Missouri
Department of
Natural Resources

STATEMENT OF BASIS

PROPOSED FINAL REMEDY AND
RELEASE FROM CORRECTIVE ACTION OBLIGATIONS

CHEMICAL RECOVERY CORPORATION
6402 STADIUM DRIVE
KANSAS CITY, MISSOURI
EPA ID# MOD000669028

Facility Type: Former Hazardous Waste Storage
Contaminants: Lead, benzo(a)pyrene, benzo(a)anthracene, ideno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(b)fluoranthene
Media: Surface Soil, Groundwater
Proposed Final Remedy: No Further Action with Institutional Controls

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INTRODUCTION

This Statement of Basis describes the proposed corrective measures (proposed final remedy) for the Chemical Recovery Corporation (CRC) facility located in the City of Kansas City, Missouri. Support for the proposed final remedy is also presented. The Missouri Department of Natural Resources (Department) prepared this Statement of Basis as part of the requirements in Code of State Regulations 10 CSR 25-8.124(7), incorporating the Code of Federal Regulations 40 CFR 124.7.

This document highlights the information that is presented in more detail in the facility Administrative Record. Among other documents, the Administrative Record includes the approved *Resource Conservation and Recovery Act* (RCRA) Facility Assessment (RFA) Report, consisting of the Environmental Priorities Initiative/Preliminary Assessment Report, dated December 11, 1991, and the RFA Addendum, dated September 30, 1996; Sampling Investigation Report, dated February 3, 2003; and RCRA Corrective Action Environmental Indicator (EI) Evaluations (CA750-Migration of Contaminated Groundwater Under Control and CA725-Current Human Exposures Under Control), dated September 30, 2013. The Department invites the public to review the Administrative Record for a more complete understanding of the historical environmental issues and corrective action activities that have been conducted at the CRC facility. The Administrative Record locations are provided at the end of this document.

The Department invites the public to review and offer written comments on the proposed final remedy and release from corrective action obligations from December 3, 2014 to January 2, 2015. A public hearing has not been scheduled; however, anyone can request a public hearing about the proposed final

remedy and regulatory release during the 30-day public comment period. The Department will approve a final remedy for the facility only after the public comment period has ended and all public comments have been reviewed and addressed in writing by the Department. The facility will be released from its corrective action obligations only after the approved final remedy has been implemented. Public participation information is provided in detail at the end of this document.

FACILITY DESCRIPTION

The CRC facility is located at 6402 Stadium Drive in Kansas City, Missouri. The property is zoned as M-3 commercial and occupies approximately 0.19 acres. The property lies within the northwest 1/4 of the southeast 1/4 of Section 24, Township 49 North, Range 33 West, in Jackson County. The geographic coordinates for the facility are 39°3’28.04” North latitude and 94°30’34.2” West longitude. A facility location map is included as Figure 1 and facility map is included as Figure 2.

CRC is generally located in an industrial area. Private residences exist along Fremont Street. The nearest residence is approximately 200 feet (ft) north of the facility.

FACILITY HISTORY

CRC operated a hazardous waste storage and reclaiming operation at the facility. The building was constructed in 1911 and used as a fire station until 1977. The building remained vacant until Reclamare Enterprises purchased the property in 1980. Reclamare changed their name to Chemical Recovery Corporation in 1988.

For approximately 13 years, CRC used the first floor of the building to reclaim two general types of wastes; metal finishing wastes and waste solvent mixes. These wastes were produced mainly by small quantity hazardous waste generators. As part of their operations, CRC also operated a hazardous waste container storage area (CSA). Aztec Laboratories, also owned by CRC, uses the second floor of the building to operate an analytical laboratory for testing soil and water samples.

REGULATORY HISTORY

CRC previously operated the hazardous waste CSA under the interim status portions of the federal and state hazardous waste laws, 40 CFR Part 265 and 10 CSR 25-7.265. When Congress passed the federal law governing hazardous waste management in 1980, all existing facilities that treated, stored, or disposed of hazardous waste in a manner that would necessitate a hazardous waste permit were required to get such a permit. Because of the large number of existing facilities, Congress set up requirements which allowed these facilities to operate temporarily under “interim status” until they received their permit. CRC submitted their RCRA Part A Permit Application on November 18, 1980, and RCRA Part B Permit Application on

August 24, 1988. On October 19, 1989, CRC entered into a Consent Decree with the State of Missouri, after the Department denied the facilities application for a hazardous waste permit. As part of that decree, CRC was required to stop functioning as a hazardous waste treatment, storage and disposal (TSD) facility, withdraw its Part B Permit Application, submit a closure plan for the facility, and remove all existing hazardous waste inventory.

