419 [0.00509]	0.00412	0.00352
OCDD	ug/kg	38.6 EJ	727 EDJ	14.9 EJ	34.4 EJ	84 D	13.6 EJ	2,270 EDJ	7.77 EJ	29.4 EJ	22.5 EJ	198 [240 EDJ]	487 EDJ	45.8 EJ
OCDF	ug/kg	2.16	123 EDJ	0.193	0.147	4.62 EJ	0.327	438 EDJ	0.0655	0.219	0.803	27.3 EJ [28.4 EJ]	41.5 EDJ	4.24 EJ
Total HpCDD	ug/kg	6.09	150	0.966	2.28	9	1.12	732	0.593	1.49	3.04	39.3 [47.3 J]	82.3	13
Total HpCDF	ug/kg	1.5 J	92.6 PJ	0.153	0.143	3.71	0.268	337	0.0582	0.18	0.582	20.5 [21.9 J]	33.7	3.66
Total HxCDD	ug/kg	1.38	12.3 J	0.123	0.239	0.914	0.177	55.3	0.092	0.176	0.646	4.77 [6.06]	5.13	1.49
Total HxCDF	ug/kg	0.383	16.5 PJ	0.0482	0.0541	1.14	0.119	72.8 PJ	0.0234	0.06	0.155	6.11 [6.79]	6.13	1.41
Total PeCDD	ug/kg	0.361	0.401	0.0188	0.0579	0.112	0.0873	3.78	0.016	0.0254	0.121	0.448 [0.543]	0.414	0.109
Total PeCDF	ug/kg	0.0681	0.775 PJ	0.00915	0.00494	0.367	0.0707	5.45 PJ	0.00667	0.0124	0.0306	0.911 [1.08]	0.652	0.261 PJ
Total TCDD	ug/kg	0.0991	0.118	0.00472	0.0127	0.0272	0.0793	0.332	0.00685	0.00837	0.0227	0.104 [0.14]	0.102	0.0468
Total TCDF	ug/kg	0.0308	0.111 PJ	0.00318	0.00302	0.101	0.0456	0.45 PJ	0.0052	0.00621	0.0133	0.107 [0.132]	0.0978	0.0701
2,3,7,8-TCDD TEQ	ug/kg	0.104	1.77	0.0151	0.0241	0.153	0.0224	7.31	0.00871	0.0224	0.0517	0.707 [0.835]	0.965	0.155

See Notes on Page 3

TABLE 1
VALIDATED ANALYTICAL DATA SUMMARY - AUGUST 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Notes:

1. Samples A1-52, A1-53, A1-54, A1-55, A1-59 and A1-61 were composites of five discrete sample locations. All remaining samples were collected from a single, discrete location.
2. Sample A1-60 was a sediment sample collected from the Glade Creek channel bottom. All remaining samples were soil samples.

Definitions:

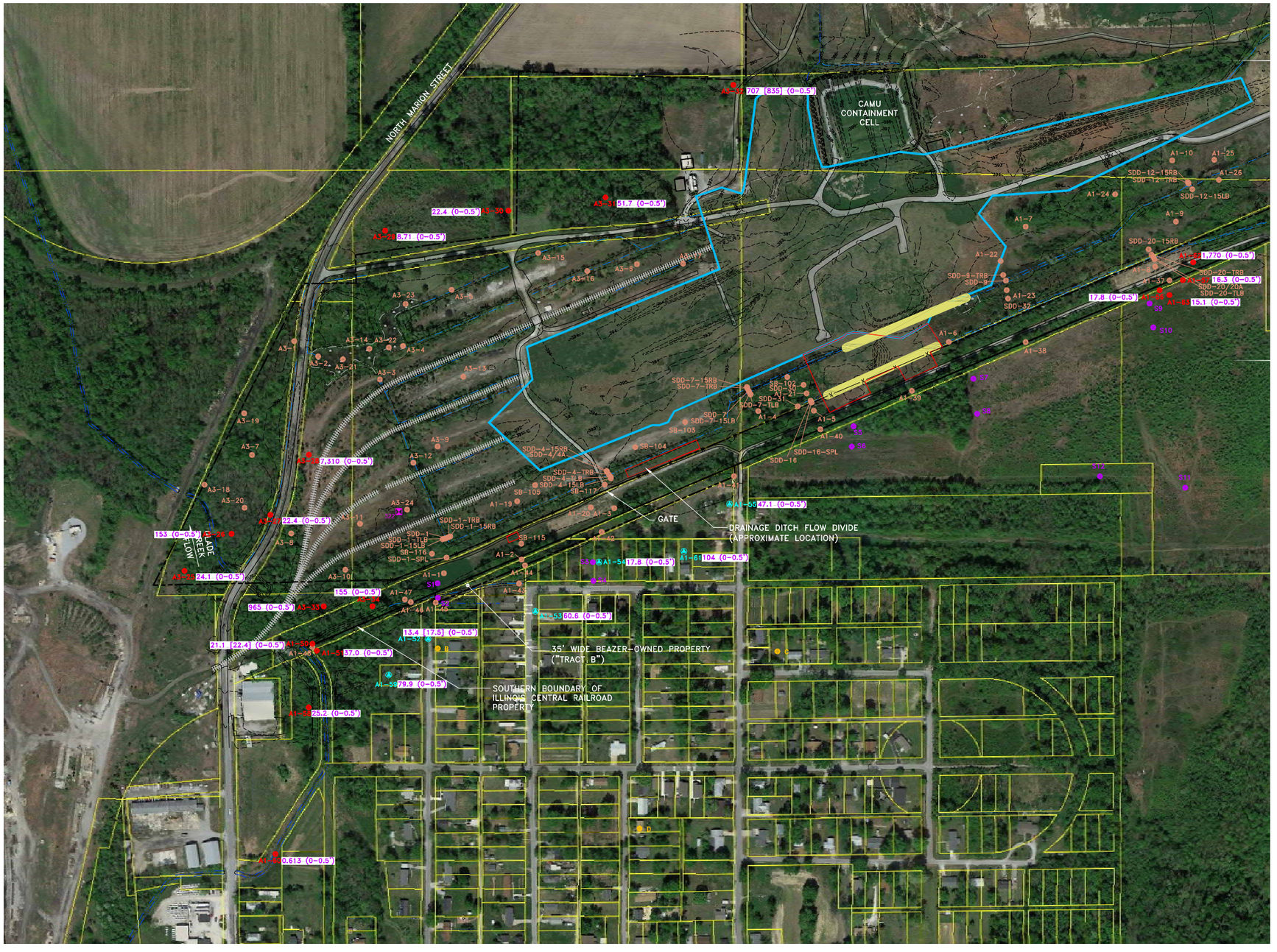
PCDDs/PCDFs = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
ug/kg = micrograms per kilogram, or parts per billions (ppb)
ft bgs = feet below ground surface
TEQ = Toxicity Equivalent, calculated using 2005 World Health Organization (WHO) Toxicity Equivalent Factors (TEFs)
[ ] = analytical result for duplicate sample

Data Qualifiers:

D = result based on analysis of diluted sample
E = the amount detected is above the High Calibration Limit
J = the amount detected is below the Low Calibration Limit; or estimated value based on data validation
P = the amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference
U = compound not detected; reported value is the sample specific estimated detection limit
UX = non-detect; reported value is the estimated maximum possible concentration

Attachment 2

Sample Location Maps



LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- PROPERTY BOUNDARY (SEE NOTE 2)
- PARCEL BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- S1 2005 RESIDENTIAL SAMPLE LOCATIONS (USEPA)
- SB-102 2005-2010 SAMPLE LOCATIONS (BEAZER)
- B 2006 RESIDENTIAL SAMPLE LOCATIONS (CITY OF CARBONDALE)
- A1-57 2012 GRAB SAMPLE LOCATION
- A1-55 2012 COMPOSITE SAMPLE LOCATION
- 15.1 (0-0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL

NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THE 2006 RESIDENTIAL SAMPLE LOCATIONS ARE APPROXIMATE.
4. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH AND DATED APRIL 2, 2012.
5. TCDD-TEQ CONCENTRATIONS ARE BASED ON UNVALIDATED LABORATORY RESULTS.

0 200' 400'
GRAPHIC SCALE

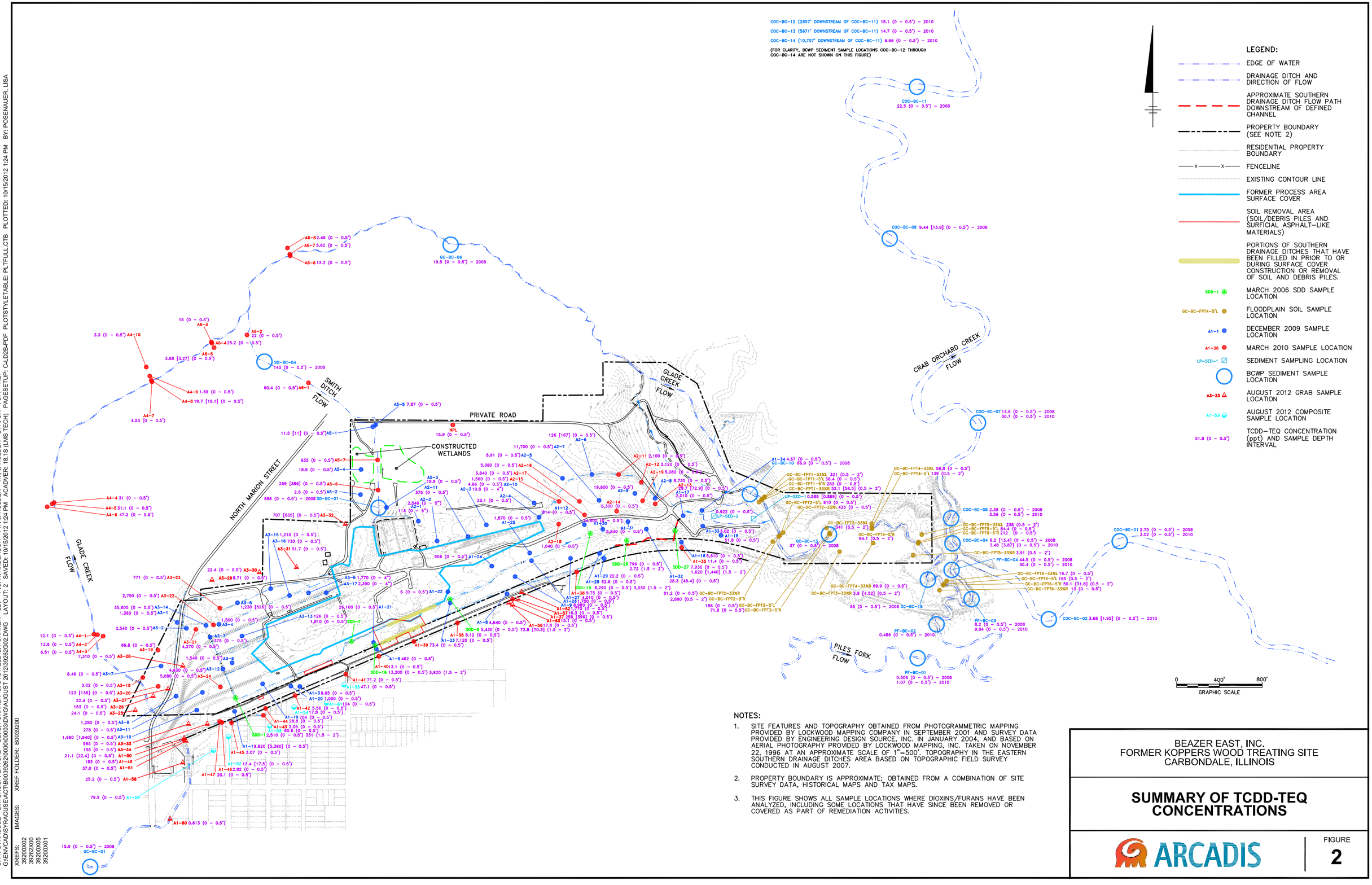
BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

AUGUST 2012 SAMPLE LOCATIONS AND TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE 1

CITY:(MANCHESTER) SYRACUSE DIV/GROUP:ENVCAD DB:(B.SMALL) G.STOWELL L.FORAKER LD: PIC:R.ANDERSON PM:J.HOLDEN TM:D.BESSINGPAS
G:\ENVCAD\SYRACUSE\ACT\B0039262\0000000003\DWG\AUGUST 2012\39262G01.DWG LAYOUT: 1 SAVED: 10/11/2012 1:31 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: C-L02B PDF 3600 DPI PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 10/11/2012 1:31 PM BY: FORAKER, LYDIA
XREFS: 39200X01 39200X02 39262X00
IMAGES: XREF FOLDER: B1039200
39200X02.jpg



NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THIS FIGURE SHOWS ALL SAMPLE LOCATIONS WHERE DIOXINS/FURANS HAVE BEEN ANALYZED, INCLUDING SOME LOCATIONS THAT HAVE SINCE BEEN REMOVED OR COVERED AS PART OF REMEDIATION ACTIVITIES.

BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

SUMMARY OF TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE
2

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER G. STOWELL L. FORAKER LD: PIC: R. ANDERSON PM: J. HOLDEN TM: J. HOLDEN LYR: ON=*; OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVITY\B0039262\100\0100003\DWG\AUGUST 2012\39262G02.DWG LAYOUT: 2 SAVED: 10/15/2012 1:24 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: C-LD2B-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 10/15/2012 1:24 PM BY: POSENAUER, LISA
XREFS: 39200X02 39262X00 39200X05 39200X01
IMAGES: XREF FOLDER: B0039200

Attachment 3

Data Validation Reports

ARCADIS
Infrastructure, environment, facilities

Imagine the result

Beazer East Inc.

Former Koppers Wood-Treating Site

Data Review

CARBONDALE, ILLINOIS

Dioxins/Furans Analyses

SDG # 33932

Analyses Performed By:
Vista Analytical Laboratories
El Dorado Hills, California

Report #17380
Review Level: Tier III
Project: B0039262.0000.00003

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 33932 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating Site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					Dioxins/Furans
A1-62	33932-001	Soil	8/8/2012		X
A1-56	33932-002	Soil	8/8/2012		X
A1-57	33932-003	Soil	8/8/2012		X
A1-63	33932-004	Soil	8/8/2012		X
A1-52	33932-005	Soil	8/8/2012		X
A1-53	33932-006	Soil	8/8/2012		X
A1-59	33932-007	Soil	8/8/2012		X
A1-54	33932-008	Soil	8/8/2012		X
A1-55	33932-009	Soil	8/8/2012		X
A1-60	33932-010	Soil	8/8/2012		X
DUP-1	33932-011	Soil	8/8/2012	A1-52	X
DUP-2	33932-012	Soil	8/8/2012	A3-32	X
EB 8/8/12	33932-013	Water	8/8/2012		X

1. The matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location A1-55.
2. Sample results were reported on a dry-weight basis.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290. Data were reviewed in accordance with USEPA National Functional Guidelines of January 2005.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected as unusable. The analyte may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cooled @ 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cooled @ 4±2 °C

The samples were received at the laboratory at acceptable temperatures and all samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment rinse blanks also measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were detected in an associated method blank (which was analyzed with SDG 33932); however, the associated sample results were either greater than the BAL or non-detect. Therefore, qualification of the sample results was not required.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable; system performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

A maximum relative standard deviation (RSD) of 20% is allowed for all non-labeled compounds (target) and 30% is allowed for all labeled compounds (internal standards and recovery standards)

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibited percent difference (%D) less than the control limit (20%).

All initial and continuing calibration criteria were within the control limits.

5. Internal Standard Performance

All samples to be analyzed for PCDD/PCDF compounds are spiked with internal standards prior to extraction. Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the internal standard compounds exhibit recoveries within the control limits of 40% to 135%.

Sample locations associated with internal standards exhibiting responses outside of the control limits are presented in the following table.

Sample Locations	Internal Standard	Response
A1-62	^{13}C-OCDD	<LL but >40%

The criteria used to evaluate the internal standard responses are presented in the following table. In the case of an internal standard deviation, the compounds quantitated under the deviant internal standard are qualified as documented in the table below.

Control limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No action
	Detect	J
< the lower control limit (LL) but > 40%	Non-detect	J
	Detect	J
< 25%	Non-detect	R
	Detect	J

6. Recovery Standard Performance

The recovery standard (^{37}Cl-2,3,7,8-TCDD) is added to the sample extract prior to the extract clean-up steps. The concentrations of the labeled standards (internal standards) are determined using the recovery standard.

All recovery standard recoveries were acceptable.

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds spiked in the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent differences (RPDs) between the MS and MSD must be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compounds concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

8. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit recoveries within the laboratory-established acceptance limits.

All compounds associated with the LCS analyses exhibited recoveries within the control limits.

9. Field Duplicate Sample Analysis

Field duplicate analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 100% for soil matrices is applied to the RPD between the parent and the field duplicate samples. In the case where the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for soil matrices.

Results (in ug/kg) for the field duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-52/ DUP-1	1,2,3,4,6,7,8-HpCDD	0.309	0.325	5.0%
	1,2,3,4,6,7,8-HpCDF	0.062	0.0721	15.0%
	1,2,3,4,7,8,9-HpCDF	0.00397	0.00563	34.5%
	1,2,3,4,7,8-HxCDD	0.00357	0.00364	1.9%
	1,2,3,4,7,8-HxCDF	0.00585	0.0121	69.6%
	1,2,3,6,7,8-HxCDD	0.0101	0.0121	18.0%
	1,2,3,6,7,8-HxCDF	0.00339	0.00681	67.0%
	1,2,3,7,8,9-HxCDD	0.00761	0.00847	10.6%
	1,2,3,7,8,9-HxCDF	0.000312 J	0.000913 J	98.1%
	1,2,3,7,8-PeCDD	0.00235 J	0.00295	22.6%
	1,2,3,7,8-PeCDF	0.00214 J	0.00811	116.4%
	2,3,4,6,7,8-HxCDF	0.00417	0.00582	33.0%
	2,3,4,7,8-PeCDF	0.00229 J	0.00456	66.2%
	2,3,7,8-TCDD	0.000491 J	0.000675	31.5%
	2,3,7,8-TCDF	0.0025	0.00638	87.3%
	37Cl-2,3,7,8-TCDD	0.0808	0.0776	4.0%

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
	OCDD	7.67 E	8.5 E	10.2%
	OCDF	0.186	0.187	0.5%
	TEQ(Min)	0.0134	0.0175	26.5%
	Total HpCDD	0.604	0.648	7.0%
	Total HpCDF	0.168	0.187	10.7%
	Total HxCDD	0.0977	0.124	23.7%
	Total HxCDF	0.0796	0.106	28.4%
	Total PeCDD	0.0365	0.0459	22.8%
	Total PeCDF	0.0534	0.0948	55.8%
	Total TCDD	0.0341	0.0337	1.1%
	Total TCDF	0.0576	0.104	57.4%
	WHO Dioxin TEQ(Human/Mammal-NDs Excluded)	0.0134	0.0175	26.5%
	WHO Dioxin TEQ(Human/Mammal-NDs used at 1/2 DL)	0.0134	0.0175	26.5%
A3-32/ DUP-2	1,2,3,4,6,7,8-HpCDD	23.9	28.6	17.9%
	1,2,3,4,6,7,8-HpCDF	5.5	5.81	5.4%
	1,2,3,4,7,8,9-HpCDF	0.379	0.423	10.9%
	1,2,3,4,7,8-HxCDD	0.233	0.28	18.3%
	1,2,3,4,7,8-HxCDF	0.229	0.242	5.5%
	1,2,3,6,7,8-HxCDD	1.01	1.22	18.8%
	1,2,3,6,7,8-HxCDF	0.132	0.142	7.2%
	1,2,3,7,8,9-HxCDD	0.514	0.632	20.5%
	1,2,3,7,8,9-HxCDF	0.0558	0.0324	53.0%
	1,2,3,7,8-PeCDD	0.0837	0.0968	14.5%
	1,2,3,7,8-PeCDF	0.0209	0.0229	9.1%
	2,3,4,6,7,8-HxCDF	0.24	0.248	3.2%
	2,3,4,7,8-PeCDF	0.0422	0.0819	63.9%
	2,3,7,8-TCDD	0.00305	0.00375	20.5%
	2,3,7,8-TCDF	0.00419	0.00509	19.3%
	37Cl-2,3,7,8-TCDD	0.0747	0.0781	4.4%
	OCDD	198	240	19.1%
	OCDF	27.3	28.4	3.9%
	TEQ(Min)	0.707	0.835	16.6%
	Total HpCDD	39.3	47.3	18.4%
	Total HpCDF	20.5	21.9	6.6%
	Total HxCDD	4.77	6.06	23.8%
	Total HxCDF	6.11	6.79	10.5%
	Total PeCDD	0.448	0.543	19.1%
	Total PeCDF	0.911	1.08	16.9%

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
	Total TCDD	0.104	0.14	29.5%
	Total TCDF	0.107	0.132	20.9%
	WHO Dioxin TEQ(Human/Mammal-NDs Excluded)	0.707	0.835	16.6%
	WHO Dioxin TEQ(Human/Mammal-NDs used at 1/2 DL)	0.707	0.835	16.6%

AC Acceptable

The compound 1,2,3,7,8-PeCDF associated with samples locations A1-52 and DUP-1 exhibited a RPD greater than the control limit. The compound 1,2,3,7,8-PeCDF results for sample locations A1-52 and DUP-1 were qualified as estimated ("J").

10. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise ratios, and retention times relative to the internal standards'.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in ug/kg) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
A1-57	1,2,3 ,7,8,9-HxCDF	0.0019 EMPC	0.0019 UX
A1-56	1,2,3,7,8-PeCDF	0.00037 EMPC	0.00037 UX
A1-63	1,2,3,7,8-PeCDF	0.000281 EMPC	0.000281 UX
	2,3,7,8-TCDD	0.000478 EMPC	0.000478 UX

The following results exhibited evidence of interference by chlorodiphenyl ethers. The results were flagged "P" by the laboratory indicating the result is the maximum concentrations of the analytes in the case that all of the quantified area is due to the target analyte and none due to the interference. Therefore, these results have been qualified as estimated ("J").

Sample ID	Compound
A1-62	Total TCDF Total PeCDF Total HxCDF Total HpCDF

Sample results that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table (ug/kg).

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
A1-62	1,2,3,6,7,8-HxCDD	2.210 E	—	2.210 EJ
	OCDD	727 ED	—	727 EDJ
	1,2,3,4,6,7,8-HpCDF	17.1 ED	—	17.1 EDJ
	OCDF	123 ED	—	123 EDJ
A1-57	OCDD	13.4 E	—	13.4 EJ
A1-52	OCDD	7.67 E	—	7.67 EJ
A1-53	OCDD	25.7 E	—	25.7 EJ
A1-59	1,2,3,4,6,7,8-HpCDD	2.85 E	—	2.85 EJ
	OCDD	47.2 ED	—	47.2 EDJ
A1-54	OCDD	15.7 E	—	15.7 EJ
A1-55	OCDD	26.8 E	—	26.8 EJ
DUP-1	OCDD	8.5 E	—	8.5 EJ
DUP-2	1,2,3,4,6,7,8-HpCDD	28.6 E	—	28.6 EJ
	OCDD	240 ED	—	240 EDJ
	1,2,3,4,6,7,8-HpCDF	5.81 E	—	5.81 EJ
	OCDF	28.4 E	—	28.4 EJ
A1-56	OCDD	14.8 E	—	14.8 EJ
A1-63	OCDD	14.9 E	—	14.9 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within calibration range	D
Diluted sample result less than the calibration range	DJ
Diluted sample result greater than the calibration range	EDJ
Original sample result greater than the calibration range	EJ

11. System Performance and Overall Assessment

Please note that when individual compounds are qualified as estimated (J) during validation, this qualification is applied to the totals as well.

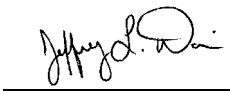
Overall system performance was acceptable. Except for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
Laboratory Control Sample (LCS) Accuracy (%R)		X		X	
Laboratory Control Sample Duplicate (LCSD) %R					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD RPD		X		X	
Field/Laboratory Duplicate Sample RPD		X	X		
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Signal-to-noise ratio $\geq$ 10:1		X		X	
Internal standard performance		X	X		
Recovery standard performance		X		X	
Resolution mix $\leq$ 25%		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference
%D – difference

VALIDATION PERFORMED BY: Jeffrey L. Davin

SIGNATURE: 

DATE: September 27, 2012

PEER REVIEW: Dennis Capria

DATE: October 1, 2012

CHAIN OF CUSTODY /
CORRECTED SAMPLE ANALYSIS DATA SHEETS

Sample ID: A1-62 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-001	Date Received:	10-Aug-12
Project:		Sample Size:	13.8 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	73.3	Date Analyzed DB-5:	20-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	0805						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	5.35			
1,2,3,7,8-PeCDD	81.8			
1,2,3,4,7,8-HxCDD	306			
1,2,3,6,7,8-HxCDD	2210			E J
1,2,3,7,8,9-HxCDD	629			
1,2,3,4,6,7,8-HpCDD	81800			D
OCDD	727000			D,E J
2,3,7,8-TCDF	3.22			
1,2,3,7,8-PeCDF	10.8			
2,3,4,7,8-PeCDF	30.8			D
1,2,3,4,7,8-HxCDF	435			
1,2,3,6,7,8-HxCDF	153			
2,3,4,6,7,8-HxCDF	341			
1,2,3,7,8,9-HxCDF	41.9			
1,2,3,4,6,7,8-HpCDF	17100			D,E J
1,2,3,4,7,8,9-HpCDF	1680			D
OCDF	123000			D,E J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	96.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	99.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.9	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	86.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	75.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	80.9	40 - 135	D
	13C-OCDD	34.8	40 - 135	D,H
	13C-2,3,7,8-TCDF	92.8	40 - 135	
	13C-1,2,3,7,8-PeCDF	107	40 - 135	
	13C-2,3,4,7,8-PeCDF	102	40 - 135	D
	13C-1,2,3,4,7,8-HxCDF	93.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	97.0	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	90.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	87.5	40 - 135	D
	13C-1,2,3,4,7,8,9-HpCDF	86.9	40 - 135	D
	13C-OCDF	74.1	40 - 135	D
CRS	37Cl-2,3,7,8-TCDD	103	40 - 135	

Totals			
Total TCDD	118	118	
Total PeCDD	401		
Total HxCDD	12300		J
Total HpCDD	150000		
Total TCDF	111		P J
Total PeCDF	775	822	P J
Total HxCDF	16500		P J
Total HpCDF	92600		P J

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 1770

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:56

Sample ID: A1-57 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-003	Date Received:	10-Aug-12
Project:		Sample Size:	12.6 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	79.7	Date Analyzed DB-5:	20-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0830						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	0.636			
1,2,3,7,8-PeCDD	2.47			J
1,2,3,4,7,8-HxCDD	5.54			
1,2,3,6,7,8-HxCDD	12.8			
1,2,3,7,8,9-HxCDD	10.0			
1,2,3,4,6,7,8-HpCDD	488			
OCDD	13400			E J
2,3,7,8-TCDF	0.305			J
1,2,3,7,8-PeCDF	0.326			J
2,3,4,7,8-PeCDF	0.711			J
1,2,3,4,7,8-HxCDF	3.34			
1,2,3,6,7,8-HxCDF	1.21			J
2,3,4,6,7,8-HxCDF	2.02			J
1,2,3,7,8,9-HxCDF	ND		0.190	UX
1,2,3,4,6,7,8-HpCDF	46.5			
1,2,3,4,7,8,9-HpCDF	4.20			
OCDF	254			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	95.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	78.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	82.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.8	40 - 135	
	13C-OCDD	96.1	40 - 135	
	13C-2,3,7,8-TCDF	90.6	40 - 135	
	13C-1,2,3,7,8-PeCDF	105	40 - 135	
	13C-2,3,4,7,8-PeCDF	102	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	92.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	86.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	86.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	86.3	40 - 135	
	13C-OCDF	90.7	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	99.7	40 - 135	

