Tables

TABLE 2-1

Iron King Mine Timeline of Operations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Event
1899	J.R. Hagen developed claim at the Iron King Mine site, which contained a rich deposit of pyrite, lead, and zinc. It also contained small amounts of gold, silver, and copper.
1903	Claim sold to American Copper Company of New York.
1904	Prescott and Eastern Railroad built Iron King Spur.
1905	American Gold and Copper Consolidated Mining Company took over operation.
1906	American Gold and Copper Consolidated Mining Company began mining oxide ore and processing with cyanide leach to recover gold and silver.
	Miners camp of 300 people. Mine had 140 employees.
1910	Mine largely inactive.
1915	Mine shut down and some company buildings torn down.
1920s	Sporadic mine production.
	Iron King Mine source of low-grade sulfide ore for Humboldt for use as a flux in smelter's blast furnace, but high pyrite gave poor smelting performance.
1905 to 1930	Total production of ore concentrates valued at $100,000.
1934	Fred Gibbs puts down deposit to purchase mine.
1937	Other investors join to form Iron King Mining Company.
Approx. 1938	Iron King Mining Company begins shipping oxide ores containing gold, silver, and zinc.
	Iron King Mining Company builds 100 tons per day (TPD) mill and flotation system.
1939	Iron King Mining Company employed 65 people and was largest producer of lead and zinc in Arizona.
Approx. 1939	Cyanide plant added to treat zinc tailings for recovery of gold.
	Installation of new bulk flotation plant increases capacity to 140 TPD in second year of operation.
	Several shafts constructed to depths of 200 to 300 feet.
Approx. 1940	Installation of new bank of flotations cells increased production to 225 TPD.
1941	Mine produced 1.5 million pounds of zinc, and 400,000 pounds of lead.
1942	Mill processed ore at 250 TPD and employed 105 people.
	Total 25 shafts up to 500 feet deep along 1,500-foot ore vein.
1942	Iron King Mine sold to Shattuck Denn Mining Corporation.
	Mine and mill expansions continued through the 1940s.
	Lead concentrates shipped to ASARCO El Paso smelter, and zinc concentrates were shipped to ASARCO Amarillo smelter.
1945	Mill flowsheet included multistage crushing, grinding, classification, differential lead and zinc flotation, thickening, and gravity concentration.

TABLE 2-1

Iron King Mine Timeline of Operations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Event
1950	After numerous mine and mill expansions, Iron King Mine processed 200,000 tons of ore for the year and produced 20,000 ounces of gold, 800,000 ounces of silver, 10 million pounds of lead, and 20 million pounds of zinc.
1950s	New underground mining methods introduced. Changed from shrinkage and open stoping to horizontal cut-and-fill stoping. Use of conveyors was introduced and production increased from 450 to 700 TPD.
1953	Shaft No. 6 was main shaft and extended 1,780 feet below the surface.
1954	Shaft No. 7 was constructed to a depth of 1,780 feet.
1956	Shaft No. 7 extended to 1,940-foot depth.
1958	Shaft No. 7 extended to 2,450-foot depth. Production increased to 1,000 TPD.
	Employed 225 people.
1959	Iron King Mine processed 330,000 tons of ore for the year and produced 26,800 ounces of gold, 863,000 ounces of silver, 12 million pounds of lead, 35 million pounds of zinc, and 470,000 pounds of copper.
1960	Shattuck Denn began operation of small fertilizer plant that produced iron-based soil supplement extracted from the mill tailings. The product was marketed as Iron King Superferrite.
1962	As ore grade dropped, the mining method changed from horizontal cut-and-fill stoping to block caving at lower levels in the mine. As a result of this method, a portion of the underground workings at the north end of the mine collapsed and formed the Glory Hole at the surface.
1963	New mining method of sub-level stoping introduced for lower levels of the mine resulting in higher production rates.
1964	Impoundment identified on 1964 aerial photograph that would develop into what would later be known as the Small Tailings Pile.
1964	On March 23, 1964, there was a slope failure of the Main Tailings Pile resulting in tailings accumulating behind the adjacent railroad berm and some portion of the tailings being discharged to a drainage routed parallel to 3rd Street and subsequently flowing into Chaparral Gulch.
1965	Mine and mill production peaked at 333,743 tons per year.
1966	Mine employed 220 people.
1967	Two main mine shafts reached depths of 2,343 and 2,700 feet.
	Final depth of 3,250 feet below the surface. Ore production of 1,050 TPD.
	Mine closed due to rising mining costs, lower ore grades, and lower metal prices.
1968	McFarland and Hullinger partnership leased mine.
	Partnership employed 100 people and had maximum output of 600 TPD. Mining operations ended by the end of the year (1968).
	Shattuck Denn continued operation of the Superferrite fertilizer operation.
Total Production	Total production from the Iron King Mine was 6,300,000 tons of ore; 232,000,000 pounds of lead; 614,000,000 pounds of zinc; 13,500,000 pounds of copper; 16,700,000 ounces of silver; 471,000 ounces of gold (Table 1 of USGS, 1995).

TABLE 2-1

Iron King Mine Timeline of Operations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Event
1969	Silver Jay Mining Company leased arrangement for milling the tailings for silver recovery and employed 200 workers, but project was short-lived.
1973	Shattuck Denn sold most holdings to Brown Company.
1974	Ironite Products Company of Scottsdale bought Shattuck Denn's Superferrite fertilizer operation.
1979	Metex, Ltd. acquired the rights to a portion of the tailings at Iron King Mine and purchased the Ironite fertilizer operations. Metex developed a process for leaching the tailings with ammonium thiosulfate. The process recovered gold and silver from the tailings and produced a fertilizer and soil supplement.
1988	A $7 million expansion of the fertilizer plant increased production capacity to 200,000 tons per year of Ironite.
2006	Ownership of the soil supplement plant is acquired by North American Industries and produces Hydromax fertilizer and supplements (EPA, 2009c).

Source: Unless otherwise noted, the source of information in this table is:
Archaeological Consulting Services (ACS), LTD. 2008. *A Cultural Resource and Historical Building Survey for a Remedial Investigation/Feasibility Study at the Iron King Mine-Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona.* November 10.

TABLE 2-2

Humboldt Smelter Timeline of Operations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Event
1876	Agua Fria Ore Mill and Smelter is built (approximately).
	Water powered stamp mill and smelter operates. Processes ore from Silver Belt mine and Chaparral Gulch shaft.
	Mill had capacity of 20 tons per day (TPD).
	Mill/smelter located on patented 5-acre mill site located in the northeast corner of the northwest quarter of Section 23, Township 13 North, Range 1 East.
	Produced $350,000 in silver.
	The Chaparral Gulch Shaft mining facility was located on the steep southeastern-facing slope overlooking the Agua Fria River (near confluence with Chaparral Gulch). Two filled mine-shaft depressions were identified at this location.
1884	Agua Fria Ore Mill and Smelter closes.
1899	Construction begins on Val Verde Smelter (Val Verde Smelting Company).
1901	Val Verde Smelter in operation.
	Initial capacity of 250 TPD; employs 74 people.
	Custom milling and smelting of copper ore from small mines in Big Bug and other mining districts
	Milling done by Standard Smelting and Refining Company.
	Used blast furnace to produce metallic copper.
1904	Fire destroyed smelter.
1906	Consolidated Arizona Smelter Company (CASC) rebuilds smelter slightly to the northwest of the Val Verde location.
	Two furnaces: 600 TPD for copper and 500 TPD for lead.
	Production sporadic during first year of operation.
1907	Smelter closed due to Panic of 1907.
1908	CASC filed for bankruptcy.
1910	Reorganized CASC, rehabilitated smelter, and reopened.
1911	Smelter shut down for expansion and improvements.
	Facility included crushers and classifiers, flotation mill, roasting plant reverberatory furnace and blast furnace. Mill capacity 400 TPD.
	Residences for mill and smelter managers built at Nob Hill on hilltop south of smelter.
1914	Smelter installed new circular blast furnace and new reverberatory furnace (Engineering and Mining Journal, 1914).
1915 and 1916	Demand for copper rises with the start of World War I. Production increased to 1,000 TPD of ore and 30 to 35 TPD of copper. Production peaked during these years.
	Smelter employed 440 people.
1917	Smelter operated the blast furnace at a record production of 600 tons of feed per 24 hours (Mining and Scientific Press, 1917).

TABLE 2-2

Humboldt Smelter Timeline of Operations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Event
1915 to 1919	Smelter produced 34 million pounds of copper during this period from the two company-owned mines alone (Blue Bell and De Soto mines). In 1918, the smelter processed ore from 67 other mines in the region.
1918	The smelter had blast furnaces for both copper (250 ton) and lead (200 ton). Although annual copper, gold, and silver production data were listed, no annual lead production data were provided (The Mines Handbook Co., 1918).
	Smelter had a wide range of processing options and capability to treat a range of copper ores.
1919	100,600 tons of ore were treated and 33,600 tons of copper concentrate were produced. The smelter treated 98,000 tons of feed (concentrate plus unprocessed ore) producing 8.7 million pounds of copper plus 9,400 ounces of gold and 257,000 ounces of silver in 1919 (The Mines Handbook Co., 1922).
1920	Smelter closed and CASC filed for bankruptcy.
1922 to 1927	Smelter operated sporadically by Southwest Metals Company.
1927	Most of the equipment removed from smelter.
	Nob Hill homes moved to Prescott.
1929	Smelter refitted and operated sporadically.
1937	Smelter closed permanently.
1942	Smelter tailings reworked through grinding and flotation mill to recover copper, gold, and silver during World War II (lease acquired by C. H. Dunning).
1945	By end of World War II, all CASC buildings had been demolished. Only two tall smokestacks remained.
1955	Val Verde smokestack demolished.
1958	Equipment for recovery of sulfur and metals from Iron King Mine tailings was delivered but not installed (under name of Southwestern Iron and Chemical Company). Zinc dross imported. Declared bankruptcy in 1958.
1961	H.K. Thomas purchased remaining interest in property, which included buildings, ore, and imported zinc dross).
1962	Installed hopper bins, fire-brick-lined evaporating vats, pressure digesters, small drying kiln.
	Chemical Metallurgical Corporation (owned by H.K. Thomas) was using hydrochloric acid to leach zinc from dross.
	Also started processing aluminum dross from Texas by means of magnetic separation, jig (gravity separation), grinding, and classification.
1965	Chemical Metallurgical Corporation renamed Thomas Enterprises.
1970	Dross processing ended. Maximum staff was four people for this operation.
	Galbraith Lumber Company purchased smelter property and operated sawmill producing wooden pallets.
1974	Pallet operation ended.

Source: Unless otherwise noted, the source of information in this table is:
Archaeological Consulting Services (ACS), LTD. 2008. *A Cultural Resource and Historical Building Survey for a Remedial Investigation/Feasibility Study at the Iron King Mine-Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona.* November 10.

TABLE 3-1

Regulatory Timeline

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Property	Issue	Owner/Operator	Agency	Description
1992	Iron King Mine	Surface water	Ironite Products Company	EPA	Ironite Products Company submits a notice of Intent to discharge stormwater under a general NPDES permit.
1995	Iron King Mine	Air Quality	Ironite Products Company	ADEQ	ADEQ issues Ironite Products Company a violation of its air quality permit (Permit No. 54098-95).
1995	Iron King Mine	Surface water	Ironite Products Company	EPA	EPA reports that stormwater discharges from Ironite Products Company facility covered by Stormwater NPDES Permit No. AZR00A425.
1995	Iron King Mine	Surface water	Ironite Products Company	EPA	During an inspection, EPA observes tailings runoff into retention ponds, and subsequent unpermitted discharge of tailings runoff into tributary of Chaparral Gulch.
1997	Iron King Mine	Air Quality	Ironite Products Company	ADEQ	ADEQ receives community complaints of dust originating during construction at the Iron King Mine.
1998 and 2001	Iron King Mine	Material Handling	Kuhles Capital, LLC	ADEQ	ADEQ observed cyanide drums and stained waste rock north of the Glory Hole, stained soil in various areas of the former Mineworks area, a gray berm along the boundary of the former Mineworks area and Main Tailings Pile, and laboratory chemical waste near the former assay laboratory.
2002	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ approves aquifer protection permit (Permit Number 50409700A) for construction debris landfill in the Glory Hole.
2002	Iron King Mine	Assessment	Ironite Products Company	EPA/ADEQ	ADEQ completes PA/SI of the iron King Mine site.
2003	Iron King Mine	Surface water	Ironite Products Company	ADEQ	ADEQ issues Ironite Products Company violations under Arizona stormwater regulations for unauthorized discharge of runoff from tailings and settling ponds to a tributary (unnamed wash) of Chaparral Gulch.
2003	Iron King Mine	Surface water	Kuhles Capital, LLC	ADEQ	ADEQ issues Kuhles Capital, LLC violations under Arizona stormwater regulations for unpermitted stormwater releases to a tributary (unnamed wash) of Galena Gulch .
2003	Iron King Mine	Septage Treatment	Aqua Tec, LLC	ADEQ	ADEQ approves aquifer protection permit (Permit Number 105204) for septage treatment facility.
2004	Humboldt Smelter	Surface water	Greenfields Enterprises, LLC	ADEQ	ADEQ issues Greenfields Enterprises, LLC violations under Arizona stormwater regulations for unpermitted release of tailings and stormwater from Humboldt Smelter to Chaparral Gulch, and for discharge of stormwater without a permit.
2004	Humboldt Smelter	Assessment	Greenfields Enterprises, LLC	EPA/ADEQ	ADEQ completes the PA/SI of the Humboldt Smelter site.
2005	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ observes unacceptable waste[a] at the Glory Hole landfill - violations result in a compliance order.
2005	Iron King Mine	Surface water	Aqua Tec, LLC	ADEQ	ADEQ issues violations to Aqua Tec Septage Treatment Plant for sludge, raw sewage, and stormwater entering a wash along the western side of the Iron King Mine.
2005	Iron King Mine	Removal Action	Ironite Products Company	EPA	EPA completes Removal Assessment Report for residential properties near Iron King Mine along Chaparral Gulch.
2005	Iron King Mine	Air Quality	Kuhles Capital, LLC	ADEQ	ADEQ issues Kuhles Capital, LLC a violation for inadequate cover over the Glory Hole landfill and windblown litter.
2006	Sitewide	Assessment	NA	EPA/ADEQ	ADEQ completes the Expanded Site Inspection of the combined Site.
2006	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ issues violations to Kuhles Capital, LLC for improper operation of the Glory Hole landfill, and requested a cleanup plan.
2006	Iron King Mine	Air Quality	Ironite Products Company	ADEQ	ADEQ issued violations to Ironite Products Company for improper record keeping and failure to submit a dust control plan as required by their air quality permit (No. 31686).
2006	Iron King Mine	Removal Action	Ironite Products Company	EPA/ADEQ	ADEQ submits a request for Federal Action to EPA; Ironite ordered to remove contaminated soil from residential properties under a 2006 Settlement Agreement with EPA.
2006	Iron King Mine	Removal Action	Ironite Products Company	EPA	Ironite Products Company begins removal actions under EPA oversight in accordance with the 2006 Settlement Agreement.
2006	Iron King Mine	Surface water	North American Industries	ADEQ	North American Industries and the former Ironite Products Company made facility modifications in response to violations issued in 2003 and ADEQ's requests for updated Best Management Practices.
2007	Iron King Mine	Air Quality	Ironite Products Company	ADEQ	ADEQ issues Ironite Products Company a violation for failure to perform hazardous pollutant testing required of their air quality permit (No. 31686).
2007	Humboldt Smelter	Air Quality	Greenfields Enterprises, LLC	ADEQ	ADEQ issues Greenfields Enterprises, LLC violations under air quality regulations for excessive amount of airborne particulates from Humboldt Smelter ash (dross) piles.