The Department received CRC's closure report, dated August 19, 1991, and accepted closure certification for its CSA on October 12, 1993. CRC is subject to corrective action by virtue of having completed closure of its interim status hazardous waste management unit after the effective date of the 1984 Hazardous and Solid Waste Amendments to RCRA. CRC is not subject to the hazardous waste permitting requirements of the Missouri Hazardous Waste Management Law or RCRA for post-closure care by virtue of having "clean closed" its interim status hazardous waste management unit. The following is a timeline of important dates in CRC's regulatory history:

- November 18, 1980 – CRC submitted a RCRA Part A Permit Application.
- August 24, 1988 – CRC submitted a RCRA Part B Permit Application.
- October 19, 1989 – CRC and the Department entered into a Consent Decree. As part of that decree, CRC was required to stop functioning as a hazardous waste TSD facility, withdraw its Part B Permit Application, submit a closure plan for the facility, and remove all existing hazardous waste inventory.
- August 19, 1991 – CRC submitted a Clean Closure Certification Report to the Department.
- December 11, 1991 – CDM Federal Programs Corporation prepared an Environmental Priorities Initiative/Preliminary Assessment Report, on behalf of the U.S. Environmental Protection Agency. The Preliminary assessment included a Visual Site Inspection (VSI). During the VSI, seven Solid Waste Management Units (SWMUs) and four Areas of Concern (AOCs) were identified. Only AOC 4 – Aztec Laboratories was recommended for further investigation.
- October 27, 1993 – The Department accepted the closure certification for the hazardous waste CSA.
- December 22, 1993 – The Department released CRC from financial assurance obligations for closure.
- September 30, 1996 – The Department prepared a Final RFA Report Addendum. This Addendum along with the Environmental Priorities Initiative/Preliminary Assessment Report constitutes the RFA for the facility. During this sampling and site reconnaissance visit, the ground surrounding and in the immediate vicinity of the building was designated as AOC 5.

- February 3, 2003 – The Department conducted a soil and groundwater sampling investigation at the facility. Soil and groundwater samples were collected at AOC 5.
- September 30, 2013 – The Department completed and transmitted to CRC the RCRA Corrective Action EI Evaluations (RCRAInfo Codes CA750-Migration of Contaminated Groundwater Under Control and CA725-Current Human Exposures Under Control). Both evaluations were coded as "Yes," affirming that migration of contaminated groundwater and current human exposures were under control.

In the September 1996 RFA Report Addendum, the Department determined that AOC 5 was the only SWMU or AOC at the facility that required additional investigation. AOC 5 is defined as the ground surrounding and in the immediate vicinity of the building. The Department collected soil samples in March 1996, as part of the RFA Addendum, and February 3, 2003. Analytical results from the March 1996 and February 2003 sampling events are included in Tables 1 and 2, respectively.

During the 1996 sampling event, lead and benzo(a)pyrene were detected in surface soil above the May 2014 EPA Region 3 Screening Levels (RSLs) for industrial use at one location east of the building. The remaining four soil sampling locations were either non-detect or below RSLs for all constituents. During the 2003 sampling event, benzo(a)anthracene, benzo(b)fluoranthene, and ideno(1,2,3-cd)pyrene exceeded the May 2014 EPA RSLs for residential use, but were below the May 2014 EPA RSLs for industrial use at two surface soil sampling locations. Benzo(a)pyrene and dibenzo(a,h)anthracene were detected in surface soils above the May 2014 EPA RSLs for industrial soil at two surface soil sample locations. The 2003 detections appear to be related to a nearby pile of roofing material, which has since been removed. All other surface and subsurface soil sample locations were non-detect or below RSLs.

During the 2003 sampling event, arsenic was detected in all fifteen soil samples above the May 2014 EPA RSLs for residential and industrial soils, but below the established background level for arsenic in soil in the Blue Valley Industrial Corridor. Detected arsenic concentrations were also within the U.S. Geological Survey's observed background range for arsenic, published in the 1984 Geochemical Survey of Missouri, Geography of Soil Geochemistry of Missouri Agricultural Soil. The concentrations of arsenic in soil at the facility appear to be naturally-occurring background soil concentrations in the area, rather than releases related to facility activities. Table 3 provides a comparison of the 2003 arsenic concentrations to background concentrations.