Totals		
Total TCDD	5.89	6.15
Total PeCDD	21.0	
Total HxCDD	150	
Total HpCDD	1090	
Total TCDF	5.20	5.66
Total PeCDF	10.4	10.6
Total HxCDF	56.0	56.4
Total HpCDF	192	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 16.3

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: FEB

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-52 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-005	Date Received:	10-Aug-12
Project:		Sample Size:	13.3 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	75.3	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	0920						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	0.491			J
1,2,3,7,8-PeCDD	2.35			J
1,2,3,4,7,8-HxCDD	3.57			
1,2,3,6,7,8-HxCDD	10.1			
1,2,3,7,8,9-HxCDD	7.61			
1,2,3,4,6,7,8-HpCDD	309			
OCDD	7670			E J
2,3,7,8-TCDF	2.50			
1,2,3,7,8-PeCDF	2.14			J
2,3,4,7,8-PeCDF	2.29			J
1,2,3,4,7,8-HxCDF	5.85			
1,2,3,6,7,8-HxCDF	3.39			
2,3,4,6,7,8-HxCDF	4.17			
1,2,3,7,8,9-HxCDF	0.312			J
1,2,3,4,6,7,8-HpCDF	62.0			
1,2,3,4,7,8,9-HpCDF	3.97			
OCDF	186			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	90.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	93.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	75.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	84.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	83.4	40 - 135	
	13C-OCDD	94.9	40 - 135	
	13C-2,3,7,8-TCDF	90.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	103	40 - 135	
	13C-2,3,4,7,8-PeCDF	102	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	85.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	91.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	84.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	83.7	40 - 135	
	13C-OCDF	90.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	101	40 - 135	

Totals		
Total TCDD	34.1	
Total PeCDD	36.5	
Total HxCDD	97.7	
Total HpCDD	604	
Total TCDF	57.6	58.4
Total PeCDF	53.4	53.6
Total HxCDF	79.6	
Total HpCDF	168	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 13.4

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-53 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-006	Date Received:	10-Aug-12
Project:		Sample Size:	11.9 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	83.8	Date Analyzed DB-5:	21-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0935						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	1.18			
1,2,3,7,8-PeCDD	15.7			
1,2,3,4,7,8-HxCDD	26.4			
1,2,3,6,7,8-HxCDD	57.9			
1,2,3,7,8,9-HxCDD	66.4			
1,2,3,4,6,7,8-HpCDD	1590			
OCDD	25700			EJ
2,3,7,8-TCDF	0.333			J
1,2,3,7,8-PeCDF	0.782			J
2,3,4,7,8-PeCDF	1.49			J
1,2,3,4,7,8-HxCDF	5.97			
1,2,3,6,7,8-HxCDF	6.70			
2,3,4,6,7,8-HxCDF	9.26			
1,2,3,7,8,9-HxCDF	0.585			J
1,2,3,4,6,7,8-HpCDF	194			
1,2,3,4,7,8,9-HpCDF	8.83			
OCDF	706			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	97.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	76.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	84.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	87.8	40 - 135	
	13C-OCDD	101	40 - 135	
	13C-2,3,7,8-TCDF	92.8	40 - 135	
	13C-1,2,3,7,8-PeCDF	107	40 - 135	
	13C-2,3,4,7,8-PeCDF	104	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	88.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	92.0	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	85.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	85.9	40 - 135	
	13C-OCDF	93.4	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	100	40 - 135	

Totals		
Total TCDD	7.19	
Total PeCDD	68.3	
Total HxCDD	520	
Total HpCDD	3070	
Total TCDF	8.74	9.73
Total PeCDF	43.6	
Total HxCDF	206	
Total HpCDF	518	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 60.5

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-59 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-007	Date Received:	10-Aug-12
Project:		Sample Size:	12.6 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	79.9	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	0955						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	0.761			
1,2,3,7,8-PeCDD	9.60			
1,2,3,4,7,8-HxCDD	24.1			
1,2,3,6,7,8-HxCDD	83.4			
1,2,3,7,8,9-HxCDD	53.6			
1,2,3,4,6,7,8-HpCDD	2850			E J
OCDD	47200			D,E J
2,3,7,8-TCDF	1.44			
1,2,3,7,8-PeCDF	1.64			J
2,3,4,7,8-PeCDF	2.91			
1,2,3,4,7,8-HxCDF	16.0			
1,2,3,6,7,8-HxCDF	9.51			
2,3,4,6,7,8-HxCDF	16.4			
1,2,3,7,8,9-HxCDF	1.52			J
1,2,3,4,6,7,8-HpCDF	452			
1,2,3,4,7,8,9-HpCDF	27.9			
OCDF	1990			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	95.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	78.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	84.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	90.6	40 - 135	
	13C-OCDD	75.9	40 - 135	D
	13C-2,3,7,8-TCDF	93.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	106	40 - 135	
	13C-2,3,4,7,8-PeCDF	104	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.9	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	93.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	89.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	87.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.8	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	87.0	40 - 135	
	13C-OCDF	99.1	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	97.8	40 - 135	

Totals		
Total TCDD	30.1	
Total PeCDD	75.9	
Total HxCDD	603	
Total HpCDD	5290	
Total TCDF	42.0	43.4
Total PeCDF	98.4	
Total HxCDF	453	
Total HpCDF	1550	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 80.0

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:56

Sample ID: A1-54 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-008	Date Received:	10-Aug-12
Project:		Sample Size:	11.4 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	88.2	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	1040						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	0.654			
1,2,3,7,8-PeCDD	1.97			J
1,2,3,4,7,8-HxCDD	3.67			
1,2,3,6,7,8-HxCDD	12.9			
1,2,3,7,8,9-HxCDD	8.93			
1,2,3,4,6,7,8-HpCDD	545			
OCDD	15700			EJ
2,3,7,8-TCDF	1.00			
1,2,3,7,8-PeCDF	1.02			J
2,3,4,7,8-PeCDF	1.44			J
1,2,3,4,7,8-HxCDF	4.15			
1,2,3,6,7,8-HxCDF	2.89			
2,3,4,6,7,8-HxCDF	4.00			
1,2,3,7,8,9-HxCDF	0.614			J
1,2,3,4,6,7,8-HpCDF	63.9			
1,2,3,4,7,8,9-HpCDF	4.25			
OCDF	238			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	94.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	96.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	78.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	82.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.0	40 - 135	
	13C-OCDD	97.1	40 - 135	
	13C-2,3,7,8-TCDF	91.9	40 - 135	
	13C-1,2,3,7,8-PeCDF	102	40 - 135	
	13C-2,3,4,7,8-PeCDF	102	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	86.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	92.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	88.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	86.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	84.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	85.8	40 - 135	
	13C-OCDF	89.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	99.6	40 - 135	

Totals		
Total TCDD	7.29	7.57
Total PeCDD	21.1	
Total HxCDD	124	
Total HpCDD	1120	
Total TCDF	21.0	21.7
Total PeCDF	18.1	
Total HxCDF	83.7	84.0
Total HpCDF	197	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 17.8

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-55 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-009	Date Received:	10-Aug-12
Project:		Sample Size:	12.1 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	83.3	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	1115						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	1.30			
1,2,3,7,8-PeCDD	8.59			
1,2,3,4,7,8-HxCDD	15.9			
1,2,3,6,7,8-HxCDD	50.0			
1,2,3,7,8,9-HxCDD	31.5			
1,2,3,4,6,7,8-HpCDD	1470			
OCDD	26800			E J
2,3,7,8-TCDF	0.999			
1,2,3,7,8-PeCDF	1.21			J
2,3,4,7,8-PeCDF	2.43			J
1,2,3,4,7,8-HxCDF	6.35			
1,2,3,6,7,8-HxCDF	4.30			
2,3,4,6,7,8-HxCDF	7.21			
1,2,3,7,8,9-HxCDF	0.928			J
1,2,3,4,6,7,8-HpCDF	165			
1,2,3,4,7,8,9-HpCDF	12.2			
OCDF	819			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	91.2	40 - 135	
	13C-1,2,3,7,8-PeCDD	93.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	76.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	84.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	86.5	40 - 135	
	13C-OCDD	103	40 - 135	
	13C-2,3,7,8-TCDF	88.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	105	40 - 135	
	13C-2,3,4,7,8-PeCDF	101	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	86.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	91.6	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	86.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	84.4	40 - 135	
	13C-OCDF	96.8	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	99.8	40 - 135	

Totals		
Total TCDD	28.6	
Total PeCDD	108	
Total HxCDD	430	
Total HpCDD	2670	
Total TCDF	27.2	28.1
Total PeCDF	57.2	
Total HxCDF	192	
Total HpCDF	645	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 47.1

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-60 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-010	Date Received:	10-Aug-12
Project:		Sample Size:	13.6 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	74.6	Date Analyzed DB-5:	21-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	1330						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.291			J
1,2,3,7,8-PeCDD	0.188			J
1,2,3,4,7,8-HxCDD	ND	0.129		
1,2,3,6,7,8-HxCDD	ND	0.153		
1,2,3,7,8,9-HxCDD	0.240			J
1,2,3,4,6,7,8-HpCDD	4.23			
OCDD	214			
2,3,7,8-TCDF	ND	0.0579		
1,2,3,7,8-PeCDF	ND	0.0424		
2,3,4,7,8-PeCDF	ND	0.0449		
1,2,3,4,7,8-HxCDF	ND	0.0584		
1,2,3,6,7,8-HxCDF	ND	0.0556		
2,3,4,6,7,8-HxCDF	ND	0.0644		
1,2,3,7,8,9-HxCDF	ND	0.0858		
1,2,3,4,6,7,8-HpCDF	0.297			J
1,2,3,4,7,8,9-HpCDF	ND	0.115		
OCDF	0.995			J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	98.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	83.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	81.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.9	40 - 135	
	13C-OCDD	84.4	40 - 135	
	13C-2,3,7,8-TCDF	93.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	108	40 - 135	
	13C-2,3,4,7,8-PeCDF	105	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	88.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	93.6	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	89.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	86.3	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	84.2	40 - 135	
	13C-OCDF	85.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	100	40 - 135	

Totals	
Total TCDD	4.68
Total PeCDD	11.5
Total HxCDD	11.9
Total HpCDD	9.11
Total TCDF	0.0887
Total PeCDF	0.148
Total HxCDF	0.392
Total HpCDF	0.876

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 0.613

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: DUP-1 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-011	Date Received:	10-Aug-12
Project:		Sample Size:	13.4 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	74.5	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	0000						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.675			
1,2,3,7,8-PeCDD	2.95			
1,2,3,4,7,8-HxCDD	3.64			
1,2,3,6,7,8-HxCDD	12.1			
1,2,3,7,8,9-HxCDD	8.47			
1,2,3,4,6,7,8-HpCDD	325			
OCDD	8500			E J
2,3,7,8-TCDF	6.38			
1,2,3,7,8-PeCDF	8.11			J
2,3,4,7,8-PeCDF	4.56			
1,2,3,4,7,8-HxCDF	12.1			
1,2,3,6,7,8-HxCDF	6.81			
2,3,4,6,7,8-HxCDF	5.82			
1,2,3,7,8,9-HxCDF	0.913			J
1,2,3,4,6,7,8-HpCDF	72.1			
1,2,3,4,7,8,9-HpCDF	5.63			
OCDF	187			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	94.9	40 - 135	
	13C-1,2,3,7,8-PeCDD	98.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	82.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	85.6	40 - 135	
	13C-OCDD	95.4	40 - 135	
	13C-2,3,7,8-TCDF	91.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	106	40 - 135	
	13C-2,3,4,7,8-PeCDF	104	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	93.4	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	89.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	87.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	85.0	40 - 135	
	13C-OCDF	89.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	96.5	40 - 135	

Totals			
Total TCDD	33.7		
Total PeCDD	45.9		
Total HxCDD	124		
Total HpCDD	648		
Total TCDF	104	105	
Total PeCDF	94.8		J
Total HxCDF	106		
Total HpCDF	187		

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 17.5

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: DUP-2 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-012	Date Received:	10-Aug-12
Project:		Sample Size:	12.9 g	QC Batch No.:	4618	Date Extracted:	15-Aug-12
Date Collected:	8-Aug-12	%Solids:	78.0	Date Analyzed DB-5:	21-Aug-12	Dates Analyzed DB-225:	21-Aug-12
Time Collected:	0000						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	3.75			
1,2,3,7,8-PeCDD	96.8			
1,2,3,4,7,8-HxCDD	280			
1,2,3,6,7,8-HxCDD	1220			
1,2,3,7,8,9-HxCDD	632			
1,2,3,4,6,7,8-HpCDD	28600			E J
OCDD	240000			D,E J
2,3,7,8-TCDF	5.09			
1,2,3,7,8-PeCDF	22.9			
2,3,4,7,8-PeCDF	81.9			
1,2,3,4,7,8-HxCDF	242			
1,2,3,6,7,8-HxCDF	142			
2,3,4,6,7,8-HxCDF	248			
1,2,3,7,8,9-HxCDF	32.4			
1,2,3,4,6,7,8-HpCDF	5810			E J
1,2,3,4,7,8,9-HpCDF	423			
OCDF	28400			E J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	95.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	96.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	83.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	88.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	82.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	112	40 - 135	
	13C-OCDD	106	40 - 135	D
	13C-2,3,7,8-TCDF	92.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	107	40 - 135	
	13C-2,3,4,7,8-PeCDF	102	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	93.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	96.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	91.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	88.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	101	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	91.3	40 - 135	
	13C-OCDF	130	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	98.4	40 - 135	

Totals				
Total TCDD	140			
Total PeCDD	543			
Total HxCDD	6060			
Total HpCDD	47300			J
Total TCDF	132	133		
Total PeCDF	1080			
Total HxCDF	6790			
Total HpCDF	21900			J

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 835

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: FEB

Approved By: Rose Harrelson 30-Aug-2012 16:16

Sample ID: A1-56 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-002	Date Received:	10-Aug-12
Project:		Sample Size:	12.5 g	QC Batch No.:	4629	Date Extracted:	22-Aug-12
Date Collected:	8-Aug-12	%Solids:	80.8	Date Analyzed DB-5:	29-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0820						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.699			
1,2,3,7,8-PeCDD	2.44			J
1,2,3,4,7,8-HxCDD	5.63			
1,2,3,6,7,8-HxCDD	13.3			
1,2,3,7,8,9-HxCDD	10.4			
1,2,3,4,6,7,8-HpCDD	541			
OCDD	14800			B,E J
2,3,7,8-TCDF	ND	0.362		
1,2,3,7,8-PeCDF	ND		0.370	UX
2,3,4,7,8-PeCDF	1.07			J
1,2,3,4,7,8-HxCDF	4.09			
1,2,3,6,7,8-HxCDF	1.48			J
2,3,4,6,7,8-HxCDF	2.35			J
1,2,3,7,8,9-HxCDF	0.296			J
1,2,3,4,6,7,8-HpCDF	61.3			
1,2,3,4,7,8,9-HpCDF	5.43			
OCDF	327			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	100	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	77.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	87.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	81.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.8	40 - 135	
	13C-OCDD	95.5	40 - 135	
	13C-2,3,7,8-TCDF	92.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	107	40 - 135	
	13C-2,3,4,7,8-PeCDF	108	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	95.0	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	91.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	90.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	91.8	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	91.5	40 - 135	
	13C-OCDF	93.7	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	97.3	40 - 135	

Totals	
Total TCDD	6.86
Total PeCDD	20.9
Total HxCDD	146
Total HpCDD	1160
Total TCDF	3.48
Total PeCDF	11.4
Total HxCDF	71.7
Total HpCDF	250

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 17.8

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: ANP

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: A1-63 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33932-004	Date Received:	10-Aug-12
Project:		Sample Size:	12.8 g	QC Batch No.:	4629	Date Extracted:	22-Aug-12
Date Collected:	8-Aug-12	%Solids:	80.4	Date Analyzed DB-5:	29-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0845						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	ND		0.478	U X
1,2,3,7,8-PeCDD	2.33			J
1,2,3,4,7,8-HxCDD	4.72			
1,2,3,6,7,8-HxCDD	10.8			
1,2,3,7,8,9-HxCDD	9.23			
1,2,3,4,6,7,8-HpCDD	446			
OCDD	14900			B,E J
2,3,7,8-TCDF	ND	0.233		
1,2,3,7,8-PeCDF	ND		0.281	U X
2,3,4,7,8-PeCDF	0.772			J
1,2,3,4,7,8-HxCDF	3.11			
1,2,3,6,7,8-HxCDF	1.22			J
2,3,4,6,7,8-HxCDF	1.75			J
1,2,3,7,8,9-HxCDF	0.340			J
1,2,3,4,6,7,8-HpCDF	40.1			
1,2,3,4,7,8,9-HpCDF	3.59			
OCDF	193			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	99.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	78.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	87.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	85.5	40 - 135	
	13C-OCDD	94.1	40 - 135	
	13C-2,3,7,8-TCDF	93.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	109	40 - 135	
	13C-2,3,4,7,8-PeCDF	106	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	93.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	88.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	90.9	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	88.8	40 - 135	
	13C-OCDF	94.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	95.0	40 - 135	

Totals		
Total TCDD	4.72	5.20
Total PeCDD	18.8	
Total HxCDD	123	
Total HpCDD	966	
Total TCDF	3.18	3.60
Total PeCDF	9.15	9.56
Total HxCDF	48.2	48.4
Total HpCDF	153	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 15.1

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: ANP

Approved By: Calvin Tanaka 30-Aug-2012 14:46

Sample ID: EB 8/8/12 — **EPA Method 8290**

Client Data
Name: ARCADIS
Project:
Date Collected: 8-Aug-12
Time Collected: 0000

Sample Data
Matrix: Aqueous
Sample Size: 0.907 L

Laboratory Data
Lab Sample: 33932-013 — Date Received: 10-Aug-12
QC Batch No.: 4616 — Date Extracted: 15-Aug-12
Date Analyzed DB-5: 17-Aug-12 — Date Analyzed DB-225: NA

Analyte	Conc. (pg/L)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	ND	0.638		
1,2,3,7,8-PeCDD	ND	0.655		
1,2,3,4,7,8-HxCDD	ND	0.778		
1,2,3,6,7,8-HxCDD	ND	0.875		
1,2,3,7,8,9-HxCDD	ND	0.910		
1,2,3,4,6,7,8-HpCDD	ND	0.892		
OCDD	ND	0.914		
2,3,7,8-TCDF	ND	0.645		
1,2,3,7,8-PeCDF	ND	0.350		
2,3,4,7,8-PeCDF	ND	0.433		
1,2,3,4,7,8-HxCDF	ND	0.384		
1,2,3,6,7,8-HxCDF	ND	0.358		
2,3,4,6,7,8-HxCDF	ND	0.390		
1,2,3,7,8,9-HxCDF	ND	0.561		
1,2,3,4,6,7,8-HpCDF	ND	0.355		
1,2,3,4,7,8,9-HpCDF	ND	0.461		
OCDF	ND	1.06		

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	85.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	82.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	72.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	72.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	70.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	72.2	40 - 135	
	13C-OCDD	65.8	40 - 135	
	13C-2,3,7,8-TCDF	85.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	102	40 - 135	
	13C-2,3,4,7,8-PeCDF	87.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	78.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	81.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	82.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	76.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	68.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	70.4	40 - 135	
	13C-OCDF	68.9	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	98.9	40 - 135	

Totals		
Total TCDD	ND	0.638
Total PeCDD	ND	0.655
Total HxCDD	ND	0.910
Total HpCDD	ND	0.892
Total TCDF	ND	0.645
Total PeCDF	ND	0.433
Total HxCDF	ND	0.561
Total HpCDF	ND	0.461

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 0

a. Sample specific estimated detection limit.
b. Estimated maximum possible concentration.
c. Method detection limit.
d. Lower control limit - upper control limit.
e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

Analyst: FEB

Approved By: Calvin Tanaka 21-Aug-2012 13:25

Vista

CHAIN OF CUSTODY

FOR LABORATORY USE ONLY
Laboratory Project ID: 33932 Storage Secured: Yes ☑ No ☐
Storage ID: WR-8 Temp: 1.3 °C

TAT: (Check One): 2.1°C
Standard: ☒ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:

Project I.D.: _____ P.O.# B0039212.0000.00002 Sampler: C. McKendrick (Name) T. STEWART

Invoice to: Name: DAVID BESSINGPASS Company: ARCADIS Address: 4350 EXCELSIOR BLVD City: BAXTER State: MN Zip: 56425 Ph#: 218-829-4167 Fax#:

Relinquished by: (Signature and Printed Name) Claire McKendrick Date: 8/9/12 Time: 1600 Received by: (Signature and Printed Name) Christina Benedict Date: 8/10/12 Time: 0814

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29
* A1-02	8/8/12	0805		1	G	SD						X									
* A1-50	8/8/12	0820		1	G	SD						X									
* A1-57	8/8/12	0830		1	G	SD						X									
* A1-03	8/8/12	0845		1	G	SD						X									
* A1-52	8/9/12	0920		1	G	SD						X									
* A1-53	8/9/12	0935		1	G	SD						X									
* A1-59	8/9/12	0955		1	G	SD						X									
* A1-54	8/9/12	1040		1	G	SD						X									
* A1-55	8/9/12	1115		1	G	SD						X									
* A1-01	8/8/12	1140		1	G	SD						X									

Special Instructions/Comments:
* project 33932
* 8 project 33933
8/10/12

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPASS
Company: ARCADIS
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____
Email: DAVID.BESSINGPASS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other_____

Vista CHAIN OF CUSTODY

FOR LABORATORY USE ONLY Storage Secured

Laboratory Project ID: 33932 Yes ☐ No ☐

Storage ID: WR-2 Temp 1.2°/2.1°C

TAT: (Check One):
Standard: X 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:

Project I.D.: _____ P.O.# B00392102.0000.00002 Sampler: J. STEWART & C. MCKENDRICK (Name)

Invoice to: Name: DAVID BESSINGPASS Company: ARCADIS Address: 10002 EXCELSIOR RD City: BAXTER State: MN Zip: 56425 Ph#: 218-829-4007 Fax#:

Relinquished by: (Signature and Printed Name) Chris McKendrick Date: 8/9/12 Time: 1600 Received by: (Signature and Printed Name) Donna J. Benedict / B. Benedict Date: 8/10/12 Time: 0841

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

	Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29
*	AI-100	8/8/12	1530		2	G	SO						X										
*	A3-32	8/8/12	1440		1	G	SO						X										
*	A3-29	8/8/12	1500		1	G	SO						X										
*	DUP-1	8/8/12	-		1	G	SO						X										
*	DUP-2	8/8/12	-		1	G	SO						X										
*	MS/MSD 1	8/8/12	-		2	G	SO						X										
*	MS/MSD 2	8/8/12	-		2	G	SO						X										
*	EB	8/8/12	-		2	A	W						X										
*	A3-34	8/9/12	0900		1	G	SO						X										
*	A3-33	8/9/12	0915		1	G	SO						X										

Special Instructions/Comments:
* project 33932
* project 33933

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPASS
Company: ARCADIS
Address: 10002 EXCELSIOR RD
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4007 Fax: _____
Email: DAVID.BESSINGPASS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other _____

*Bottle Preservative Type: T = Thiosulfate,
O = Other _____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other _____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

ARCADIS
Infrastructure, environment, facilities

Imagine the result

Beazer East Inc.

Former Koppers Wood-Treating Site

Data Review

CARBONDALE, ILLINOIS

Dioxins/Furans Analyses

SDG # 33933

Analyses Performed By:
Vista Analytical Laboratories
El Dorado Hills, California

Report #17381
Review Level: Tier III
Project: B0039262.0000.00003

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 33933 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating Site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					Dioxins/Furans
A1-50	33933-001	Soil	8/9/2012		X
A1-51	33933-002	Soil	8/9/2012		X
A3-28	33933-003	Soil	8/9/2012		X
A3-27	33933-004	Soil	8/9/2012		X
A3-26	33933-005	Soil	8/9/2012		X
A3-25	33933-006	Soil	8/9/2012		X
A3-31	33933-007	Soil	8/9/2012		X
A3-30	33933-008	Soil	8/9/2012		X
A1-58	33933-009	Soil	8/9/2012		X
DUP-3	33933-010	Soil	8/9/2012	A1-50	X
A3-32	33933-011	Soil	8/8/2012		X
A3-29	33933-012	Soil	8/8/2012		X
A3-34	33933-013	Soil	8/9/2012		X
A3-33	33933-014	Soil	8/9/2012		X
A1-61	33933-015	Soil	8/8/2012		X
EB 8/9/12	33933-016	Water	8/9/2012		X

1. The matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location A1-61.
2. Sample results were reported on a dry-weight basis.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290. Data were reviewed in accordance with USEPA National Functional Guidelines of January 2005.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected as unusable. The analyte may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cooled @ 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cooled @ 4±2 °C

The samples were received at the laboratory at acceptable temperatures and all samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Equipment rinse blanks also measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were detected in an associated method blank and equipment blank (which were analyzed with SDG 33933); however, the associated sample results were either greater than the BAL or non-detect. Therefore, qualification of the sample results was not required.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable; system performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

A maximum relative standard deviation (RSD) of 20% is allowed for all non-labeled compounds (target) and 30% is allowed for all labeled compounds (internal standards and recovery standards)

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibited percent difference (%D) less than the control limit (20%).

All initial and continuing calibration criteria were within the control limits.

5. Internal Standard Performance

All samples to be analyzed for PCDD/PCDF compounds are spiked with internal standards prior to extraction. Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the internal standard compounds exhibit recoveries within the control limits of 40% to 135%.

Sample locations associated with internal standards exhibiting responses outside of the control limits are presented in the following table.

Sample Locations	Internal Standard	Response
A3-28	^{13}C-OCDD	>UL

The criteria used to evaluate the internal standard responses are presented in the following table. In the case of an internal standard deviation, the compounds quantitated under the deviant internal standard are qualified as documented in the table below.

Control limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No action
	Detect	J
< the lower control limit (LL) but > 40%	Non-detect	J
	Detect	J
< 25%	Non-detect	R
	Detect	J

6. Recovery Standard Performance

The recovery standard (^{37}Cl-2,3,7,8-TCDD) is added to the sample extract prior to the extract clean-up steps. The concentrations of the labeled standards (internal standards) are determined using the recovery standard.

All recovery standard recoveries were acceptable.

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds spiked in the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent differences (RPDs) between the MS and MSD must be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compounds concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
A1-61	1,2,3,4,6,7,8-HpCDF	< LL but > 10%	< LL but > 10%

AC = Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	J
	Detect	J
< 10%	Non-detect	R
	Detect	J

8. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit recoveries within the laboratory-established acceptance limits.

All compounds associated with the LCS analyses exhibited recoveries within the control limits.

9. Field Duplicate Sample Analysis

Field duplicate analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 100% for soil matrices is applied to the RPD between the parent and the field duplicate samples. In the case where the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for soil matrices.