TABLE 3-1

Regulatory Timeline

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Year	Property	Issue	Owner/Operator	Agency	Description
2007	Sitewide	NPL Listing	NA	EPA	EPA proposes Site for inclusion on the NPL.
2008	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ issues Abatement Order A-19-08 to Kuhles Capital, LLC for improper demolition of asbestos-containing structures at Iron King Mine.
2008	Sitewide	NPL Listing	NA	EPA	Site is formally placed on the NPL.
2008	Sitewide	Remedial Investigation	NA	EPA	Remedial investigations begin.
2009	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ files a lawsuit for improper demolition of structures containing asbestos and disposal of asbestos-containing material in the Glory Hole landfill.
2009	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	Maricopa County Superior Court orders Kuhles Capital, LLC to comply with Abatement Order A-19-08.
2010	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	ADEQ issues revised aquifer protection plan for final cover construction with provisions for post-closure monitoring.
2010	Iron King Mine	Landfill	Kuhles Capital, LLC	ADEQ	Kuhles Capital, LLC submits National Emission Standards for Hazardous Air Pollutants notification for renovation and demolition activities.
2011	Iron King Mine	Removal Action	NA	EPA	EPA completes Removal Assessment for properties in Dewey-Humboldt and performs Time Critical Removal Action for 10 residential properties, 1 municipal property, and the Small Tailings Pile north of Iron King Mine.

Data Source: EA, 2010

Notes:

[a] Municipal waste, waste tires, wood chips, medical waste, and batteries

ADEQ = Arizona Department of Environmental Quality

EPA = U.S. Environmental Protection Agency

NA - not applicable

NPDES = National Pollutant Discharge Elimination System

NPL = National Priorities List

PA/SI = Preliminary Assessment/Site Inspection

TABLE 3-2

Summary of Preliminary Investigations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Investigation	Year	Property	Performed By	Source Document	Scope	Summary of Findings
Phase 1 Environmental Site Assessment for the Ironite Products Facility	1998	Iron King Mine	AGRA Earth & Environmental	*Phase I Environmental Site Assessment, Ironite Products Facilit* y. Prepared by AGRA Earth & Environmental for Pacific Century Bank, N.A. December 23, 1998.	Review of available records, visual observations of the area, and personal interviews. No samples were collected.	Poor storm water monitoring. Improperly labeled drums and other small containers of waste materials. Laboratory sink and floor drain lead to a septic system. Unused wells on the property are a potential threat to groundwater.
Phase 1 Environmental Site Assessment for the Iron King Smelter/Mill Site	2002	Humboldt Smelter	Hoque & Associates	*Phase I Environmental Site Assessment, Iron King Smelter/Mill Site* . Prepared by Hoque & Associates for Kuhles Capital. August 2002.	Review of available records, visual observations of the area, and personal interviews. No samples were collected.	Large areas of exposed surfaces of apparent mine tailings, smelter ash (dross), and smelter slag. Piles of apparent assay laboratory materials. Suspected underground storage tanks. Stained soils near used oil storage and aboveground diesel tank.
Preliminary Assessment/Site Inspection of the Iron King Mine	2002	Iron King Mine	Arizona Department of Environmental Quality	*Preliminary Assessment/Site Inspection Report, Iron King Mine and Tailing* . Prepared by Arizona Department of Environmental Quality for Region IX EPA. October 7, 2002.	Surface and subsurface soil samples were collected from the following areas: Main Tailings Pile, retention ponds, Ironite Products Company (now North American Industries) operations area, former assay laboratory, former mill site, former fertilizer plant, stained soil, waste rock piles, PACE Preparatory Academy schoolyard, and background areas. Sediment samples were collected upstream and downstream of the Site from the Agua Fria River, Chaparral Gulch, and Galena Gulch. Surface water samples were collected from the Agua Fria River above, below, and at its confluence with Chaparral Gulch. Groundwater samples were collected from three existing wells. Samples were analyzed for a combination of metals, cyanide, VOCs, SVOCs, and anions.	Metals including antimony, arsenic, cadmium, lead and/or mercury were detected at concentrations exceeding EPA and/or ADEQ benchmarks in tailings, waste rock, sediment and other areas. Arsenic concentration in Ironite production well exceeded EPA benchmarks. Arsenic, lead, mercury, and cadmium impacts to sediments in Chaparral Gulch and Galena Gulch.
Phase 2 Sampling Report for the Iron King Smelter/Mill Site	2003	Humboldt Smelter	Hoque & Associates	*Phase II Sampling Report, Iron King Smelter/Mill Site* . Prepared by Hoque & Associates, Inc. for Kuhles Konstruction, Inc. February 2003.	Surface sampling was conducted from tailings, dross, slag, assay laboratory wastes, and unknown drummed material. All samples were analyzed for cyanide and/or metals; limited analysis of samples for hydrocarbons. Data are not incorporated in the Site database.	Metals, including lead and arsenic, were detected at concentrations exceeding the average background levels and/or non-residential screening levels.
Preliminary Assessment/ Site Inspection of the Humboldt Smelter	2004	Humboldt Smelter	Arizona Department of Environmental Quality	*Preliminary Assessment/Site Inspection Report, Humboldt Smelter* . Prepared by Arizona Department of Environmental Quality for Region IX EPA. April 29, 2004.	Soil samples were collected from the former ore concentration area, Smelter Tailings Swale, Tailings Floodplain, retention pond, dross piles, the Humboldt Elementary School, private residences, background locations, and other areas of concern. Surface water and sediment samples were collected from two locations along the Agua Fria River and one location in Chaparral Gulch. Samples were analyzed for a combination of metals, cyanide, SVOCs, and anions.	Arsenic, lead, copper, zinc, and/or other metals exceeded release criteria in source area samples, including the Smelter Tailings Swale, Tailings Floodplain, former ore concentration area, retention pond, dross pile, and former assay laboratory area. Lead and zinc were elevated in soil at the Humboldt Elementary School and the residence to the northwest of the former Humboldt Smelter in comparison to background samples. Arsenic in surface water and sediment samples from lower Chaparral Gulch met release criteria.

TABLE 3-2

Summary of Preliminary Investigations

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Investigation	Year	Property	Performed By	Source Document	Scope	Summary of Findings
Soil Removal Assessment	2005	Iron King Mine Offsite Residential Properties	Ecology and Environment, Inc.	*Removal Assessment Report, Iron King Mine Site, Humboldt, Arizona* . Prepared by Ecology and Environment, Inc. for EPA START. October 2005.	Objective was to determine the level of arsenic and lead contained in the soils of 16 privately owned residential properties and 1 horse pasture along Chaparral Gulch resulting from erosion and tailings upset events from the Iron King Mine. Soil samples were collected in August 2005 from 153 surface locations and 17 subsurface locations at the properties and analyzed for lead and arsenic. Results were compared to previously established background arsenic and lead concentrations as well as the 2002 EPA Region 9 residential PRGs.	Eight of the properties had an average arsenic concentration that exceeded the PRG. EPA subsequently directed Ironite to excavate contaminated soil from four residential properties that contained substantially greater arsenic concentrations than other properties. EPA's Office of Emergency Response supervised the sampling and removal.
Expanded Site Inspection of the Iron King Mine/Humboldt Smelter	2006	Sitewide	Arizona Department of Environmental Quality	*Expanded Site Inspection Report, Iron King Mine/Humboldt Smelter* . Prepared by Arizona Department of Environmental Quality for EPA Region 9. October 31, 2006.	Groundwater samples were collected from 12 Humboldt Water System wells and private domestic wells. The samples were analyzed for total metals and cyanide. A second round of sampling was performed form 6 wells to confirm initial results.	Arsenic was detected at concentrations exceeding the MCL in 5 of the initial samples, including samples collected from a background well; and all confirmation samples.
Ironite Products Company/ North American Industries Sampling	2008	Iron King Mine	Brown and Caldwell	*Sampling Report, Former Ironite Products Company Facility.* Prepared by Brown and Caldwell for North American Industries. May 14, 2009.	Surface soil samples were collected from 62 locations in the North American Industries Operations area, the Main Tailings Pile, and adjacent parcels. Subsurface samples were collected from 6 locations on the Main Tailings Pile. All samples were analyzed for arsenic, lead, and mercury; a subset of samples was analyzed for additional metals, physical properties, acid base accounting, and synthetic precipitation leaching procedure metals. Surface water samples were collected from two onsite retention ponds and analyzed for total arsenic and lead.	Samples collected from the Main Tailings Pile had very high concentrations of arsenic, lead, and mercury. A portion of the Main Tailings Pile is located on property owned by the State of Arizona (south of the North American Industries property), and Kuhles Capital, LLC (north and northwest of the North American Industries property). Concentrations from other adjacent properties were significantly lower.

Notes:
ADEQ = Arizona Department of Environmental Quality
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
PRG = preliminary remediation goal
SVOC = semivolatile organic compound
VOC = volatile organic compound

TABLE 3-3

Summary of Removal Actions

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location of Property			Investigation Findings	Date(s) Removal Action Conducted[a]	Complete[b] or Partial Removal	Cleanup Levels (mg/kg)		Description of Removal Action	Amount of Soil Removed (yd^3)	Excavated Soil Management
Site ID	APN	Address or Description				As	Pb			
Ironite Products Company Removal Action										
O02	402-08-034L	12470 East Yavapai Road	Sampling in 2006 indicated As concentrations ranging from 11 to 210 mg/kg, with 29 of 68 samples exceeding the cleanup level.	7/24/06 to 8/2/06	Complete	23	NA	More than 50% of yard excavated to depths ranging from 1 inch to 2 feet bgs.	1,030	Excavated soil consolidated with Iron King Mine Main Tailings Pile.
O03	402-08-019R	12514 E. Yavapai Street	Sampling in 2006 indicated As concentrations ranging from 10 to 300 mg/kg, with 19 of 44 samples exceeding the cleanup level.	8/1/06 to 8/2/06	Complete	23	NA	More than 50% of yard excavated to depths ranging from 1 inch to 3 feet bgs.	140	Excavated soil consolidated with Iron King Mine Main Tailings Pile.
171 and O04	402-08-023	12516 E. Corley Street	Sampling in 2006 indicated As concentrations ranging from 12 to 99 mg/kg, with 18 of 56 samples exceeding the cleanup level.	8/7/06 to 8/10/06	Complete	23	NA	More than 50% of yard excavated to depths ranging from 1 inch to 2 feet bgs.	434	Excavated soil consolidated with Iron King Mine Main Tailings Pile.
O07	402-08-044E	12735 E. Main Street	Delineation sampling could not be performed in 2006 because access was denied. A hot spot was identified southeast of the house during the EPA 2005 Removal Assessment with an As concentration of 520 mg/kg.	5/15/07	Partial	23	NA	Excavated 15 x 15 x 1 foot deep area southeast of the house on current Yard 007C. The original excavation boundary included the entire O06 and O07 properties. However, the excavation boundary was revised to limited hot spot removal after access was denied.	8	Excavated soil consolidated with Iron King Mine Main Tailings Pile.
EPA Time-Critical Removal Action										
103 and 142[e]	402-07-002B 402-07-004[e]	13030 E. Main Street 13052 E. Main Street [e]	Sampling in 2008 and 2009 revealed an area with elevated average concentrations of As (46 mg/kg) and Pb (135 mg/kg).	9/3/11 to 11/15/11	Partial	38	23	Excavated 35 x 35 x 2 feet deep area along the property line between OFS-103 and OFS-142.	90.7[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
111	402-06-102L	2925 South Sweet Pea Lane	Historical data indicated elevated average concentrations of As (116 mg/kg) and Pb (639 mg/kg).	9/3/11 to 11/15/11	Complete	38	23	Full yard excavated to a depth of 2 feet bgs.	579[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
118	402-06-102K	2905 South Sweet Pea Lane	Historical data indicated elevated average concentrations of As (147 mg/kg) and Pb (1,148 mg/kg).	9/3/11 to 11/15/11	Complete	38	23	Full yard excavated to a depth of 2 feet bgs.	575[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
119	402-07-007C	13080 East Main Street	Contaminated soil from 133 determined to encroach onto northern corner of property.	9/3/11 to 11/15/11	Partial	38	23	140[d] x 10-feet strip along the northwest boundary of yard excavated to a depth of 2 feet bgs as part of OFS-133 removal activities.	97[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
132	402-06-102P	2875 South Third Street	Historical data indicated elevated average concentrations of As (103 mg/kg) and Pb (950 mg/kg).	9/3/11 to 11/15/11	Complete	38	23	Full yard excavated to a depth of 2 feet bgs.	592[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
133	402-07-006	13070 Main Street	Sampling in 2009 and 2011 indicated 95% upper confidence limits for As and Pb (383 and 1,584 mg/kg, respectively) were in top 10% of in-town properties.	9/3/11 to 11/15/11	Complete	38	23	Full yard excavated to a depth of 2 feet bgs.	544[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
148	402-06-102M	2945 Sweet Pea Lane	Sampling in 2008 indicated elevated average concentrations of As (106 mg/kg) and Pb (578 mg/kg).	9/3/11 to 11/15/11	Complete	38	23	Full yard excavated to a depth of 2 feet bgs.	649[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.