Lead was detected in one sample location above the May 2014 EPA RSL for residential soils of 400 parts per million (ppm) and industrial soil of 800 ppm during both the 1996 and 2003 sampling events. Lead was detected at 878 ppm in 1996 and at 1310 ppm in 2003. Both of these soil samples were collected from the east side of the building. All other soil samples for lead were representative of background levels in soil. Refer to Tables 1 and 2 for comparison of lead concentrations to screening levels. CRC is located in the Blue River Industrial Corridor, which

is a highly industrialized area of Kansas City. Site-specific Preliminary Remediation Goals (PRGs) for lead were previously calculated for two other RCRA TSD facilities in/near the Blue River Industrial Corridor: AK Steel and BP Products North America, Incorporated, Former Sugar Creek Refinery. PRGs for both sites were calculated using the Integrated Exposure-Update Biokinetic Model and Adult Lead Methodology. AK Steel's PRGs were calculated by EPA and BP's PRGs were calculated by Tetra Tech, under contract for the EPA. PRGs for surface soil at both facilities were calculated for recreational user/trespasser and outdoor industrial worker. The PRG for a recreational user/trespasser was 1531 milligram/kilogram or ppm, at AK Steel and 1529 ppm at BP. The PRG for an outdoor industrial worker was 2240 ppm at AK Steel and 3135 ppm at BP. Given the limited extent of lead impacts at CRC and the calculations performed at nearby similar facilities, potential exposures to lead at the CRC facility are expected to be insignificant. Table 4 presents a comparison of lead concentrations to the PRGs.

Construction/utility workers could be exposed to subsurface soil during construction/utility work. With the exception of arsenic, which is naturally-occurring, all chemicals of potential concern were either not detected or were below screening levels in subsurface soil. Arsenic was detected above the May 2014 EPA RSLs, but was below background. Therefore, the subsurface soils do not appear to have been contaminated from releases related to operations at the facility.

Groundwater was not sampled in 1996. During 2003, three groundwater samples were collected at AOC 5 and analyzed for metals, volatile organic compounds, and semivolatile organic compounds. Arsenic, bis(2-ethylhexyl)phthalate and toluene were the only chemicals detected in groundwater. Table 5 presents a comparison of detected chemicals to screening levels. Arsenic was detected in all three groundwater samples at concentrations exceeding EPA's Maximum Contaminant Level (MCL) for drinking water. However, arsenic occurs naturally in soil in the Kansas City area and may have leached from the soil to the groundwater. It is also likely that arsenic containing soil particles became suspended in groundwater during drilling and sampling activities. The water samples analyzed were unfiltered grab samples. Any soil particles suspended in the groundwater could cause laboratory results to falsely indicate an elevated concentration of arsenic in the groundwater. The presence of arsenic in groundwater does not appear related to releases from operations at the facility.

Bis(2-ethylhexyl)phthalate was detected in the groundwater sample from one soil boring location, at a concentration exceeding EPA's MCL, which is based on using water as drinking water. Bis(2-ethylhexyl)phthalate was below the Missouri Risk Based Corrective Action Tier 1 Risk Based Target Level for Dermal Contact, which is a more likely exposure scenario. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and was not used in any of CRC's treatment or recovery processes. Bis(2-ethylhexyl)phthalate is also a plasticizer used in the manufacturing of polyvinylchloride (PVC) materials and could have been transferred to the groundwater sample from the PVC well screen used in the borehole or from the plastic container used to collect and transport the groundwater sample.

There are no drinking water wells in the vicinity of the facility and water is provided to residents and industry through the city of Kansas City public water supply system. Use of the groundwater as drinking water is not expected. Use of the groundwater for drinking water purposes in the larger Blue Valley Industrial Corridor is also unlikely. There are no monitoring wells at the facility and groundwater on the property was found at a depth of approximately 20 ft below ground surface (bgs) during the 2003 investigation. The only potential for exposure to groundwater is through dermal contact for a construction/utility worker. The typical depth of construction and/or utility work is 10 ft bgs or less. Therefore, it is highly unlikely that a construction and/or utility worker would come in contact with groundwater at 20 ft bgs.

Toluene is the only chemical of concern detected in groundwater at the CRC facility that is considered to be "vapor forming." Concentrations of toluene were below the screening levels in the EPA Office of Solid Waste and Emergency Response Vapor Intrusion Screening Level (VISL) Calculator Version 3.3.1, dated June 2014. Therefore, potential volatilization of toluene from groundwater to indoor air at a level of concern is not expected. Due to the conservative assumptions inherent in the calculation of potential indoor air impacts, contaminants that do not pose an indoor inhalation risk, also do not pose an outdoor inhalation risk. There are no surface water bodies at the facility; therefore, there are no potential surface water or sediment impacts. Table 6 presents a comparison of toluene concentrations to the VISL Calculator.