Results (in ug/kg) for the field duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-50 DUP-3	1,2,3,4,6,7,8-HpCDD	0.626	0.781	22.0%
	1,2,3,4,6,7,8-HpCDF	0.0588	0.0491	17.9%
	1,2,3,4,7,8,9-HpCDF	0.00482	0.00424	12.8%
	1,2,3,4,7,8-HxCDD	0.00408	0.00513	22.8%
	1,2,3,4,7,8-HxCDF	0.00377	0.00334	12.0%
	1,2,3,6,7,8-HxCDD	0.0158	0.0145	8.5%
	1,2,3,6,7,8-HxCDF	0.00225 J	0.00161 J	33.1%
	1,2,3,7,8,9-HxCDD	0.0117	0.0118	0.8%
	1,2,3,7,8,9-HxCDF	0.000545 J	0.000345 J	44.9%
	1,2,3,7,8-PeCDD	0.00251	0.0019 J	27.6%
	1,2,3,7,8-PeCDF	0.000752 J	0.000465 J	47.1%
	2,3,4,6,7,8-HxCDF	0.00394	0.00325	19.1%
	2,3,4,7,8-PeCDF	0.00138 J	0.00138 J	0%
	2,3,7,8-TCDD	0.000558	0.000416 J	29.1%
	2,3,7,8-TCDF	0.000633	0.000436 J	36.8%
	37Cl-2,3,7,8-TCDD	0.0746	0.0822	9.6%
	OCDD	21.1	23.9	12.4%
	OCDF	0.421	0.351	18.1%
	TEQ(Min)	0.0211	0.0224	5.9%
	Total HpCDD	1.47	2.46	50.3%
	Total HpCDF	0.295	0.24	20.5%
	Total HxCDD	0.164	0.235	35.5%
	Total HxCDF	0.0909	0.0777	15.6%
	Total PeCDD	0.0227	0.0203	11.1%
	Total PeCDF	0.0504	0.0339	39.1%
	Total TCDD	0.0126	0.0104	19.1%
	Total TCDF	0.018	0.0135	28.5%
	WHO Dioxin TEQ(Human/Mammal-NDs Excluded)	0.0211	0.0224	5.9%
	WHO Dioxin TEQ(Human/Mammal-NDs used at 1/2 DL)	0.0211	0.0224	5.9%

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

10. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise ratios, and retention times relative to the internal standards'.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in ug/kg) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
A3-29	2,3,7,8-TCDD	0.000225 EMPC	0.000225 UX
A3-25	2,3,7,8-TCDF	0.000233 EMPC	0.000233 UX
	2,3,4,7,8-PeCDF	0.000519 EMPC	0.000519 UX
	1,2,3,7,8,9-HxCDF	0.000317 EMPC	0.000317 UX

The following results exhibited evidence of interference by chlorodiphenyl ethers. The results were flagged "P" by the laboratory indicating the result is the maximum concentrations of the analytes in the case that all of the quantified area is due to the target analyte and none due to the interference. Therefore, these results have been qualified as estimated ("J").

Sample ID	Compound
A1-51	Total PeCDF
A3-28	1,2,3,6,7,8-HxCDF Total TCDF Total PeCDF Total HxCDF
A3-34	Total PeCDF

Sample results that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table (ug/kg).

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
A1-50	OCDD	21.1 E	—	21.1 EJ
A1-51	OCDD	24.5 E	—	24.5 EJ
A3-28	1,2,3,6,7,8-HxCDD	6.66 E	—	6.66 EJ
	1,2,3,7,8,9-HxCDD	3.02 E	—	3.02 EJ
	1,2,3,4,6,7,8-HpCDD	343 ED	—	343 EDJ
	OCDD	2270 ED	—	2270 EDJ
	1,2,3,4,6,7,8-HpCDF	68.9 ED	—	68.9 EDJ
	OCDF	438 ED	—	438 EDJ
A3-27	OCDD	13.6 E	—	13.6 EJ
A3-26	1,2,3,4,6,7,8-HpCDD	5 E	—	5 EJ
	OCDF	4.62 E	—	4.62 EJ
A3-31	OCDD	22.5 E	—	22.5 EJ
A3-30	OCDD	29.4 E	—	29.4 EJ

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
A1-58	OCDD	31.3 E	—	31.3 EJ
DUP-3	OCDD	23.9 E	—	23.9 EJ
A3-32	1,2,3,4,6,7,8-HpCDD	23.9 ED	—	23.9 EDJ
	1,2,3,4,6,7,8-HpCDF	5.5 E	—	5.5 EJ
	OCDF	27.3 E	—	27.3 EJ
A3-29	OCDD	7.77 E	—	7.77 EJ
A3-34	1,2,3,4,6,7,8-HpCDD	5.16 E	—	5.16 EJ
	OCDD	45.8 E	—	45.8 EJ
	OCDF	4.24 E	—	4.24 EJ
A3-33	1,2,3,4,6,7,8-HpCDD	43.1 ED	—	43.1 EDJ
	OCDD	487 ED	—	487 EDJ
	OCDF	41.5 ED	—	41.5 EDJ
A3-25	OCDD	34.4 E	—	34.4 EJ
A1-61	1,2,3,4,6,7,8-HpCDD	3.12 E	—	3.12 EJ
	OCDD	38.6 E	—	38.6 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within calibration range	D
Diluted sample result less than the calibration range	DJ
Diluted sample result greater than the calibration range	EDJ
Original sample result greater than the calibration range	EJ

11. System Performance and Overall Assessment

Please note that when individual compounds are qualified as estimated (J) during validation, this qualification is applied to the totals as well.

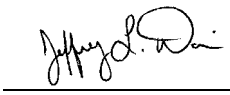
Overall system performance was acceptable. Except for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
Laboratory Control Sample (LCS) Accuracy (%R)		X		X	
Laboratory Control Sample Duplicate (LCSD) %R					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate (MSD) %R		X	X		
MS/MSD RPD		X		X	
Field/Laboratory Duplicate Sample RPD		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Signal-to-noise ratio $\geq$ 10:1		X		X	
Internal standard performance		X	X		
Recovery standard performance		X		X	
Resolution mix $\leq$ 25%		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference
%D – difference

VALIDATION PERFORMED BY: Jeffrey L. Davin

SIGNATURE: 

DATE: September 27, 2012

PEER REVIEW: Dennis Capria

DATE: October 1, 2012

CHAIN OF CUSTODY /
CORRECTED SAMPLE ANALYSIS DATA SHEETS

Sample ID: A1-50 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-001	Date Received:	10-Aug-12
Project:		Sample Size:	12.7 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	79.9	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	0930						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.558			
1,2,3,7,8-PeCDD	2.51			
1,2,3,4,7,8-HxCDD	4.08			
1,2,3,6,7,8-HxCDD	15.8			
1,2,3,7,8,9-HxCDD	11.7			
1,2,3,4,6,7,8-HpCDD	626			
OCDD	21100			B,E J
2,3,7,8-TCDF	0.633			
1,2,3,7,8-PeCDF	0.752			J
2,3,4,7,8-PeCDF	1.38			J
1,2,3,4,7,8-HxCDF	3.77			
1,2,3,6,7,8-HxCDF	2.25			J
2,3,4,6,7,8-HxCDF	3.94			
1,2,3,7,8,9-HxCDF	0.545			J
1,2,3,4,6,7,8-HpCDF	58.8			
1,2,3,4,7,8,9-HpCDF	4.82			
OCDF	421			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	91.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	95.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	89.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	82.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	84.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	94.1	40 - 135	
	13C-OCDD	97.3	40 - 135	
	13C-2,3,7,8-TCDF	92.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	91.9	40 - 135	
	13C-2,3,4,7,8-PeCDF	88.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	83.8	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	90.2	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	90.9	40 - 135	
	13C-OCDF	87.3	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	94.5	40 - 135	

Totals		
Total TCDD	12.6	
Total PeCDD	22.7	
Total HxCDD	164	
Total HpCDD	1470	
Total TCDF	18.0	19.2
Total PeCDF	50.4	
Total HxCDF	90.9	
Total HpCDF	295	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 21.1

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A1-51 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-002	Date Received:	10-Aug-12
Project:		Sample Size:	12.9 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	78.0	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	0945						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	1.62			
1,2,3,7,8-PeCDD	5.97			
1,2,3,4,7,8-HxCDD	11.4			
1,2,3,6,7,8-HxCDD	31.1			
1,2,3,7,8,9-HxCDD	25.7			
1,2,3,4,6,7,8-HpCDD	918			
OCDD	24500			B,E J
2,3,7,8-TCDF	1.84			
1,2,3,7,8-PeCDF	1.60			J
2,3,4,7,8-PeCDF	3.57			
1,2,3,4,7,8-HxCDF	8.89			
1,2,3,6,7,8-HxCDF	7.75			
2,3,4,6,7,8-HxCDF	13.5			
1,2,3,7,8,9-HxCDF	0.793			J
1,2,3,4,6,7,8-HpCDF	136			
1,2,3,4,7,8,9-HpCDF	10.7			
OCDF	523			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	104	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	83.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	83.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	81.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	95.4	40 - 135	
	13C-OCDD	107	40 - 135	
	13C-2,3,7,8-TCDF	91.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	96.6	40 - 135	
	13C-2,3,4,7,8-PeCDF	90.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	92.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	84.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	88.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	85.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	90.4	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	94.3	40 - 135	
	13C-OCDF	92.1	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	97.1	40 - 135	

Totals			
Total TCDD	15.3	16.2	
Total PeCDD	46.0		
Total HxCDD	254		
Total HpCDD	1810		
Total TCDF	57.6	58.7	
Total PeCDF	168		P J
Total HxCDF	253		
Total HpCDF	483		

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 37.0

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-28 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-003	Date Received:	10-Aug-12
Project:		Sample Size:	12.7 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	79.5	Date Analyzed DB-5:	30-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1040						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	38.8			
1,2,3,7,8-PeCDD	616			
1,2,3,4,7,8-HxCDD	1820			
1,2,3,6,7,8-HxCDD	6660			E J
1,2,3,7,8,9-HxCDD	3020			E J
1,2,3,4,6,7,8-HpCDD	343000			D,E J
OCDD	2270000			D,E J
2,3,7,8-TCDF	9.31			B
1,2,3,7,8-PeCDF	66.7			
2,3,4,7,8-PeCDF	110			
1,2,3,4,7,8-HxCDF	1840			
1,2,3,6,7,8-HxCDF	980			P J
2,3,4,6,7,8-HxCDF	1840			
1,2,3,7,8,9-HxCDF	125			
1,2,3,4,6,7,8-HpCDF	68900			D,E J
1,2,3,4,7,8,9-HpCDF	6060			D
OCDF	438000			D,E J

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	94.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	92.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	93.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	92.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	66.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	78.2	40 - 135	D
	13C-OCDD	136	40 - 135	D,H
	13C-2,3,7,8-TCDF	77.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	83.9	40 - 135	
	13C-2,3,4,7,8-PeCDF	81.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	91.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	104	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	84.4	40 - 135	D
	13C-1,2,3,4,7,8,9-HpCDF	81.6	40 - 135	D
	13C-OCDF	90.3	40 - 135	D
CRS	37Cl-2,3,7,8-TCDD	96.6	40 - 135	

Totals				
Total TCDD	332			
Total PeCDD	3780			
Total HxCDD	55300			
Total HpCDD	732000			
Total TCDF	450		451	P J
Total PeCDF	5450			P J
Total HxCDF	72800			P J
Total HpCDF	337000			

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 7310

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Rose Harrelson 31-Aug-2012 16:32

Sample ID: A3-27 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-004	Date Received:	10-Aug-12
Project:		Sample Size:	12.2 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	82.2	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1050						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.808			
1,2,3,7,8-PeCDD	4.66			
1,2,3,4,7,8-HxCDD	6.90			
1,2,3,6,7,8-HxCDD	17.9			
1,2,3,7,8,9-HxCDD	11.0			
1,2,3,4,6,7,8-HpCDD	532			
OCDD	13600			B,E J
2,3,7,8-TCDF	1.81			
1,2,3,7,8-PeCDF	1.72			J
2,3,4,7,8-PeCDF	3.68			
1,2,3,4,7,8-HxCDF	7.01			
1,2,3,6,7,8-HxCDF	4.20			
2,3,4,6,7,8-HxCDF	6.08			
1,2,3,7,8,9-HxCDF	0.638			J
1,2,3,4,6,7,8-HpCDF	69.2			
1,2,3,4,7,8,9-HpCDF	5.37			
OCDF	327			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	86.3	40 - 135	
	13C-1,2,3,7,8-PeCDD	93.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	83.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	77.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	90.7	40 - 135	
	13C-OCDD	90.9	40 - 135	
	13C-2,3,7,8-TCDF	85.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	86.0	40 - 135	
	13C-2,3,4,7,8-PeCDF	79.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	86.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	80.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	81.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	88.6	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	88.9	40 - 135	
	13C-OCDF	86.2	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	93.5	40 - 135	

Totals			
Total TCDD	79.3		
Total PeCDD	87.3		
Total HxCDD	177		
Total HpCDD	1120		
Total TCDF	45.6	46.1	
Total PeCDF	70.7	70.9	
Total HxCDF	119		
Total HpCDF	268		

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 22.4

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-26 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-005	Date Received:	10-Aug-12
Project:		Sample Size:	14.2 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	70.4	Date Analyzed DB-5:	30-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1055						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	3.72			
1,2,3,7,8-PeCDD	17.5			
1,2,3,4,7,8-HxCDD	39.0			
1,2,3,6,7,8-HxCDD	160			
1,2,3,7,8,9-HxCDD	86.1			
1,2,3,4,6,7,8-HpCDD	5000			E J
OCDD	84000			D
2,3,7,8-TCDF	3.69			B
1,2,3,7,8-PeCDF	4.30			
2,3,4,7,8-PeCDF	13.0			
1,2,3,4,7,8-HxCDF	47.6			
1,2,3,6,7,8-HxCDF	25.5			
2,3,4,6,7,8-HxCDF	49.0			
1,2,3,7,8,9-HxCDF	9.97			
1,2,3,4,6,7,8-HpCDF	864			
1,2,3,4,7,8,9-HpCDF	69.7			
OCDF	4620			E J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	94.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	90.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	86.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	87.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	102	40 - 135	
	13C-OCDD	82.9	40 - 135	D
	13C-2,3,7,8-TCDF	90.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	99.2	40 - 135	
	13C-2,3,4,7,8-PeCDF	94.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	90.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.7	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	85.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	86.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	92.8	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	95.0	40 - 135	
	13C-OCDF	96.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	93.7	40 - 135	

Totals		
Total TCDD	27.2	27.9
Total PeCDD	112	
Total HxCDD	914	
Total HpCDD	9000	
Total TCDF	101	103
Total PeCDF	367	
Total HxCDF	1140	
Total HpCDF	3710	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 153

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Rose Harrelson 31-Aug-2012 16:32

Sample ID: A3-31 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-007	Date Received:	10-Aug-12
Project:		Sample Size:	13.3 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	75.7	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1150						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	1.35			
1,2,3,7,8-PeCDD	12.3			
1,2,3,4,7,8-HxCDD	19.8			
1,2,3,6,7,8-HxCDD	58.5			
1,2,3,7,8,9-HxCDD	47.5			
1,2,3,4,6,7,8-HpCDD	1460			
OCDD	22500			B,EJ
2,3,7,8-TCDF	0.810			
1,2,3,7,8-PeCDF	0.973			J
2,3,4,7,8-PeCDF	1.61			J
1,2,3,4,7,8-HxCDF	7.48			
1,2,3,6,7,8-HxCDF	3.86			
2,3,4,6,7,8-HxCDF	5.68			
1,2,3,7,8,9-HxCDF	0.771			J
1,2,3,4,6,7,8-HpCDF	140			
1,2,3,4,7,8,9-HpCDF	9.94			
OCDF	803			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	89.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	96.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	74.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	73.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	89.2	40 - 135	
	13C-OCDD	93.8	40 - 135	
	13C-2,3,7,8-TCDF	86.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	85.3	40 - 135	
	13C-2,3,4,7,8-PeCDF	82.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	83.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	77.8	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	80.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	78.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	86.4	40 - 135	
	13C-OCDF	83.9	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	95.8	40 - 135	

Totals		
Total TCDD	22.7	
Total PeCDD	121	
Total HxCDD	646	
Total HpCDD	3040	
Total TCDF	13.3	13.9
Total PeCDF	30.6	30.8
Total HxCDF	155	
Total HpCDF	582	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 51.7

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-30 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-008	Date Received:	10-Aug-12
Project:		Sample Size:	11.9 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	83.9	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1200						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.341			J
1,2,3,7,8-PeCDD	2.28			J
1,2,3,4,7,8-HxCDD	5.92			
1,2,3,6,7,8-HxCDD	13.1			
1,2,3,7,8,9-HxCDD	12.1			
1,2,3,4,6,7,8-HpCDD	606			
OCDD	29400			B,E J
2,3,7,8-TCDF	0.311			J
1,2,3,7,8-PeCDF	0.400			J
2,3,4,7,8-PeCDF	1.23			J
1,2,3,4,7,8-HxCDF	3.65			
1,2,3,6,7,8-HxCDF	1.65			J
2,3,4,6,7,8-HxCDF	2.54			
1,2,3,7,8,9-HxCDF	0.270			J
1,2,3,4,6,7,8-HpCDF	45.0			
1,2,3,4,7,8,9-HpCDF	3.52			
OCDF	219			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	87.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	102	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	74.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	89.9	40 - 135	
	13C-OCDD	97.7	40 - 135	
	13C-2,3,7,8-TCDF	87.8	40 - 135	
	13C-1,2,3,7,8-PeCDF	89.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	81.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	80.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	82.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	81.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	85.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.7	40 - 135	
	13C-OCDF	86.1	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	94.6	40 - 135	

Totals		
Total TCDD	8.37	8.92
Total PeCDD	25.4	
Total HxCDD	176	
Total HpCDD	1490	
Total TCDF	6.21	6.72
Total PeCDF	12.4	12.4
Total HxCDF	60.0	
Total HpCDF	180	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 22.4

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A1-58 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-009	Date Received:	10-Aug-12
Project:		Sample Size:	12.5 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	81.8	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1330						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.587			
1,2,3,7,8-PeCDD	2.61			
1,2,3,4,7,8-HxCDD	5.68			
1,2,3,6,7,8-HxCDD	14.0			
1,2,3,7,8,9-HxCDD	11.3			
1,2,3,4,6,7,8-HpCDD	602			
OCDD	31300			B,E J
2,3,7,8-TCDF	1.08			
1,2,3,7,8-PeCDF	0.889			J
2,3,4,7,8-PeCDF	3.66			
1,2,3,4,7,8-HxCDF	4.29			
1,2,3,6,7,8-HxCDF	2.91			
2,3,4,6,7,8-HxCDF	5.22			
1,2,3,7,8,9-HxCDF	0.638			J
1,2,3,4,6,7,8-HpCDF	83.9			
1,2,3,4,7,8,9-HpCDF	4.15			
OCDF	233			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	109	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	81.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	93.5	40 - 135	
	13C-OCDD	100	40 - 135	
	13C-2,3,7,8-TCDF	94.7	40 - 135	
	13C-1,2,3,7,8-PeCDF	95.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	90.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	83.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	86.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	86.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	89.3	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	95.4	40 - 135	
	13C-OCDF	86.9	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	105	40 - 135	

Totals		
Total TCDD	9.14	9.26
Total PeCDD	23.9	
Total HxCDD	142	
Total HpCDD	1310	
Total TCDF	22.9	23.6
Total PeCDF	55.6	
Total HxCDF	115	
Total HpCDF	270	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 25.2

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: DUP-3 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-010	Date Received:	10-Aug-12
Project:		Sample Size:	12.5 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	80.5	Date Analyzed DB-5:	29-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0000						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.416			J
1,2,3,7,8-PeCDD	1.90			J
1,2,3,4,7,8-HxCDD	5.13			
1,2,3,6,7,8-HxCDD	14.5			
1,2,3,7,8,9-HxCDD	11.8			
1,2,3,4,6,7,8-HpCDD	781			
OCDD	23900			B,E J
2,3,7,8-TCDF	0.436			J
1,2,3,7,8-PeCDF	0.465			J
2,3,4,7,8-PeCDF	1.38			J
1,2,3,4,7,8-HxCDF	3.34			
1,2,3,6,7,8-HxCDF	1.61			J
2,3,4,6,7,8-HxCDF	3.25			
1,2,3,7,8,9-HxCDF	0.345			J
1,2,3,4,6,7,8-HpCDF	49.1			
1,2,3,4,7,8,9-HpCDF	4.24			
OCDF	351			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	95.7	40 - 135	
	13C-1,2,3,7,8-PeCDD	112	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	83.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	85.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	97.1	40 - 135	
	13C-OCDD	107	40 - 135	
	13C-2,3,7,8-TCDF	94.7	40 - 135	
	13C-1,2,3,7,8-PeCDF	97.3	40 - 135	
	13C-2,3,4,7,8-PeCDF	89.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	93.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	85.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	90.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	88.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	92.1	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	96.9	40 - 135	
	13C-OCDF	92.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	104	40 - 135	

Totals		
Total TCDD	10.4	11.2
Total PeCDD	20.3	
Total HxCDD	235	
Total HpCDD	2460	
Total TCDF	13.5	14.4
Total PeCDF	33.9	
Total HxCDF	77.7	
Total HpCDF	240	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 22.4

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-32 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-011	Date Received:	10-Aug-12
Project:		Sample Size:	12.9 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	8-Aug-12	%Solids:	77.6	Date Analyzed DB-5:	30-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1440						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	3.05			
1,2,3,7,8-PeCDD	83.7			
1,2,3,4,7,8-HxCDD	233			
1,2,3,6,7,8-HxCDD	1010			
1,2,3,7,8,9-HxCDD	514			
1,2,3,4,6,7,8-HpCDD	23900			D,E J
OCDD	198000			
2,3,7,8-TCDF	4.19			B
1,2,3,7,8-PeCDF	20.9			
2,3,4,7,8-PeCDF	42.2			
1,2,3,4,7,8-HxCDF	229			
1,2,3,6,7,8-HxCDF	132			
2,3,4,6,7,8-HxCDF	240			
1,2,3,7,8,9-HxCDF	55.8			
1,2,3,4,6,7,8-HpCDF	5500			E J
1,2,3,4,7,8,9-HpCDF	379			
OCDF	27300			E J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	91.9	40 - 135	
	13C-1,2,3,7,8-PeCDD	92.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	95.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	91.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	91.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	113	40 - 135	
	13C-OCDD	97.9	40 - 135	D
	13C-2,3,7,8-TCDF	87.7	40 - 135	
	13C-1,2,3,7,8-PeCDF	98.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	94.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	92.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	84.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	88.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	91.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	100	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	102	40 - 135	
	13C-OCDF	103	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	93.5	40 - 135	

Totals		
Total TCDD	104	104
Total PeCDD	448	
Total HxCDD	4770	
Total HpCDD	39300	
Total TCDF	107	
Total PeCDF	911	
Total HxCDF	6110	
Total HpCDF	20500	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 707

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: ANP

Approved By: Rose Harrelson 31-Aug-2012 16:32

Sample ID: A3-29 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-012	Date Received:	10-Aug-12
Project:		Sample Size:	12.2 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	8-Aug-12	%Solids:	83.2	Date Analyzed DB-5:	29-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	1500						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	ND		0.225	UX
1,2,3,7,8-PeCDD	1.56			J
1,2,3,4,7,8-HxCDD	3.40			
1,2,3,6,7,8-HxCDD	6.82			
1,2,3,7,8,9-HxCDD	6.66			
1,2,3,4,6,7,8-HpCDD	249			
OCDD	7770			B,EJ
2,3,7,8-TCDF	0.253			J
1,2,3,7,8-PeCDF	0.243			J
2,3,4,7,8-PeCDF	0.351			J
1,2,3,4,7,8-HxCDF	1.40			J
1,2,3,6,7,8-HxCDF	0.675			J
2,3,4,6,7,8-HxCDF	1.02			J
1,2,3,7,8,9-HxCDF	0.171			J
1,2,3,4,6,7,8-HpCDF	14.7			
1,2,3,4,7,8,9-HpCDF	1.31			J
OCDF	65.5			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	91.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	112	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	84.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	98.3	40 - 135	
	13C-OCDD	95.7	40 - 135	
	13C-2,3,7,8-TCDF	94.8	40 - 135	
	13C-1,2,3,7,8-PeCDF	96.5	40 - 135	
	13C-2,3,4,7,8-PeCDF	90.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	91.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	86.8	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	89.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	88.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	91.9	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	95.0	40 - 135	
	13C-OCDF	90.5	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	102	40 - 135	

Totals		
Total TCDD	6.85	8.00
Total PeCDD	16.0	16.4
Total HxCDD	92.0	
Total HpCDD	593	
Total TCDF	5.20	5.48
Total PeCDF	6.67	6.97
Total HxCDF	23.4	
Total HpCDF	58.2	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 8.71

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-34 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-013	Date Received:	10-Aug-12
Project:		Sample Size:	12.6 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	80.7	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	31-Aug-12
Time Collected:	0900						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	2.22			
1,2,3,7,8-PeCDD	18.5			
1,2,3,4,7,8-HxCDD	58.6			
1,2,3,6,7,8-HxCDD	167			
1,2,3,7,8,9-HxCDD	118			
1,2,3,4,6,7,8-HpCDD	5160			E J
OCDD	45800			B,E J
2,3,7,8-TCDF	3.52			
1,2,3,7,8-PeCDF	5.17			
2,3,4,7,8-PeCDF	16.7			
1,2,3,4,7,8-HxCDF	73.4			
1,2,3,6,7,8-HxCDF	33.5			
2,3,4,6,7,8-HxCDF	54.8			
1,2,3,7,8,9-HxCDF	5.16			
1,2,3,4,6,7,8-HpCDF	986			
1,2,3,4,7,8,9-HpCDF	76.0			
OCDF	4240			E J

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	113	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	80.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	102	40 - 135	
	13C-OCDD	109	40 - 135	
	13C-2,3,7,8-TCDF	91.8	40 - 135	
	13C-1,2,3,7,8-PeCDF	95.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	92.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	84.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	87.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	92.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	95.2	40 - 135	
	13C-OCDF	93.9	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	108	40 - 135	

Totals	
Total TCDD	46.8
Total PeCDD	109
Total HxCDD	1490
Total HpCDD	13000
Total TCDF	70.1
Total PeCDF	261 P J
Total HxCDF	1410
Total HpCDF	3660

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 154

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-33 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-014	Date Received:	10-Aug-12
Project:		Sample Size:	14.9 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	9-Aug-12	%Solids:	67.8	Date Analyzed DB-5:	30-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	0915						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	3.84			
1,2,3,7,8-PeCDD	62.6			
1,2,3,4,7,8-HxCDD	199			
1,2,3,6,7,8-HxCDD	1030			
1,2,3,7,8,9-HxCDD	360			
1,2,3,4,6,7,8-HpCDD	43100			D,E J
OCDD	487000			D,E J
2,3,7,8-TCDF	4.12			~~B~~
1,2,3,7,8-PeCDF	12.3			
2,3,4,7,8-PeCDF	43.2			
1,2,3,4,7,8-HxCDF	273			
1,2,3,6,7,8-HxCDF	90.9			
2,3,4,6,7,8-HxCDF	184			
1,2,3,7,8,9-HxCDF	49.9			
1,2,3,4,6,7,8-HpCDF	7040			D
1,2,3,4,7,8,9-HpCDF	586			D
OCDF	41500			D,E J

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.7	40 - 135	
	13C-1,2,3,7,8-PeCDD	87.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	90.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	84.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	84.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	73.1	40 - 135	D
	13C-OCDD	62.8	40 - 135	D
	13C-2,3,7,8-TCDF	93.9	40 - 135	
	13C-1,2,3,7,8-PeCDF	97.1	40 - 135	
	13C-2,3,4,7,8-PeCDF	91.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	90.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	88.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	81.2	40 - 135	D
	13C-1,2,3,4,7,8,9-HpCDF	75.3	40 - 135	D
	13C-OCDF	84.3	40 - 135	D
CRS	37Cl-2,3,7,8-TCDD	96.7	40 - 135	

Totals		
Total TCDD	102	
Total PeCDD	414	
Total HxCDD	5130	
Total HpCDD	82300	
Total TCDF	97.8	
Total PeCDF	652	665
Total HxCDF	6130	
Total HpCDF	33700	

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 965

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: FEB

Approved By: Rose Harrelson 31-Aug-2012 16:32

Sample ID: A1-61 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-015	Date Received:	10-Aug-12
Project:		Sample Size:	12.0 g	QC Batch No.:	4619	Date Extracted:	19-Aug-12
Date Collected:	8-Aug-12	%Solids:	83.9	Date Analyzed DB-5:	29-Aug-12	Dates Analyzed DB-225:	30-Aug-12
Time Collected:	1140						

Analyte	Conc. (pg/g)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	3.60			
1,2,3,7,8-PeCDD	22.9			
1,2,3,4,7,8-HxCDD	52.0			
1,2,3,6,7,8-HxCDD	123			
1,2,3,7,8,9-HxCDD	80.1			
1,2,3,4,6,7,8-HpCDD	3120			E J
OCDD	38600			B,E J
2,3,7,8-TCDF	0.859			
1,2,3,7,8-PeCDF	1.94			J
2,3,4,7,8-PeCDF	3.10			
1,2,3,4,7,8-HxCDF	22.9			
1,2,3,6,7,8-HxCDF	7.72			
2,3,4,6,7,8-HxCDF	11.4			
1,2,3,7,8,9-HxCDF	2.11			J
1,2,3,4,6,7,8-HpCDF	309			J
1,2,3,4,7,8,9-HpCDF	23.4			
OCDF	2160			

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	92.9	40 - 135	
	13C-1,2,3,7,8-PeCDD	110	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	86.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	77.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	82.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	101	40 - 135	
	13C-OCDD	103	40 - 135	
	13C-2,3,7,8-TCDF	94.6	40 - 135	
	13C-1,2,3,7,8-PeCDF	88.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	85.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	83.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	88.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	89.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	92.3	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	94.6	40 - 135	
	13C-OCDF	93.5	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	105	40 - 135	

Totals			
Total TCDD	99.1		
Total PeCDD	361		
Total HxCDD	1380		
Total HpCDD	6090		
Total TCDF	30.8	31.1	
Total PeCDF	68.1	68.4	
Total HxCDF	383		
Total HpCDF	1500		J

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 104

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: MAS

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: A3-25 **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Soil	Lab Sample:	33933-006	Date Received:	10-Aug-12
Project:		Sample Size:	13.0 g	QC Batch No.:	4623	Date Extracted:	20-Aug-12
Date Collected:	9-Aug-12	%Solids:	78.5	Date Analyzed DB-5:	24-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	1100						

Analyte	Conc. (pg/g)	DL [a]	EMPC[b]	Qualifiers
2,3,7,8-TCDD	0.361			J
1,2,3,7,8-PeCDD	2.24			J
1,2,3,4,7,8-HxCDD	5.33			
1,2,3,6,7,8-HxCDD	14.5			
1,2,3,7,8,9-HxCDD	10.4			
1,2,3,4,6,7,8-HpCDD	715			
OCDD	34400			EJ
2,3,7,8-TCDF	ND		0.233	UX
1,2,3,7,8-PeCDF	0.402			J
2,3,4,7,8-PeCDF	ND		0.519	UX
1,2,3,4,7,8-HxCDF	2.57			
1,2,3,6,7,8-HxCDF	1.16			J
2,3,4,6,7,8-HxCDF	2.03			J
1,2,3,7,8,9-HxCDF	ND		0.317	UX
1,2,3,4,6,7,8-HpCDF	34.9			
1,2,3,4,7,8,9-HpCDF	3.51			
OCDF	147			

	Labeled Standard	%R	LCL-UCL[d]	Qualifiers
IS	13C-2,3,7,8-TCDD	93.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	89.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	75.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	77.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	74.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	80.0	40 - 135	
	13C-OCDD	102	40 - 135	
	13C-2,3,7,8-TCDF	89.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	102	40 - 135	
	13C-2,3,4,7,8-PeCDF	103	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	84.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	86.6	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	85.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	82.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	81.7	40 - 135	
	13C-OCDF	87.4	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	94.3	40 - 135	

Totals	
Total TCDD	12.7
Total PeCDD	57.9
Total HxCDD	239
Total HpCDD	2280
Total TCDF	3.02
Total PeCDF	4.94
Total HxCDF	54.1
Total HpCDF	143

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 24.1

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

The results are reported in dry weight. The sample size is reported in wet weight.