TABLE 3-3

Summary of Removal Actions

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location of Property			Investigation Findings	Date(s) Removal Action Conducted[a]	Complete[b] or Partial Removal	Cleanup Levels (mg/kg)		Description of Removal Action	Amount of Soil Removed (yd^3)	Excavated Soil Management
Site ID	APN	Address or Description				As	Pb			
208 and 244	402-09-016D 402-09-016H	2565 Hill Street 2575 Hill Street	Sampling in 2011 confirmed a hot spot at 208, bordering the 244 property (As and Pb concentrations of 470 and 380 mg/kg, respectively).	9/3/11 to 11/15/11	Partial	38	23	Excavated 12 x 15 x 2 feet deep area along the property line between OFS-208 and OFS-244.	13.3[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
260 (Right-of-Way)	800-27-005T	Unsurfaced right-of-way behind Sweet Pea Lane	Sampling in 2010 and 2011 indicated elevated average concentrations of As (158 mg/kg) and Pb (747 mg/kg).	9/3/11 to 11/15/11	Complete	38	23	Full property excavated to a depth of 2 feet bgs.	1,304[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
301	402-06-102N	2965 Sweet Pea Lane	Sampling in 2011 revealed a hot spot with elevated concentrations of As (180 mg/kg) and Pb (180 to 1,200 mg/kg).	9/3/11 to 11/15/11	Partial	38	23	105 x 7 feet[d] and 22 x 65 feet[d] areas on northeast side of yard excavated to a depth of 2 feet bgs.	161[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
306	402-06-026 402-06-027B	13087 E. Main Street 13089 E. Main Street	Sampling in 2011 revealed areas with elevated concentrations of As (110 to 210 mg/kg) and Pb (140 to 360 mg/kg).	9/3/11 to 11/15/11	Partial	38	23	Area of approximately 7,000 square feet along southern parcel boundary excavated to a depth of 2 feet bgs.	518[c]	Excavated soil consolidated with Iron King Mine Main Tailings Pile and hydroseeded.
Small Tailings Pile	402-08-034L	12470 East Yavapai Road	Sampling in 2008 and 2011 indicated elevated average concentrations of As (556 mg/kg) and Pb (706 mg/kg).	10/27/11 to 11/15/11	Complete	38	23	Tailings pile removed to the depth of original grade; excavation depth ranged from 2 to 15 feet below the former top of the pile.	21,500	Excavated soil consolidated with temporary lined pad on southeast side of Iron King Mine Main Tailings Pile, and a fixative agent applied to surface.

Notes:

[a] Removal actions completed in 2006 and 2007 were conducted by Brown and Caldwell on behalf of the Ironite Products Company, and are documented in the Removal Action Completion Report (Brown and Caldwell, 2007). Removal actions completed in 2011 were conducted by the EPA and Ecology and Environment, Inc. (E & E), and are documented in the 2012 Removal Report (E & E, 2012).

[b] A "complete" removal action is defined as removal of more than 50 percent of the surface soil in the undeveloped portion of the site. Areas shown as having partial removal action were subject to hot spot removals only.

[c] Listed volume is an estimate based on the stated excavation depth and the area(s) of removal depicted on site maps in the 2012 Removal Report (E & E, 2012), and is likely underestimated (the same report indicates that a total of 6,339 yd^3 of soil was removed from all 11 noted properties).

[d] Listed measurement is based on the area(s) of removal depicted on site maps in the 2012 Removal Report (E & E, 2012).

[e] The 2012 Removal Report (E & E, 2012) describes a partial removal action at Property 103 and states that no action was taken at adjacent Property 142. With approval and input from EPA, select parcel boundaries were adjusted in this RI, in instances where GPS measurements and field observations identified inconsistencies and inaccuracies. The boundary between Property 103 and 142 was adjusted, and a portion of the 103 removal now falls within the boundary of 142.

APN = Assessor's Parcel Number
As = arsenic
bgs = below ground surface
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
NA = not applicable
Pb = lead
yd^3 = cubic yard(s)

TABLE 4-1

Air Sampling Design – 2008 to 2009 Initial Remedial Investigation

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location ID	Sample Group[a]	Sampling Equipment	Approximate Number of Samples[b]	Sample Date Range
ABG-01	Background	BGI PQ100	29	1/9/2009 to 9/8/2009
AES-01	Humboldt Proper (near Humboldt Elementary School)	BGI PQ100	27	1/9/2009 to 8/31/2009
		Thermo Electron TEOM Series 1400a Continuous Particulate Monitor with Automatic Cartridge Collection Unit	26	3/30/2009 to 9/8/2009
AHS-01	Background	BGI PQ100	13	8/17/2008 to 8/30/2008
AHS-02	Humboldt Proper	BGI PQ100	10	8/17/2008 to 8/30/2008
AHS-02A[c]	Former Humboldt Smelter	BGI PQ100	35	1/15/2009 to 9/8/2009
		Thermo Electron TEOM Series 1400a Continuous Particulate Monitor with Automatic Cartridge Collection Unit	26	3/30/2009 to 9/8/2009
AHS-03	Former Humboldt Smelter	BGI PQ100	13	8/17/2008 to 8/31/2008
AIK-01	Former Iron King Mine	BGI PQ100	7	8/17/2008 to 8/23/2008
AIK-01A	Former Iron King Mine	BGI PQ100	7	8/24/2008 to 8/31/2008
AIK-02	Former Iron King Mine	BGI PQ100	49	8/17/2008 to 9/8/2009
		Thermo Electron TEOM Series 1400a Continuous Particulate Monitor with Automatic Cartridge Collection Unit	24	4/6/2009 to 9/8/2009
AIK-03	Humboldt Proper	BGI PQ100	12	8/17/2008 to 8/30/2008

Notes:

[a] As designated in the EA Engineering, Science, and Technology, Inc. (EA) Remedial Investigation (RI) Table 2-9 and Figure 2-6 (EA, 2010).

[b] Duplicate samples were excluded.

[c] The location ID was derived from EA RI Figure 2-6, which designates this sample location as AHS-02A to differentiate it from AHS-02; however, EA RI Table 2-9 and the Sample IDs in the database do not include the "A" designation.

TABLE 4-2

Summary of Investigation Activities – Data Gap Remedial Investigations 2013 - 2015

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Activity	Location	Description
Subsurface Investigation	Former Humboldt Smelter property and Chaparral Gulch	99 shallow borings in Chaparral Gulch
		16 shallow borings in the Humboldt Smelter
		More than 500 samples of unconsolidated material collected and analyzed for metals using an XRF.
		Select samples collected for laboratory analysis, including TAL metals, SPLP metals, ABA, and physical properties.
		5 piezometers installed at 4 borehole locations (CHF-MW-01 through CHF-MW-03, STS-MW-04S, STS-MW-04I).
Surface Geophysical Investigation	Smelter Tailings Swale and Tailings Floodplain	Site visit and evaluation of multiple geophysical methods.
		Acquisition/modeling of geophysical data.
		Delineation/mapping of tailing deposits.
		Volume estimation of tailings.
Dross, Plateau Soils, and Slag Investigations	Former Humboldt Smelter property	**Dross Investigation**
		300 samples collected from 140 hand auger and 7 drilled boreholes.
		Samples analyzed for metals using XRF.
		Select samples collected for laboratory analysis, including TAL metals, SPLP metals, ABA, dioxins/furans and physical properties.
		Plateau Soil Characterization
		11 samples collected from 5 borehole locations to depths of 7.5 feet.
		Samples analyzed for metals using XRF.
		Select samples analyzed for TAL metals and physical properties.
		Slag Pile Characterization
		3 surface samples collected: 1 from primary slag pile, 2 from satellite slag pile.
		Samples analyzed for TAL metals, SPLP metals, ABA, and specific gravity.
Main Tailings Pile (MTP) and Waste Rock Investigations	Former Iron King Mine, Galena Gulch	**Shallow Boreholes**
		Advanced 11 borings (maximum depth 24 feet) along the margin of the MTP.
		Continuous samples logged for lithology, moisture conditions, perched water.
		Approximately 50 samples collected and analyzed for metals using XRF.
		MTP Investigation
		3 deep boreholes advanced through MTP into underlying Hickey Formation.
		Continuous core samples collected from grade to final depth.
		Total depths ranged from 77 to 134 feet below grade.
		Collected samples from each borehole for TAL, SPLP, and ABA analysis.
		Standard penetration tests conducted at regular intervals; samples of geotechnical parameters were collected at select locations.
		Boreholes backfilled to base of tailings and completed as monitoring wells (CHF-MW-01, CHF-MW-02, CHF-MW-03); wells were dry during the investigation period.

TABLE 4-2

Summary of Investigation Activities – Data Gap Remedial Investigations 2013 - 2015

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Activity	Location	Description
		Waste Rock Investigation
		Survey of waste rock west of the former Mineworks area and along Galena Gulch for suitability as construction material.
		3 waste rock samples analyzed for TAL metals, SPLP metals, and ABA.
Installation of New Monitoring Wells	Sitewide	6 new monitoring wells installed at 4 locations east of Highway 69 (MW-10S/10D, MW-12S/12D, MW-02D, MW-11S) to expand the Sitewide monitoring well network.
		Additional piezometers and monitoring wells were installed as discussed under the MTP and Waste Rock Investigation and Subsurface Investigation.
Geologic Model	Chaparral Gulch, Tailings Floodplain, and Smelter Tailings Swale	Used both 3-dimensional (3D) and 2-dimensional (2D) visualization software.
		Developed hydrostratigraphic sections.
		Developed isopach map of tailings and contaminated soil within Chaparral Gulch showing thickness and horizontal extents.
		Developed depth to groundwater contours and schematic flow directions within Chaparral Gulch area.
Groundwater Sampling	Sitewide	Sampling and water level gauging in June (existing wells only), July, and October 2014.
		Sampled 10 existing MWs, 6 new MWs, 4 new piezometers.
		Analysis included TAL metals and water quality parameters.
Surface Water and Sediment Monitoring	Agua Fria River, Chaparral Gulch	Collected 6 baseline surface water samples in early May 2014.
		Installed dedicated sampling devices at 9 locations to monitor storm flows in July, August, and October 2014.
		Collected sediment samples at 8 locations and determined sediment thickness.
		All surface water and sediment samples were analyzed for TAL metals; selected samples were analyzed for other parameters.
		Surveyed the Chaparral Gulch channel at 2 locations and installed pressure transducers to determine peak discharges and associated channel velocities during the monitoring period.
Biological Survey and Bioassessment Sampling	Sitewide and Agua Fria River	**Biological Survey**
		Assessed riparian corridors and upland areas suitable for wildlife.
		Benthic community and fish observations documented.
		Benthic macroinvertebrate samples collected.
		General habitat map developed for Site.
		Bioassessment Sampling
		Collected 41 sediment samples, 18 surface water samples along Chaparral Gulch and the Agua Fria River; samples were analyzed TAL metals and select samples analyzed for water quality parameters.
		Collected 10 collocated plant material and surface soil samples from the MTP.
		Collected 15 samples from MTP and Galena Gulch for hexavalent chromium (MTP only) and *in vitro* bioaccessibility.

TABLE 4-2

Summary of Investigation Activities – Data Gap Remedial Investigations 2013 - 2015

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Activity	Location	Description
Soil Ecological Testing	Tailings Floodplain, MTP, and Dross	Bench-scale plant growth study and agronomic analysis conducted.
		Assessed why nonvegetated areas exist adjacent to well-vegetated areas within the Tailings Floodplain.
		Samples tested for ability to support plant growth.
Surface Soil Sampling	Residential Properties	Soil sampling on residential sites near Iron King Mine and Humboldt Smelter sites.
		Focused on properties believed to be contaminated by Site.
		Most sampling intervals were: 0 to 2 inches and 10 to 14 inches below grade.
		ERT and SERAS collected 254 surface and 27 subsurface soil samples from 10 properties in August 2013.
		ERT and SERAS collected approximately 4,400 samples from 373 properties in 2014.
		Soil samples analyzed for target metals using field XRF.
		10% of the samples were submitted for laboratory confirmation analysis.
		40 samples were collected in 2013 and 2014 for i*n vitro* bioaccessibility analysis for lead and arsenic.
Surface Soil Sampling	Non-Residential Areas	Approximately 340 surface and near-surface samples were collected from areas surrounding the former Iron King Mine property.
		All soil samples analyzed for target metals using field XRF.
		18 of the samples were submitted for laboratory confirmation analysis.
Surveys	Chaparral Gulch, Iron King Mine, Humboldt Smelter, Monitoring Well Locations	Horizontal and vertical survey measurements of new monitoring wells.
		Survey measurements on slag pile for monitoring movements along cracks.
		Survey measurements of concrete dam to support stability analysis.
		Acquired topographic data throughout Smelter Tailings Swale to estimate tailing volumes.
		Surveyed channel cross sections in area downstream of Chaparral Gulch for flow estimation.
Support Information		
Flood Hazard Study	Chaparral Gulch	Identified the watershed that drains toward Chaparral Gulch, estimated return flows, and delineated the floodplain (Cardno, Inc., 2014).
Construction Material Survey	Sitewide	Identified local suppliers of construction materials.
Smelter Stack Assessment	Humboldt Smelter	Perform a structural condition assessment of the Humboldt Smelter stack (Core Structure Group, LLC, 2013).
Aerial Imagery, Topographic, and Parcel Data Collection	Sitewide	Obtained aerial imagery, topographic, and parcel data to assist with generating figures, estimating the volume of mine wastes, and identifying parcels requiring property access.