SUMMARY OF FACILITY RISKS

The current land use at the property is non-residential and land use is expected to remain non-residential for the foreseeable future. Future residential land use is possible however as there are residences nearby. Based on residential and non-residential land use scenarios, potential on-property receptors are current and future (business) workers, construction workers, and future residents. The Department's conclusions from the investigations performed to date at the facility and the discussion contained in the preceding paragraphs are:

1. There are no significant releases from the SWMUs/AOCs to the surface soil, subsurface soil, groundwater, or indoor air at the facility.

2. Due to the uncertainties inherent in environmental investigations, estimates and risk management, the Department and CRC propose to execute an enforceable Environmental Covenant, which will be recorded in the chain of title for the property, as an additional protective measure. The covenant will meet the requirements of the Missouri Environmental Covenants Act and restrict the land use at the property to non-residential and prohibit the use of groundwater for domestic consumption. This will further ensure that potential future exposure to residual contaminants on the CRC property that could pose human health risks does not occur.

Human Health Risk Evaluation

The human health risk assessment evaluated potential exposure of on-site workers, construction/utility workers, and trespassers to hazardous constituents detected in the soil surrounding the building. The objectives of the risk assessment were to determine whether releases from AOC 5 posed unacceptable risks to human health and the environment and to provide information to support decisions concerning further evaluation or remedial action under current and reasonably anticipated future land use.

Potential receptors included on-site workers, construction/utility workers, and trespassers. Exposure through ingestion, dermal contact, and inhalation of soil were evaluated in all exposure scenarios. Off-property land use is a mixture of industrial and residential. Residential land use is found approximately 200 feet from the facility. Sensitive receptors (such as children at daycare facilities) are found approximately 1.5 miles from the facility. Groundwater is not used on the facility property for any purpose. Impacted soils are contained within facility boundaries. Future land use on the property is anticipated to be no different from current use, in that industrial operation will continue and property use will remain nonresidential; consequently the exposure routes and pathways will remain the same for current and future receptors.

The health risk assessment calculated hazard indices and incremental excess lifetime cancer risk following EPA and Departmental guidance. Results were compared to EPA's and the Department's generally acceptable cancer risk range of $1x10^{-6}$ to $1x10^{-4}$. Carcinogenic risk was calculated for residential use, industrial use, and outdoor worker using the maximum measured concentrations for benz(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flournathene, dibenso(a,h)anthracene, and ideno(1,2,3-cd)pyrene. Risk was calculated using the equations and default parameters in the EPA Regional Screening Tables Calculator, dated May 2014. The cumulative carcinogenic risk for surface soil for residential use was $3.5x10^{-5}$, for industrial use was $8.2x10^{-6}$, and for an outdoor worker was $7.4x10^{-6}$. All three scenarios fall within EPA and the Department's acceptable target risk range.

PROPOSED FINAL REMEDY

Soil and groundwater contamination at the facility potentially attributable to facility operations was, with limited exceptions, below the EPA's residential and industrial RSLs. There were a few isolated instances where RSLs in soil were exceeded; however, supplemental human health risk calculations using conservative assumptions demonstrated that residual worst-case contaminant concentrations in soil and groundwater were within the acceptable risk range. As such, the Department is proposing that no further corrective action is needed at the CRC facility, except for establishment of an enforceable Environmental Covenant containing certain property activity and use restrictions. The covenant will restrict the property to non-residential use and prohibit the use of groundwater to help ensure that potential future exposure to residual contaminants on the facility property does not occur.

A draft Environmental Covenant has been prepared as the proposed final remedy for the facility and will be finalized upon completion of the public comment period for the proposed final remedy, the Department's written response to public comments, if any, and Departmental approval of the final remedy. Once executed by the Department and CRC, the covenant will be filed with the Jackson County Recorder's office and recorded in the chain of title for the facility property. CRC will provide proof of recording to the Department.

REGULATORY DISPOSITION OF FACILITY

Once the enforceable Environmental Covenant containing activity and use restrictions for the CRC facility has been recorded in the property chain of title, the Department intends to release CRC from further regulation as a former interim status hazardous waste TSD facility subject to the corrective action requirements of the Missouri Hazardous Waste Management Law and regulations.