Analyst: FEB

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Sample ID: EB 8/9/12 — **EPA Method 8290**

Client Data		Sample Data		Laboratory Data			
Name:	ARCADIS	Matrix:	Aqueous	Lab Sample:	33933-016	Date Received:	10-Aug-12
Project:		Sample Size:	0.841 L	QC Batch No.:	4616	Date Extracted:	15-Aug-12
Date Collected:	9-Aug-12			Date Analyzed DB-5:	17-Aug-12	Date Analyzed DB-225:	NA
Time Collected:	0000						

Analyte	Conc. (pg/L)	DL [a]	EMPC [b]	Qualifiers
2,3,7,8-TCDD	ND	0.779		
1,2,3,7,8-PeCDD	ND	0.834		
1,2,3,4,7,8-HxCDD	ND	0.781		
1,2,3,6,7,8-HxCDD	ND	0.891		
1,2,3,7,8,9-HxCDD	ND	0.905		
1,2,3,4,6,7,8-HpCDD	ND	0.976		
OCDD	2.97			J
2,3,7,8-TCDF	ND	0.838		
1,2,3,7,8-PeCDF	ND	0.498		
2,3,4,7,8-PeCDF	ND	0.613		
1,2,3,4,7,8-HxCDF	ND	0.396		
1,2,3,6,7,8-HxCDF	ND	0.366		
2,3,4,6,7,8-HxCDF	ND	0.398		
1,2,3,7,8,9-HxCDF	ND	0.569		
1,2,3,4,6,7,8-HpCDF	ND	0.428		
1,2,3,4,7,8,9-HpCDF	ND	0.537		
OCDF	ND	1.02		

	Labeled Standard	%R	LCL-UCL [d]	Qualifiers
IS	13C-2,3,7,8-TCDD	88.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	83.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	77.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	78.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	76.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	76.8	40 - 135	
	13C-OCDD	67.4	40 - 135	
	13C-2,3,7,8-TCDF	86.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	106	40 - 135	
	13C-2,3,4,7,8-PeCDF	87.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	82.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	86.8	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	88.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	80.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	74.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	74.0	40 - 135	
	13C-OCDF	71.4	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	96.1	40 - 135	

Totals		
Total TCDD	ND	0.779
Total PeCDD	ND	0.834
Total HxCDD	ND	0.905
Total HpCDD	ND	0.976
Total TCDF	ND	0.838
Total PeCDF	ND	0.613
Total HxCDF	ND	0.569
Total HpCDF	ND	0.537

Toxic Equivalent Quotient (TEQ) Data [e]

TEQ (Min): 0.000891

a. Sample specific estimated detection limit.

b. Estimated maximum possible concentration.

c. Method detection limit.

d. Lower control limit - upper control limit.

e. TEQ based on (2005) World Health Organization Toxic Equivalent Factors (WHO)

Analyst: FEB

Approved By: Calvin Tanaka 31-Aug-2012 14:40

Vista

CHAIN OF CUSTODY

FOR LABORATORY USE ONLY

Laboratory Project ID: 33933

Storage Secured: Yes ☑ No ☐

Storage ID: WR 2 Temp ____ °C

TAT: (Check One):
Standard: ☒ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:____

Project I.D.:____ P.O.#[redacted]03712.02.00.00002 Sampler: I. STEWART & C. MCLENDRICK (Name)

Invoice to: Name: DAVID BESSINGPASS Company: ARCADIS Address: 10002 EXCELSIOR RD City: BAXTER State: MN Zip: 56425 Ph#: 218-829-4607 Fax#:

Relinquished by: (Signature and Printed Name) Claire McLendrick Date: 9/9/12 Time: 1600 Received by: (Signature and Printed Name) Date: 8/10/12 Time: 0842

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN:____

Method of Shipment: ____

Tracking No.: ____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29
A1-50	8/9/12	0930		1	G	SO						X									
A1-51	8/9/12	0945		1	G	SO						X									
A3-28	8/9/12	1040		1	G	SO						X									
A3-27	8/9/12	1050		1	G	SO						X									
A3-26	8/9/12	1055		1	G	SO						X									
A3-25	8/9/12	1100		1	G	SO						X									
A3-31	8/9/12	1150		1	G	SO						X									
A3-30	8/9/12	1200		1	G	SO						X									
A1-53	8/9/12	1330		1	G	SO						X									
DUP-3	8/9/12	-		1	G	SO						X									

Special Instructions/Comments:____

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPASS
Company: ARCADIS
Address: 10002 EXCELSIOR RD
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax:____
Email: DAVID.BESSINGPASS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other____

*Bottle Preservative Type: T = Thiosulfate,
O = Other____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum AQ = Aqueous, O = Other____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

Vista

2 of 4

FOR LABORATORY USE ONLY
Laboratory Project ID: 33933
Storage Secured: Yes ☐ No ☐
Storage ID: _____ Temp _____ °C

TAT: (Check One):
Standard: ☒ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify: ___

Project I.D.: _____ P.O.# B0039210Z.0000.00002 Sampler: J. STEWART & C. MCVENDRICK (Name)

Invoice to: Name DAVID BESSINGPASS Company ARCADIS Address 10060 EXCELSIOR BLVD City BAXTER State MN Zip 56425 Ph# 218-829-4407 Fax# _____

Relinquished by: (Signature and Printed Name) Chris McVendrick Date: 8/9/12 Time: 1100 Received by: (Signature and Printed Name) Tanna J. Benedict Date: 8/10/12 Time: 0841

Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____ Received by: (Signature and Printed Name) _____ Date: _____ Time: _____

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29
* AH60	8/8/12	1330		2	G	SD						X									
* A3-32	8/8/12	1440		1	G	SD						X									
* A3-29	8/8/12	1500		1	G	SD						X									
* DUP-1	8/8/12	-		1	G	SD						X									
* DUP-2	8/8/12	-		1	G	SD						X									
* MS/MSD1	8/8/12	-		2	G	SD						X									
* MS/MSD2	8/8/12	-		2	G	SD						X									
* EB	8/8/12	-		2	A	W						X									
* A3-34	8/9/12	0900		1	G	SD						X									
* A3-33	8/9/12	0915		1	G	SD						X									

Special Instructions/Comments:
* project 33932
* project 33933

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPASS
Company: ARCADIS
Address: 10060 EXCELSIOR BLVD
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4407 Fax: _____
Email: DAVID.BESSINGPASS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O = Other _____

*Bottle Preservative Type: T = Thiosulfate,
O = Other _____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other _____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

Vista

CHAIN OF CUSTODY

FOR LABORATORY USE ONLY
Laboratory Project ID: 33933
Storage ID ______ Temp ______ °C
Storage Secured Yes ☐ No ☐

TAT: (Check One):
Standard: ⊗ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify: ___

Project I.D.: ______ P.O.# B0039212.0000.00002 Sampler: C. McKendrick / T. STEWART (Name)

Invoice to: Name DAVID BESSINGPASS Company ARCADIS Address 1402 EXCELSIOR RD City BAXTER State MN Zip 56425 Ph# 218-829-4107 Fax#

Relinquished by: (Signature and Printed Name) Claire McKendrick Date: 8/9/12 Time: 1600 Received by: (Signature and Printed Name) B. Benedict Date: 8/10/12 Time: 0841

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: ______

Method of Shipment: ______

Tracking No.: ______

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Container(s) Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA8280 TOTALS	EPA1668 COPLANAR PCB'S	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	WHO-29	
* A1-02	8/8/12	0805		1	G	SO						X										
* A1-56	8/8/12	0820		1	G	SO						X										
* A1-57	8/8/12	0830		1	G	SO						X										
* A1-63	8/8/12	0845		1	G	SO						X										
* A1-52	8/8/12	0920		1	G	SO						X										
* A1-53	8/8/12	0935		1	G	SO						X										
* A1-59	8/8/12	0955		1	G	SO						X										
* A1-54	8/8/12	1040		1	G	SO						X										
* A1-55	8/8/12	1115		1	G	SO						X										
* A1-01	8/8/12	1140		1	G	SO						X										

Special Instructions/Comments:
* project 33932
* project 33933

SEND DOCUMENTATION AND RESULTS TO:
Name: DAVID BESSINGPASS
Company: ARCADIS
Address:
City: State: Zip:
Phone: Fax:
Email: DAVID.BESSINGPASS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O = Other ______

*Bottle Preservative Type: T = Thiosulfate,
O = Other ______

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other ______

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

Vista

CHAIN OF CUSTODY

FOR LABORATORY USE ONLY

Laboratory Project ID: 33933

Storage ID: WRJ

Storage Secured: Yes ☑ No ☐

Temp ____ °C

Project I.D.: _____ P.O.#: B0N342.02.0000.00002 Sampler: C. MCKENDRICK, I. STENART & (Name)

TAT: (Check One):

Standard: ☒ 21 Days

Rush (surcharge may apply):

○ 14 days ○ 7 days Specify: ___

Invoice to: Name: DAVID BESSINGPASS Company: ARCADIS Address: 6162 EXCELSIOR BLVD City: BAXTER State: MN Zip: 56425 Ph#: 218.829.4607 Fax#: _____

Relinquished by: (Signature and Printed Name) Claire McKendrick Date: 8/9/12 Time: 1600 Received by: (Signature and Printed Name) Bethna B. Benedict Date: 8/10/12 Time: 0842

Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____ Received by: (Signature and Printed Name) _____ Date: _____ Time: _____

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29
EB	8/9/12	-		2	A	W						X									

Special Instructions/Comments: _____

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPASS
Company: ARCADIS
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____
Email: DAVID.BESSINGPASS@ARCADIS-US.com

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O = Other _____

*Bottle Preservative Type: T = Thiosulfate,
O = Other _____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other _____

November 19, 2012

WORK PLAN FOR ADDITIONAL SOIL SAMPLING AND PCDD/PCDF ANALYSIS

BEAZER EAST, INC.
FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Introduction/Purpose

As a follow-up to the sampling activities conducted in August 2012, and discussions with the United States Environmental Protection Agency (USEPA) during a November 9, 2012 conference call, Beazer East, Inc. (Beazer) has prepared this Work Plan for the collection of additional soil samples from the residential area south of the Former Koppers Wood-Treating Site in Carbondale, Illinois (the Site). The samples will be analyzed for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs).

Scope/Procedures

Soil samples will be collected from a total of 16 locations in the residential area south of the Site (A1-64 through A1-79; Figure 1). As shown on Figure 1, samples will be collected from rights-of-way along North Allman Street, North Robert A. Stalls Avenue, North Pierce Street, and North Wall Street. Consistent with the sampling approach used during the August 2012 sampling event, samples representing the 16 proposed sample locations will each be a composite from five discrete locations near the target sample area. For a given location, each discrete sample will be collected using a stainless-steel trowel and composited into a single sample for laboratory analysis. The five discrete locations will be collected from the surveyed sample location, as well as from four additional locations (5 feet and 10 feet from either side of the surveyed location, parallel to the road). To the extent possible, samples will be collected from areas that do not collect runoff from roads or driveways and are at least 10 feet from potential sources of dioxins (e.g., utility poles, fences, and landscape materials from treated wood). For example, where drainage ditches parallel the road, try to collect samples on the far side of the ditch from the road if accommodated by the right-of-way boundary. All samples will be collected from the 0- to 0.5-foot depth interval.

Soil types/characteristics and descriptions of staining, odors or other noteworthy characteristics will be recorded in a field notebook. Recovered soils will be homogenized prior to placing them into sample containers. Excess soils will be placed back into the holes following sample collection. Each sample location will be staked and surveyed at the central discrete sample location so that they can be accurately depicted on the site plan and re-established in the future, if necessary.

All 16 samples will be submitted to Vista Analytical Laboratory in El Dorado Hills, California for PCDDs/PCDFs analysis via USEPA SW-846 Method 8290. Initially, eight samples (A1-68 through A1-75) will be analyzed on a 21-day turn-around-time. The remaining eight samples (A1-64 through A1-67 and A1-76 through A1-79) will be held at the lab pending the results of the eight initially analyzed samples (see Data Review and Reporting section below for additional details). The hold times for Method 8290 are 30 days from collection to extraction, and 45 days from extraction to analysis. If necessary depending on the timing of a decision following the initial analyses, Beazer will instruct the laboratory to extract the remaining samples before the hold time expires until a decision is made regarding which, if any, of the held samples require analysis.

Table 1 provides additional details on the sample location description, and summarizes the “analyze vs. hold” approach for each sample.

Property Access

All of the proposed sample locations are located in public rights-of-way adjacent to roadways. Individual access agreements with adjacent property owners will not be necessary. The City of Carbondale will be contacted to provide a representative to be present during the surveying and sampling activities in the event there are any disputes over ownership of the rights-of-way.

Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples will be collected at the frequencies specified in the Quality Assurance Project Plan (QAPP; ARCADIS, February 2008): one blind duplicate per 10 field samples, one matrix spike/matrix spike duplicate per 20 field samples, one equipment rinse blank per day. Analytical data will be validated in accordance with USEPA National Functional Guidelines for Data Review, as discussed in the QAPP.

Equipment Cleaning and Waste Management

Non-dedicated/non-disposable sampling equipment will be cleaned prior to use at each sample location following procedures outlined in the QAPP (i.e., non-phosphate detergent wash, distilled/deionized water rinse, and triple rinse sequence of solvent followed by distilled/deionized water).

Equipment cleaning fluids will be collected for treatment at the onsite wastewater treatment system (WWTS). Used personal protective equipment, disposable sampling equipment, and other miscellaneous wastes will be placed into a 55-gallon drum and staged at a designated area near the WWTS for subsequent characterization and disposal by Beazer.

Data Review and Reporting

Following receipt of the preliminary laboratory results for the eight initially analyzed samples, Beazer will prepare a figure showing the calculated 2,3,7,8-TCDD Toxic Equivalent (TEQ) concentration for each sample, and participate in a web meeting/conference call with USEPA to discuss the results and mutually agree upon which, if any, of the eight held samples will be released for analysis.

Following receipt of final data reports from the lab, the analytical data will be validated, and final data tables and sample location maps will be prepared for submittal to the USEPA.

Schedule

The field work will be conducted in late November or early December, pending USEPA approval of this Work Plan and availability of the survey and sampling crews. The field activities are anticipated to require approximately three days to complete. The web meeting/conference call with USEPA to review and discuss the preliminary results of the eight initially analyzed samples is anticipated to be held within approximately three days following receipt of the preliminary results from the lab. Because laboratory results may be expected during a holiday period, Beazer will provide as much notice as possible of the target date for scheduling the web meeting/conference call. It will be important to hold the meeting in a timely manner and determine which of the held samples will be analyzed so that the laboratory can complete the work within the method-specified holding times. To account for the data validation timeframe, final data summary tables and sample location maps will be submitted to the USEPA within approximately six weeks following receipt of all associated laboratory analytical data.

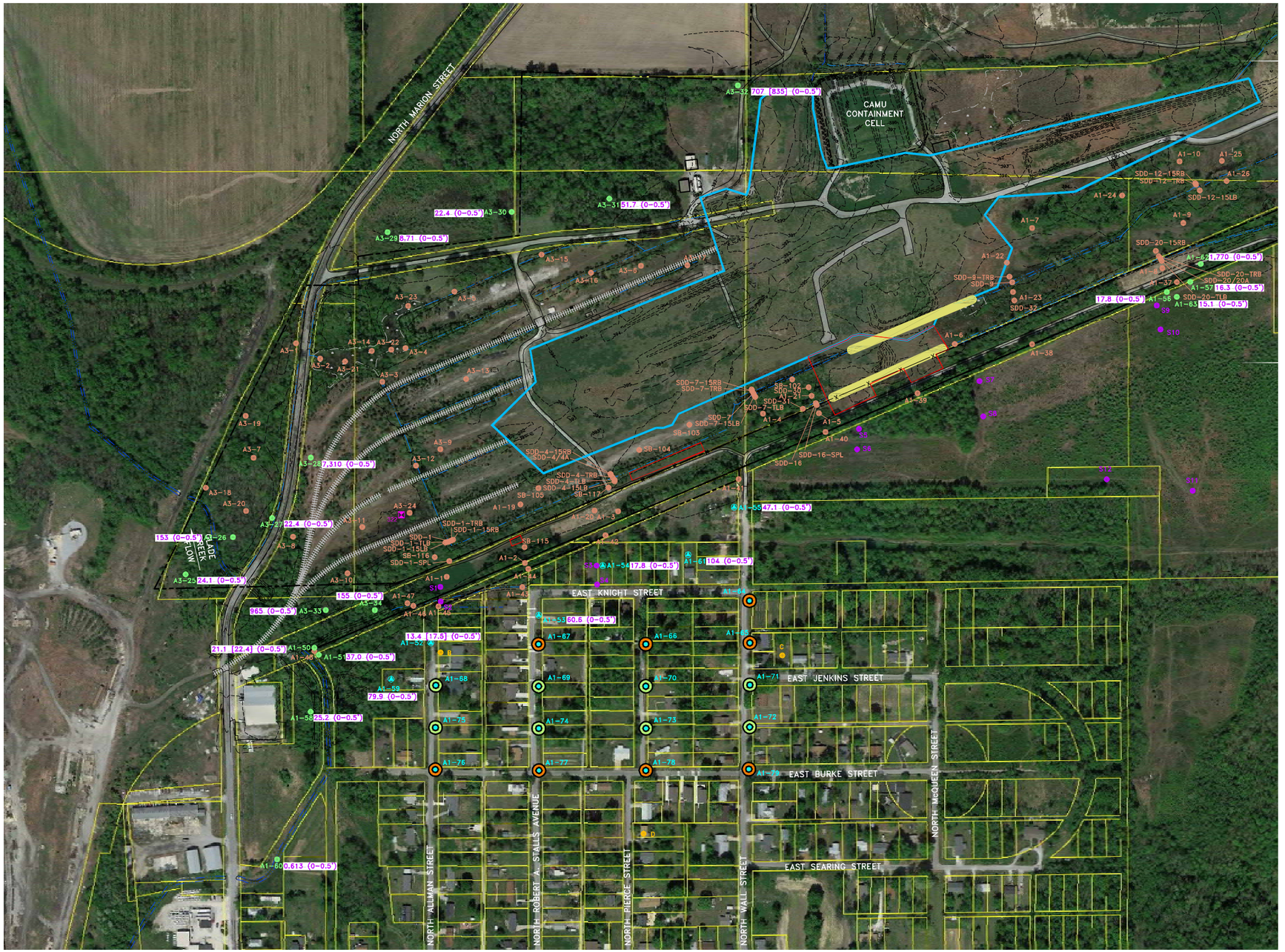
TABLE 1
SAMPLE LOCATION DESCRIPTIONS AND ANALYTICAL APPROACH

Beazer East, Inc.
Former Koppers Wood-Treating Site
Carbondale, Illinois

Sample ID	Location Description	Analyze or Hold[1]
A1-64	Right-of-way on east side of N Wall St, south of intersection with E Knight St	Hold
A1-65	Right-of-way on east side of N Wall St	Hold
A1-66	Right-of-way on east side of N Pierce St	Hold
A1-67	Right-of-way on east side of N Robert A Stalls Ave	Hold
A1-68	Right-of-way on east side of N Allman St	Analyze
A1-69	Right-of-way on east side of N Robert A Stalls Ave	Analyze
A1-70	Right-of-way on east side of N Pierce St	Analyze
A1-71	Right-of-way on east side of N Wall St, south of intersection with E Jenkins St	Analyze
A1-72	Right-of-way on east side of N Wall St	Analyze
A1-73	Right-of-way on east side of N Pierce St	Analyze
A1-74	Right-of-way on east side of N Robert A Stalls Ave	Analyze
A1-75	Right-of-way on east side of N Allman St	Analyze
A1-76	Right-of-way on east side of N Allman St, north of intersection with E Burke St	Hold
A1-77	Right-of-way on east side of N Robert A Stalls Ave, north of intersection with E Burke St	Hold
A1-78	Right-of-way on east side of N Pierce St, north of intersection with E Burke St	Hold
A1-79	Right-of-way on east side of N Wall St, north of intersection with E Burke St	Hold

Notes:

1. Eight samples will be held at the lab pending the results of the eight initially analyzed samples, and discussions between Beazer and USEPA.
2. Samples designated for analysis will be analyzed for PCDDs/PCDFs via USEPA Method 8290.



LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- PROPERTY BOUNDARY (SEE NOTE 2)
- PARCEL BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- S1 2005 RESIDENTIAL SAMPLE LOCATIONS (USEPA)
- SB-102 2005-2010 SAMPLE LOCATIONS (BEAZER)
- B 2006 RESIDENTIAL SAMPLE LOCATIONS (CITY OF CARBONDALE)
- A1-57 AUGUST 2012 GRAB SAMPLE LOCATION
- A1-55 AUGUST 2012 COMPOSITE SAMPLE LOCATION
- 15.1 (0-0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL
- PROPOSED COMPOSITE SAMPLE LOCATION (ANALYZE)
- PROPOSED COMPOSITE SAMPLE LOCATION (HOLD)

NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THE 2006 RESIDENTIAL SAMPLE LOCATIONS ARE APPROXIMATE.
4. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH AND DATED APRIL 2, 2012.

0 200' 400'
GRAPHIC SCALE

BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

PROPOSED SAMPLE LOCATIONS

ARCADIS

FIGURE 1

CITY:(MANCHESTER) SYRACUSE DIV/GROUP:ENVCAD DB:(B.SMALL) G.STOWELL L.FORAKER LD: PIC:R.ANDERSON PM:J.HOLDEN TM:D.BESSINGPAS LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0039275\000\0001\DWG\PROPOSED\39275G01.DWG LAYOUT: 1 SAVED: 11/19/2012 2:20 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: C4-D2B PDF 3600 DPI PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/19/2012 2:20 PM BY: FORAKER, LYDIA
XREFS: 39200X01 39200X02 39275X00
IMAGES: XREF FOLDER: B0039200
39200X02.jpg

Beazer

BEAZER EAST, INC. C/O THREE RIVERS MANAGEMENT, INC.
MANOR OAK ONE, SUITE 200, 1910 COCHRAN ROAD, PITTSBURGH, PA 15220

February 19, 2013

Ms. Carolyn Bury
U.S. Environmental Protection Agency, Region V
77 West Jackson Boulevard
Mail Code DE-9J
Chicago, IL 60604-3590

Re: Former Koppers Wood-Treating Site – Carbondale, Illinois
November 2012 Dioxin Sampling Final/Validated Data Submittal

Dear Ms. Bury:

In accordance with the November 19, 2012 *Work Plan for Additional Soil Sampling and PCDD/PCDF Analysis* (Work Plan), which was approved by the USEPA on November 20, 2012, Beazer conducted sampling in the residential area south of the Former Koppers Wood-Treating Site in Carbondale, Illinois on November 27 and 28, 2012. The purpose of this letter is to transmit the final/validated laboratory analytical data associated with the November 2012 sampling to the USEPA. The following are attached to this letter:

- Attachment 1 – Validated Analytical Data Summary Table
- Attachment 2 – Sample Location Maps
- Attachment 3 – Data Validation Reports (includes validated laboratory analytical data sheets)

As discussed in the Work Plan, a total of 16 samples were collected – eight of the 16 were initially analyzed for PCDDs/PCDFs, and the other eight were held at the laboratory. Based on discussions with USEPA during a December 18, 2012 conference call, four of the initially held samples were released for PCDD/PCDF analysis. The results for all 12 of the analyzed samples are reported herein.

Please feel contact me at 412-208-8867 if you have any questions or comments regarding this submittal.