Notes:
Source: Lockheed Martin SERAS, 2015
ABA = acid-base accounting
MW = monitoring wells
SPLP = synthetic precipitation leaching procedure
TAL = target analyte list metals
XRF = x-ray fluorescence

TABLE 5-1

Monthly Average Flow in Agua Fria River for Water Years 2000-2014

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Statistic	Units	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	cfs	4.31	2.96	5.33	8.25	10.3	5.31	3.02	2.02	1.1	4.28	6.85	5.23
Maximum	cfs	21.3	6.42	31	48.7	83.1	23.7	7.07	4.56	3.19	13	36.3	41.6
(WY)		(2001)	(2009)	(2005)	(2005)	(2005)	(2010)	(2010)	(2005)	(2005)	(2010)	(2014)	(2002)
Minimum		1.3	1.58	1.91	2.05	2.08	1.86	1.5	0.93	0.051	0.12	0.046	0.93
(WY)		(2003)	(2010)	(2002)	(2002)	(2002)	(2002)	(2002)	(2012)	(2013)	(2002)	(2002)	(2001)

Notes:

Data from USGS gaging station 09512450, Aqua Fria River near Humboldt, Arizona

cfs = cubic feet per second

WY = Water Years

TABLE 5-2

Summary of Peak Flows in Chaparral Gulch (July through October 2014)

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

			Section C-C'				Section D-D'			
Storm Event (Date)	**Storm Event Rainfall (in)**	**Peak Flow (date/time)**	**Stage (feet)**	**W.S. Elevation (feet)**	**Q (cfs)**	**V (fps)**	**Stage (feet)**	**W.S. Elevation (feet)**	**Q (cfs)**	**V (fps)**
--	--	--	0.62	4,426.46	0.92	1.41	0.57	4,421.49	0.83	1.42
7/3/2014	0.01	7/3/2014 18:45	2.00	4,427.84	21.6	3.59	1.73	4,422.65	23.6	2.41
8/3/2014	0.14	8/3/2014 16:15	1.22	4,427.06	4.19	2.06	1.15	4,422.07	5.84	2.12
8/10/2014	0.14	8/10/2014 19:30	1.73	4,427.57	14.2	3.18	1.68	4,422.60	21.2	2.39
8/12/14 - 8/13/14	1.46	8/12/2014 19:15	1.93	4,427.77	20.4	3.63	1.74	4,422.66	24.3	2.42
8/18/14 - 8/19/14	1.53	8/18/2014 19:15	3.71	4,429.55	291.4	6.45	3.28	4,424.20	214.4	4.58
8/26/2014	0.89	8/26/2014 14:45	2.26	4,428.10	32.7	3.83	1.31	4,422.23	9.21	2.31
9/8/2014	0.34	9/8/2014 5:45	1.55	4,427.39	9.72	2.75	1.21	4,422.13	6.9	2.19

Notes:

Rainfall recorded at Prescott Municipal Airport (Ernest A. Love Field)

Section C-C' is located upgradient of Section D-D'. The sections were separated by a horizontal distance of approximately 69 feet. The location of these sections is indicated by the label "EPA Chaparral Gulch Gaging Station" on Figures 5-5 and 5-6. The sections are also shown on Figure 8-4 of the ERT report (Lockheed Martin SERAS, 2015) (Appendix F).

-- = not applicable

cfs = cubic feet per second

fps = feet per second

Q = discharge

V = average velocity

W.S. Elevation = water surface elevation (above mean sea level)

Source: Lockheed Martin SERAS, 2015

TABLE 5-3

Estimated Recurrence Interval Peak Flows in Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Recurrence Interval	Estimated Peak Flow at Highway 69 (cfs)	Estimated Peak Flow at Confluence with Aqua Fria River (cfs)
2 Years	157	163
5 Years	560	584
10 Years	996	1,040
25 Years	1,880	1,960
50 Years	3,300	3,440
100 Years	5,100	5,310
500 Years	12,100	12,500

Notes:

cfs = cubic feet per second

Source: Cardno, 2014

TABLE 5-4

Well Construction Details - EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Well No.	Installation Date	Investigation	Location Description	Easting (feet)	Northing (feet)	MP (feet msl)[1]	TD (feet)	ST (feet)	SB (feet)	Well Type	Hydrostratigraphic Unit
CHF-MW-01	2/21/2014	ERT Data Gap RI	Tailings Floodplain	604507.05	1271004.24	4,467.72	26	2	12	2-inch PVC	Quaternary Alluvium/Tailings
CHF-MW-02	2/22/2014	ERT Data Gap RI	Tailings Floodplain	604002.21	1271369.09	4,474.60	30	7.5	22.5	2-inch PVC	Quaternary Alluvium/Tailings
CHF-MW-03	2/22/2014	ERT Data Gap RI	Tailings Floodplain	603604.48	1271672.06	4,480.62	38	11	21	2-inch PVC	Quaternary Alluvium/Tailings
STS-MW-04S	2/25/2014	ERT Data Gap RI	Tailings Floodplain	603810.74	1271639.22	4,476.10	10	3	8	2-inch PVC	Quaternary Alluvium/Tailings
STS-MW-04I	2/25/2014	ERT Data Gap RI	Tailings Floodplain	603808.81	1271636.80	4,479.01	38	18	28	2-inch PVC	Quaternary Alluvium/Tailings
MTP-MW1	4/3/2014	ERT Data Gap RI	MTP	600177.43	1273107.36	4,643.42	77	25	45	4-inch PVC	MTP Tailings
MTP-MW2	4/4/2014	ERT Data Gap RI	MTP	599136.73	1273698.39	4,749.23	110	61	81	4-inch PVC	MTP Tailings
MTP-MW3	4/7/2014	ERT Data Gap RI	MTP	598707.82	1273321.09	4,746.67	134	86	106	4-inch PVC	MTP Tailings
MW-01S	2008	EA Initial RI	Bank between Humboldt Smelter and the Agua Fria River	604926.85	1273051.90	4,543.59	123	106	121	4-inch PVC	Hickey Formation (Basalt)
MW-02S	2008	EA Initial RI	Smelter Tailings Swale	603593.21	1272195.36	4,516.84	54	37	52	4-inch PVC	Hickey Formation (Upper)
MW-02D	7/16/2014	ERT Data Gap RI	Smelter Tailings Swale	603599.43	1272206.03	4,516.31	360	306	356	4-inch PVC	Precambrian Bedrock (Iron King Volcanics)
MW-03S	2008	EA Initial RI	Southeast of MTP	600151.24	1272665.94	4,607.28	40	23	38	4-inch PVC	Hickey Formation (Upper)
MW-04S	2008	EA Initial RI	Toe of MTP	599873.54	1273498.41	4,640.68	59	42	57	4-inch PVC	Hickey Formation (Upper)
MW-05S	2008	EA Initial RI	Toe of MTP	599802.47	1272858.67	4,640.64	59	42	57	4-inch PVC	Hickey Formation (Upper)
MW-06D	2008	EA Initial RI	Adjacent to Glory Hole	597753.68	1274715.99	4,760.31	350	315	345	4-inch PVC	Precambrian Bedrock (Spud Mountain Series)
MW-07S	5/7/2012	EA Supplemental RI	Downgradient of Iron King Mine	600757.55	1273133.01	4,562.49	34	14	29	4-inch PVC	Hickey Formation (Upper)
MW-07D[2]	9/9/2012	EA Supplemental RI	Downgradient of Iron King Mine	600825.89	1273133.73	4,561.69	360	325	355	4-inch PVC	Iron King Volcanics
MW-08S	6/7/2012	EA Supplemental RI	Toe of MTP	599852.65	1273220.75	4,638.62	33	16	31	2-inch PVC	MTP Tailings
MW-08D	2012	EA Supplemental RI	Toe of MTP	599852.87	1273221.09	4,638.59	62	45	60	2-inch PVC	Hickey Formation (Upper)
MW-9S	5/22/2012	EA Supplemental RI	MTP	598554.24	1273981.44	4,751.91	74	52	72	2-inch PVC	MTP Tailings
MW-9D	5/28/2012	EA Supplemental RI	MTP	598555.68	1273976.76	4,751.65	180	158	178	2-inch PVC	Hickey Formation (Upper)
MW-10S	6/18/2014	ERT Data Gap RI	Humboldt, East of Highway 69	602098.37	1274184.87	4,530.29	51	34	49	4-inch PVC	Hickey Formation (Upper)
MW-10D	7/2/2014	ERT Data Gap RI	Humboldt, East of Highway 69	602102.71	1274179.37	4,530.11	330	294.5	324.5	4-inch PVC	Precambrian Bedrock (Iron King Volcanics)
MW-11S	6/20/2014	ERT Data Gap RI	Humboldt, East of Highway 69	603185.16	1273525.32	4,566.99	88	62	77	4-inch PVC	Hickey Formation (Basalt)
MW-12S	7/11/2014	ERT Data Gap RI	Humboldt, East of Highway 69	603898.57	1274665.73	4,511.87	49	30	45	4-inch PVC	Hickey Formation (Upper)
MW-12D	7/10/2014	ERT Data Gap RI	Humboldt, East of Highway 69	603903.72	1274665.98	4,511.83	219	135	175	4-inch PVC	Hickey Formation (Volcanic Hash)

Notes:

1. Elevation datum NAVD88
2. Alternate log from May 9 to May 21, 2012, shows a TD of 354 feet and a screen interval of 319 to 349 feet

MP = measuring point elevation or top-of-PVC (feet above sea level)
msl = mean sea level
MTP = Main Tailings Pile
PVC = polyvinyl chloride
RI = remedial investigation
SB = bottom of screen below ground surface
ST = top of screen below ground surface
TD = total depth below ground surface (feet)

TABLE 5-5

Groundwater Level Measurements - EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Date	MP	Depth to Water (feet)	Groundwater Elevation (feet msl)
CHF-MW-01	10-Jun-14	4467.72	6.13	4,461.59
CHF-MW-01	29-Jul-14	4467.72	5.69	4,462.03
CHF-MW-01	20-Oct-14	4467.72	4.66	4,463.06
CHF-MW-02	10-Jun-14	4474.60	10.7	4,463.90
CHF-MW-02	29-Jul-14	4474.60	10.9	4,463.70
CHF-MW-02	20-Oct-14	4474.60	8.33	4,466.27
CHF-MW-03	10-Jun-14	4480.62	16.39	4,464.23
CHF-MW-03	29-Jul-14	4480.62	16.13	4,464.49
CHF-MW-03	20-Oct-14	4480.62	13.44	4,467.18
MTP-MW1	10-Jun-14	4643.42	Dry	Dry
MTP-MW1	29-Jul-14	4643.42	Dry	Dry
MTP-MW1	20-Oct-14	4643.42	Dry	Dry
MTP-MW2	10-Jun-14	4749.23	Dry	Dry
MTP-MW2	29-Jul-14	4749.23	Dry	Dry
MTP-MW2	20-Oct-14	4749.23	Dry	Dry
MTP-MW3	10-Jun-14	4746.67	Dry	Dry
MTP-MW3	29-Jul-14	4746.67	Dry	Dry
MTP-MW3	20-Oct-14	4746.67	Dry	Dry
MW-01S	29-Apr-09	4543.59	96.44	4,447.15
MW-01S	04-May-10	4543.59	85.63	4,457.96
MW-01S	17-Oct-12	4543.59	102.57	4,441.02
MW-01S	11-Jun-14	4543.59	105.08	4,438.51
MW-01S	29-Jul-14	4543.59	115.81	4,427.78
MW-01S	20-Oct-14	4543.59	95.55	4,448.04
MW-02D	31-Jul-14	4516.31	334.17	4,182.14
MW-02D	20-Oct-14	4516.31	111.79	4,404.52
MW-02S	29-Apr-09	4516.84	40.19	4,476.65
MW-02S	03-May-10	4516.84	34.05	4,482.79
MW-02S	17-Oct-12	4516.84	42	4,474.84
MW-02S	10-Jun-14	4516.84	43.16	4,473.68
MW-02S	29-Jul-14	4516.84	43.81	4,473.03
MW-02S	20-Oct-14	4516.84	41.53	4,475.31
MW-03S	27-Apr-09	4607.28	22.69	4,584.59
MW-03S	03-May-10	4607.28	22.47	4,584.81

TABLE 5-5

Groundwater Level Measurements - EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Date	MP	Depth to Water (feet)	Groundwater Elevation (feet msl)
MW-03S	15-Oct-12	4607.28	26.12	4,581.16
MW-03S	12-Jun-14	4607.28	29.05	4,578.23
MW-03S	29-Jul-14	4607.28	30.64	4,576.64
MW-03S	20-Oct-14	4607.28	27.8	4,579.48
MW-04S	28-Apr-09	4640.68	45.13	4,595.55
MW-04S	05-May-10	4640.68	44.53	4,596.15
MW-04S	16-Oct-12	4640.68	46.09	4,594.59
MW-04S	12-Jun-14	4640.68	47.97	4,592.71
MW-04S	29-Jul-14	4640.68	48.41	4,592.27
MW-04S	20-Oct-14	4640.68	47.4	4,593.28
MW-05S	28-Apr-09	4640.64	41.69	4,598.95
MW-05S	04-May-10	4640.64	39.5	4,601.14
MW-05S	17-Oct-12	4640.64	42.14	4,598.50
MW-05S	12-Jun-14	4640.64	46.01	4,594.63
MW-05S	29-Jul-14	4640.64	47.02	4,593.62
MW-05S	20-Oct-14	4640.64	45.03	4,595.61
MW-06D	13-Oct-08	4760.31	275.08	4,485.23
MW-06D	30-Apr-09	4760.31	266.33	4,493.98
MW-06D	05-May-10	4760.31	253.31	4,507.00
MW-06D	17-Oct-12	4760.31	227.02	4,533.29
MW-06D	12-Jun-14	4760.31	212.4	4,547.91
MW-06D	28-Jul-14	4760.31	210.25	4,550.06
MW-06D	20-Oct-14	4760.31	210	4,550.31
MW-07D	16-Oct-12	4561.69	42.05	4,519.64
MW-07D	11-Jun-14	4561.69	31.67	4,530.02
MW-07D	30-Jul-14	4561.69	29.2	4,532.49
MW-07D	20-Oct-14	4561.69	22.16	4,539.53
MW-07S	16-Oct-12	4562.49	7.67	4,554.82
MW-07S	11-Jun-14	4562.49	6.69	4,555.80
MW-07S	30-Jul-14	4562.49	11.1	4,551.39
MW-07S	20-Oct-14	4562.49	8.79	4,553.70
MW-08D	15-Oct-12	4638.59	34.9	4,603.69
MW-08D	12-Jun-14	4638.59	40.39	4,598.20
MW-08D	29-Jul-14	4638.59	41.42	4,597.17