PUBLIC PARTICIPATION

The Department invites the public to review and offer written comments on the proposed final remedy and regulatory release from December 3, 2014 to January 2, 2015. During the 30-day public comment period, anyone can request a public hearing about the proposed remedy and regulatory release. To request a public hearing, please submit a written request to Christine Kump-Mitchell, P.E., at the addresses below. The hearing request must state what issues are to be brought up during the hearing.

Comments on the proposed final remedy and regulatory release are more effective if they point out legal or technical issues or provide information that is not in the record. Please send written comments to Christine Kump-Mitchell, P.E., Missouri Department of Natural Resources, 7545 South Lindbergh Boulevard, Suite 210, St. Louis, MO 63125-4839, or by e-mail to christine.kump@dnr.mo.gov.

At the end of the public comment period, the Department will review all written comments and any comments given at the public hearing, if one was held. The Department will prepare a written summary and response to all comments and explain how each was addressed. The Summary and Response will be entered into the Administrative Record for the CRC facility. The Department will approve a final remedy for the facility only after the public comment period has ended, all comments have been reviewed, and written responses have been prepared to address the comments. The Department may modify the proposed final remedy or select another final remedy based on new information or technical or legal issues brought up by the comments received during the public comment period. The CRC facility will be released from its corrective action obligations only after the approved final remedy has been fully implemented.

MORE INFORMATION

The public can view and copy the Administrative Record, which includes all correspondence and reports relevant to the final remedy selection, at the following locations:

Kansas City Public Library*
Lucile H. Bluford Branch
3050 Prospect Ave.
Kansas City, Missouri
Phone: (816) 701-3482
*During normal business hours.

Missouri Department of Natural Resources*
1730 E. Elm St. (lower level)
Jefferson City, Missouri
Phone: (573) 751-3043
*File reviews must be made through a sunshine request. Please visit www.dnr.mo.gov/sunshinerequests.htm.

For more information about the proposed final remedy and regulatory release, please contact Ms. Kump-Mitchell, by telephone at (314) 416-2464 or 1-800-361-4827. Hearing- and speech-impaired individuals may reach Ms. Kump-Mitchell through Relay Missouri at 1-800-735-2966.

Table 1
Soil Sampling Results – April 1996 (milligrams/kilogram = parts per million (ppm))

Parameter	EPA Regional Screening Tables Residential	EPA Regional Screening Tables Industrial[1]	96-1376 Background – SW corner of lot 2' bgs[2]	96-1377 West side of Building 2-3' bgs	96-1378 Dirt Pile East side of Building 2-3' bgs Boring #1	96-1379 Dirt Pile East side of Building 2' bgs Boring #2	96-1380 East side of Building next to Trailer 1' bgs	96-1381 East side of Building next to trailer 1' bgs - Duplicate
Arsenic	0.61	3	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Cadmium	70	980	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Chromium	120,000	1,800,000	17.4	18.2	39.4	34.7	19.4	25.4
Copper	3,100	47,000	15.2	19.5	145	19.9	100	155
Lead	400	800	23.7	59.9	207	137	**812**	**878**
Nickel	1,500	22,000	18.8	21.2	33.1	19.6	14.2	20.3
Acenaphthene	3,500	45,000	**NA**	<0.1	<0.1	**NA**	<0.1	<0.1
Anthracene	17,000	230,000	**NA**	<0.1	<0.1	**NA**	0.1	<0.1
Benzo(a)anthracene	0.15	2.9	**NA**	0.25	0.38	**NA**	1.1	1.0
Benzo(a)pyrene	0.015	0.29	**NA**	0.18	**0.32**	**NA**	**1.1**	**1.3**
Benzo(b)fluoranthene	0.15	2.9	**NA**	0.25	0.5	**NA**	1.8	1.8
Benzo(g,h,i)perylene	NA	NA	**NA**	0.13	0.43	**NA**	<0.1	1.1
Benzo(k)fluoranthene	1.5	29	**NA**	<0.1	0.16	**NA**	0.53	0.46
Bis(2-ethylhexyl)phthalate	38	160	**NA**	<0.1	0.11	**NA**	0.1	<0.1
Butyl benzyl phthalate	280	1,200	**NA**	<0.1	1.6	**NA**	0.2	0.1
Chrysene	15	290	**NA**	0.23	.044	**NA**	1.2	1.2
Dibenzo(a,h)anthracene	0.015	0.29	**NA**	<0.1	<0.1	**NA**	0.23	0.3
Dibenzofuran	NA	NA	**NA**	<0.1	0.26	**NA**	<0.1	<0.1
2,6-Dinitrotoluene	0.36	1.5	**NA**	<0.1	<0.1	**NA**	<0.1	<0.1
Fluoranthene	2,300	30,000	**NA**	0.47	0.56	**NA**	1.6	1.1
Fluorene	2,300	30,000	**NA**	<0.1	<0.1	**NA**	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	0.15	2.9	**NA**	0.15	0.39	**NA**	<0.1	1.3
Isophorone	560	2,400	**NA**	<0.1	<0.1	**NA**	<0.1	<0.1
2-Methylnaphthalene	230	3,000	**NA**	0.28	0.89	**NA**	0.15	0.14
Pentachlorophenol	0.99	4	**NA**	<0.25	<0.25	**NA**	<0.25	<0.25
Pyrene	1,700	23,000	**NA**	0.52	0.61	**NA**	<.1	<.1
Naphthalene	3.8	17	**NA**	0.13	0.3	**NA**	0.12	0.11