Sincerely,

Michael Slenska, P.E.
Senior Environmental Manager

Enclosure

cc: James Moore, IEPA
Jeffrey Holden, ARCADIS
Paul Anderson, ARCADIS
David Bessingpas, ARCADIS

Writer's Direct Dial: 412/208-8867

Attachment 1

Validated Analytical Data
Summary Table

TABLE 1
VALIDATED ANALYTICAL DATA SUMARY - NOV. 2012 SAMPLES

FORMER KOPPERS WOOD-TREATING SITE
CARBONDALE, ILLINOIS

Sample ID:		A1-64	A1-65	A1-66	A1-67	A1-68	A1-69	A1-70	A1-71	A1-72	A1-73	A1-74	A1-75
Depth (ft bgs):		0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Sample Date:	Units	11/27/12	11/27/12	11/28/12	11/28/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12
PCDDs/PCDFs													
1,2,3,4,6,7,8-HpCDD	pg/g	344	358	1,530	5,010 EJ	296 [317]	205	897	653	269	773 [1,160]	316	817
1,2,3,4,6,7,8-HpCDF	pg/g	25.8	41.3	189 J	468	24.1 [26.5]	19.7	254	82.8	19.4	130 [186]	30.6	62.4
1,2,3,4,7,8,9-HpCDF	pg/g	1.88 J	3.13	13.1	29.3	1.88 J [1.84 J]	1.42 J	26.5	5.77	1.39 J	9.45 [14.6]	2.21 J	4.42
1,2,3,4,7,8-HxCDD	pg/g	2.88	3.52	11.5	31.4	3.31 [3.34]	2.15 J	8.26	7.01	2.77 J	9.72 [12.4]	3.19	9.48
1,2,3,4,7,8-HxCDF	pg/g	1.48 J	1.93 J	7.81	7.87	1.51 J [1.46 J]	1.16 J	11.7	3.85	0.844 J	5.26 [6.94]	1.98 J	2.32 J
1,2,3,6,7,8-HxCDD	pg/g	7.22	10.1	44.5	95.0	8.83 [10.7]	5.83	29.7	17.9	6.08	24.1 [30.8]	7.64	20.8
1,2,3,6,7,8-HxCDF	pg/g	1.09 J	1.42 J	5.86	5.54	1.26 J [1.12 UX]	0.808 UX	7.16	3.19	0.685 UX	5.98 [7.50]	1.65 J	2.12 J
1,2,3,7,8,9-HxCDD	pg/g	6.96	8.17	27.1	79.3	8.04 [9.54]	5.35	21.0	16.4	6.66	23.7 [29.5]	6.97	33.7
1,2,3,7,8,9-HxCDF	pg/g	0.139 J	0.193 J	0.745 J	0.737 J	0.483 U [0.505 U]	0.390 U	1.63 J	0.275 J	0.316 U	0.984 U [1.59 J]	0.375 U	0.277 U
1,2,3,7,8-PeCDD	pg/g	1.64 J	2.04 J	4.85	10.5	2.06 J [2.56 J]	1.53 J	4.04	4.16	1.22 UX	6.58 [6.47]	2.03 J	8.18
1,2,3,7,8-PeCDF	pg/g	0.419 J	0.336 J	2.29 J	0.807 J	0.453 J [0.395 J]	0.429 J	0.721 J	1.03 J	0.235 U	1.14 J [1.11 J]	0.709 J	0.682 J
2,3,4,6,7,8-HxCDF	pg/g	1.76 J	2.32 J	9.08	11.1	2.12 J [2.21 J]	1.24 J	14.3	5.05	1.18 J	8.06 [10.7]	2.17 J	3.58
2,3,4,7,8-PeCDF	pg/g	0.524 J	0.778 J	3.86 J	1.58 J	1.04 J [1.03 J]	0.654 J	0.609 J	2.48 J	0.190 UX	1.38 J [1.54 J]	1.00 J	0.568 J
2,3,7,8-TCDD	pg/g	0.301 J	0.269 UX	0.870	0.782	0.364 J [0.372 J]	0.316 UX	0.329 UX	0.561 J	0.185 UX	0.667 [0.579]	0.259 J	1.25
2,3,7,8-TCDF	pg/g	0.652	0.408 J	1.65	0.479 J	0.331 J [0.287 J]	0.555 J	0.336 J	1.22	0.157 J	0.627 [0.769]	0.821	0.760
OCDD	pg/g	17,700 EJ	12,700 EJ	30,900 EJ	170,000 DEJ	10,900 EJ [11,200 EJ]	9,870 EJ	19,900 EJ	24,000 EJ	20,000 EJ	21,500 EJ [26,800 EJ]	12,400 EJ	21,000 EJ
OCDF	pg/g	112	169	718	3,970 J	82.3 [88.8]	60.9	576	319	78.7	450 [871]	107	340
Total HpCDD	pg/g	759	832	2,610	8,240	583 [656]	439	1,450	1,570	588	1,480 [2,150]	709	1,730
Total HpCDF	pg/g	88.7	138	639	2,250	82.7 [80.6]	58.5	849	273	62.4	397 [633]	97.7	227
Total HxCDD	pg/g	75.2	89.8	257	601	73.5 [84.3]	61.3	157	162	57.5	208 [274]	81.9	204
Total HxCDF	pg/g	31.5	47.4	170	327	38.1 [37.9]	19.3	281	91.3	20.4	139 [205]	36.4	64.4
Total PeCDD	pg/g	18.4	17.9	36.3	52.5	13.6 [16.5]	15.9	21.9	34.2	9.91	36.2 [47.1]	16.4	37.4
Total PeCDF	pg/g	13.3	14.8	52.9	34.4	22.3 [19.6]	9.72	25.7	38.2	4.96	40.7 [58.5]	19.7	40.6
Total TCDD	pg/g	9.13	5.82	7.00	4.51	2.11 [2.33]	3.73	1.46	12.2	1.25	7.27 [9.10]	1.87	7.82
Total TCDF	pg/g	9.56	8.38	30.5	9.56	9.05 [6.87]	7.12	2.86	27.0	1.78	16.9 [20.7]	16.1	16.3
2,3,7,8-TCDD TEQ	pg/g	13.4	13.0	44.6	142	11.8 [12.8]	8.61	31.6	25.7	10.7	31.1 [39.5]	12.3	32.1

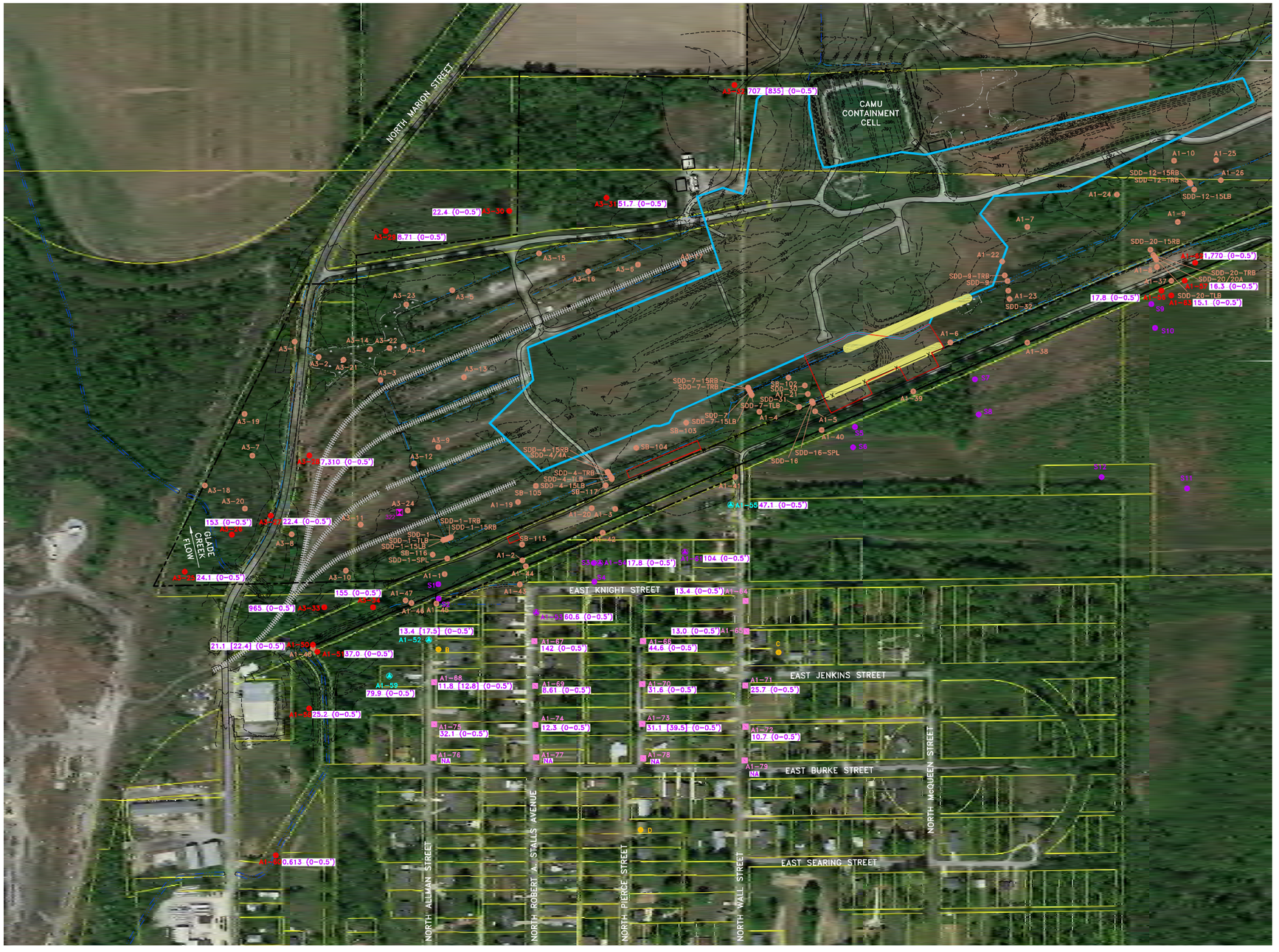
Notes:
1. All 12 samples were composites of five discrete soil sample locations.

Definitions:
PCDDs/PCDFs = polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
pg/g = picograms per gram, or parts per trillion (ppt)
ft bgs = feet below ground surface
TEQ = Toxicity Equivalent, calculated using 2005 World Health Organization (WHO) Toxicity Equivalent Factors (TEFs)
[ ] = analytical result for duplicate sample

Data Qualifiers:
D = result based on analysis of diluted sample
E = the amount detected is above the High Calibration Limit
J = the amount detected is below the Low Calibration Limit; or estimated value based on data validation
U = compound not detected; reported value is the sample specific estimated detection limit
UX = non-detect; reported value is the estimated maximum possible concentration

Attachment 2

Sample Location Maps



LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- PROPERTY BOUNDARY (SEE NOTE 2)
- PARCEL BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- S1 2005 RESIDENTIAL SAMPLE LOCATIONS (USEPA)
- SB-102 2005-2010 SAMPLE LOCATIONS (BEAZER)
- B 2006 RESIDENTIAL SAMPLE LOCATIONS (CITY OF CARBONDALE)
- A1-57 AUGUST 2012 GRAB SAMPLE LOCATION
- A1-55 AUGUST 2012 COMPOSITE SAMPLE LOCATION
- A1-66 NOVEMBER 2012 COMPOSITE SAMPLE LOCATION
- 15.1 (0-0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL
- NA NOT ANALYZED

NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THE 2006 RESIDENTIAL SAMPLE LOCATIONS ARE APPROXIMATE.
4. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH AND DATED APRIL 2, 2012.

0 200' 400'
GRAPHIC SCALE

BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

AUGUST/NOVEMBER 2012 SAMPLE LOCATIONS AND TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE 1

COC-BC-12 (2657' DOWNSTREAM OF COC-BC-11) 15.1 (0 - 0.5') - 2010
COC-BC-13 (5671' DOWNSTREAM OF COC-BC-11) 14.7 (0 - 0.5') - 2010
COC-BC-14 (10,707' DOWNSTREAM OF COC-BC-11) 6.66 (0 - 0.5') - 2010
(FOR CLARITY, BCWP SEDIMENT SAMPLE LOCATIONS COC-BC-12 THROUGH COC-BC-14 ARE NOT SHOWN ON THIS FIGURE)

COC-BC-11 22.5 (0 - 0.5') - 2008
COC-BC-09 9.44 [13.8] (0 - 0.5') - 2008
CRAB ORCHARD CREEK FLOW
COC-BC-07 13.6 (0 - 0.5') - 2008 30.7 (0 - 0.5') - 2010
COC-BC-05 2.38 (0 - 0.5') - 2008 5.56 (0 - 0.5') - 2010
COC-BC-04 6.2 [13.4] (0 - 0.5') - 2008 5.48 [5.87] (0 - 0.5') - 2010
COC-BC-01 2.75 (0 - 0.5') - 2008 3.02 (0 - 0.5') - 2010
COC-BC-02 3.68 [1.95] (0 - 0.5') - 2010
PF-BC-04 44.5 (0 - 0.5') - 2008 30.4 (0 - 0.5') - 2010
PF-BC-03 8.2 (0 - 0.5') - 2008 9.84 (0 - 0.5') - 2010
PF-BC-02 0.486 (0 - 0.5') - 2010
PF-BC-01 0.506 (0 - 0.5') - 2008 1.07 (0 - 0.5') - 2010
PILES FORK FLOW
GC-BC-10 66.9 (0 - 0.5') - 2008
GC-BC-11 37 (0 - 0.5') - 2008
GC-BC-12 55 (0 - 0.5') - 2008
GC-BC-13 188 (0 - 0.5') 71.6 (0 - 0.5')
GC-BC-14 81.2 (0 - 0.5') 2,880 (0.5 - 2')
GC-BC-15 2,880 (0.5 - 2')
GC-BC-16 55 (0 - 0.5') - 2008
GC-BC-FPT1-33XL 321 (0.5 - 2')
GC-BC-FPT1-5'L 58.4 (0 - 0.5')
GC-BC-FPT1-5'R 283 (0 - 0.5')
GC-BC-FPT1-33XR 52.1 [58.5] (0.5 - 2')
GC-BC-FPT2-5'L 810 (0 - 0.5')
GC-BC-FPT2-33XL 453 (0 - 0.5')
GC-BC-FPT2-5'R
GC-BC-FPT2-33XR
GC-BC-FPT3-33XL 241 (0.5 - 2')
GC-BC-FPT3-5'L
GC-BC-FPT3-5'R
GC-BC-FPT3-33XR 3.6 [4.52] (0.5 - 2')
GC-BC-FPT4-33XL 59.8 (0 - 0.5') 139 (0.5 - 2')
GC-BC-FPT4-5'L
GC-BC-FPT4-5'R 64.1 (0.5 - 2')
GC-BC-FPT4-33XR 69.8 (0 - 0.5')
GC-BC-FPT5-33XL 238 (0.5 - 2')
GC-BC-FPT5-5'L 84.4 (0 - 0.5')
GC-BC-FPT5-5'R 212 (0 - 0.5')
GC-BC-FPT5-33XR 3.91 (0.5 - 2')
GC-BC-FPT6-33XL 16.7 (0 - 0.5')
GC-BC-FPT6-5'L 165 (0.5 - 2')
GC-BC-FPT6-5'R 50.1 [31.8] (0.5 - 2')
GC-BC-FPT6-33XR 13 (0 - 0.5')
LP-SED-1 0.588 [0.869] (0 - 0.5')
LP-SED-2 0.922 (0 - 0.5')

A6-8 2.49 (0 - 0.5')
A6-7 5.62 (0 - 0.5')
A6-6 13.2 (0 - 0.5')
GC-BC-08 19.5 (0 - 0.5') - 2008
A6-3 15 (0 - 0.5')
A6-2 22 (0 - 0.5')
A6-4 25.2 (0 - 0.5')
A6-5 3.68 [3.27] (0 - 0.5')
A4-10 3.3 (0 - 0.5')
SD-BC-04 143 (0 - 0.5') - 2008
A6-1 60.4 (0 - 0.5')
SMITH DITCH FLOW
A4-9 1.69 (0 - 0.5')
A4-8 19.7 [18.1] (0 - 0.5')
A4-7 4.53 (0 - 0.5')
A5-5 7.87 (0 - 0.5')
A5-1 11.5 [11] (0 - 0.5')
NPL 15.9 (0 - 0.5')
PRIVATE ROAD
CONSTRUCTED WETLANDS
GLADE CREEK FLOW
NORTH MARION STREET
A4-4 31 (0 - 0.5')
A4-5 31.1 (0 - 0.5')
A4-6 47.2 (0 - 0.5')
A5-7 635 (0 - 0.5')
A5-4 18.9 (0 - 0.5')
A5-6 259 [386] (0 - 0.5')
A5-2 2.6 (0 - 0.5')
SD-BC-01 688 (0 - 0.5') - 2008
A3-32 707 [835] (0 - 0.5')
A3-30 22.4 (0 - 0.5')
A3-29 8.71 (0 - 0.5')
A3-15 1,210 (0 - 0.5')
A3-16 730 (0 - 0.5')
A3-31 51.7 (0 - 0.5')
A3-23 771 (0 - 0.5')
A3-22 2,750 (0 - 0.5')
A3-14 35,600 (0 - 0.5') 1,360 (0 - 0.5')
A3-1 2,540 (0 - 0.5')
A3-2 12.1 (0 - 0.5')
A4-1 12.6 (0 - 0.5')
A4-2 6.51 (0 - 0.5')
A4-3 7,310 (0 - 0.5')
A3-28
A3-19 66.8 (0 - 0.5')
A3-7 8.46 (0 - 0.5')
A3-18 3.02 (0 - 0.5')
A3-20 123 [138] (0 - 0.5')
A3-27 22.4 (0 - 0.5')
A3-26 153 (0 - 0.5')
A3-25 24.1 (0 - 0.5')
A3-8 1,280 (0 - 0.5')
A3-11 278 (0 - 0.5')
A3-10 1,660 [1,940] (0 - 0.5')
A3-33 963 (0 - 0.5')
A3-34 155 (0 - 0.5')
A1-50 21.1 [22.4] (0 - 0.5')
A1-48 183 (0 - 0.5')
A1-51 37.0 (0 - 0.5')
A1-58 25.2 (0 - 0.5')
A1-59 79.9 (0 - 0.5')
A1-60 0.613 (0 - 0.5')
GC-BC-01 15.9 (0 - 0.5') - 2008
A3-5 1,230 [526] (0 - 0.5')
A3-4 1,500 (0 - 0.5')
A3-3 375 (0 - 0.5')
A3-21 4,270 (0 - 0.5')
A3-9 1,540 (0 - 0.5')
A3-12 4,830 (0 - 0.5')
A3-24 5,080 (0 - 0.5')
A3-13 126 (0 - 0.5') 1,810 (0 - 0.5')
SDD-7
A1-21 26,100 (0 - 0.5')
A3-6 1,770 (0 - 4')
A3-17 2,390 (0 - 4')
A1-22 6 (0 - 0.5')
A1-24 906 (0 - 0.5')
A1-25 1,870 (0 - 0.5')
A2-1 113 (0 - 5')
A2-2 2,340 (0 - 5')
A2-11 375 (0 - 0.5')
A2-4 23.1 (0 - 0.5')
A2-10 4.86 (0 - 0.5')
A2-3 19.8 (0 - 4')
A5-3 15.9 (0 - 0.5')
A2-16 5,080 (0 - 0.5')
A2-17 3,840 (0 - 0.5')
A2-15 1,560 (0 - 0.5')
A2-7 11,700 (0 - 0.5')
A2-5 8.91 (0 - 0.5')
A2-6 126 [167] (0 - 0.5')
A2-18 1,040 (0 - 0.5')
A1-12 814 (0 - 0.5')
A1-30 5,840 (0 - 0.5')
A1-31 5,840 (0 - 0.5')
A2-14 6,300 (0 - 0.5')
A2-11 2,100 (0 - 0.5')
A2-12 3,120 (0 - 0.5')
A2-19 5,080 (0 - 0.5')
A2-8 8,730 (0 - 0.5')
A2-9 19,600 (0 - 0.5')
A2-17 414.7 [72.9] (0 - 0.5')
A2-13 2,010 (0 - 0.5')
A1-33 3.02 (0 - 0.5')
A1-18 51.8 (0 - 0.5')
A1-16 5,810 (0 - 0.5')
A1-35 11.4 (0 - 0.5')
A1-34 4.67 (0 - 0.5')
GC-BC-10 66.9 (0 - 0.5') - 2008
SDD-26 796 (0 - 0.5') 2.72 (1.5 - 2')
SDD-27 7,930 (0 - 0.5') 1,620 [1,440] (1.5 - 2')
A1-32 28.3 [45.4] (0 - 0.5')
SDD-15 6,290 (0 - 0.5') 3,030 (1.5 - 2')
A1-29 22.2 (0 - 0.5')
A1-28 62.6 (0 - 0.5')
A1-27 4,010 (0 - 0.5')
A1-26 1,700 (0 - 0.5')
A1-36 9.75 (0 - 0.5')
A1-8 5,880 (0 - 0.5')
A1-62 1,770 (0 - 0.5')
A1-57 19.3 (0 - 0.5')
A1-37 238 [398] (0 - 0.5')
A1-63 19.1 (0 - 0.5')
A1-56 17.8 (0 - 0.5')
A1-6 4,840 (0 - 0.5')
SDD-9 5,430 (0 - 0.5') 72.8 [70.3] (1.5 - 2')
A1-35 8.12 (0 - 0.5')
A1-23 7,120 (0 - 0.5')
A1-39 73.4 (0 - 0.5')
A1-5 462 (0 - 0.5')
A1-40 3.1 (0 - 0.5')
SDD-16 13,200 (0 - 0.5') 3,920 (1.5 - 2')
A1-41 71.2 (0 - 0.5')
A1-55 47.1 (0 - 0.5')
A1-38 65 (0 - 0.5')
A1-20 1,030 (0 - 0.5')
A1-61 104 (0 - 0.5')
A1-42 5.56 (0 - 0.5')
A1-17 17.8 (0 - 0.5')
A1-19 704 (0 - 0.5')
A1-44 28.8 (0 - 0.5')
A1-43 2.05 (0 - 0.5')
A1-53 60.8 (0 - 0.5')
SDD-1 2,510 (0 - 0.5') 331 (1.5 - 2')
A1-52 142 (0 - 0.5')
A1-19 820 [5,390] (0 - 0.5')
A1-45 3.07 (0 - 0.5')
A1-64 13.4 (0 - 0.5')
A1-65 13.0 (0 - 0.5')
A1-66 44.6 (0 - 0.5')
A1-68 11.8 [12.8] (0 - 0.5')
A1-69 8.61 (0 - 0.5')
A1-70 31.6 (0 - 0.5')
A1-71 25.7 (0 - 0.5')
A1-75 32.1 (0 - 0.5')
A1-74 12.3 (0 - 0.5')
A1-72 10.7 (0 - 0.5')
A1-22 13.4 [17.5] (0 - 0.5')
A1-73 31.1 [38.5] (0 - 0.5')
A1-46 2.82 (0 - 0.5')
A1-47 20.1 (0 - 0.5')

0 400' 800'
GRAPHIC SCALE

LEGEND:

- EDGE OF WATER
- DRAINAGE DITCH AND DIRECTION OF FLOW
- APPROXIMATE SOUTHERN DRAINAGE DITCH FLOW PATH DOWNSTREAM OF DEFINED CHANNEL
- PROPERTY BOUNDARY (SEE NOTE 2)
- RESIDENTIAL PROPERTY BOUNDARY
- FENCELINE
- EXISTING CONTOUR LINE
- FORMER PROCESS AREA SURFACE COVER
- SOIL REMOVAL AREA (SOIL/DEBRIS PILES AND SURFICIAL ASPHALT-LIKE MATERIALS)
- PORTIONS OF SOUTHERN DRAINAGE DITCHES THAT HAVE BEEN FILLED IN PRIOR TO OR DURING SURFACE COVER CONSTRUCTION OR REMOVAL OF SOIL AND DEBRIS PILES.
- SDD-1 MARCH 2006 SDD SAMPLE LOCATION
- GC-BC-FPT4-5'L FLOODPLAIN SOIL SAMPLE LOCATION
- A1-1 DECEMBER 2009 SAMPLE LOCATION
- A1-36 MARCH 2010 SAMPLE LOCATION
- LP-SED-1 SEDIMENT SAMPLING LOCATION
- BCWP SEDIMENT SAMPLE LOCATION
- A3-33 AUGUST 2012 GRAB SAMPLE LOCATION
- A1-53 AUGUST 2012 COMPOSITE SAMPLE LOCATION
- A1-71 NOVEMBER 2012 COMPOSITE SAMPLE LOCATION
- 51.8 (0 - 0.5') TCDD-TEQ CONCENTRATION (ppt) AND SAMPLE DEPTH INTERVAL

NOTES:

1. SITE FEATURES AND TOPOGRAPHY OBTAINED FROM PHOTOGRAMMETRIC MAPPING PROVIDED BY LOCKWOOD MAPPING COMPANY IN SEPTEMBER 2001 AND SURVEY DATA PROVIDED BY ENGINEERING DESIGN SOURCE, INC. IN JANUARY 2004, AND BASED ON AERIAL PHOTOGRAPHY PROVIDED BY LOCKWOOD MAPPING, INC. TAKEN ON NOVEMBER 22, 1996 AT AN APPROXIMATE SCALE OF 1"=500'. TOPOGRAPHY IN THE EASTERN SOUTHERN DRAINAGE DITCHES AREA BASED ON TOPOGRAPHIC FIELD SURVEY CONDUCTED IN AUGUST 2007.
2. PROPERTY BOUNDARY IS APPROXIMATE; OBTAINED FROM A COMBINATION OF SITE SURVEY DATA, HISTORICAL MAPS AND TAX MAPS.
3. THIS FIGURE SHOWS ALL SAMPLE LOCATIONS WHERE DIOXINS/FURANS HAVE BEEN ANALYZED, INCLUDING SOME LOCATIONS THAT HAVE SINCE BEEN REMOVED OR COVERED AS PART OF REMEDIATION ACTIVITIES.

BEAZER EAST, INC.
FORMER KOPPERS WOOD TREATING SITE
CARBONDALE, ILLINOIS

SUMMARY OF TCDD-TEQ CONCENTRATIONS

ARCADIS

FIGURE 2

Attachment 3

Data Validation Reports
(includes validated laboratory
data sheets)

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

Beazer East Inc.

Former Koppers Wood-Treating Site

Data Review

CARBONDALE, ILLINOIS

Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans (PCDDs/PCDFs) Analyses

SDG #: 2110011

Analyses Performed By:
Vista Analytical Laboratory
El Dorado Hills, California

Report #: 18268R
Review Level: Tier III
Project: B0039275.0000.00003

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 2110011 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC
A1-68 (0-0.5')	2110011-01	Soil	11/27/2012				X		
DUP-1	2110011-02	Soil	11/27/2012	A1-68 (0-0.5')			X		
A1-75 (0-0.5')	2110011-03	Soil	11/27/2012				X		
A1-69 (0-0.5')	2110011-04	Soil	11/27/2012				X		
A1-74 (0-0.5')	2110011-05	Soil	11/27/2012				X		
A1-70 (0-0.5')	2110011-06	Soil	11/27/2012				X		
A1-73 (0-0.5')	2110011-07	Soil	11/27/2012				X		
A1-71 (0-0.5')	2110011-08	Soil	11/27/2012				X		
A1-72 (0-0.5')	2110011-09	Soil	11/27/2012				X		
EB 112712	2110011-10	Water	11/27/2012				X		

Note: Soil sample results were reported on a dry weight basis.

Sample location A1-73 (0-0.5') is the parent sample of field duplicate sample DUP 2 which is included in SDG 2110012 (data validation report 19269R); the field duplicate sample results were evaluated within this data validation report.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290 as referenced in NYSDEC-ASP. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999 and USEPA Region II SOP associated with USEPA SW-846 Method 8290 Validating Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans by High Resolution GC/MS (SOP HW-19 Revision 1, October 2006).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected as unusable. The compound may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C

All samples were extracted and analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Target compounds were not detected above the MDL in the associated laboratory method blank; therefore detected sample results were not associated with blank contamination.

3. Mass Spectrometer Tuning

Mass spectrometer performance including instrument sensitivity and mass resolution were acceptable.

Overall system performance and gas chromatographic column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

All compounds associated with the initial calibration standards must exhibit signal-to-noise ratios (S/N) of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent relative standard deviations (%RSDs) of the relative response factors (RRFs) less than 20% for the labeled standards and less than 30% for the target compounds.

4.2 Continuing Calibration

Instrument performance must be verified at 12 hour periods after successful tune verifications. All compounds associated with the continuing calibration standard must exhibit S/N of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent differences (%D) of the RRFs less than 30% for the labeled standards and less than 20% for the target compounds..

All initial and continuing calibration criteria were within the control limits.

5. Injection Internal Standard Performance

Injection internal standards are added to all extracts prior to instrumental analysis. The injection internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the injection internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within ± fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each injection internal standard exhibit a ratio of the two identifying masses (m/z) within the method specified limits.

All injection internal standard S/N, RT, and m/z ratios were within established limits.

6. Surrogate Internal Standard Compounds

All field samples, blanks, LCS, and MS/MSD are spiked with surrogate internal standard compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The acceptance criteria require that the surrogate internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within ± fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each surrogate internal standard exhibit a calculated recovery and a ratio of the two identifying masses (m/z) within the method specified limits.

All samples exhibited surrogate internal standard acceptance criteria within the control limits.

7. Clean-up Recovery Surrogate Performance

All field samples, blanks, LCS, and MS/MSD are spiked with recovery surrogates prior to extract clean-up. Recovery surrogate acceptance criteria require that their calculated recoveries, S/N, m/z ratios, and relative retention times (RRTs) be within the method-specified acceptance limits.