TABLE 5-5

Groundwater Level Measurements - EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Date	MP	Depth to Water (feet)	Groundwater Elevation (feet msl)
MW-08D	20-Oct-14	4638.59	37.52	4,601.07
MW-08S	15-Oct-12	4638.62	31.12	4,607.50
MW-08S	12-Jun-14	4638.62	31.05	4,607.57
MW-08S	29-Jul-14	4638.62	31.06	4,607.56
MW-08S	20-Oct-14	4638.62	Dry	Dry
MW-09D	15-Oct-12	4751.65	92.56	4,659.09
MW-09D	12-Jun-14	4751.65	93.9	4,657.75
MW-09D	28-Jul-14	4751.65	94.35	4,657.30
MW-09D	20-Oct-14	4751.65	94.3	4,657.35
MW-09S	15-Oct-12	4751.91	71.27	4,680.64
MW-09S	12-Jun-14	4751.91	72.17	4,679.74
MW-09S	28-Jul-14	4751.91	72.25	4,679.66
MW-09S	20-Oct-14	4751.91	Dry	Dry
MW-10D	31-Jul-14	4530.11	96.73	4,433.38
MW-10D	20-Oct-14	4530.11	78.91	4,451.20
MW-10S	30-Jul-14	4530.29	21.27	4,509.02
MW-10S	20-Oct-14	4530.29	20.03	4,510.26
MW-11S	29-Jul-14	4566.99	75.5	4,491.49
MW-11S	20-Oct-14	4566.99	76.17	4,490.82
MW-12D	30-Jul-14	4511.83	85.92	4,425.91
MW-12D	20-Oct-14	4511.83	63.5	4,448.33
MW-12S	30-Jul-14	4511.87	22.31	4,489.56
MW-12S	20-Oct-14	4511.87	20.57	4,491.30
STS-MW-04I	10-Jun-14	4479.01	14.9	4,464.11
STS-MW-04I	29-Jul-14	4479.01	8.89	4,470.12
STS-MW-04I	20-Oct-14	4479.01	12.32	4,466.69
STS-MW-04S	10-Jun-14	4476.10	Dry	Dry
STS-MW-04S	29-Jul-14	4476.10	Dry	Dry
STS-MW-04S	20-Oct-14	4476.10	Dry	Dry

Notes:

NAVD88 = North American Vertical Datum 1988

PVC = polyvinyl chloride

MP = measuring point elevation or top-of-PVC (feet msl). Elevation datum NAVD88.

msl = mean sea level

TABLE 6-1

Background Summary Statistics for Metals in Shallow Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Parameter	Number of Detects	Number of Analyses	Percent Detects	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Arithmetic Mean Value (mg/kg)	Standard Deviation (mg/kg)	95/95 UTL (mg/kg)	UTL Basis
Aluminum	159	159	100	6320	43000	19800	7310	**35600**	Gamma UTL
Antimony	9	159	6	0.37	4.5	1.001	0.944	**2.42**	Gamma UTL
Arsenic	268	268	100	3.4	421	39.1	36.2	**112**	Lognormal UTL
Barium	159	159	100	61	532	156	66.5	**271**	Gamma UTL
Beryllium	108	159	68	0.029	1.9	0.623	0.494	**1.7**	Nonparametric UTL
Cadmium	73	159	46	0.056	1.4	0.343	0.259	**0.824**	Normal UTL
Calcium	159	159	100	2000	19500	6630	3700	**15500**	Lognormal UTL
Chromium	159	159	100	0.73	260	34.8	44	**145**	Nonparametric UTL
Cobalt	159	159	100	6	51.5	16.6	8.93	**43.6**	Nonparametric UTL
Copper	265	268	99	11	317	57.1	42.4	**182**	Non-parametric UTL
Iron	159	159	100	16300	100000	39900	15900	**71900**	Normal UTL
Lead	268	268	100	4.05	89.3	15.6	10.5	**34.8**	Lognormal UTL
Magnesium	159	159	100	2740	25600	8750	5420	**24300**	Nonparametric UTL
Manganese	159	159	100	348	2620	889	352	**1600**	Gamma UTL
Mercury	117	156	75	0.0085	0.11	0.0364	0.0223	**0.0795**	Gamma UTL
Nickel	158	159	99	0.33	119	23.97	23.59	**89**	Nonparametric UTL
Potassium	159	159	100	649	10700	3000	1680	**6610**	Lognormal UTL
Selenium	102	163	63	0.59	5.1	1.994	0.982	**4.4**	Nonparametric UTL
Sodium	106	159	67	9.2	649	80.95	96.53	**533**	Nonparametric UTL
Thallium	131	159	82	0.13	3.5	1.319	0.692	**2.8**	Nonparametric UTL
Vanadium	159	159	100	10.7	283	73.5	49	**231**	Nonparametric UTL
Zinc	268	268	100	27.3	257	79.3	28.7	**136**	Lognormal UTL

Notes:

Data source for arsenic, copper, lead, and zinc: Soil Background Study Report (CH2M, 2015).

Data source for other parameters: Calculations performed by CH2M, dated November 6, 2015.

These calculations include the best result from shallow soil samples, defined as a top depth of 0 feet below ground surface, collected between 2002 and 2013 from areas outside of the background boundary (see Figure 6-1).

mg/kg = milligrams per kilogram

UTL = upper tolerance limit

TABLE 6-2

Soil Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CAS Number	Maximum Detected Site Concentration (mg/kg)	Screening Level (mg/kg)	Maximum Result > Screening Level (Y/N)	Screening Level Type	Background UTL (mg/kg)	Maximum Result > Background (Y/N)	Comment
Metals and Cyanide								
Aluminum	7429-90-5	254000	77000	Yes	EPA Residential RSL	35600	Yes	
Antimony	7440-36-0	360	31	Yes	EPA Residential RSL	2.42	Yes	
Arsenic	7440-38-2	20200	194	Yes	Age Weighted 10-4 risk	112	Yes	
Barium	7440-39-3	2940	15000	No	EPA Residential RSL	271	Yes	
Beryllium	7440-41-7	60.3	160	No	EPA Residential RSL	1.7	Yes	
Cadmium	7440-43-9	210	70	Yes	EPA Residential RSL	0.824	Yes	
Calcium	7440-70-2	216000	N/A	N/A	N/A	15500	Yes	
Chromium	7440-47-3	1790	120000	No	EPA Residential RSL	145	Yes	
Chromium, Hexavalent	18540-29-9	18	0.3	Yes	EPA Residential RSL	N/A	N/A	
Cobalt	7440-48-4	102	23	Yes	EPA Residential RSL	43.6	Yes	
Copper	7440-50-8	39800	3100	Yes	EPA Residential RSL	182	Yes	
Cyanide	57-12-5	172	21	Yes	EPA Residential RSL	N/A	N/A	
Iron	7439-89-6	300000	55000	Yes	EPA Residential RSL	71900	Yes	
Lead	7439-92-1	65700	140	Yes	Provisional RSL	34.8	Yes	
Lead	7439-92-1	65700	400	Yes	EPA Residential RSL	34.8	Yes	
Magnesium	7439-95-4	46200	N/A	N/A	N/A	24300	Yes	
Manganese	7439-96-5	74000	1800	Yes	EPA Residential RSL	1600	Yes	
Mercury	7487-94-7	160	23	Yes	EPA Residential RSL	0.0795	Yes	
Nickel	7440-02-0	1240	1500	No	EPA Residential RSL	89	Yes	
Potassium	7440-09-7	35600	N/A	N/A	N/A	6610	Yes	
Selenium	7782-49-2	160	390	No	EPA Residential RSL	4.4	Yes	
Silver	7440-22-4	397	390	Yes	EPA Residential RSL	N/A	N/A	
Sodium	7440-23-5	38300	N/A	N/A	N/A	533	Yes	
Thallium	7440-28-0	15.4	0.78	Yes	EPA Residential RSL	2.8	Yes	
Vanadium	7440-62-2	343	390	No	EPA Residential RSL	231	Yes	
Zinc	7440-66-6	75000	23000	Yes	EPA Residential RSL	136	Yes	
Dioxins/Furans								
TEQBird	1746-01-6	0.00206	0.0000049	Yes	EPA Residential RSL	N/A	N/A	Surrogate: 2,3,7,8-TCDD
TEQFish	1746-01-6	0.0013	0.0000049	Yes	EPA Residential RSL	N/A	N/A	Surrogate: 2,3,7,8-TCDD
TEQMammal	1746-01-6	0.00116	0.0000049	Yes	EPA Residential RSL	N/A	N/A	Surrogate: 2,3,7,8-TCDD
PAHs								
2-Methylnaphthalene	91-57-6	0.85	230	No	EPA Residential RSL	N/A	N/A	
Acenaphthene	83-32-9	0.26	3500	No	EPA Residential RSL	N/A	N/A	
Anthracene	120-12-7	0.18	17000	No	EPA Residential RSL	N/A	N/A	
Benzo[a]anthracene	56-55-3	0.71	0.15	Yes	EPA Residential RSL	N/A	N/A	
Benzo[a]pyrene	50-32-8	0.54	0.015	Yes	EPA Residential RSL	N/A	N/A	
Benzo[b]fluoranthene	205-99-2	0.72	0.15	Yes	EPA Residential RSL	N/A	N/A	
Benzo[g,h,i]perylene	129-00-0	0.16	1700	No	EPA Residential RSL	N/A	N/A	Surrogate: Pyrene
Benzo[k]fluoranthene	207-08-9	0.45	1.5	No	EPA Residential RSL	N/A	N/A	
Chrysene	218-01-9	0.72	15	No	EPA Residential RSL	N/A	N/A	
Dibenzo[a,h]anthracene	53-70-3	0.11	0.015	Yes	EPA Residential RSL	N/A	N/A	

TABLE 6-2

Soil Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CAS Number	Maximum Detected Site Concentration (mg/kg)	Screening Level (mg/kg)	Maximum Result > Screening Level (Y/N)	Screening Level Type	Background UTL (mg/kg)	Maximum Result > Background (Y/N)	Comment
Fluoranthene	206-44-0	1.3	2300	No	EPA Residential RSL	N/A	N/A	
Fluorene	86-73-7	0.14	2300	No	EPA Residential RSL	N/A	N/A	
Indeno(1,2,3-Cd)Pyrene	193-39-5	0.5	0.15	Yes	EPA Residential RSL	N/A	N/A	
Naphthalene	91-20-3	0.6	3.8	No	EPA Residential RSL	N/A	N/A	
Phenanthrene	120-12-7	0.7	17000	No	EPA Residential RSL	N/A	N/A	Surrogate: Anthracene
Pyrene	129-00-0	1.1	1700	No	EPA Residential RSL	N/A	N/A	Surrogate: Pyrene
PCBs								
Aroclor-1016	12674-11-2	6.1	4	Yes	EPA Residential RSL	N/A	N/A	
Aroclor-1242	53469-21-9	0.17	0.24	No	EPA Residential RSL	N/A	N/A	
Aroclor-1248	12672-29-6	0.97	0.24	Yes	EPA Residential RSL	N/A	N/A	
Aroclor-1254	11097-69-1	0.39	0.24	Yes	EPA Residential RSL	N/A	N/A	
Aroclor-1260	11096-82-5	0.22	0.24	No	EPA Residential RSL	N/A	N/A	
Pesticides								
4,4'-DDD	72-54-8	0.11	2.2	No	EPA Residential RSL	N/A	N/A	
4,4'-DDE	72-55-9	0.021	1.6	No	EPA Residential RSL	N/A	N/A	
4,4'-DDT	50-29-3	0.1	1.9	No	EPA Residential RSL	N/A	N/A	
Aldrin	309-00-2	0.002	0.031	No	EPA Residential RSL	N/A	N/A	
Alpha-Chlordane	12789-03-6	0.017	1.8	No	EPA Residential RSL	N/A	N/A	Surrogate: Chlordane
Beta-BHC	319-85-7	0.021	0.3	No	EPA Residential RSL	N/A	N/A	
Delta-BHC	319-85-7	0.15	0.3	No	EPA Residential RSL	N/A	N/A	Surrogate: Beta-BHC
Dieldrin	60-57-1	0.041	0.033	Yes	EPA Residential RSL	N/A	N/A	
Endosulfan I	115-29-7	0.025	370	No	EPA Residential RSL	N/A	N/A	Surrogate: Endosulfan
Endosulfan II	115-29-7	0.11	370	No	EPA Residential RSL	N/A	N/A	Surrogate: Endosulfan
Endosulfan Sulfate	115-29-7	0.43	370	No	EPA Residential RSL	N/A	N/A	Surrogate: Endosulfan
Endrin	72-20-8	0.076	18	No	EPA Residential RSL	N/A	N/A	
Endrin Aldehyde	72-20-8	0.52	18	No	EPA Residential RSL	N/A	N/A	Surrogate: Endrin
Endrin Ketone	72-20-8	0.5	18	No	EPA Residential RSL	N/A	N/A	
Gamma-BHC	58-89-9	0.022	0.56	No	EPA Residential RSL	N/A	N/A	
Gamma-Chlordane	12789-03-6	0.012	1.8	No	EPA Residential RSL	N/A	N/A	Surrogate: Chlordane
Heptachlor	76-44-8	0.06	0.12	No	EPA Residential RSL	N/A	N/A	
Heptachlor Epoxide	1024-57-3	0.025	0.059	No	EPA Residential RSL	N/A	N/A	
Methoxychlor	72-43-5	0.94	310	No	EPA Residential RSL	N/A	N/A	
SVOCs								
1,1-Biphenyl	92-52-4	2.7	47	No	EPA Residential RSL	N/A	N/A	
4-Chloroaniline	106-47-8	0.043	2.7	No	EPA Residential RSL	N/A	N/A	
4-Methylphenol	108-39-4	3.8	3100	No	EPA Residential RSL	N/A	N/A	Surrogate: m-Cresol
Acetophenone	98-86-2	0.61	7800	No	EPA Residential RSL	N/A	N/A	
Benzaldehyde	100-52-7	0.46	7800	No	EPA Residential RSL	N/A	N/A	
Benzyl butyl phthalate	85-68-7	340	280	Yes	EPA Residential RSL	N/A	N/A	
bis(2-Ethylhexyl)phthalate	117-81-7	12	38	No	EPA Residential RSL	N/A	N/A	
Caprolactam	105-60-2	0.086	31000	No	EPA Residential RSL	N/A	N/A	
Carbazole	122-39-4	0.1	1500	No	EPA Residential RSL	N/A	N/A	