[1] EPA Regional Screening Levels (RSLs) for Residential Soils, dated May 2014; [2] - EPA RSLs for Industrial Soils, dated May 2014
NA denotes not analyzed

Table 2
Soil Sampling Results - February 2003 (milligrams/kilogram = parts per million (ppm))

Parameter	EPA Regional Screening Tables Residential[1]	EPA Regional Screening Tables Industrial[2]	SB-1 (1-2')	SB-1 (3-5')	SB-1 (8-10')	SB-2 (1-2')	SB-2 (3-5')	SB-2 (8-10')	SB-3 (1-2')	SB-3 (3-5')	SB-3 (8-10')	SB-4 (1-2')	SB-4 (3-5')	SB-4 (8-10')	SB-5 (1-2')	SB-5 (3-5')	SB-5 (8-10')
			East Side of Building			Northeast Side of Building			North Side of Building			Northwest side of Building			West side of building		
Arsenic	0.61	3	**19.3**	**7.58**	**10.8**	**7.48**	**7.54**	**6.39**	**7.58**	**9.9**	**15.3**	**8.33**	**16.3**	**10.1**	**9.35**	**9.4**	**8.27**
Cadmium	70	980	3.45	<0.50	0.614	1.43	<.50	<0.5	1.05	0.511	0.954	13.2	24.6	1.2	1.54	<500	<500
Chromium	120,000	1,800,000	46.1	49.3	48.5	40.9	54.3	48.6	39.4	48.5	48.5	42.7	47.2	46	56	52.7	52.3
Copper	3,100	47,000	182	18.7	18.8	22.2	19.8	16.6	16.6	17	18.2	16.7	25.3	19.8	27	20.3	16.7
Lead	400	800	**1310**	33.1	28.8	52.2	30.6	45.9	33	40	41	39.8	39	30	57.5	29.1	26.4
Nickel	1,500	22,000	100	24.6	30.4	22.2	25.3	20.3	28.80	26.70	27.1	25.1	93.5	45.5	32.9	29.4	22.1
Acenaphthene	3,500	45,000	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.107	<.1	<.1
Anthracene	17,000	230,000	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	1.02	<.1	<.1
Benzo(a)anthracene	0.15	2.9	**1.25**	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	**1.87**	<.1	<.1
Benzo(a)pyrene	0.015	0.29	**1.34**	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	**1.34**	<.1	<.1
Benzo(b)fluoranthene	0.15	2.9	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	**1.02**	<.1	<.1
Benzo(g,h,i)perylene	NA	NA	1.35	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.652	<.1	<.1
Benzo(k)fluoranthene	1.5	29	1.39	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.311	<.1	<.1
Bis (2-ethylhexyl)phthalate	38	160	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Butyl benzyl phthalate	280	1,200	1.32	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Chrysene	15	290	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	2.1	<.1	<.1
Dibenzo(a,h)anthracene	0.015	0.29	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	**0.59**	<.1	<.1
Dibenzofuran	NA	NA	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.108	<.1	<.1
2,6-Dinitrotoluene	0.36	1.5	<1	<.1	<.1	<.1	0.139	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.121	<.1	<.1
Fluoranthene	2,300	30,000	3.58	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	6.84	<.1	<.1
Fluorene	2,300	30,000	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.108	<.1	<.1
Indeno(1,2,3-cd)pyrene	0.15	2.9	**1.47**	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	**1.47**	<.1	<.1
Isophorone	560	2,400	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	0.236	<.1	<.1
2-Methylnaphthalene	230	3,000	<1	<.1	<.1	<.1	0.323	<.1	<.1	0.151	<.1	<.1	<.1	<.1	0.209	<.1	<.1
Pentachlorophenol	0.99	4	<1	0.181	0.174	<.1	0.701	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Pyrene	1,700	23,000	2.77	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	5.38	<.1	<.1
Naphthalene	3.8	17	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