All recovery surrogate recoveries S/N, m/z ratios, and RRTs were within the control limits.

8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the (optional) MS/MSD analysis should exhibit recoveries within the method-specified acceptance limits of 80-120%. The relative percent difference (RPD) between the MS and MSD results should be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater. Sample results associated with MS/MSD exceedances where the parent samples are not site-specific are not qualified.

Sample location A1-69(0-0.5') was used for the MS/MSD analysis. All compounds associated with the MS/MSD analyses exhibited acceptable recoveries and RPDs between the MS and MSD results.

9. Ongoing Precision and Recovery (OPR) Sample Analysis

The OPR analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the OPR analysis must exhibit a percent recovery within the method-specified acceptance limits.

All compounds associated with the OPR analysis exhibited recoveries within the control limits.

10. Field Duplicate Sample Analysis

Field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 50% for water matrices and 100% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

Results (in pg/g) for the field duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-68 (0-0.5') / DUP-1	2,3,7,8-TCDD	0.364 J	0.372 J	2.2 %
	1,2,3,7,8-PeCDD	2.06 J	2.56 J	21.6 %
	1,2,3,4,7,8-HxCDD	3.31	3.34	0.9 %
	1,2,3,6,7,8-HxCDD	8.83	10.7	19.2 %
	1,2,3,7,8,9-HxCDD	8.04	9.54	17.1 %
	1,2,3,4,6,7,8-HpCDD	296	317	6.9 %
	OCDD	10900 E	11200 E	2.7 %
	2,3,7,8-TCDF	0.331 J	0.287 J	14.2 %
	1,2,3,7,8-PeCDF	0.453 J	0.395 J	13.7 %
	2,3,4,7,8-PeCDF	1.04 J	1.03 J	1.0 %
	1,2,3,4,7,8-HxCDF	1.51 J	1.46 J	3.4 %
	1,2,3,6,7,8-HxCDF	1.26 J	1.12 U	AC
	2,3,4,6,7,8-HxCDF	2.12 J	2.21 J	4.2 %
	1,2,3,4,6,7,8-HpCDF	24.1	26.5	9.5 %
	1,2,3,4,7,8,9-HpCDF	1.88 J	1.84 J	2.2 %
	OCDF	82.3	88.8	7.6 %
	Total TCDD	2.11	2.33	9.9 %
	Total PeCDD	13.6	16.5	19.3 %
	Total HxCDD	73.5	84.3	13.7 %
	Total HpCDD	583	656	11.8 %
	Total TCDF	9.05	6.87	27.4 %

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
A1-68 (0-0.5') / DUP-1	Total PeCDF	22.3	19.6	12.9 %
	Total HxCDF	38.1	37.9	0.5 %
	Total HpCDF	82.7	80.6	2.6 %
	TEQ	11.8	12.8	8.1 %
A1-73 (0-0.5') / DUP 2	2,3,7,8-TCDD	0.667	0.579	14.1 %
	1,2,3,7,8-PeCDD	6.58	6.47	1.7 %
	1,2,3,4,7,8-HxCDD	9.72	12.4	24.2 %
	1,2,3,6,7,8-HxCDD	24.1	30.8	24.4 %
	1,2,3,7,8,9-HxCDD	23.7	29.5	21.8 %
	1,2,3,4,6,7,8-HpCDD	773	1160	40.0 %
	OCDD	21500 E	26800 E	21.9 %
	2,3,7,8-TCDF	0.627	0.769	20.3 %
	1,2,3,7,8-PeCDF	1.14 J	1.11 J	2.7 %
	2,3,4,7,8-PeCDF	1.38 J	1.54 J	11.0 %
	1,2,3,4,7,8-HxCDF	5.26	6.94	27.5 %
	1,2,3,6,7,8-HxCDF	5.98	7.50	22.6 %
	2,3,4,6,7,8-HxCDF	8.06	10.7	28.1 %
	1,2,3,7,8,9-HxCDF	0.984 U	1.59 J	AC
	1,2,3,4,6,7,8-HpCDF	130	186	35.4 %
	1,2,3,4,7,8,9-HpCDF	9.45	14.6	42.8 %
	OCDF	450	871	63.7 %
	Total TCDD	7.27	9.10	22.4 %
	Total PeCDD	36.2	47.1	26.2 %
	Total HxCDD	208	274	27.4 %
	Total HpCDD	1480	2150	36.9 %
	Total TCDF	16.9	20.7	20.2 %
	Total PeCDF	40.7	58.5	35.9 %
	Total HxCDF	139	205	38.4 %
	Total HpCDF	397	633	45.8 %
	TEQ	31.1	39.5	23.8 %

AC Acceptable
J Estimated (result is < RL)
U Not detected

The field duplicate sample results are acceptable.

11. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise

values, and relative retention times.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in pg/g) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
DUP-1	1,2,3,6,7,8-HxCDF	1.12 EMPC	1.12 UX
A1-69 (0-0.5')	2,3,7,8-TCDD	0.316 EMPC	0.316 UX
	1,2,3,6,7,8-HxCDF	0.808 EMPC	0.808 UX
A1-70 (0-0.5')	2,3,7,8-TCDD	0.329 EMPC	0.329 UX
A1-72 (0-0.5')	2,3,7,8-TCDD	0.185 EMPC	0.185 UX
	1,2,3,7,8-PeCDD	1.22 EMPC	1.22 UX
	2,3,4,7,8-PeCDF	0.190 EMPC	0.190 UX
	1,2,3,6,7,8-HxCDF	0.685 EMPC	0.685 UX

Sample results associated with compound that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
A1-68 (0-0.5')	OCDD	10900 E	---	10900 EJ
DUP-1	OCDD	11200 E	---	11200 EJ
A1-75 (0-0.5')	OCDD	21000 E	---	21000 EJ
A1-69 (0-0.5')	OCDD	9870 E	---	9870 EJ
A1-74 (0-0.5')	OCDD	12400 E	---	12400 EJ
A1-70 (0-0.5')	OCDD	19900 E	---	19900 EJ
A1-73 (0-0.5')	OCDD	21500 E	---	21500 EJ
A1-71 (0-0.5')	OCDD	24000 E	---	24000 EJ
A1-72 (0-0.5')	OCDD	20000 E	---	20000 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within the calibration range	D
Diluted sample result < the calibration range	DJ
Diluted sample result > the calibration range	EDJ
Original sample result > the calibration range	EJ

The analyzing laboratory noted that the compounds in the following table exhibited interference by a co-eluting furan isomer and may have concentrations that are biased high. Therefore, the following results were qualified as estimated.

Sample Location	Analyte
A1-68 (0-0.5') DUP-1 A1-75 (0-0.5') A1-69 (0-0.5') A1-74 (0-0.5') A1-73 (0-0.5')	2,3,4,7,8-PeCDF
A1-70 (0-0.5') A1-71 (0-0.5')	2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF

12. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
Ongoing Precision and Accuracy (OPR) Accuracy (%R)		X		X	
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD RPD		X		X	
Field/Laboratory Duplicate Sample RPD		X		X	
Surrogate Internal Standard Spike %R		X		X	
Recovery Surrogate Standard Spike %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSD		X		X	
Continuing calibration %D		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Signal-to-noise ratio		X		X	
Injection Internal Standard performance		X		X	
Recovery standard performance		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted for sample dilutions		X		X	
F. Compound quantification		X	X		

RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference
%D – difference

SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]					Noncompliance
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC	
2110011	11/27/2012	SW846	A1-68 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	DUP-1	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-75 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-69 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-74 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-70 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-73 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-71 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance
	11/27/2012	SW846	A1-72 (0-0.5')	Soil	---	---	No	---	---	Calibration range exceedance; EMPC
	11/27/2012	SW846	EB 112712	Water	---	---	Yes	---	---	

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable

Validation Performed By: Dennis Dyke

Signature: 

Date: January 18, 2013

Peer Review: Dennis Capria

Date: January 24, 2013

CHAIN OF CUSTODY /
LABORATORY QUALIFIERS /
CORRECTED SAMPLE ANALYSIS DATA SHEETS

CHAIN OF CUSTODY

1 OF 3

Vista

FOR LABORATORY USE ONLY Storage Secured

Laboratory Project ID: 2110011 Yes ☑ No ☐

Storage ID WR-2 Temp 0.8 °C

TAT: (Check One):
Standard: ☒ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:___

Project I.D.:_____ P.O.# B0039275.0000.00002 Sampler: I. STEWART / R. STEVENSON (Name)

Invoice to: Name DAVID BESSINGPAS Company ARCADIS Address 6602 EXCELSIOR RD. City BAXTER State MN Zip 56425 Ph# 218-829-4607 Fax#

Relinquished by: (Signature and Printed Name) RAY STEVENSON Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Bethma / Benedict B. Benedict Date: 11/29/12 Time: 1039

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29	
A1-68 (0-0.5')	11/27/12	0855		1	G	So						X										
DUP-1	11/27/12	—		1	G	So						X										
A1-75 (0-0.5')	11/27/12	0940		1	G	So						X										
A1-69 (0-0.5')	11/27/12	1010		1	G	So						X										
A1-69 (0-0.5') MS	11/27/12	1010		1	G	So						X										
A1-69 (0-0.5') MSD	11/27/12	1010		1	G	So						X										
A1-74 (0-0.5')	11/27/12	1100		1	G	So						X										
A1-70 (0-0.5')	11/27/12	1135		1	G	So						X										
A1-73 (0-0.5')	11/27/12	1210		1	G	So						X										
* DUP-2	11/27/12	—		1	G	So						X										* HOLD *

Special Instructions/Comments:
* Sample logged in to Work Order 2110018

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax:
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

2 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110011

Storage ID: WR-2

Storage Secured: Yes ☑ No ☐

Temp 0.8 °C

TAT: (Check One):

Standard: ~~X~~ 21 Days

Rush (surcharge may apply):

○ 14 days ○ 7 days Specify:___

Project I.D.:_____ P.O.# B0039275.0000.00002 Sampler: I. STEWART & R. STEVENSON (Name)

Invoice to: Name: DAVID BESSINGPAS Company: ARCADIS Address: 6602 EXCELSIOR RD. City: BAXTER State: MN Zip: 56425 Ph#: 218-829-4607 Fax#:

Relinquished by: (Signature and Printed Name) RAY STEVENSON Date: 11/28/12 Time: 1445 Received by: (Signature and Printed Name) Bethany Benedict B Benedict Date: 11/29/12 Time: 1040

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29	
A1-71 (0-0.5')	11/27/12	1330		1	G	So						X										
A1-72 (0-0.5')	11/27/12	1400		1	G	So						X										
* A1-65 (0-0.5')	11/27/12	1430		1	G	So						X										* HOLD *
* A1-64 (0-0.5')	11/27/12	1500		1	G	So						X										* HOLD *
EB 112712	11/27/12	1540		2	A	AQ						X										
* A1-79 (0-0.5')	11/28/12	0900		1	G	So						X										* HOLD *
* A1-78 (0-0.5')	11/28/12	0925		1	G	So						X										* HOLD *
* A1-77 (0-0.5')	11/28/12	0950		1	G	So						X										* HOLD *
* A1-76 (0-0.5')	11/28/12	1020		1	G	So						X										* HOLD *
* A1-67 (0-0.5')	11/28/12	1115		1	G	So						X										* HOLD *

Special Instructions/Comments:_____

* Samples logged in to WorkOrder 2110017

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax:_____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

3 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110011

Storage ID: WR-2

Storage Secured: Yes ☑ No ☐

Temp: 0.8 °C

TAT: (Check One):

Standard: ☒ 21 Days

Rush (surcharge may apply):

○ 14 days ○ 7 days Specify:___

Project I.D.:_____ P.O.# B0039275.0000.00002 Sampler: I. STEWART / R. STEVENSON (Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	ARCADIS	6602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
RAY STEVENSON	11/28/12	1445	Bethma A Benedict B. Benedict	11/29/12	1040
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 WHO-29	
* A1-66 (0-0.5')	11/28/12	1150		1	G	So						X										* HOLD *
* EB 112812	11/28/12	1400		2	A	Aq						X										

Special Instructions/Comments:

* Sample logged into WorkOrder 2110012

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax:_____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum AQ = Aqueous, O = Other_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The amount detected is above the High Calibration Limit.**
P	**The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.**
H	**Recovery was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Low Calibration Limit.**
*****	**See Cover Letter**
Conc.	**Concentration**
DL	**Sample-specific estimated detection limit**
MDL	**The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero in the matrix tested.**
EMPC	**Estimated Maximum Possible Concentration**
NA	**Not applicable**
RL	**Reporting Limit – concentrations that correspond to low calibration point**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Sample ID: A1-68 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 8:55

Sample Data
Matrix: Soil
Sample Size: 10.5 g
% Solids: 77.3

Laboratory Data
Lab Sample: 2110011-01 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 18:11 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.364			J
1,2,3,7,8-PeCDD	2.06			J
1,2,3,4,7,8-HxCDD	3.31			
1,2,3,6,7,8-HxCDD	8.83			
1,2,3,7,8,9-HxCDD	8.04			
1,2,3,4,6,7,8-HpCDD	296			
OCDD	10900			E J
2,3,7,8-TCDF	0.331			J
1,2,3,7,8-PeCDF	0.453			J
2,3,4,7,8-PeCDF	1.04			J
1,2,3,4,7,8-HxCDF	1.51			J
1,2,3,6,7,8-HxCDF	1.26			J
2,3,4,6,7,8-HxCDF	2.12			J
1,2,3,7,8,9-HxCDF	ND	0.483		
1,2,3,4,6,7,8-HpCDF	24.1			
1,2,3,4,7,8,9-HpCDF	1.88			J
OCDF	82.3			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	90.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	66.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	82.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	77.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
	13C-OCDD	96.5	40 - 135	
	13C-2,3,7,8-TCDF	83.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	77.1	40 - 135	
	13C-2,3,4,7,8-PeCDF	81.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.9	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	78.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	75.5	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	77.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	81.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	78.9	40 - 135	
	13C-OCDF	83.8	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	87.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	11.8

TOTALS

Total TCDD	2.11	3.15
Total PeCDD	13.6	14.3
Total HxCDD	73.5	
Total HpCDD	583	
Total TCDF	9.05	9.16
Total PeCDF	22.3	
Total HxCDF	38.1	
Total HpCDF	82.7	

DL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration
LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: DUP-1

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 0:00

Sample Data
Matrix: Soil
Sample Size: 10.3 g
% Solids: 78.3

Laboratory Data
Lab Sample: 2110011-02 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 18:59 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.372			J
1,2,3,7,8-PeCDD	2.56			J
1,2,3,4,7,8-HxCDD	3.34			
1,2,3,6,7,8-HxCDD	10.7			
1,2,3,7,8,9-HxCDD	9.54			
1,2,3,4,6,7,8-HpCDD	317			
OCDD	11200			E J
2,3,7,8-TCDF	0.287			J
1,2,3,7,8-PeCDF	0.395			J
2,3,4,7,8-PeCDF	1.03			J
1,2,3,4,7,8-HxCDF	1.46			J
1,2,3,6,7,8-HxCDF	ND		1.12	UX
2,3,4,6,7,8-HxCDF	2.21			J
1,2,3,7,8,9-HxCDF	ND	0.505		
1,2,3,4,6,7,8-HpCDF	26.5			
1,2,3,4,7,8,9-HpCDF	1.84			J
OCDF	88.8			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.4	40 - 135	
	13C-1,2,3,7,8-PeCDD	74.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	85.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	84.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	78.6	40 - 135	
	13C-OCDD	99.1	40 - 135	
	13C-2,3,7,8-TCDF	65.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	78.2	40 - 135	
	13C-2,3,4,7,8-PeCDF	78.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	84.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	79.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	78.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	85.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	82.4	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.6	40 - 135	
	13C-OCDF	86.9	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	82.5	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	12.8

TOTALS

Total TCDD	2.33	2.83	
Total PeCDD	16.5	17.4	
Total HxCDD	84.3		
Total HpCDD	656		
Total TCDF	6.87	8.15	
Total PeCDF	19.6	19.7	
Total HxCDF	37.9	39.0	
Total HpCDF	80.6	81.4	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-75 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 9:40

Sample Data
Matrix: Soil
Sample Size: 10.7 g
% Solids: 74.9

Laboratory Data
Lab Sample: 2110011-03 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 19:47 Column: ZB-5 Analyst: MAS
07-Dec-12 11:50 Column: DB-225 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	1.25			
1,2,3,7,8-PeCDD	8.18			
1,2,3,4,7,8-HxCDD	9.48			
1,2,3,6,7,8-HxCDD	20.8			
1,2,3,7,8,9-HxCDD	33.7			
1,2,3,4,6,7,8-HpCDD	817			
OCDD	21000			E J
2,3,7,8-TCDF	0.760			
1,2,3,7,8-PeCDF	0.682			J
2,3,4,7,8-PeCDF	0.568			J
1,2,3,4,7,8-HxCDF	2.32			J
1,2,3,6,7,8-HxCDF	2.12			J
2,3,4,6,7,8-HxCDF	3.58			
1,2,3,7,8,9-HxCDF	ND	0.277		
1,2,3,4,6,7,8-HpCDF	62.4			
1,2,3,4,7,8,9-HpCDF	4.42			
OCDF	340			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	96.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	78.1	40 - 135	
	13C-OCDD	116	40 - 135	
	13C-2,3,7,8-TCDF	83.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	88.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	83.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	79.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	81.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.7	40 - 135	
	13C-OCDF	94.1	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	91.7	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin 32.1

TOTALS

Total TCDD	7.82	8.06	
Total PeCDD	37.4		
Total HxCDD	204		
Total HpCDD	1730		
Total TCDF	16.3	17.7	
Total PeCDF	40.6		
Total HxCDF	64.4		
Total HpCDF	227		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-69 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 10:10

Sample Data
Matrix: Soil
Sample Size: 10.1 g
% Solids: 79.5

Laboratory Data
Lab Sample: 2110011-04 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0009 Date Extracted: 04-Dec-2012 15:00
Date Analyzed : 07-Dec-12 00:35 Column: ZB-5 Analyst: MAS
07-Dec-12 13:59 Column: DB-225 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.316	UX
1,2,3,7,8-PeCDD	1.53			J
1,2,3,4,7,8-HxCDD	2.15			J
1,2,3,6,7,8-HxCDD	5.83			
1,2,3,7,8,9-HxCDD	5.35			
1,2,3,4,6,7,8-HpCDD	205			
OCDD	9870			E J
2,3,7,8-TCDF	0.555			J
1,2,3,7,8-PeCDF	0.429			J
2,3,4,7,8-PeCDF	0.654			J
1,2,3,4,7,8-HxCDF	1.16			J
1,2,3,6,7,8-HxCDF	ND		0.808	UX
2,3,4,6,7,8-HxCDF	1.24			J
1,2,3,7,8,9-HxCDF	ND	0.390		
1,2,3,4,6,7,8-HpCDF	19.7			
1,2,3,4,7,8,9-HpCDF	1.42			J
OCDF	60.9			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	97.0	40 - 135	
	13C-1,2,3,7,8-PeCDD	83.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	78.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.0	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	79.3	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	90.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	86.2	40 - 135	
	13C-2,3,4,7,8-PeCDF	94.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	76.0	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	75.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	79.3	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	89.1	40 - 135	
	13C-OCDF	92.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	91.7	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin 8.61

TOTALS

Total TCDD	3.73	5.11	
Total PeCDD	15.9		
Total HxCDD	61.3		
Total HpCDD	439		
Total TCDF	7.12	9.14	
Total PeCDF	9.72		
Total HxCDF	19.3	20.1	
Total HpCDF	58.5		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-74 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 11:00

Sample Data
Matrix: Soil
Sample Size: 10.5 g
% Solids: 77.2

Laboratory Data
Lab Sample: 2110011-05 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 20:35 Column: ZB-5 Analyst: MAS
07-Dec-12 12:22 Column: DB-225 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.259			J
1,2,3,7,8-PeCDD	2.03			J
1,2,3,4,7,8-HxCDD	3.19			
1,2,3,6,7,8-HxCDD	7.64			
1,2,3,7,8,9-HxCDD	6.97			
1,2,3,4,6,7,8-HpCDD	316			
OCDD	12400			E J
2,3,7,8-TCDF	0.821			
1,2,3,7,8-PeCDF	0.709			J
2,3,4,7,8-PeCDF	1.00			J
1,2,3,4,7,8-HxCDF	1.98			J
1,2,3,6,7,8-HxCDF	1.65			J
2,3,4,6,7,8-HxCDF	2.17			J
1,2,3,7,8,9-HxCDF	ND	0.375		
1,2,3,4,6,7,8-HpCDF	30.6			
1,2,3,4,7,8,9-HpCDF	2.21			J
OCDF	107			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.7	40 - 135	
	13C-1,2,3,7,8-PeCDD	76.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	76.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	72.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	73.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	74.4	40 - 135	
	13C-OCDD	97.0	40 - 135	
	13C-2,3,7,8-TCDF	78.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	81.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	85.2	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	76.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	71.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	72.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	76.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	74.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	82.8	40 - 135	
	13C-OCDF	86.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	83.7	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin 12.3

TOTALS

Total TCDD	1.87	5.43
Total PeCDD	16.4	18.2
Total HxCDD	81.9	84.0
Total HpCDD	709	
Total TCDF	16.1	17.1
Total PeCDF	19.7	
Total HxCDF	36.4	
Total HpCDF	97.7	98.6

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-70 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 11:35

Sample Data
Matrix: Soil
Sample Size: 10.4 g
% Solids: 77.4

Laboratory Data
Lab Sample: 2110011-06 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 21:23 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.329	UX
1,2,3,7,8-PeCDD	4.04			
1,2,3,4,7,8-HxCDD	8.26			
1,2,3,6,7,8-HxCDD	29.7			
1,2,3,7,8,9-HxCDD	21.0			
1,2,3,4,6,7,8-HpCDD	897			
OCDD	19900			E J
2,3,7,8-TCDF	0.336			J
1,2,3,7,8-PeCDF	0.721			J
2,3,4,7,8-PeCDF	0.609			J
1,2,3,4,7,8-HxCDF	11.7			
1,2,3,6,7,8-HxCDF	7.16			
2,3,4,6,7,8-HxCDF	14.3			
1,2,3,7,8,9-HxCDF	1.63			J
1,2,3,4,6,7,8-HpCDF	254			
1,2,3,4,7,8,9-HpCDF	26.5			
OCDF	576			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	78.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	68.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	75.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	72.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	74.1	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.9	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	71.5	40 - 135	
	13C-1,2,3,7,8-PeCDF	73.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	82.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	75.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	73.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	73.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	77.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	79.6	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	85.8	40 - 135	
	13C-OCDF	92.2	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	79.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	31.6

TOTALS

Total TCDD	1.46	3.03	
Total PeCDD	21.9	22.6	
Total HxCDD	157		
Total HpCDD	1450		
Total TCDF	2.86	5.74	
Total PeCDF	25.7		
Total HxCDF	281	281	
Total HpCDF	849		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-73 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 12:10

Sample Data
Matrix: Soil
Sample Size: 10.2 g
% Solids: 78.6

Laboratory Data
Lab Sample: 2110011-07 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 22:11 Column: ZB-5 Analyst: MAS
07-Dec-12 12:54 Column: DB-225 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.667			
1,2,3,7,8-PeCDD	6.58			
1,2,3,4,7,8-HxCDD	9.72			
1,2,3,6,7,8-HxCDD	24.1			
1,2,3,7,8,9-HxCDD	23.7			
1,2,3,4,6,7,8-HpCDD	773			
OCDD	21500			E J
2,3,7,8-TCDF	0.627			
1,2,3,7,8-PeCDF	1.14			J
2,3,4,7,8-PeCDF	1.38			J
1,2,3,4,7,8-HxCDF	5.26			
1,2,3,6,7,8-HxCDF	5.98			
2,3,4,6,7,8-HxCDF	8.06			
1,2,3,7,8,9-HxCDF	ND	0.984		
1,2,3,4,6,7,8-HpCDF	130			
1,2,3,4,7,8,9-HpCDF	9.45			
OCDF	450			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	70.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	62.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	63.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	61.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	61.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	68.0	40 - 135	
	13C-OCDD	84.9	40 - 135	
	13C-2,3,7,8-TCDF	66.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	66.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	71.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	61.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	58.9	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	60.1	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	65.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	64.2	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	73.7	40 - 135	
	13C-OCDF	69.7	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	70.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	31.1

TOTALS

Total TCDD	7.27	8.45	
Total PeCDD	36.2	39.7	
Total HxCDD	208		
Total HpCDD	1480		
Total TCDF	16.9	17.8	
Total PeCDF	40.7	42.2	
Total HxCDF	139	140	
Total HpCDF	397		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-71 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 13:30

Sample Data
Matrix: Soil
Sample Size: 10.3 g
% Solids: 77.5

Laboratory Data
Lab Sample: 2110011-08 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 22:59 Column: ZB-5 Analyst: MAS
07-Dec-12 13:27 Column: DB-225 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.561			J
1,2,3,7,8-PeCDD	4.16			
1,2,3,4,7,8-HxCDD	7.01			
1,2,3,6,7,8-HxCDD	17.9			
1,2,3,7,8,9-HxCDD	16.4			
1,2,3,4,6,7,8-HpCDD	653			
OCDD	24000			E J
2,3,7,8-TCDF	1.22			
1,2,3,7,8-PeCDF	1.03			J
2,3,4,7,8-PeCDF	2.48			J
1,2,3,4,7,8-HxCDF	3.85			
1,2,3,6,7,8-HxCDF	3.19			
2,3,4,6,7,8-HxCDF	5.05			
1,2,3,7,8,9-HxCDF	0.275			J
1,2,3,4,6,7,8-HpCDF	82.8			
1,2,3,4,7,8,9-HpCDF	5.77			
OCDF	319			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	87.1	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.8	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.0	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	78.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	86.1	40 - 135	
	13C-OCDD	116	40 - 135	
	13C-2,3,7,8-TCDF	81.0	40 - 135	
	13C-1,2,3,7,8-PeCDF	83.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	91.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	80.4	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	78.4	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	77.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	86.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	94.6	40 - 135	
	13C-OCDF	94.8	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	84.2	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	25.7

TOTALS

Total TCDD	12.2	13.3	
Total PeCDD	34.2		
Total HxCDD	162		
Total HpCDD	1570		
Total TCDF	27.0	27.5	
Total PeCDF	38.2		
Total HxCDF	91.3	91.9	
Total HpCDF	273		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: A1-72 (0-0.5')

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 14:00

Sample Data
Matrix: Soil
Sample Size: 10.4 g
% Solids: 77.7

Laboratory Data
Lab Sample: 2110011-09 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0001 Date Extracted: 03-Dec-2012 8:36
Date Analyzed : 06-Dec-12 23:47 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.185	UX
1,2,3,7,8-PeCDD	ND		1.22	UX
1,2,3,4,7,8-HxCDD	2.77			J
1,2,3,6,7,8-HxCDD	6.08			
1,2,3,7,8,9-HxCDD	6.66			
1,2,3,4,6,7,8-HpCDD	269			
OCDD	20000			E J
2,3,7,8-TCDF	0.157			J
1,2,3,7,8-PeCDF	ND	0.235		
2,3,4,7,8-PeCDF	ND		0.190	UX
1,2,3,4,7,8-HxCDF	0.844			J
1,2,3,6,7,8-HxCDF	ND		0.685	UX
2,3,4,6,7,8-HxCDF	1.18			J
1,2,3,7,8,9-HxCDF	ND	0.316		
1,2,3,4,6,7,8-HpCDF	19.4			
1,2,3,4,7,8,9-HpCDF	1.39			J
OCDF	78.7			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	90.6	40 - 135	
	13C-1,2,3,7,8-PeCDD	77.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	74.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	75.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.0	40 - 135	
	13C-OCDD	108	40 - 135	
	13C-2,3,7,8-TCDF	83.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	87.7	40 - 135	
	13C-2,3,4,7,8-PeCDF	88.3	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	77.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	73.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	73.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	78.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	93.0	40 - 135	
	13C-OCDF	84.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	87.9	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	10.7

TOTALS

Total TCDD	1.25	2.11
Total PeCDD	9.91	11.7
Total HxCDD	57.5	
Total HpCDD	588	
Total TCDF	1.78	2.49
Total PeCDF	4.96	5.35
Total HxCDF	20.4	21.1
Total HpCDF	62.4	

DL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 17-Dec-2012 11:44

Sample ID: EB 112712

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 15:40

Sample Data
Matrix: Aqueous
Sample Size: 1.01 L

Laboratory Data
Lab Sample: 2110011-10 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0033 Date Extracted: 12-Dec-2012 10:12
Date Analyzed : 13-Dec-12 20:39 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND	0.755		
1,2,3,7,8-PeCDD	ND	1.01		
1,2,3,4,7,8-HxCDD	ND	1.15		
1,2,3,6,7,8-HxCDD	ND	1.35		
1,2,3,7,8,9-HxCDD	ND	1.56		
1,2,3,4,6,7,8-HpCDD	ND	1.97		
OCDD	ND	1.78		
2,3,7,8-TCDF	ND	0.858		
1,2,3,7,8-PeCDF	ND	0.728		
2,3,4,7,8-PeCDF	ND	0.684		
1,2,3,4,7,8-HxCDF	ND	0.537		
1,2,3,6,7,8-HxCDF	ND	0.532		
2,3,4,6,7,8-HxCDF	ND	0.559		
1,2,3,7,8,9-HxCDF	ND	0.817		
1,2,3,4,6,7,8-HpCDF	ND	0.639		
1,2,3,4,7,8,9-HpCDF	ND	0.929		
OCDF	ND	2.34		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	81.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	67.4	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	67.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	71.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	63.4	32 - 141	
	13C-1,2,3,4,6,7,8-HpCDD	60.0	40 - 135	
	13C-OCDD	53.0	40 - 135	
	13C-2,3,7,8-TCDF	85.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	62.9	40 - 135	
	13C-2,3,4,7,8-PeCDF	73.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	69.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	71.2	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	74.7	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	66.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	61.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	59.4	40 - 135	
	13C-OCDF	55.4	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	96.6	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin 0.00

TOTALS

Total TCDD	ND	0.755
Total PeCDD	ND	1.01
Total HxCDD	ND	1.56
Total HpCDD	ND	1.97
Total TCDF	ND	0.858
Total PeCDF	ND	0.728
Total HxCDF	ND	0.817
Total HpCDF	ND	0.929

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

Approved By: William Luksemburg 17-Dec-2012 11:44

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Beazer East Inc.