TABLE 6-2

Soil Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CAS Number	Maximum Detected Site Concentration (mg/kg)	Screening Level (mg/kg)	Maximum Result > Screening Level (Y/N)	Screening Level Type	Background UTL (mg/kg)	Maximum Result > Background (Y/N)	Comment
Dibenzofuran	132-64-9	0.31	72	No	EPA Residential RSL	N/A	N/A	
Diethyl phthalate	84-66-2	2.8	49000	No	EPA Residential RSL	N/A	N/A	Surrogate: Diethyl Phthalate
Dimethyl phthalate	84-66-2	0.44	49000	No	EPA Residential RSL	N/A	N/A	Surrogate: Diethyl Phthalate
Di-n-butyl phthalate	84-74-2	3.6	6200	No	EPA Residential RSL	N/A	N/A	
Di-n-octyl phthalate	84-74-2	9.2	6200	No	EPA Residential RSL	N/A	N/A	Surrogate: Di-n-butyl phthalate
Pentachlorophenol	87-86-5	0.35	0.99	No	EPA Residential RSL	N/A	N/A	
Phenol	108-95-2	2.7	18000	No	EPA Residential RSL	N/A	N/A	
VOCs								
1,1,1-Trichloroethane	71-55-6	0.0046	8100	No	EPA Residential RSL	N/A	N/A	
1,1,2,2-Tetrachloroethane	79-34-5	0.0046	0.6	No	EPA Residential RSL	N/A	N/A	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.0046	40000	No	EPA Residential RSL	N/A	N/A	
1,1,2-Trichloroethane	79-00-5	0.0046	1.1	No	EPA Residential RSL	N/A	N/A	
1,1-Dichloroethane	75-34-3	0.0046	3.6	No	EPA Residential RSL	N/A	N/A	
1,1-Dichloroethene	75-35-4	0.0046	230	No	EPA Residential RSL	N/A	N/A	
1,2,3-Trichlorobenzene	87-61-6	0.0046	49	No	EPA Residential RSL	N/A	N/A	
1,2,4-Trichlorobenzene	120-82-1	0.0046	24	No	EPA Residential RSL	N/A	N/A	
1,2-Dibromo-3-chloropropane	96-12-8	0.0046	0.0053	No	EPA Residential RSL	N/A	N/A	
1,2-Dibromoethane	106-93-4	0.0046	0.036	No	EPA Residential RSL	N/A	N/A	
1,2-Dichlorobenzene	95-50-1	0.0046	1800	No	EPA Residential RSL	N/A	N/A	
1,2-Dichloroethane	107-06-2	0.0046	0.46	No	EPA Residential RSL	N/A	N/A	
1,2-Dichloropropane	78-87-5	0.0046	1	No	EPA Residential RSL	N/A	N/A	
1,3-Dichlorobenzene	106-46-7	0.0046	2.6	No	EPA Residential RSL	N/A	N/A	Surrogate: 1,4-Dichlorobenzene
1,4-Dichlorobenzene	106-46-7	0.0046	2.6	No	EPA Residential RSL	N/A	N/A	
2-Hexanone	591-78-6	0.0093	200	No	EPA Residential RSL	N/A	N/A	
Acetone	67-64-1	0.033	61000	No	EPA Residential RSL	N/A	N/A	
Benzene	71-43-2	0.0046	1.2	No	EPA Residential RSL	N/A	N/A	
Bromochloromethane	74-97-5	0.0046	150	No	EPA Residential RSL	N/A	N/A	
Bromodichloromethane	75-27-4	0.0046	0.29	No	EPA Residential RSL	N/A	N/A	
Bromoform	75-25-2	0.0046	67	No	EPA Residential RSL	N/A	N/A	
Bromomethane	74-83-9	0.0046	6.8	No	EPA Residential RSL	N/A	N/A	
Carbon disulfide	75-15-0	0.0046	770	No	EPA Residential RSL	N/A	N/A	
Carbon tetrachloride	56-23-5	0.0046	0.65	No	EPA Residential RSL	N/A	N/A	
Chlorobenzene	108-90-7	0.0046	280	No	EPA Residential RSL	N/A	N/A	
Chloroethane	74-87-3	0.0046	110	No	EPA Residential RSL	N/A	N/A	Surrogate: Chloromethane
Chloroform	67-66-3	0.0088	0.32	No	EPA Residential RSL	N/A	N/A	
Chloromethane	74-87-3	0.0046	110	No	EPA Residential RSL	N/A	N/A	
cis-1,2-Dichloroethene	156-59-2	0.0046	160	No	EPA Residential RSL	N/A	N/A	
cis-1,3-Dichloropropene	542-75-6	0.0046	1.8	No	EPA Residential RSL	N/A	N/A	
Cyclohexane	110-82-7	0.0046	6500	No	EPA Residential RSL	N/A	N/A	
Dibromochloromethane	124-48-1	0.0046	0.73	No	EPA Residential RSL	N/A	N/A	
Dichlorodifluoromethane	75-71-8	0.0046	87	No	EPA Residential RSL	N/A	N/A	
Ethylbenzene	100-41-4	0.0046	5.8	No	EPA Residential RSL	N/A	N/A	

TABLE 6-2

Soil Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CAS Number	Maximum Detected Site Concentration (mg/kg)	Screening Level (mg/kg)	Maximum Result > Screening Level (Y/N)	Screening Level Type	Background UTL (mg/kg)	Maximum Result > Background (Y/N)	Comment
Isopropylbenzene	98-82-8	0.0046	1900	No	EPA Residential RSL	N/A	N/A	
Methyl acetate	79-20-9	0.0046	78000	No	EPA Residential RSL	N/A	N/A	
Methyl ethyl ketone	78-93-3	0.01	27000	No	EPA Residential RSL	N/A	N/A	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	0.0093	5300	No	EPA Residential RSL	N/A	N/A	
Methyl t-butyl ether	1634-04-4	0.0046	47	No	EPA Residential RSL	N/A	N/A	
Methylcyclohexane	110-82-7	0.0046	6500	No	EPA Residential RSL	N/A	N/A	Surrogate: cyclohexane
Methylene chloride	75-09-2	0.0046	57	No	EPA Residential RSL	N/A	N/A	
o-Xylene	95-47-6	0.0046	650	No	EPA Residential RSL	N/A	N/A	
p- & m-Xylenes	108-38-3	0.0046	550	No	EPA Residential RSL	N/A	N/A	Surrogate: m-xylene
Styrene	100-42-5	0.0046	6000	No	EPA Residential RSL	N/A	N/A	
Tetrachloroethene	127-18-4	0.0046	24	No	EPA Residential RSL	N/A	N/A	
Toluene	108-88-3	0.0046	4900	No	EPA Residential RSL	N/A	N/A	
trans-1,2-Dichloroethene	156-60-5	0.0046	1600	No	EPA Residential RSL	N/A	N/A	
trans-1,3-Dichloropropene	542-75-6	0.0046	1.8	No	EPA Residential RSL	N/A	N/A	Surrogate: 1,3-Dichloropropene
Trichloroethene	79-01-6	0.0046	0.94	No	EPA Residential RSL	N/A	N/A	
Trichlorofluoromethane	75-69-4	0.0046	730	No	EPA Residential RSL	N/A	N/A	
Vinyl chloride	75-01-4	0.0046	0.059	No	EPA Residential RSL	N/A	N/A	
Nitrate and Perchlorate								
Nitrate as N	14797-55-8	970	130000	No	EPA Residential RSL	N/A	N/A	
Perchlorate	14797-73-0	0.029	55	No	EPA Residential RSL	N/A	N/A	

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

EPA Residential RSL = EPA Regional Screening Level for Residential Exposures, equating to $1x10^{-6}$ risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a).

The arsenic screening level corresponds to $1x10^{-4}$ risk and incorporates site-specific bioavailability (Section 9.4.5 and Appendix H).

The lead provisional RSL is has not been fully promulgated by EPA and is currently under review (refer to Section 9.6.3).

The mercury EPA Residential RSL is for mercuric chloride and other mercury salts.

Analytes that are shaded have concentrations that exceed screening levels and background concentrations, where developed, and are retained as potential chemicals of interest.

CAS = Chemical Abstracts Service (registry number)

EPA = U.S. Environmental Protection Agency

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = regional screening level

SVOC = semivolatile organic compound

TEQ = calculated toxicity equivalents for dioxins and furans (mammal)

UTL = 95th upper tolerance limit

VOC = volatile organic compound

TABLE 6-3

Sediment Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detected Site Concentration (mg/kg)	Screening Level[1] (mg/kg)	Maximum Result > Screening Level (Y/N)	Type[2]	Source
Metals and Cyanide					
Aluminum	198000	25500	Yes	TEL	Buchman, 2008
Antimony	189	2	Yes	Region III FSSB	EPA, 2011c
Arsenic	6920	9.79	Yes	TEC	MacDonald et al., 2000
Barium	756	130	Yes	TEL	Buchman, 2008
Beryllium	28.1	--	--	--	--
Cadmium	40.7	0.99	Yes	TEC	MacDonald et al., 2000
Calcium	54700	--	--	--	--
Chromium	1160	43.4	Yes	TEC	MacDonald et al., 2000
Cobalt	58.2	50	Yes	LEL	Buchman, 2008
Copper	8030	31.6	Yes	TEC	MacDonald et al., 2000
Cyanide	1.2	--	--	--	--
Iron	456000	20000	Yes	Region III FSSB	EPA, 2011c
Lead	14300	35.8	Yes	TEC	MacDonald et al., 2000
Magnesium	32200	--	--	--	--
Manganese	16500	630	Yes	TEL	Buchman, 2008
Mercury	49.4	0.18	Yes	TEC	MacDonald et al., 2000
Nickel	877	22.7	Yes	TEC	MacDonald et al., 2000
Potassium	14600	--	--	--	--
Selenium	72.5	2.5	Yes	Low	USDI, November 1998
Silver	63.2	1	Yes	Region III FSSB	EPA, 2011c
Sodium	16200	--	--	--	--
Thallium	17.4	--	--	--	--
Vanadium	155	57	Yes	AETm	Buchman, 2008
Zinc	14400	121	Yes	TEC	MacDonald et al., 2000
Dioxins/Furans					
1,2,3,4,6,7,8-Hepta CDD	0.000019	0.00000085	Yes	TEL	Buchman, 2008
1,2,3,4,6,7,8-Hepta CDF	0.0000045	0.00000085	Yes	TEL	Buchman, 2008
1,2,3,4,7,8-Hexa CDD	0.00000025	0.00000085	No	TEL	Buchman, 2008
1,2,3,6,7,8-Hexa CDD	0.000000196	0.00000085	No	TEL	Buchman, 2008
1,2,3,7,8-Penta CDF	0.000000188	0.00000085	No	TEL	Buchman, 2008
2,3,4,7,8-Penta CDF	0.000000104	0.00000085	No	TEL	Buchman, 2008
OCDD	0.00039	0.00000085	Yes	TEL	Buchman, 2008
OCDF	0.000011	0.00000085	Yes	TEL	Buchman, 2008
TEQBird	0.000000123	--	--	--	--
TEQFish	0.000000155	--	--	--	--
TEQMammal	0.00000034	--	--	--	--

TABLE 6-3

Sediment Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detected Site Concentration (mg/kg)	Screening Level[1] (mg/kg)	Maximum Result > Screening Level (Y/N)	Type[2]	Source
Total Hepta CDD	0.000047	--	--	--	--
Total Hepta CDF	0.0000077	--	--	--	--
Total Hexa CDD	0.0000052	--	--	--	--
Total Hexa CDF	0.000000405	--	--	--	--
Total Penta CDD	0.000000674	--	--	--	--
Total Penta CDF	0.000000828	--	--	--	--
Total Tetra CDD	0.000000383	--	--	--	--
Total Tetra CDF	0.000000944	--	--	--	--
SVOCs					
Acetophenone	0.39	--	--	--	--
bis(2-Ethylhexyl)phthalate	0.066	0.18	No	TELm	Buchman, 2008
General Chemistry					
Chloride	180	--	--	--	--
Nitrate as N	200	--	--	--	--
pH	8.5	--	--	--	--
pH, Saturated Paste	6.3	--	--	--	--
Sulfate	38000	--	--	--	--
Total Organic Carbon	53000	--	--	--	--

Notes:

1. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

2. Screening levels are the lowest of the benchmark levels evaluated.

Analytes that are shaded have concentrations that exceed screening levels and are retained as potential chemicals of interest (COIs).