[1] - EPA RSLs for Residential Soils, dated May 2014; [2] - EPA RSLs for Industrial Soils, dated May 2014

Table 3
2003 Arsenic Comparisons to Background (milligrams/kilogram = parts per million (ppm))

Parameter	Average Background Concentrations, Geometric Mean Tidball[1]	Blue Valley Industrial Corridor Soil Background[2]	East Side of Building			Northeast Side of Building			North Side of Building SB-3			Northwest side of Building SB-4			West side of building		
			SB-1 (1-2')	SB-1 (3-5')	SB-1 (8-10')	SB-2 (1-2')	SB-2 (3-5')	SB-2 (8-10')	SB-3 (1-2')	SB-3 (3-5')	SB-3 (8-10')	SB-4 (1-2')	SB-4 (3-5')	SB-4 (8-10')	SB-5 (1-2')	SB-5 (3-5')	SB-5 (8-10')
Arsenic	8.7	24	19.3	7.58	10.8	7.48	7.54	6.39	7.58	9.9	15.3	8.33	16.3	10.1	9.35	9.4	8.27

[1] Tidball, Geochemical Survey of Missouri, Geography of Soil Geochemistry of Missouri Agricultural Soils, 1984
[2] US Army Corp of Engineers, Blue Valley Industrial Corridor Soils Background Study Report, March 2003

Table 4
Comparison of Lead Concentration to Preliminary Remediation Goals (PRGs) at AK Steel and BP
(milligrams/kilogram = parts per million (ppm))

PRG Recreational User/Trespasser AK Steel[1]	PRG Recreational User/Trespasser BP[2]	PRG Outdoor Industrial Worker AK Steel[1]	PRG Outdoor Industrial Worker BP[2]	April 1996 Sample# 96-1381 East side of building	February 2003 SB-1 (1-2') East side of Building
1531	1529	2240	3135	878	1310

[1] Soil Preliminary Remediation Goals, AK Steel Facility, Kansas City, Missouri, EPA Region 7, September 2010
[2] Draft Final Preliminary Remediation Goals, Lower Refinery and East Bluffs Area, Former Amoco Refinery Site, Sugar Creek, Missouri
Tetra Tech, EMI, February 2010

Table 5
Groundwater Sampling Results - February 2003 (µg/l = parts per billion (ppb))

Parameter	MCL[1]	EPA Regional Screening Levels[2]	SB-4	SB-4 (duplicate)	SB-5	SB-6
Arsenic	10	0.052	**141**	**150**	**21.7**	**24.7**
bis(2-ethylhexyl)phthalate	6	4.8	<10	<11.6	**18.5**	<10
Toluene	1000	860	1.04	<1	1.82	<1

[1] EPA Maximum Contaminant Levels
[2] EPA RSLs for Tap Water, May 2014

Table 6
Comparison of Toluene Concentrations to Vapor Intrusion Screening Levels

Parameter	Toxicity Basis	Target Groundwater Concentration for Inhalation[1] of Vapors from Groundwater Target Hazard Quotient =1.0	Groundwater Concentrations at CRC (µg/l = ppb)		
			SB-4	SB-5	SB-6
Toluene	Non-Cancer	19,000 µg/l (ppb)	1.04	1.82	<1

[1] Vapor Intrusion Screening Level (VISL) Calculator Version 3.3.1, EPA Office of Soils Waste and Emergency Response, June 2014

Table 7
Risk Calculations for Constituents of Concern Based on Maximum Concentrations
Surface Soil Pathway - Residential