Former Koppers Wood-Treating Site

Data Review

CARBONDALE, ILLINOIS

Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans (PCDDs/PCDFs) Analyses

SDG #: 2110012

Analyses Performed By:
Vista Analytical Laboratory
El Dorado Hills, California

Report #: 18269R
Review Level: Tier III
Project: B0039275.0000.00003

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 2110012 for samples collected in association with the Beazer East Inc. Former Koppers Wood-Treating site. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC
DUP 2	2110012-01	Soil	11/27/2012	A1-73 (0-0.5')			X		
A1-65 (0-0.5)	2110012-02	Soil	11/27/2012				X		
A1-64 (0-0.5)	2110012-03	Soil	11/27/2012				X		
A1-67 (0-0.5)	2110012-08	Soil	11/28/2012				X		
A1-66 (0-0.5)	2110012-09	Soil	11/28/2012				X		
EB 112812	2110012-10	Water	11/28/2012				X		

Note: Soil sample results were reported on a dry weight basis.

The parent sample of field duplicate sample DUP 2 (sample location A1-73 (0-0.5')) is from SDG 2110011; the field duplicate sample results were evaluated with SDG 2110011 in data validation report 18268R.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8290 as referenced in NYSDEC-ASP. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999 and USEPA Region II SOP associated with USEPA SW-846 Method 8290 Validating Polychlorinated Dibenzo-Dioxins and Polychlorinated Dibenzo-Furans by High Resolution GC/MS (SOP HW-19 Revision 1, October 2006).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected as unusable. The compound may or may not be present in the sample.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED DIBENZODIOXINS AND POLYCHLORINATED DIBENZOFURANS (PCDD/PCDF) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8290	Water	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C
	Soil	30 days from collection to extraction and 45 days from extraction to analysis	Cool to 4±2 °C

All samples were extracted and analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Target compounds were detected in the associated QA blanks; however, the associated sample results were greater than the BA. Therefore, sample results greater than the BAL resulted in the removal of the laboratory qualifier (B). No other qualification of the sample results was required.

3. Mass Spectrometer Tuning

Mass spectrometer performance including instrument sensitivity and mass resolution were acceptable.

Overall system performance and gas chromatographic column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

All compounds associated with the initial calibration standards must exhibit signal-to-noise ratios (S/N) of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent relative

standard deviations (%RSDs) of the relative response factors (RRFs) less than 20% for the labeled standards and less than 30% for the target compounds.

4.2 Continuing Calibration

Instrument performance must be verified at 12 hour periods after successful tune verifications. All compounds associated with the continuing calibration standard must exhibit S/N of at least 2.5, isotopic ratios within the limits listed in table eight of the method, and percent differences (%D) of the RRFs less than 30% for the labeled standards and less than 20% for the target compounds..

All initial and continuing calibration criteria were within the control limits.

5. Injection Internal Standard Performance

Injection internal standards are added to all extracts prior to instrumental analysis. The injection internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria require the injection internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within ± fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each injection internal standard exhibit a ratio of the two identifying masses (m/z) within the method specified limits.

All injection internal standard S/N, RT, and m/z ratios were within established limits.

6. Surrogate Internal Standard Compounds

All field samples, blanks, LCS, and MS/MSD are spiked with surrogate internal standard compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The acceptance criteria require that the surrogate internal standard compounds exhibit a signal-to-noise (S/N) ratio of at least 10 and elute within ± fifteen seconds of the retention times (RTs) established during calibration. The acceptance criteria also specify that each surrogate internal standard exhibit a calculated recovery and a ratio of the two identifying masses (m/z) within the method specified limits.

Sample locations associated with surrogate internal standard compounds exhibiting recoveries outside of the control limits presented in the following table.

Sample Location	Surrogate	Recovery
DUP 2 A1-65 (0-0.5) A1-64 (0-0.5) A1-66 (0-0.5)	13C-OCDD	> UL
A1-67 (0-0.5)	13C-OCDD 13C-OCDF	> UL

UL Upper control limit

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of any surrogate internal standard compound deviations, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	No Action
	Detect	J
< LL but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

7. Clean-up Recovery Surrogate Performance

All field samples, blanks, LCS, and MS/MSD are spiked with recovery surrogates prior to extract clean-up. Recovery surrogate acceptance criteria require that their calculated recoveries, S/N, m/z ratios, and relative retention times (RRTs) be within the method-specified acceptance limits.

All recovery surrogate recoveries S/N, m/z ratios, and RRTs were within the control limits.

8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the (optional) MS/MSD analysis should exhibit recoveries within the method-specified acceptance limits of 80-120%. The relative percent difference (RPD) between the MS and MSD results should be within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater. Sample results associated with MS/MSD exceedances where the parent samples are not site-specific are not qualified.

Sample location A1-67(0-0.5) was used for the MS/MSD analysis. All compounds associated with the MS/MSD analyses exhibited acceptable recoveries and RPDs between the MS and MSD results.

9. Ongoing Precision and Recovery (OPR) Sample Analysis

The OPR analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the OPR analysis must exhibit a percent recovery within the method-specified acceptance limits.

All compounds associated with the OPR analysis exhibited recoveries within the control limits.

10. Field Duplicate Sample Analysis

Field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. A control limit of 50% for water matrices and 100% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

The field duplicate sample results were evaluated with SDG 2110011 in Data Validation Report 18268R.

11. Compound Identification

PCDD/PCDF compounds are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

An estimated maximum possible concentration (EMPC) designation is given to compounds which have signals eluting within the established retention time window which would, if positively identified, be greater than the detection limit. The signals do not, however, meet the ion abundance ratio criteria and therefore cannot be identified as the compound of interest. The EMPC value is the estimated concentration of the interferant quantitated "as the compound of interest". This value should be considered an elevated detection limit based on potential compound identification and quantitation interference. The "UX" qualifier has been added to the following sample results (in pg/g) to indicate the elevated detection limit as EMPC.

Sample ID	Compound	Laboratory Result	Reported Result
A1-65 (0-0.5)	2,3,7,8-TCDD	0.269 EMPC	0.269 UX

Sample results associated with compound that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compound	Original Analysis	Diluted Analysis	Reported Analysis
DUP 2	OCDD	26800 E	---	26800 EJ
A1-65 (0-0.5)	OCDD	12700 E	---	12700 EJ
A1-64 (0-0.5)	OCDD	17700 E	---	17700 EJ
A1-67 (0-0.5)	1,2,3,4,6,7,8-HpCDD	5010 E	---	5010 EJ
	OCDD	170000 DE	---	170000 DEJ
A1-66 (0-0.5)	OCDD	30900 E	---	30900 EJ

Note: In the instance where both the original analysis and the diluted analysis sample results exhibited a concentration greater than and/or less than the calibration linear range of the instrument; the sample result exhibiting the greatest concentration will be reported as the final result.

Sample results associated with compounds exhibiting concentration greater than the linear range qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within the calibration range	D
Diluted sample result < the calibration range	DJ
Diluted sample result > the calibration range	EDJ
Original sample result > the calibration range	EJ

The analyzing laboratory noted that the compounds in the following table exhibited interference by a co-eluting furan isomer and may have concentrations that are biased high. Therefore, the following results were qualified as estimated.

Sample Location	Analyte
DUP 2 A1-65 (0-0.5)	2,3,4,7,8-PeCDF
A1-64 (0-0.5) A1-67 (0-0.5) A1-66 (0-0.5)	2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF

12. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCDD/PCDF

PCDDs/PCDFs; SW-846 8290	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
Ongoing Precision and Accuracy (OPR) Accuracy (%R)		X		X	
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD RPD		X		X	
Field/Laboratory Duplicate Sample RPD		X		X	
Surrogate Internal Standard Spike %R		X	X		
Recovery Surrogate Standard Spike %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSD		X		X	
Continuing calibration %D		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Signal-to-noise ratio		X		X	
Injection Internal Standard performance		X		X	
Recovery standard performance		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted for sample dilutions		X		X	
F. Compound quantification		X	X		

RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference
%D – difference

SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]					Noncompliance
					VOC	SVOC	PCDDs/ PCDFs	MET	MISC	
2110012	11/27/2012	SW846	DUP 2	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/27/2012	SW846	A1-65 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance; EMPC
	11/27/2012	SW846	A1-64 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/28/2012	SW846	A1-67 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance
	11/28/2012	SW846	A1-66 (0-0.5)	Soil	---	---	No	---	---	Surrogate Internal Standard %R; Calibration range exceedance; Analyte interference
	11/28/2012	SW846	EB 112812	Water	---	---	Yes	---	---	

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable

Validation Performed By: Dennis Dyke

Signature: 

Date: January 18, 2013

Peer Review: Dennis Capria

Date: January 24, 2013

CHAIN OF CUSTODY /
LABORATORY QUALIFIERS /
CORRECTED SAMPLE ANALYSIS DATA SHEETS

CHAIN OF CUSTODY

1 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110012

Storage Secured: Yes ☑ No ☐

Storage ID: WR-2 Temp: 0.9 °C

TAT: (Check One):
Standard: ⊘ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:

Project I.D.: _____ P.O.# B003975.0000.00002 Sampler: I. STEWART / R. STEVENSON (Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	ARCADIS	16602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
RAY STEVENSON	11/28/12	1445	Nathan D. Benedict	11/29/12	1039
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1614 PBDE	CARB429 PAH	CARB429 WHO-29	
* A1-68 (0-0.5')	11/27/12	0855		1	G	So						X										
* DUP-1	11/27/12	—		1	G	So						X										
* A1-75 (0-0.5')	11/27/12	0940		1	G	So						X										
* A1-69 (0-0.5')	11/27/12	1010		1	G	So						X										
* A1-69 (0-0.5') MS	11/27/12	1010		1	G	So						X										
* A1-69 (0-0.5') MSD	11/27/12	1010		1	G	So						X										
* A1-74 (0-0.5')	11/27/12	1100		1	G	So						X										
* A1-70 (0-0.5')	11/27/12	1135		1	G	So						X										
* A1-73 (0-0.5')	11/27/12	1210		1	G	So						X										
DUP-2	11/27/12	—		1	G	So						X										* HOLD *

Special Instructions/Comments:
* Samples logged in to Workorder 2110011

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 16602 EXCELSIOR RD
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax: _____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

CHAIN OF CUSTODY

2 OF 3

FOR LABORATORY USE ONLY — Storage Secured: Yes ☒ No ☐

Laboratory Project ID: 2110012 — Storage ID: WR-2 — Temp 0.8 °C

TAT: (Check One): Standard: ○ 21 Days — Rush (surcharge may apply): ○ 14 days ○ 7 days Specify:

Project I.D.: _____ P.O.# B0039275.0000.00002 Sampler: I. STEWART & R. STEVENSON (Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	ARCADIS	6602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
KAY STEVENSON	11/28/12	1445	[illegible]	11/29/12	1040
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

	Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 WHO-29	
*	A1-71 (0-0.5')	11/27/12	1330		1	G	So			X													
*	A1-72 (0-0.5')	11/27/12	1400		1	G	So			X													
	A1-65 (0-0.5')	11/27/12	1430		1	G	So			X													* HOLD *
	A1-64 (0-0.5')	11/27/12	1500		1	G	So			X													* HOLD *
*	EB 112712	11/27/12	1540		2	A	AQ			X													
	A1-79 (0-0.5')	11/28/12	0900		1	G	So			X													* HOLD *
	A1-78 (0-0.5')	11/28/12	0925		1	G	So			X													* HOLD *
	A1-77 (0-0.5)	11/28/12	0950		1	G	So			X													* HOLD *
	A1-76 (0-0.5')	11/28/12	1020		1	G	So			X													* HOLD *
	A1-67 (0-0.5')	11/28/12	1115		1	G	So			X													* HOLD *

Special Instructions/Comments:
* Sample logged in to Work Order 2110011

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax: _____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other _____

*Bottle Preservative Type: T = Thiosulfate,
O = Other _____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper,
SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum
AQ = Aqueous, O = Other _____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

Vista

CHAIN OF CUSTODY

3 OF 3

FOR LABORATORY USE ONLY

Laboratory Project ID: 2110012

Storage ID WR-2

Storage Secured: Yes ☒ No ☐

Temp 0.8 °C

TAT: (Check One):
Standard: ⊘ 21 Days
Rush (surcharge may apply):
○ 14 days ○ 7 days Specify:___

Project I.D.:_____ P.O.# B0039275.0000.00002 Sampler: I. STEWART / R. STEVENSON (Name)

Invoice to: Name	Company	Address	City	State	Zip	Ph#	Fax#
DAVID BESSINGPAS	ARCADIS	6602 EXCELSIOR RD.	BAXTER	MN	56425	218-829-4607	

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
RAY STEVENSON	11/28/12	1445	[illegible]	11/29/12	1040
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

See "Sample Log-in Checklist" for additional sample information

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 • Fax (916) 673-0106

ATTN:_____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Sample ID	Date	Time	Location/Sample Description	Container(s) Quantity	Type	Matrix	EPA1613 2378-TCDD	EPA1613 2378-TCDD/TCDF	EPA1613 PCDD/PCDF	EPA8290 2378-TCDD	EPA8290 2378-TCDD/TCDF	EPA8290 PCDD/PCDF	EPA8280 2378-TCDD	EPA8280 2378-TCDD/TCDF	EPA8280 PCDD/PCDF	EPA1668 TOTALS	EPA1668 COPLANAR PCB's	EPA1668 209 CONGENERS	EPA1668 PBDE	EPA1614 PAH	CARB429 WHO-29	
A1-66 (0-0.5')	11/28/12	1150		1	G	So						X										*HOLD*
* EB 112812	11/28/12	1400		2	A	Aq						X										

Special Instructions/Comments:
* Sample logged in to $WorkOrder 2110011
11/30/12 moved "EB112812" to 2110012 as per Bill

SEND DOCUMENTATION AND RESULTS TO:

Name: DAVID BESSINGPAS
Company: ARCADIS
Address: 6602 EXCELSIOR RD.
City: BAXTER State: MN Zip: 56425
Phone: 218-829-4607 Fax:_____
Email: DAVID.BESSINGPAS@ARCADIS-US.COM

Container Types: A = 1 Liter Amber, G = Glass Jar
P = PUF, T = MM5 Train, O= Other_____

*Bottle Preservative Type: T = Thiosulfate,
O = Other_____

Matrix Types: DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum AQ = Aqueous, O = Other_____

WHITE - ORIGINAL YELLOW - ARCHIVE PINK - COPY

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The amount detected is above the High Calibration Limit.**
P	**The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.**
H	**Recovery was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Low Calibration Limit.**
*****	**See Cover Letter**
Conc.	**Concentration**
DL	**Sample-specific estimated detection limit**
MDL	**The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero in the matrix tested.**
EMPC	**Estimated Maximum Possible Concentration**
NA	**Not applicable**
RL	**Reporting Limit – concentrations that correspond to low calibration point**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Sample ID: DUP 2

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 0:00

Sample Data
Matrix: Soil
Sample Size: 13.3 g
% Solids: 76.6

Laboratory Data
Lab Sample: 2110012-01 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 02-Jan-13 17:57 Column: DB-225 Analyst: MAS
29-Dec-12 17:26 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.579			
1,2,3,7,8-PeCDD	6.47			
1,2,3,4,7,8-HxCDD	12.4			
1,2,3,6,7,8-HxCDD	30.8			
1,2,3,7,8,9-HxCDD	29.5			
1,2,3,4,6,7,8-HpCDD	1160			
OCDD	26800			~~B~~, E J
2,3,7,8-TCDF	0.769			
1,2,3,7,8-PeCDF	1.11			J
2,3,4,7,8-PeCDF	1.54			J
1,2,3,4,7,8-HxCDF	6.94			
1,2,3,6,7,8-HxCDF	7.50			
2,3,4,6,7,8-HxCDF	10.7			
1,2,3,7,8,9-HxCDF	1.59			J
1,2,3,4,6,7,8-HpCDF	186			
1,2,3,4,7,8,9-HpCDF	14.6			
OCDF	871			
TOTALS				
Total TCDD	9.10		10.2	
Total PeCDD	47.1			
Total HxCDD	274			
Total HpCDD	2150			
Total TCDF	20.7		23.7	
Total PeCDF	58.5			
Total HxCDF	205			
Total HpCDF	633			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	82.3	40 - 135	
	13C-1,2,3,7,8-PeCDD	81.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	80.3	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	79.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	79.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	84.3	40 - 135	
	13C-OCDD	209	40 - 135	H
	13C-2,3,7,8-TCDF	79.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	79.0	40 - 135	
	13C-2,3,4,7,8-PeCDF	85.0	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	89.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.3	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	78.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	80.3	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	81.9	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	92.4	40 - 135	
	13C-OCDF	107	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	72.3	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	39.5

DL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration
LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-65 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 14:30

Sample Data
Matrix: Soil
Sample Size: 12.9 g
% Solids: 78.4

Laboratory Data
Lab Sample: 2110012-02 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 29-Dec-12 18:14 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND		0.269	UX
1,2,3,7,8-PeCDD	2.04			J
1,2,3,4,7,8-HxCDD	3.52			
1,2,3,6,7,8-HxCDD	10.1			
1,2,3,7,8,9-HxCDD	8.17			
1,2,3,4,6,7,8-HpCDD	358			
OCDD	12700			~~B,~~ E J
2,3,7,8-TCDF	0.408			J
1,2,3,7,8-PeCDF	0.336			J
2,3,4,7,8-PeCDF	0.778			J
1,2,3,4,7,8-HxCDF	1.93			J
1,2,3,6,7,8-HxCDF	1.42			J
2,3,4,6,7,8-HxCDF	2.32			J
1,2,3,7,8,9-HxCDF	0.193			J
1,2,3,4,6,7,8-HpCDF	41.3			
1,2,3,4,7,8,9-HpCDF	3.13			
OCDF	169			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	86.8	40 - 135	
	13C-1,2,3,7,8-PeCDD	85.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	79.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	73.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	74.5	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	77.2	40 - 135	
	13C-OCDD	176	40 - 135	H
	13C-2,3,7,8-TCDF	79.1	40 - 135	
	13C-1,2,3,7,8-PeCDF	80.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	82.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	88.1	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	81.7	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	79.8	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	83.2	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	83.7	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
	13C-OCDF	97.7	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	85.0	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	13.0

TOTALS

Total TCDD	5.82	6.85	
Total PeCDD	17.9		
Total HxCDD	89.8		
Total HpCDD	832		
Total TCDF	8.38	9.37	
Total PeCDF	14.8		
Total HxCDF	47.4		
Total HpCDF	138		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-64 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 27-Nov-2012 15:00

Sample Data
Matrix: Soil
Sample Size: 12.7 g
% Solids: 79.4

Laboratory Data
Lab Sample: 2110012-03 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 02-Jan-13 18:29 Column: DB-225 Analyst: MAS
29-Dec-12 19:03 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.301			J
1,2,3,7,8-PeCDD	1.64			J
1,2,3,4,7,8-HxCDD	2.88			
1,2,3,6,7,8-HxCDD	7.22			
1,2,3,7,8,9-HxCDD	6.96			
1,2,3,4,6,7,8-HpCDD	344			
OCDD	17700			~~B~~, E J
2,3,7,8-TCDF	0.652			
1,2,3,7,8-PeCDF	0.419			J
2,3,4,7,8-PeCDF	0.524			J
1,2,3,4,7,8-HxCDF	1.48			J
1,2,3,6,7,8-HxCDF	1.09			J
2,3,4,6,7,8-HxCDF	1.76			J
1,2,3,7,8,9-HxCDF	0.139			J
1,2,3,4,6,7,8-HpCDF	25.8			
1,2,3,4,7,8,9-HpCDF	1.88			J
OCDF	112			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	79.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	83.1	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	87.0	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	80.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.4	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	81.6	40 - 135	
	13C-OCDD	201	40 - 135	H
	13C-2,3,7,8-TCDF	75.6	40 - 135	
	13C-1,2,3,7,8-PeCDF	81.6	40 - 135	
	13C-2,3,4,7,8-PeCDF	86.5	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	90.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	80.5	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	79.9	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	82.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	84.0	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	96.4	40 - 135	
	13C-OCDF	105	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	69.4	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	13.4

TOTALS

Total TCDD	9.13	10.5	
Total PeCDD	18.4		
Total HxCDD	75.2		
Total HpCDD	759		
Total TCDF	9.56	11.8	
Total PeCDF	13.3		
Total HxCDF	31.5		
Total HpCDF	88.7		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

The results are reported in dry weight.

The sample size is reported in wet weight.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-67 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 11:15

Sample Data
Matrix: Soil
Sample Size: 12.3 g
% Solids: 81.7

Laboratory Data
Lab Sample: 2110012-08 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 29-Dec-12 20:39 Column: ZB-5 Analyst: MAS
29-Dec-12 21:27 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.782			
1,2,3,7,8-PeCDD	10.5			
1,2,3,4,7,8-HxCDD	31.4			
1,2,3,6,7,8-HxCDD	95.0			
1,2,3,7,8,9-HxCDD	79.3			
1,2,3,4,6,7,8-HpCDD	5010			E J
OCDD	170000			D, ~~B~~, E J
2,3,7,8-TCDF	0.479			J
1,2,3,7,8-PeCDF	0.807			J
2,3,4,7,8-PeCDF	1.58			J
1,2,3,4,7,8-HxCDF	7.87			
1,2,3,6,7,8-HxCDF	5.54			
2,3,4,6,7,8-HxCDF	11.1			
1,2,3,7,8,9-HxCDF	0.737			J
1,2,3,4,6,7,8-HpCDF	468			
1,2,3,4,7,8,9-HpCDF	29.3			
OCDF	3970			J
TOTALS				
Total TCDD	4.51		5.46	
Total PeCDD	52.5			
Total HxCDD	601			
Total HpCDD	8240			
Total TCDF	9.56		10.2	
Total PeCDF	34.4		38.6	
Total HxCDF	327			
Total HpCDF	2250			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	85.5	40 - 135	
	13C-1,2,3,7,8-PeCDD	93.8	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	84.2	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	80.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	81.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	123	40 - 135	
	13C-OCDD	302	40 - 135	D, H
	13C-2,3,7,8-TCDF	72.4	40 - 135	
	13C-1,2,3,7,8-PeCDF	84.4	40 - 135	
	13C-2,3,4,7,8-PeCDF	83.9	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	98.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	89.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	87.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	90.9	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	93.6	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	98.6	40 - 135	
	13C-OCDF	170	40 - 135	H
CRS	37Cl-2,3,7,8-TCDD	79.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	142

DL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration
LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: A1-66 (0-0.5)

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 11:50

Sample Data
Matrix: Soil
Sample Size: 13.1 g
% Solids: 77.5

Laboratory Data
Lab Sample: 2110012-09 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0072 Date Extracted: 19-Dec-2012 14:30
Date Analyzed : 02-Jan-13 19:01 Column: DB-225 Analyst: MAS
29-Dec-12 19:51 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/g)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	0.870			
1,2,3,7,8-PeCDD	4.85			
1,2,3,4,7,8-HxCDD	11.5			
1,2,3,6,7,8-HxCDD	44.5			
1,2,3,7,8,9-HxCDD	27.1			
1,2,3,4,6,7,8-HpCDD	1530			
OCDD	30900			~~B,~~E J
2,3,7,8-TCDF	1.65			
1,2,3,7,8-PeCDF	2.29			J
2,3,4,7,8-PeCDF	3.86			J
1,2,3,4,7,8-HxCDF	7.81			
1,2,3,6,7,8-HxCDF	5.86			
2,3,4,6,7,8-HxCDF	9.08			
1,2,3,7,8,9-HxCDF	0.745			J
1,2,3,4,6,7,8-HpCDF	189			J
1,2,3,4,7,8,9-HpCDF	13.1			
OCDF	718			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	75.2	40 - 135	
	13C-1,2,3,7,8-PeCDD	85.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	67.6	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	64.3	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	64.8	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDD	72.8	40 - 135	
	13C-OCDD	198	40 - 135	H
	13C-2,3,7,8-TCDF	66.3	40 - 135	
	13C-1,2,3,7,8-PeCDF	76.8	40 - 135	
	13C-2,3,4,7,8-PeCDF	79.7	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	82.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	74.1	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	71.6	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	74.6	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	75.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	80.0	40 - 135	
	13C-OCDF	95.0	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	76.1	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	44.6

TOTALS

Total TCDD	7.00	7.30	
Total PeCDD	36.3		
Total HxCDD	257		
Total HpCDD	2610		
Total TCDF	30.5		
Total PeCDF	52.9		
Total HxCDF	170		
Total HpCDF	639		

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.