- - = not applicable or not available

AETm = apparent effects threshold for marine exposures

ESV = ecological screening value

FSSB = freshwater sediment screening benchmark

LEL = lowest effect level

mg/kg = milligrams per kilogram

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = regional screening level

SVOC = semivolatile organic compound

TEC = threshold effect concentration

TEL = threshold effect level

TELm = threshold effect level (marine)

TEQ = calculated toxicity equivalents for dioxins and furans (mammal)

TABLE 6-4

Surface Water Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Fraction	Units	Maximum Detected Site Concentration (mg/L)	Screening Level[1,2] (mg/L)	Conversion Factor[3]	Maximum Result > Screening Level (Y/N)	Type	Source
Metals and Cyanide								
Aluminum	Dissolved	mg/L	964	0.087		Yes	CCC NRWQC	EPA, 2009d
Aluminum	Total	mg/L	969	0.087		Yes	CCC NRWQC	EPA, 2009d
Antimony	Dissolved	mg/L	0.563	0.03	1	Yes	A&Ww chronic	ADEQ, 2009
Antimony	Total	mg/L	0.556	0.03		Yes	A&Ww chronic	ADEQ, 2009
Arsenic	Dissolved	mg/L	205	0.15		Yes	CCC NRWQC	EPA, 2009d
Arsenic	Total	mg/L	198	0.15		Yes	CCC NRWQC	EPA, 2009d
Barium	Dissolved	mg/L	0.314	0.004		Yes	Tier II value	Suter and Tsao, 1996
Barium	Total	mg/L	3.7	0.004		Yes	Tier II value	Suter and Tsao, 1996
Beryllium	Dissolved	mg/L	0.0228	0.00066		Yes	Tier II value	Suter and Tsao, 1996
Beryllium	Total	mg/L	0.025	0.00066		Yes	Tier II value	Suter and Tsao, 1996
Cadmium	Dissolved	mg/L	2.88	0.00025		Yes	CCC NRWQC	EPA, 2009d
Cadmium	Total	mg/L	2.88	0.00028	Note 4	Yes	CCC NRWQC	EPA, 2009d
Calcium	Dissolved	mg/L	633	--	--	--	--	--
Calcium	Total	mg/L	663	--	--	--	--	--
Chromium	Dissolved	mg/L	0.568	0.074		Yes	CCC NRWQC	EPA, 2009d
Chromium	Total	mg/L	0.64	0.086	0.86	Yes	CCC NRWQC	EPA, 2009d
Cobalt	Dissolved	mg/L	1.31	0.023		Yes	Tier II value	Suter and Tsao, 1996
Cobalt	Total	mg/L	11.8	0.023		Yes	Tier II value	Suter and Tsao, 1996
Copper	Dissolved	mg/L	92.8	0.009		Yes	CCC NRWQC	EPA, 2009d
Copper	Total	mg/L	402	0.0094	0.96	Yes	CCC NRWQC	EPA, 2009d
Cyanide (Total)	Total	mg/L	0.183	0.0052		Yes	CCC NRWQC	EPA, 2009d
Iron	Dissolved	mg/L	11900	1		Yes	CCC NRWQC	EPA, 2009d
Iron	Total	mg/L	13000	1		Yes	CCC NRWQC	EPA, 2009d
Lead	Dissolved	mg/L	0.885	0.0025		Yes	CCC NRWQC	EPA, 2009d
Lead	Total	mg/L	10.2	0.0032	Note 5	Yes	CCC NRWQC	EPA, 2009d
Magnesium	Dissolved	mg/L	1420	--	--	--	--	--
Magnesium	Total	mg/L	2840	--	--	--	--	--
Manganese	Dissolved	mg/L	49.8	0.12		Yes	Tier II value	Suter and Tsao, 1996
Manganese	Total	mg/L	205	0.12		Yes	Tier II value	Suter and Tsao, 1996
Mercury	Dissolved	mg/L	0.0012	0.00001		Yes	A&Ww chronic	ADEQ, 2009
Mercury	Total	mg/L	0.0801	0.000012	0.85	Yes	A&Ww chronic	EPA, 2009d
Nickel	Dissolved	mg/L	0.878	0.052		Yes	CCC NRWQC	EPA, 2009d
Nickel	Total	mg/L	1.59	0.052	0.997	Yes	CCC NRWQC	EPA, 2009d
Potassium	Dissolved	mg/L	26.1	--	--	--	--	--
Potassium	Total	mg/L	59.7	--	--	--	--	--
Selenium	Dissolved	mg/L	0.731	0.002		Yes	A&Ww chronic	ADEQ, 2009
Selenium	Total	mg/L	2.24	0.002		Yes	A&Ww chronic	ADEQ, 2009
Silver	Dissolved	mg/L	0.448	0.00032	CMC/10	Yes	CMC NRWQC	EPA, 2009d
Silver	Total	mg/L	0.476	0.00038	0.85, CMC/10	Yes	CMC NRWQC	EPA, 2009d

TABLE 6-4

Surface Water Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Fraction	Units	Maximum Detected Site Concentration (mg/L)	Screening Level[1,2] (mg/L)	Conversion Factor[3]	Maximum Result > Screening Level (Y/N)	Type	Source
Sodium	Dissolved	mg/L	84.5	--	--	--	--	--
Sodium	Total	mg/L	464	--	--	--	--	--
Thallium	Dissolved	mg/L	0.627	0.15	1	Yes	A&Ww chronic	ADEQ, 2009
Thallium	Total	mg/L	0.648	0.15		Yes	A&Ww chronic	ADEQ, 2009
Total Silica	Total	mg/L	215	--	--	--	--	--
Vanadium	Dissolved	mg/L	2.06	0.02		Yes	Tier II value	Suter and Tsao, 1996
Vanadium	Total	mg/L	2.17	0.02		Yes	Tier II value	Suter and Tsao, 1996
Zinc	Dissolved	mg/L	1740	0.12		Yes	CCC NRWQC	EPA, 2009d
Zinc	Total	mg/L	1610	0.122	0.978	Yes	CCC NRWQC	EPA, 2009d
Anions								
Bromide	Total	mg/L	0.36	--	--	--	--	--
Chloride	Total	mg/L	79	230		No	CCC NRWQC	EPA, 2009d
Fluoride	Total	mg/L	14	--	--	--	--	--
Nitrate as N	Total	mg/L	9.6	--	--	--	--	--
Nitrite as N	Total	mg/L	11	--	--	--	--	--
Sulfate	Total	mg/L	27000	--	--	--	--	--
General Chemistry / Anions								
Alkalinity (as CaCO3)	Total	mg/L	520	20		Yes	CCC NRWQC	EPA, 2009d
Bicarbonate (as CaCO3)	Total	mg/L	520	--	--	--	--	--
O-Phosphate, as P	Total	mg/L	1.2	--	--	--	--	--
Total Dissolved Solids	Dissolved	mg/L	39000	--	--	--	--	--

Notes:

1. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

2. Cadmium, chromium, copper, lead, nickel, silver, and zinc have hardness dependent criteria and assume a default hardness value of 100 mg/L as CaCO3.

3. Conversion factor between dissolved and total results. Water quality criteria are based on dissolved concentrations for arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The dissolved water quality criteria were conservatively applied to the total fraction for identifying potential COIs and evaluating the nature and extent evaluation.

4. Cadmium - CF of 1.101672-[(ln hardness)(0.041838)] was applied to the dissolved value. Assume hardness of 100 mg/L.

5. Lead - CF of 1.46203-[(ln hardness)(0.145712)] was applied to the dissolved value. Assume hardness of 100 mg/L.

Analytes that are shaded have concentrations that exceed screening levels and are retained as potential chemicals of interest.

'--- = not available or applicable
A&Ww = aquatic and wildlife (warm water)
CaCO3 = calcium carbonate
CCC = criterion continuous concentration
CF = conversion factor
CMC = criterion maximum concentration
COI = chemical of interest
EPA = U.S. Environmental Protection Agency
mg/L = milligrams per liter
NRWQC = national recommended water quality criteria

TABLE 6-5

Groundwater Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detected Site Concentration, Total (mg/L)	Maximum Detected Site Concentration, Dissolved (mg/L)	Screening Level (mg/L)[1]	Maximum Total Result > Screening Level (Y/N)	Maximum Dissolved Result > Screening Level (Y/N)	Screening Level Type[2]
Metals and Cyanide						
Aluminum	103	1.46	0.2	Yes	Yes	Secondary Drinking Water MCL
Antimony	0.0319	0.0133	0.006	Yes	Yes	Primary Drinking Water MCL
Arsenic	1.95	1.01	0.01	Yes	Yes	Primary Drinking Water MCL
Barium	0.804	0.201	2	No	No	AAWQS
Beryllium	0.0086	0.000042	0.004	Yes	No	Primary Drinking Water MCL
Cadmium	0.0402	0.0428	0.005	Yes	Yes	Primary Drinking Water MCL
Calcium	2810	2980	--	--	--	--
Chromium	0.436	0.0156	0.1	Yes	No	Primary Drinking Water MCL
Cobalt	0.29	0.112	0.006	Yes	Yes	Tap Water RSL
Copper	4.28	0.113	1.3	Yes	No	Primary Drinking Water MCL
Cyanide	0.0143	0.0143	0.2	No	No	Primary Drinking Water MCL
Cyanide (Total)	0.0133	0.0133	0.2	No	No	Primary Drinking Water MCL
Iron	98.7	35.8	0.3	Yes	Yes	Secondary Drinking Water MCL
Lead	1.37	0.0564	0.015	Yes	Yes	Primary Drinking Water MCL
Magnesium	1000	1010	--	--	--	--
Manganese	12	6.44	0.05	Yes	Yes	Secondary Drinking Water MCL
Mercury	0.0101	0.00028	0.002	Yes	No	Primary Drinking Water MCL
Nickel	0.403	0.0464	0.1	Yes	No	AAWQS
Potassium	622	578	--	--	--	--
Selenium	0.341	0.306	0.05	Yes	Yes	Primary Drinking Water MCL
Silver	0.0343	0.0394	0.1	No	No	Secondary Drinking Water MCL
Sodium	1760	1650	--	--	--	--
Thallium	0.0071	0.00037	0.002	Yes	No	Primary Drinking Water MCL
Vanadium	0.488	0.0211	0.086	Yes	No	Tap Water RSL
Zinc	14.6	12.9	5	Yes	Yes	Secondary Drinking Water MCL
Anions						
Bromide	24		--	--	--	--
Chloride	5400		250	Yes	--	Secondary Drinking Water MCL
Fluoride	11		4	Yes	--	Primary Drinking Water MCL
Nitrate As N	360		10	Yes	--	Primary Drinking Water MCL
Nitrate+Nitrite As N	530	300	10	Yes	Yes	Primary Drinking Water MCL
Sulfate	4800		250	Yes	--	Secondary Drinking Water MCL
Sulfide	1.7		--	--	--	--
General Chemistry						
Alkalinity (As $CaCO_3$)	1200		--	--	--	--
Bicarbonate (As $CaCO_3$)	1200		--	--	--	--
Carbonate (As Caco3)	65		--	--	--	--
Dissolved Organic Carbon		47	--	--	--	--
Nitrogen, Total Kjeldahl	63		--	--	--	--
Phosphorus, Total As P		0.8	--	--	--	--

TABLE 6-5

Groundwater Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detected Site Concentration, Total (mg/L)	Maximum Detected Site Concentration, Dissolved (mg/L)	Screening Level (mg/L)[1]	Maximum Total Result > Screening Level (Y/N)	Maximum Dissolved Result > Screening Level (Y/N)	Screening Level Type[2]
Total Dissolved Solids		28000	500	--	Yes	Secondary Drinking Water MCL
Total Silica	181		--	--	--	--
Explosives or SVOCs						
1,3,5-Trinitrobenzene	0.001		--	--	--	--
1,3-Dinitrobenzene	0.0004		0.002	No	--	Tap Water RSL
2,4,6-Trinitrotoluene	0.0004		--	--	--	--
2,4-Dinitrotoluene	0.0004		0.00024	Yes	--	Tap Water RSL
2,6-Dinitrotoluene	0.0002		0.000048	Yes	--	Tap Water RSL
2-Amino-4,6-Dinitrotoluene	0.0002		--	--	--	--
2-Nitrotoluene	0.0004		--	--	--	--
3-Nitrotoluene	0.0004		--	--	--	--
4-Amino-2,6-Dinitrotoluene	0.0002		--	--	--	--
4-Nitrotoluene	0.001		--	--	--	--
HMX	0.0027		1	No	--	Tap Water RSL
Nitrobenzene	0.0004		0.00014	Yes	--	Tap Water RSL
Nitroglycerin	0.003		0.002	Yes	--	Tap Water RSL
PETN	0.002		0.019	No	--	Tap Water RSL
RDX	0.0002		0.0007	No	--	Tap Water RSL
Tetryl	0.0002		0.039	No	--	Tap Water RSL
VOCs						
4-Bromofluorobenzene	0.00475		--	--	--	--
Toluene	0.00026		1	No	--	Primary Drinking Water MCL
Perchlorate						
Perchlorate	0.0033		0.014	No	--	Tap Water RSL

Notes:

1. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

2. Screening levels are the lowest of the benchmark levels evaluated.

3. Tap Water RSL = 2015 EPA Regional Screening Level for Tap Water Residential Exposures, equating to 1x10-6 risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a)

Primary Drinking Water MCL = EPA primary maximum contaminant level

Secondary Drinking Water MCL = EPA secondary maximum contaminant level

Analytes that are shaded have concentrations that exceed screening levels for either the total or dissolved fraction and are retained as potential chemicals of interest.

-- = not available or applicable

AAWQS = Arizona Aquifer Water Quality Standard

EPA = U.S. Environmental Protection Agency

MCL = maximum contaminant level

mg/L = milligrams per liter

RSL = regional screening level

SVOC = semivolatile organic compound

TEQ = calculated toxicity equivalents for dioxins and furans (mammal)

VOC = volatile organic compound

TABLE 6-6

Ambient Air Screening Levels, Maximum Concentrations, and Chemicals of Interest

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detected Site Concentration[1] (µg/m^3)	Screening Level[2] (µg/m^3)	Maximum Result > Screening Level (Y/N)	Screening Level Type
Aluminum	63.9	5.2	Yes	EPA Residential RSL
Antimony	0.0454	0.21	No	EPA Residential RSL
Arsenic	0.0354	0.00065	Yes	EPA Residential RSL
Barium	0.114	0.52	No	EPA Residential RSL
Beryllium	0.0160	0.0012	Yes	EPA Residential RSL
Cadmium	0.00549	0.0016	Yes	EPA Residential RSL
Calcium	8.70	---	---	
Chromium[3]	0.129	---	---	---
Copper	0.881	---	---	---
Iron	25.7	---	---	---
Lead	0.180	0.15	Yes	EPA Residential RSL
Mercury	0.00112	0.31	No	EPA Residential RSL
Nickel	0.137	0.011	Yes	EPA Residential RSL
Selenium	0.0222	21	No	EPA Residential RSL
Silver	0.0213	---	---	---
Sodium	3.66	---		---
Zinc	0.541	---	---	---

Notes:

1. Maximum detected sitewide concentration for samples collected using either the BGI PQ100 or Thermo Electron TEOM Series 1400a (TEOM) samplers.
2. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.
3. Speciation of chromium in source materials shows that chromium exists predominantly in trivalent form. There is no EPA RSL for total or trivalent chromium.
4. EPA Residential RSL = EPA Regional Screening Level for Residential Exposures, equating to 1x10-6 risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a)

Analytes that are shaded have concentrations that exceed screening levels and are retained as potential chemicals of interest (COIs).