Parameter	Maximum Concentration (mg/kg = ppm)	Surface Soil Residential Ingestion Pathway	Surface Soil Residential Dermal Pathway	Surface Soil Residential Inhalation Pathway	Surface Soil Residential All Pathways
Benz(a)anthracene	1.87	$1.96x10^{-6}$	$7.8x10^{-7}$	$5.39x10^{-11}$	$2.74x10^{-6}$
Benzo(a)pyrene	**1.34**	$1.41x10^{-5}$	$5.59x10^{-6}$	$3.86x10^{-10}$	$1.96x10^{-5}$
Benzo(b)fluoranthene	**1.02**	$1.07x10^{-6}$	$4.25x10^{-7}$	$2.94x10^{-11}$	$1.5x10^{-6}$
Benzo(k)fluoranthene	1.39	$1.46x10^{-7}$	$5.8x10^{-8}$	$5.1x10^{-11}$	$2.04x10^{-7}$
Dibenzo(a,h)anthracene	**0.59**	$6.2x10^{-6}$	$2.46x10^{-6}$	$1.85x10^{-10}$	$8.66x10^{-6}$
Indeno(1,2,3-cd)pyrene	**1.47**	$1.54x10^{-6}$	$6.13x10^{-7}$	$4.23x10^{-11}$	$2.15x10^{-6}$
Cumulative Risk		$2.5x10^{-5}$	$9.93x10^{-6}$	$7.4x10^{-10}$	$3.5x10^{-5}$

Bold denotes concentrations exceed EPA Regional Screening Levels for Residential Soils,
Target Risk – 1E-6 and Target Hazard Quotient =1, May 2014

Table 8
Risk Calculations for Constituents of Concern Based on Maximum Concentrations
Surface Soil Pathway – Industrial Worker

Parameter	Maximum Concentration (mg/kg = ppm)	Surface Soil Industrial Ingestion Pathway	Surface Soil Industrial Dermal Pathway	Surface Soil Industrial Inhalation Pathway	Surface Soil Industrial All Pathways
Benz(a)anthracene	1.87	$4.14x10^{-7}$	$2.26x10^{-7}$	$1.55x10^{-11}$	$8.86x10^{-7}$
Benzo(a)pyrene	**1.34**	$2.97x10^{-6}$	$1.62x10^{-6}$	$8.84x10^{-11}$	$6.35x10^{-6}$
Benzo(b)fluoranthene	1.02	$2.27x10^{-7}$	$1.23x10^{-7}$	$8.56x10^{-12}$	$4.83x10^{-7}$
Benzo(k)fluoranthene	1.39	$3.08x10^{-8}$	1.68x10-^{8}	$9.17x10^{-12}$	$6.59x10^{-8}$
Dibenzo(a,h)anthracene	**0.59**	$1.31x10^{-6}$	$7.13x10^{-7}$	$4.24x10^{-11}$	$2.8x10^{-6}$
Indeno(1,2,3-cd)pyrene	1.47	$3.56x10^{-7}$	$1.78x10^{-7}$	$9.69x10^{-12}$	$6.97x10^{-7}$
Cumulative Risk		$5.31x10^{-6}$	$2.88x10^{-6}$	$1.72x10^{-10}$	$8.2x10^{-6}$

Bold denotes concentrations exceed EPA Regional Screening Levels for Industrial Soils,
Target Risk – 1E-6 and Target Hazard Quotient =1, May 2014

Table 9
Risk Calculations for Constituents of Concern Based on Maximum Concentrations
Surface Soil Pathway – Outdoor Worker

Parameter	Maximum Concentration (ppm)	Surface Soil Outdoor Worker Ingestion Pathway	Surface Soil Outdoor Worker Dermal Pathway	Surface Soil Outdoor Worker Inhalation Pathway	Surface Soil Residential All Pathways
Benzo(a)anthracene	1.87	$3.76x10^{-7}$	$2.03x10^{-7}$	$1.11x10^{-11}$	$5.79x10^{-7}$
Benzo(a)pyrene	**1.34**	$2.69x10^{-6}$	$1.45x10^{-6}$	$7.96x10^{-11}$	$4.14x10^{-6}$
Benzo(b)fluoranthene	1.02	$2.05x10^{-7}$	$1.11x10^{-7}$	$6.06x10^{-12}$	$3.16x10^{-7}$
Benzo(k)fluoranthene	1.39	$2.79x10^{-8}$	$1.51x10^{-8}$	$8.26x10^{-12}$	$4.3x10^{-8}$
Dibenzo(a,h)anthracene	**0.59**	$1.19x10^{-6}$	$6.41x10^{-7}$	$3.82x10^{-11}$	$1.83x10^{-6}$
Indeno(1,2,3-cd)pyrene	1.47	$2.95x10^{-7}$	$1.6x10^{-7}$	$8.73x10^{-12}$	$4.55x10^{-7}$
Cumulative Risk		$4.78x10^{-6}$	$2.59x10^{-6}$	$1.52x10^{-10}$	$7.4x10^{-6}$

Bold denotes concentrations exceed EPA Regional Screening Levels for Industrial Soils,
Target Risk – 1E-6 and Target Hazard Quotient =1, May 2014