Approved By: William Luksemburg 04-Jan-2013 8:19

Sample ID: EB 112812

EPA Method 8290

Client Data
Name: ARCADIS
Project: Carbondale
Date Collected: 28-Nov-2012 14:00

Sample Data
Matrix: Aqueous
Sample Size: 0.996 L

Laboratory Data
Lab Sample: 2110012-10 Date Received: 29-Nov-2012 10:23
QC Batch: B2L0077 Date Extracted: 20-Dec-2012 8:01
Date Analyzed : 27-Dec-12 14:05 Column: ZB-5 Analyst: MAS

Analyte	Conc. (pg/L)	DL	EMPC	Qualifiers
2,3,7,8-TCDD	ND	1.70		
1,2,3,7,8-PeCDD	ND	1.41		
1,2,3,4,7,8-HxCDD	ND	2.03		
1,2,3,6,7,8-HxCDD	ND	2.39		
1,2,3,7,8,9-HxCDD	ND	2.37		
1,2,3,4,6,7,8-HpCDD	ND	2.18		
OCDD	ND	3.11		
2,3,7,8-TCDF	ND	0.616		
1,2,3,7,8-PeCDF	ND	1.41		
2,3,4,7,8-PeCDF	ND	1.39		
1,2,3,4,7,8-HxCDF	ND	1.20		
1,2,3,6,7,8-HxCDF	ND	1.33		
2,3,4,6,7,8-HxCDF	ND	1.52		
1,2,3,7,8,9-HxCDF	ND	1.83		
1,2,3,4,6,7,8-HpCDF	ND	1.26		
1,2,3,4,7,8,9-HpCDF	ND	1.47		
OCDF	ND	2.89		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-2,3,7,8-TCDD	88.2	40 - 135	
	13C-1,2,3,7,8-PeCDD	105	40 - 135	
	13C-1,2,3,4,7,8-HxCDD	81.5	40 - 135	
	13C-1,2,3,6,7,8-HxCDD	81.4	40 - 135	
	13C-1,2,3,7,8,9-HxCDD	80.6	32 - 141	
	13C-1,2,3,4,6,7,8-HpCDD	80.0	40 - 135	
	13C-OCDD	99.5	40 - 135	
	13C-2,3,7,8-TCDF	86.2	40 - 135	
	13C-1,2,3,7,8-PeCDF	86.0	40 - 135	
	13C-2,3,4,7,8-PeCDF	86.6	40 - 135	
	13C-1,2,3,4,7,8-HxCDF	87.7	40 - 135	
	13C-1,2,3,6,7,8-HxCDF	82.4	40 - 135	
	13C-2,3,4,6,7,8-HxCDF	84.2	40 - 135	
	13C-1,2,3,7,8,9-HxCDF	89.7	40 - 135	
	13C-1,2,3,4,6,7,8-HpCDF	77.5	40 - 135	
	13C-1,2,3,4,7,8,9-HpCDF	90.5	40 - 135	
	13C-OCDF	92.7	40 - 135	
CRS	37Cl-2,3,7,8-TCDD	86.3	40 - 135	

Toxic Equivalent Quotient (TEQ) Data

TEQMinWHO2005Dioxin	0.00

TOTALS

Total TCDD	ND	3.01
Total PeCDD	ND	1.41
Total HxCDD	ND	3.23
Total HpCDD	ND	2.18
Total TCDF	ND	0.616
Total PeCDF	ND	1.77
Total HxCDF	ND	2.60
Total HpCDF	ND	1.12

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL- Lower control limit - upper control limit

Approved By: William Luksemburg 04-Jan-2013 8:19

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
LU-9J

March 14, 2014

Certified Mail 7001 0320 0006 0192 7132
Return Receipt Requested and *via* Email

Mike Slenska
Three Rivers Management for
Beazer East, Inc.
Manor Oak One, Suite 200
1910 Cochran Rd.
Pittsburgh, PA 15220

Re: Response to Human Health Risk Assessment Inquiry
Former Koppers Company Wood-Treating Site, Carbondale, IL
U.S. EPA ID No. ILD 000 819 946

Dear Mr. Slenska:

Beazer recently asked EPA how to address the Northeast Carbondale neighborhood in the forthcoming Human Health Risk Assessment. Owing to the neighborhood's proximity to the Former Koppers Company Wood-Treating Site, EPA and IEPA (jointly), Beazer, and the City of Carbondale have at various times investigated the surface soil there for contamination. The evaluations proceeded due to the potential migration of site-related chemicals through surface run-off and airborne dispersion into the neighborhood.

The EPA's analysis of the soil analytical data and other evidence assembled to date indicate that the neighborhood south of the facility is not contaminated with wood-treating chemicals. The detected chemical concentrations in the neighborhood were generally in the range of urban area background concentrations. Therefore, consistent with EPA risk assessment protocol, the neighborhood south of the property does not need to be included in the risk analysis. Nonetheless, the risk assessment document should contain a description of the contaminant characterization that Beazer completed in the neighborhood, including a description of the sampling design (e.g., the rationale for sample locations) and data collection activities. The risk assessment document should include Beazer's sampling results and this letter in an appendix or attachment. In addition, the risk assessment document should make reference to the sampling results from 2005 (EPA and IEPA with Beazer's splits) and 2006 (City of Carbondale).

The following surface soil sampling events in the neighborhood supported EPA's analysis:

1) a soil sampling event that USEPA and IEPA completed in 2005
2) a soil sampling event that the City of Carbondale completed in 2006, and

3) soil sampling events completed by Beazer East, Inc. in 2012.

EPA also considered these other available lines of evidence:

1) the concentrations and distribution of analytes in the soil did not indicate airborne migration under current conditions
2) physical barriers present in the land surface between the Site and the neighborhood would likely prevent overland flow of chemical migration from the Koppers Site to the neighborhood during precipitation events (berm and drainage ditches)
3) the contaminant concentrations north of the property line (on the Koppers side) were orders of magnitude higher than the concentrations found in the neighborhood to the south (supporting the conclusion that physical barriers prevent overland flow/surface migration to the south)
4) the detected chemical concentrations in the neighborhood were generally in the range of urban area background concentrations, and
5) the containment remedies and their maintenance within the facility prevent chemicals being released off-site in the future.

Please call me at 312-886-3020 if you have any questions about this letter.

Sincerely,

Carolyn Bury

Carolyn Bury
Project Manager

cc: Jim Moore, IEPA
Jeff Holden, Arcadis (electronic)

Appendix C

ProUCL Outputs

APPENDIX C
PRO-UCL RESULTS FOR SOIL NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:11:31 PM
From File	Book1.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (arsenic)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	6900	Mean	10000
Maximum	13000	Median	10400
SD	2109	Std. Error of Mean	635.9
Coefficient of Variation	0.211	Skewness	0.0997

Normal GOF Test

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	11153	95% Adjusted-CLT UCL (Chen-1995)	11066
		95% Modified-t UCL (Johnson-1978)	11156

Gamma GOF Test

A-D Test Statistic	0.422	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.216	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	24.36	k star (bias corrected MLE)	17.78
Theta hat (MLE)	410.5	Theta star (bias corrected MLE)	562.5
nu hat (MLE)	535.9	nu star (bias corrected)	391.1
MLE Mean (bias corrected)	10000	MLE Sd (bias corrected)	2372
		Approximate Chi Square Value (0.05)	346.3
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	339.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11295	95% Adjusted Gamma UCL (use when n<50)	11524

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.267	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.839	Mean of logged Data	9.19
Maximum of Logged Data	9.473	SD of logged Data	0.214

Assuming Lognormal Distribution

95% H-UCL	11380	90% Chebyshev (MVUE) UCL	11951
95% Chebyshev (MVUE) UCL	12834	97.5% Chebyshev (MVUE) UCL	14059
99% Chebyshev (MVUE) UCL	16466		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	11046	95% Jackknife UCL	11153
95% Standard Bootstrap UCL	11006	95% Bootstrap-t UCL	11153
95% Hall's Bootstrap UCL	10954	95% Percentile Bootstrap UCL	11009
95% BCA Bootstrap UCL	10991		
90% Chebyshev(Mean, Sd) UCL	11908	95% Chebyshev(Mean, Sd) UCL	12772
97.5% Chebyshev(Mean, Sd) UCL	13971	99% Chebyshev(Mean, Sd) UCL	16327

Suggested UCL to Use

95% Student's-t UCL 11153

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SOIL NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:11:31 PM
From File	Book1.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (bap te (nds = 1/2 dl))

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	8.38	Mean	367.5
Maximum	1730	Median	138
SD	592.9	Std. Error of Mean	178.8
Coefficient of Variation	1.613	Skewness	1.887

Normal GOF Test

Shapiro Wilk Test Statistic	0.651	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	691.6	95% Adjusted-CLT UCL (Chen-1995)	770.3
		95% Modified-t UCL (Johnson-1978)	708.5

Gamma GOF Test

A-D Test Statistic	0.517	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.786	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.477	k star (bias corrected MLE)	0.407
Theta hat (MLE)	771.3	Theta star (bias corrected MLE)	902.7
nu hat (MLE)	10.48	nu star (bias corrected)	8.958
MLE Mean (bias corrected)	367.5	MLE Sd (bias corrected)	576
		Approximate Chi Square Value (0.05)	3.301
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	2.766

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	997.2	95% Adjusted Gamma UCL (use when n<50)	1190

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.267	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.126	Mean of logged Data	4.564
Maximum of Logged Data	7.456	SD of logged Data	1.864

Assuming Lognormal Distribution

95% H-UCL	9484	90% Chebyshev (MVUE) UCL	1107
95% Chebyshev (MVUE) UCL	1430	97.5% Chebyshev (MVUE) UCL	1877
99% Chebyshev (MVUE) UCL	2756		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	661.6	95% Jackknife UCL	691.6
95% Standard Bootstrap UCL	652.7	95% Bootstrap-t UCL	1871
95% Hall's Bootstrap UCL	2395	95% Percentile Bootstrap UCL	674.9
95% BCA Bootstrap UCL	758.2		
90% Chebyshev(Mean, Sd) UCL	903.8	95% Chebyshev(Mean, Sd) UCL	1147
97.5% Chebyshev(Mean, Sd) UCL	1484	99% Chebyshev(Mean, Sd) UCL	2146

Suggested UCL to Use

95% Adjusted Gamma UCL	1190

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SOIL NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:11:31 PM
From File	Book1.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (chromium)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	14700	Mean	19305
Maximum	28200	Median	19000
SD	4124	Std. Error of Mean	1243
Coefficient of Variation	0.214	Skewness	0.932

Normal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	21558	95% Adjusted-CLT UCL (Chen-1995)	21723
		95% Modified-t UCL (Johnson-1978)	21616

Gamma GOF Test

A-D Test Statistic	0.299	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.15	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	25.75	k star (bias corrected MLE)	18.79
Theta hat (MLE)	749.7	Theta star (bias corrected MLE)	1027
nu hat (MLE)	566.5	nu star (bias corrected)	413.3
MLE Mean (bias corrected)	19305	MLE Sd (bias corrected)	4454
		Approximate Chi Square Value (0.05)	367.2
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	360.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	21730	95% Adjusted Gamma UCL (use when n<50)	22158

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.267	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.596	Mean of logged Data	9.849
Maximum of Logged Data	10.25	SD of logged Data	0.205

Assuming Lognormal Distribution

95% H-UCL	21812	90% Chebyshev (MVUE) UCL	22882
95% Chebyshev (MVUE) UCL	24507	97.5% Chebyshev (MVUE) UCL	26763
99% Chebyshev (MVUE) UCL	31193		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	21350	95% Jackknife UCL	21558
95% Standard Bootstrap UCL	21279	95% Bootstrap-t UCL	22227
95% Hall's Bootstrap UCL	22717	95% Percentile Bootstrap UCL	21355
95% BCA Bootstrap UCL	21555		
90% Chebyshev(Mean, Sd) UCL	23035	95% Chebyshev(Mean, Sd) UCL	24725
97.5% Chebyshev(Mean, Sd) UCL	27070	99% Chebyshev(Mean, Sd) UCL	31677

Suggested UCL to Use

95% Student's-t UCL	21558

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:10:21 PM
From File	Book1_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (arsenic)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	6300	Mean	7531
Maximum	9400	Median	7550
SD	986.7	Std. Error of Mean	348.8
Coefficient of Variation	0.131	Skewness	0.678

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8192	95% Adjusted-CLT UCL (Chen-1995)	8194
		95% Modified-t UCL (Johnson-1978)	8206

Gamma GOF Test

A-D Test Statistic	0.292	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.161	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.293	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	68.47	k star (bias corrected MLE)	42.88
Theta hat (MLE)	110	Theta star (bias corrected MLE)	175.6
nu hat (MLE)	1096	nu star (bias corrected)	686.1
MLE Mean (bias corrected)	7531	MLE Sd (bias corrected)	1150
		Approximate Chi Square Value (0.05)	626.3
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	611.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	8250	95% Adjusted Gamma UCL (use when n<50)	8446

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.748	Mean of logged Data	8.919
Maximum of Logged Data	9.148	SD of logged Data	0.129

Assuming Lognormal Distribution

95% H-UCL	8258	90% Chebyshev (MVUE) UCL	8559
95% Chebyshev (MVUE) UCL	9025	97.5% Chebyshev (MVUE) UCL	9672
99% Chebyshev (MVUE) UCL	10942		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8105	95% Jackknife UCL	8192
95% Standard Bootstrap UCL	8070	95% Bootstrap-t UCL	8291
95% Hall's Bootstrap UCL	8541	95% Percentile Bootstrap UCL	8100
95% BCA Bootstrap UCL	8125		
90% Chebyshev(Mean, Sd) UCL	8578	95% Chebyshev(Mean, Sd) UCL	9052
97.5% Chebyshev(Mean, Sd) UCL	9710	99% Chebyshev(Mean, Sd) UCL	11002

Suggested UCL to Use

95% Student's-t UCL	8192

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:10:21 PM
From File	Book1_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (bap te (nds = 1/2 dl))

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	65.6	Mean	165.7
Maximum	236	Median	190
SD	67.04	Std. Error of Mean	23.7
Coefficient of Variation	0.405	Skewness	-0.651

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	210.6	95% Adjusted-CLT UCL (Chen-1995)	198.9
		95% Modified-t UCL (Johnson-1978)	209.7

Gamma GOF Test

A-D Test Statistic	0.633	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.291	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.397	k star (bias corrected MLE)	3.456
Theta hat (MLE)	30.7	Theta star (bias corrected MLE)	47.94
nu hat (MLE)	86.35	nu star (bias corrected)	55.3
MLE Mean (bias corrected)	165.7	MLE Sd (bias corrected)	89.13
		Approximate Chi Square Value (0.05)	39.21
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	35.81

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	233.7	95% Adjusted Gamma UCL (use when n<50)	255.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.292	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.184	Mean of logged Data	5.015
Maximum of Logged Data	5.464	SD of logged Data	0.502

Assuming Lognormal Distribution

95% H-UCL	267.2	90% Chebyshev (MVUE) UCL	258.3
95% Chebyshev (MVUE) UCL	299.2	97.5% Chebyshev (MVUE) UCL	356
99% Chebyshev (MVUE) UCL	467.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	204.7	95% Jackknife UCL	210.6
95% Standard Bootstrap UCL	201.8	95% Bootstrap-t UCL	204.8
95% Hall's Bootstrap UCL	195.5	95% Percentile Bootstrap UCL	199.8
95% BCA Bootstrap UCL	198.1		
90% Chebyshev(Mean, Sd) UCL	236.8	95% Chebyshev(Mean, Sd) UCL	269
97.5% Chebyshev(Mean, Sd) UCL	313.7	99% Chebyshev(Mean, Sd) UCL	401.5

Suggested UCL to Use

95% Student's-t UCL	210.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

APPENDIX C
PRO-UCL RESULTS FOR SOIL EAST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:10:21 PM
From File	Book1_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (chromium)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	15800	Mean	19950
Maximum	27400	Median	19650
SD	3887	Std. Error of Mean	1374
Coefficient of Variation	0.195	Skewness	0.91

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	22553	95% Adjusted-CLT UCL (Chen-1995)	22683
		95% Modified-t UCL (Johnson-1978)	22627

Gamma GOF Test

A-D Test Statistic	0.307	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.203	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	31.93	k star (bias corrected MLE)	20.04
Theta hat (MLE)	624.8	Theta star (bias corrected MLE)	995.5
nu hat (MLE)	510.9	nu star (bias corrected)	320.6
MLE Mean (bias corrected)	19950	MLE Sd (bias corrected)	4456
		Approximate Chi Square Value (0.05)	280.2
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	270.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	22833	95% Adjusted Gamma UCL (use when n<50)	23644

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.668	Mean of logged Data	9.885
Maximum of Logged Data	10.22	SD of logged Data	0.187

Assuming Lognormal Distribution

95% H-UCL	22914	90% Chebyshev (MVUE) UCL	23912
95% Chebyshev (MVUE) UCL	25711	97.5% Chebyshev (MVUE) UCL	28207
99% Chebyshev (MVUE) UCL	33110		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	22210	95% Jackknife UCL	22553
95% Standard Bootstrap UCL	22050	95% Bootstrap-t UCL	23312
95% Hall's Bootstrap UCL	22965	95% Percentile Bootstrap UCL	22213
95% BCA Bootstrap UCL	22388		
90% Chebyshev(Mean, Sd) UCL	24072	95% Chebyshev(Mean, Sd) UCL	25940
97.5% Chebyshev(Mean, Sd) UCL	28531	99% Chebyshev(Mean, Sd) UCL	33622

Suggested UCL to Use

95% Student's-t UCL	22553

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SEDIMENT NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:09:10 PM
From File	Book1_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (arsenic)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	6700	Mean	11893
Maximum	29200	Median	9400
SD	6440	Std. Error of Mean	1721
Coefficient of Variation	0.542	Skewness	1.89

Normal GOF Test

Shapiro Wilk Test Statistic	0.762	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	14941	95% Adjusted-CLT UCL (Chen-1995)	15653
		95% Modified-t UCL (Johnson-1978)	15086

Gamma GOF Test

A-D Test Statistic	0.847	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.738	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.053	k star (bias corrected MLE)	4.018
Theta hat (MLE)	2354	Theta star (bias corrected MLE)	2960
nu hat (MLE)	141.5	nu star (bias corrected)	112.5
MLE Mean (bias corrected)	11893	MLE Sd (bias corrected)	5933
		Approximate Chi Square Value (0.05)	89.01
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	86.24

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	15031	95% Adjusted Gamma UCL (use when n<50)	15513

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.81	Mean of logged Data	9.281
Maximum of Logged Data	10.28	SD of logged Data	0.439

Assuming Lognormal Distribution

95% H-UCL	15088	90% Chebyshev (MVUE) UCL	15961
95% Chebyshev (MVUE) UCL	17874	97.5% Chebyshev (MVUE) UCL	20530
99% Chebyshev (MVUE) UCL	25747		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	14724	95% Jackknife UCL	14941
95% Standard Bootstrap UCL	14634	95% Bootstrap-t UCL	18076
95% Hall's Bootstrap UCL	26175	95% Percentile Bootstrap UCL	14686
95% BCA Bootstrap UCL	15757		
90% Chebyshev(Mean, Sd) UCL	17056	95% Chebyshev(Mean, Sd) UCL	19395
97.5% Chebyshev(Mean, Sd) UCL	22642	99% Chebyshev(Mean, Sd) UCL	29018

Suggested UCL to Use

95% Adjusted Gamma UCL	15513

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR SEDIMENT NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:09:10 PM
From File	Book1_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (bap te (nds = 1/2 dl))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	74.2	Mean	726.6
Maximum	2600	Median	592.5
SD	648	Std. Error of Mean	173.2
Coefficient of Variation	0.892	Skewness	1.995

Normal GOF Test

Shapiro Wilk Test Statistic	0.806	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1033	95% Adjusted-CLT UCL (Chen-1995)	1110
		95% Modified-t UCL (Johnson-1978)	1049

Gamma GOF Test

A-D Test Statistic	0.204	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.233	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.573	k star (bias corrected MLE)	1.284
Theta hat (MLE)	461.8	Theta star (bias corrected MLE)	566
nu hat (MLE)	44.05	nu star (bias corrected)	35.95
MLE Mean (bias corrected)	726.6	MLE Sd (bias corrected)	641.3
		Approximate Chi Square Value (0.05)	23.23
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	21.88

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1125	95% Adjusted Gamma UCL (use when n<50)	1194

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.307	Mean of logged Data	6.238
Maximum of Logged Data	7.863	SD of logged Data	0.92

Assuming Lognormal Distribution

95% H-UCL	1540	90% Chebyshev (MVUE) UCL	1346
95% Chebyshev (MVUE) UCL	1616	97.5% Chebyshev (MVUE) UCL	1991
99% Chebyshev (MVUE) UCL	2727		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1011	95% Jackknife UCL	1033
95% Standard Bootstrap UCL	1004	95% Bootstrap-t UCL	1230
95% Hall's Bootstrap UCL	2427	95% Percentile Bootstrap UCL	1025
95% BCA Bootstrap UCL	1099		
90% Chebyshev(Mean, Sd) UCL	1246	95% Chebyshev(Mean, Sd) UCL	1482
97.5% Chebyshev(Mean, Sd) UCL	1808	99% Chebyshev(Mean, Sd) UCL	2450

Suggested UCL to Use

95% Student's-t UCL	1033

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
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APPENDIX C
PRO-UCL RESULTS FOR SEDIMENT NORTH WEST OF THE SITE
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:09:10 PM
From File	Book1_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (chromium)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	14600	Mean	22057
Maximum	60500	Median	19550
SD	11693	Std. Error of Mean	3125
Coefficient of Variation	0.53	Skewness	3.098

Normal GOF Test

Shapiro Wilk Test Statistic	0.589	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	27592	95% Adjusted-CLT UCL (Chen-1995)	29963
		95% Modified-t UCL (Johnson-1978)	28023

Gamma GOF Test

A-D Test Statistic	1.324	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.23	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.229	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.475	k star (bias corrected MLE)	5.135
Theta hat (MLE)	3406	Theta star (bias corrected MLE)	4295
nu hat (MLE)	181.3	nu star (bias corrected)	143.8
MLE Mean (bias corrected)	22057	MLE Sd (bias corrected)	9733
		Approximate Chi Square Value (0.05)	117.1
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	113.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	27089	95% Adjusted Gamma UCL (use when n<50)	27849

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.774	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.203	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.589	Mean of logged Data	9.922
Maximum of Logged Data	11.01	SD of logged Data	0.368

Assuming Lognormal Distribution

95% H-UCL	26618	90% Chebyshev (MVUE) UCL	28198
95% Chebyshev (MVUE) UCL	31144	97.5% Chebyshev (MVUE) UCL	35233
99% Chebyshev (MVUE) UCL	43264		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	27198	95% Jackknife UCL	27592
95% Standard Bootstrap UCL	27069	95% Bootstrap-t UCL	36523
95% Hall's Bootstrap UCL	46812	95% Percentile Bootstrap UCL	27871
95% BCA Bootstrap UCL	30450		
90% Chebyshev(Mean, Sd) UCL	31433	95% Chebyshev(Mean, Sd) UCL	35679
97.5% Chebyshev(Mean, Sd) UCL	41574	99% Chebyshev(Mean, Sd) UCL	53152

Suggested UCL to Use

95% Student's-t UCL	27592	or 95% Modified-t UCL	28023

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR PILES FORK CRAB ORCHARD CREEK SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:07:46 PM
From File	Book1_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (arsenic)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	5950	Mean	8900
Maximum	16600	Median	8100
SD	3068	Std. Error of Mean	703.8
Coefficient of Variation	0.345	Skewness	1.439

Normal GOF Test

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10120	95% Adjusted-CLT UCL (Chen-1995)	10306
		95% Modified-t UCL (Johnson-1978)	10159

Gamma GOF Test

A-D Test Statistic	0.74	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.199	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.69	k star (bias corrected MLE)	9.039
Theta hat (MLE)	832.4	Theta star (bias corrected MLE)	984.6
nu hat (MLE)	406.3	nu star (bias corrected)	343.5
MLE Mean (bias corrected)	8900	MLE Sd (bias corrected)	2960
		Approximate Chi Square Value (0.05)	301.5
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	298.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	10138	95% Adjusted Gamma UCL (use when n<50)	10255

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.901	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.203	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.691	Mean of logged Data	9.046
Maximum of Logged Data	9.717	SD of logged Data	0.305

Assuming Lognormal Distribution

95% H-UCL	10151	90% Chebyshev (MVUE) UCL	10752
95% Chebyshev (MVUE) UCL	11605	97.5% Chebyshev (MVUE) UCL	12790
99% Chebyshev (MVUE) UCL	15117		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10058	95% Jackknife UCL	10120
95% Standard Bootstrap UCL	10024	95% Bootstrap-t UCL	10612
95% Hall's Bootstrap UCL	10671	95% Percentile Bootstrap UCL	10058
95% BCA Bootstrap UCL	10274		
90% Chebyshev(Mean, Sd) UCL	11011	95% Chebyshev(Mean, Sd) UCL	11968
97.5% Chebyshev(Mean, Sd) UCL	13295	99% Chebyshev(Mean, Sd) UCL	15903

Suggested UCL to Use

95% Student's-t UCL	10120

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR PILES FORK CRAB ORCHARD CREEK SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:07:46 PM
From File	Book1_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (bap te (nds = 1/2 dl))

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	30.4	Mean	4055
Maximum	37300	Median	969
SD	10035	Std. Error of Mean	2783
Coefficient of Variation	2.475	Skewness	3.548

Normal GOF Test

Shapiro Wilk Test Statistic	0.394	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.459	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	9015	95% Adjusted-CLT UCL (Chen-1995)	11559
		95% Modified-t UCL (Johnson-1978)	9472

Gamma GOF Test

A-D Test Statistic	1.42	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.791	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.3	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.25	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.495	k star (bias corrected MLE)	0.432
Theta hat (MLE)	8190	Theta star (bias corrected MLE)	9384
nu hat (MLE)	12.87	nu star (bias corrected)	11.24
MLE Mean (bias corrected)	4055	MLE Sd (bias corrected)	6169
		Approximate Chi Square Value (0.05)	4.728
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	4.142

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	9637	95% Adjusted Gamma UCL (use when n<50)	10998

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.246	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.414	Mean of logged Data	7.023
Maximum of Logged Data	10.53	SD of logged Data	1.578

Assuming Lognormal Distribution

95% H-UCL	23344	90% Chebyshev (MVUE) UCL	8056
95% Chebyshev (MVUE) UCL	10224	97.5% Chebyshev (MVUE) UCL	13232
99% Chebyshev (MVUE) UCL	19142		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8633	95% Jackknife UCL	9015
95% Standard Bootstrap UCL	8444	95% Bootstrap-t UCL	43629
95% Hall's Bootstrap UCL	28794	95% Percentile Bootstrap UCL	9513
95% BCA Bootstrap UCL	12437		
90% Chebyshev(Mean, Sd) UCL	12404	95% Chebyshev(Mean, Sd) UCL	16186
97.5% Chebyshev(Mean, Sd) UCL	21436	99% Chebyshev(Mean, Sd) UCL	31747

Suggested UCL to Use

99% Chebyshev (Mean, Sd) UCL	31747

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX C
PRO-UCL RESULTS FOR PILES FORK CRAB ORCHARD CREEK SEDIMENT
FORMER KOPPERS WOOD-TREATING SITE, CARBONDALE, ILLINOIS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	10/25/2014 11:07:46 PM
From File	Book1_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (chromium)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	12600	Mean	15734
Maximum	22500	Median	14650
SD	2920	Std. Error of Mean	669.9
Coefficient of Variation	0.186	Skewness	1.435

Normal GOF Test

Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16896	95% Adjusted-CLT UCL (Chen-1995)	17072
		95% Modified-t UCL (Johnson-1978)	16933

Gamma GOF Test

A-D Test Statistic	1.132	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.198	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	34.67	k star (bias corrected MLE)	29.23
Theta hat (MLE)	453.8	Theta star (bias corrected MLE)	538.2
nu hat (MLE)	1318	nu star (bias corrected)	1111
MLE Mean (bias corrected)	15734	MLE Sd (bias corrected)	2910
		Approximate Chi Square Value (0.05)	1035
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1028

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	16896	95% Adjusted Gamma UCL (use when n<50)	17002

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.901	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.209	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.203	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.441	Mean of logged Data	9.649
Maximum of Logged Data	10.02	SD of logged Data	0.17

Assuming Lognormal Distribution

95% H-UCL	16886	90% Chebyshev (MVUE) UCL	17569
95% Chebyshev (MVUE) UCL	18405	97.5% Chebyshev (MVUE) UCL	19567
99% Chebyshev (MVUE) UCL	21848		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	16836	95% Jackknife UCL	16896
95% Standard Bootstrap UCL	16806	95% Bootstrap-t UCL	17304
95% Hall's Bootstrap UCL	17308	95% Percentile Bootstrap UCL	16879
95% BCA Bootstrap UCL	17137		
90% Chebyshev(Mean, Sd) UCL	17744	95% Chebyshev(Mean, Sd) UCL	18654
97.5% Chebyshev(Mean, Sd) UCL	19918	99% Chebyshev(Mean, Sd) UCL	22400

Suggested UCL to Use

95% Student's-t UCL	16896	or 95% Modified-t UCL	16933

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.