--- = not available or applicable

µg/m^3 = micrograms per cubic meter

EPA = U.S. Environmental Protection Agency

RSL = regional screening level

TABLE 6-7

Chemicals of Interest for Nature and Extent Evaluation for Soil, Sediment, Surface Water, Groundwater and Ambient Air

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Soil
Aluminum
Antimony
Aroclor-1016
Aroclor-1248
Aroclor-1254
Arsenic
Benzo[a]anthracene
Benzo[a]pyrene
Benzo[b]fluoranthene
Benzyl butyl phthalate
Cadmium
Chromium, Hexavalent
Cobalt
Copper
Cyanide
Dibenzo[a,h]anthracene
Dieldrin
Indeno(1,2,3-Cd)Pyrene
Iron
Lead
Manganese
Mercury
Silver
TEQ
Thallium
Zinc

Sediment
1,2,3,4,6,7,8-Hepta CDD
1,2,3,4,6,7,8-Hepta CDF
Aluminum
Antimony
Arsenic
Barium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Nickel
OCDD
OCDF
Selenium
Silver
Vanadium
Zinc

Surface Water
Alkalinity (As $CaCO_3$)
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Cyanide
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Groundwater
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Aluminum
Antimony
Arsenic
Beryllium (total only)
Cadmium
Chloride
Chromium (total only)
Cobalt
Copper (total only)
Fluoride
Iron
Lead
Manganese
Mercury (total only)
Nickel (total only)
Nitrate
Nitrobenzene
Nitroglycerin
Selenium
Sulfate
Thallium (total only)
Total Dissolved Solids
Vanadium (total only)
Zinc

Ambient Air
Aluminum
Arsenic
Beryllium
Cadmium
Lead
Nickel

Note:

Shaded chemicals were selected as primary chemicals of interest for the nature and extent evaluation (see Section 6.4) based on:

- frequency of detection above screening levels
- maximum concentrations relative to screening levels
- distribution at the former Iron King Mine and Humboldt Smelter properties and adjacent areas

TABLE 6-8

Exposure Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Exposure Area Group or Type	Designation	Name	Description	Potential Source Materials and Transport Pathways[a]
Soil	Non-residential	NR2 Town Hall	Dewey-Humboldt Town Hall	Town hall and adjacent commercial buildings in Humboldt Proper, north of former Iron King Mine and Humboldt Smelter properties	Windblown tailings, dust, dross associated with Iron King Mine and Humboldt Smelter; historical Humboldt Smelter stack emissions
Soil	Non-residential	NR2 School	Humboldt Elementary School	Public school in Humboldt Proper, north of former Iron King Mine and Humboldt Smelter properties	Windblown tailings, dust, dross associated with Iron King Mine and Humboldt Smelter; historical Humboldt Smelter stack emissions
Soil	Non-residential, possible future residential	NR3	Upper Chaparral Gulch	Chaparral Gulch between Highway 69 and the confluence with the MTP 1964 Blow Out Path; overlaps with residential properties in this area	Iron King Mine tailings; windblown tailings
Soil	Non-residential	NR4	JT Septic Facility	Commercial facility east of MTP; located on probable tailings migration pathway associated with the MTP 1964 Blow Out	Iron King Mine tailings
Soil	Non-residential	NR5	Main Tailings Pile 1964 Blow Out Path	Gully located between JT Septic and confluence with Chaparral Gulch; contains tailings from MTP 1964 Blow Out	Iron King Mine tailings
Soil	Non-residential	NR6	Middle Chaparral Gulch	Chaparral Gulch between confluence with the MTP 1964 Blow Out path (NR5) and Tailings Floodplain (NR8)	Iron King Mine tailings
Soil	Non-residential	NR7	Smelter Tailings Swale	Bermed tailings impoundment on former Humboldt Smelter property, west of the former pyrometallurgical operations area; impoundment (berm) failed releasing tailings into Tailings Floodplain (NR8)	Humboldt Smelter tailings
Soil	Non-residential	NR8	Tailings Floodplain	Tailings Floodplain on former Humboldt Smelter property between Middle Chaparral Gulch (NR6) and Chaparral Gulch Dam; remedial investigation evaluations indicate that the impounded area behind the dam is filled with native alluvium, Humboldt Smelter tailings, and Iron King Mine tailings	Iron King Mine and Humboldt Smelter tailings
Soil	Non-residential	NR9	Lower Chaparral Gulch	Chaparral Gulch between the dam and confluence with Agua Fria River; wetland and riparian habitat	Iron King Mine and Humboldt Smelter tailings
Soil	Non-residential	NR10	Agua Fria Tailings Pile	Tailings associated with predecessor to Humboldt Smelter, located below Humboldt Smelter plateau (NR12), above Agua Fria River	Tailings from predecessor mining and milling operations on former Humboldt Smelter property

TABLE 6-8

Exposure Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Exposure Area Group or Type	Designation	Name	Description	Potential Source Materials and Transport Pathways[a]
Soil	Non-residential	NR11	Former Pyrometallurgical Operations Area	Humboldt Smelter pyrometallurgical operations area; roasters, blast and reverberatory furnaces, converters, cooling pods, and other operational features were located in this area; primary area for handling of concentrate and molten materials (slag); dross was imported and stockpiled in this area after closure and dismantling of the smelter	Dross, slag, other smelter-related wastes; windblown tailings and historical Humboldt Smelter stack emissions
Soil	Non-residential	NR12	Smelter Plateau	Portion of the former Humboldt Smelter that lies on the basalt plateau south of the former pyrometallurgical area (NR11); precursor mining operations, residential housing during smelting operations, and ancillary smelting and dross operations were present in this area	Sporadic piles of dross and tailings; satellite slag pile; windblown tailings, dross, and historical Humboldt Smelter stack emissions
Soil	Non-residential, possible future residential	NR13	Former Humboldt Smelter Property East of the Agua Fria River	Vacant, undeveloped portion of Humboldt Smelter east of Agua Fria River	Windblown tailings, dross, and historical Humboldt Smelter stack emissions
Soil	Non-residential	NR14	South of Former Iron King Mine Property	Vacant, undeveloped land south of the MTP and former Mineworks area and within the Galena Gulch watershed; sporadic mineral exploration performed in this area	Dumping, placement, and erosion of Iron King Mine waste rock and tailings; windblown Iron King Mine tailings
Soil	Non-residential	NR15	Auto Yard	Auto yard south of former Iron King Mine property and MTP and east of NR15	Windblown Iron King Mine tailings
Soil	Non-residential	NR16	Former Mineworks Area	Former Iron King Mine operations area west of the MTP that included the headworks, shafts, and concentrating equipment; exposure area also includes adjacent former fertilizer plant area	Waste rock, tailings, and releases associated with Iron King Mine and former fertilizer operations
Soil	Non-residential	NR17	Main Tailings Pile	MTP at Iron King Mine	Iron King Mine Tailings
Soil	Non-residential	NR18	North American Industries (NAI) Operations Area	Current NAI Operations area for fertilizer production, adjacent to and north of the MTP	Iron King Mine tailings; windblown tailings
Soil	Non-residential, possible future residential	NR19	Former Glory Hole and North of Main Tailings Pile	Vacant, undeveloped land between MTP and Chaparral Gulch; includes the former Glory Hole and the former Small Tailings Pile	Iron King Mine tailings and waste rock; windblown tailings

TABLE 6-8

Exposure Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Exposure Area Group or Type	Designation	Name	Description	Potential Source Materials and Transport Pathways[a]
Soil	Non-residential, possible future residential	NR20	North of Chaparral Gulch	Vacant, undeveloped land north and upslope of the MTP and Chaparral Gulch; includes small portion of Iron King Mine property	Windblown tailings
Soil	Residential yard	RYSR	Residential Yard-Specific Risk	Properties located near the former Iron King Mine or Humboldt Smelter properties, or where previous sampling indicated the presence of elevated concentrations of COIs, were designated as Residential Yard-Specific Risk (RYSR) areas; sampling and analysis for RYSR areas was performed on a yard-by-yard basis	Windblown dust, tailings, dross, and impacted soil; historical Humboldt Smelter stack emissions; spills and releases along historical rail routes; erosion and releases into drainages; use of waste material (tailings, waste rock) as fill
Soil	Residential area	RSAR-(A though H)	Residential Screening Area Risk	Properties located near the boundary of the APSI that were judged less likely to be impacted by site-related impacts were designated as Residential Screening Area Risk (RSAR) areas; RSAR exposure areas were evaluated on a per-area basis instead of a per-yard basis	Windblown dust, tailings, dross, and impacted soil; historical Humboldt Smelter stack emissions; use of waste material (tailings, waste rock) as fill
Sediment	Sitewide	Sediment	N/A	Agua Fria River, Chaparral Gulch, and Galena Gulch within APSI; Agua Fria River is the only true aquatic habitat	Iron King Mine and Humboldt Smelter tailings from erosion and historical releases, placement, or impoundments; impacts from slag and dross near Humboldt Smelter property; windblown tailings, dusts, and dross deposition
Surface Water	Sitewide	Surface Water	N/A	Agua Fria River, Chaparral Gulch, and Galena Gulch within APSI; Agua Fria River is the only true aquatic habitat	Leaching of COIs to surface runoff on former Iron King Mine and Humboldt Smelter properties; leaching from tailings and other wastes deposited in channels
Groundwater	Sitewide	Groundwater	N/A	Groundwater beneath and downgradient of former Iron King Mine and Humboldt Smelter properties	Releases of liquid wastes from Humboldt Smelter and Iron King Mine; leaching of COIs from tailings and other wastes; acid rock/acid mine drainage; recharge from impacted surface water
Ambient Air	Sitewide	Ambient Air	N/A	Ambient air within APSI	Windblown dust, tailings, dross, and impacted soil

Notes:

[a]Potential source materials and transport pathways were identified solely to provide a basis for evaluating the nature and extent of contamination; they are not intended to infer the existence of unacceptable risk.

APSI = area of potential site impact

COI = chemical of interest

MTP = Main Tailings Pile

TABLE 7-1

Nature and Extent Summary

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Designation	Name	COI(s) Exceeding Screening Levels	Nature and Extent Summary
Soil	NR2 Town Hall	Dewey-Humboldt Town Hall	None	Soil in this exposure area does not exceed screening levels.
Soil	NR2 School	Humboldt Elementary School	None	Soil in this exposure area does not exceed screening levels.
Soil	NR3	Upper Chaparral Gulch	Metals	Primary COI concentrations exceed screening levels in surface soil and in subsurface samples to depths of 5 feet. The exceedances are primarily associated within the widening channel floodplain upstream of Third Street.
Soil	NR4	JT Septic Facility	Metals	Concentrations of primary COIs exceed screening levels in surface soil and are associated with Iron King Mine tailings released by the 1964 MTP Blow Out.
Soil	NR5	Main Tailings Pile 1964 Blow Out Path	Metals	The primary COI concentrations exceed screening levels in surface soil and locally to depths of 3 feet; the elevated concentrations are associated with the Uppermost Channel Deposit, which is interpreted to be alluvium impacted by Iron King Mine tailings.
Soil	NR6	Middle Chaparral Gulch	Metals	Primary COI concentrations exceed screening levels in surface soil and locally to depths of 13 feet. Most primary COI exceedances are associated with the Uppermost Channel Deposit, which has been impacted by Iron King Mine tailings.
Soil	NR7	Smelter Tailings Swale	Metals	Primary COI concentrations exceed screening levels in surface soil and locally to depths of 9 feet. The exceedances are generally associated with exposed tailings, which increase in thickness to more than 9 feet near the berm at the southern end of the swale. Concentrations above screening levels are seen throughout the tailings swale.
Soil	NR8	Tailings Floodplain	Metals	Primary COI concentrations exceed screening levels in surface soil and locally to depths of 27 feet. The highest concentrations of the primary COIs are located in the southern portion of the floodplain and increase with depth downgradient to the Chaparral Gulch Dam, where the tailings deposits are thickest. The exceedances of primary COIs are associated with tailings from Iron King Mine and Humboldt Smelter operations.
Soil	NR9	Lower Chaparral Gulch	Metals	The maximum concentrations of the primary COIs in surface soil were associated with a tailings deposit in the lower Chaparral Gulch canyon, approximately 800 feet downstream of the Chaparral Gulch Dam.
Soil	NR10	Agua Fria Tailings Pile	Metals	Concentrations of the primary COIs exceed screening levels in the area of the tailings deposit associated with predecessor mining and milling operations.
Soil	NR11	Former Pyrometallurgical Operations Area	Dioxins/Furans, Metals, PAHs, PCBs	The concentrations of primary COIs in soil exceed screening levels in the dross, slag, and impacted soil, in samples collected at depths up to 9 feet locally. The highest levels of primary COIs in samples are associated with smelting operations (blast furnace, railway spur, concentrators, crusher feeds) rather than the dross material.
Soil	NR12	Smelter Plateau	Dioxins/Furans and Metals	The concentrations of the primary COIs in surface samples exceed screening levels in soil, dross, and slag. Lead exceeds screening levels in the subsurface to a depth of 5 feet locally. Concentrations are most elevated in the source areas and decrease with distance.
Soil	NR13	Former Humboldt Smelter Property East of the Agua Fria River	Metals	The primary COI lead exceeds screening levels.
Soil	NR14	South of Former Iron King Mine Property	Metals	Primary COI concentrations exceed screening levels, with the highest concentrations detected in areas of waste rock along Galena Gulch, south of the former Mineworks and former Fertilizer Plant areas.
Soil	NR15	Auto Yard	Metals	Primary COI concentrations do not exceed screening levels.
Soil	NR16	Former Mineworks Area	Metals and Cyanide	Primary COIs exceed screening levels in surface soil, with higher concentrations occurring in areas of exposed waste rock. Samples collected to a depth of 15 feet exceed the screening levels for primary COIs and are associated with the highly elevated surface samples.

TABLE 7-1

Nature and Extent Summary

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Designation	Name	COI(s) Exceeding Screening Levels	Nature and Extent Summary
Soil	NR17	Main Tailings Pile	Metals and Cyanide	Primary COI concentrations in soil exceed screening levels in most surface and subsurface samples collected within the MTP. The MTP ranges from 60 to 100 feet in thickness. Samples not exceeding screening levels were at the perimeter of the MTP outside of the tailings impoundment.
Soil	NR18	North American Industries Operations Area	Metals	Primary COI concentrations in surface soil exceed screening levels centered around the current operational buildings and decrease near the edges of the exposure area. Samples collected at depth did not exceed the screening levels for primary COIs.
Soil	NR19	Former Glory Hole and North of Main Tailings Pile	Metals, PCBs, and SVOCs	Primary COI concentrations in soil locally exceed screening levels; higher concentrations occur on the south side of the exposure area near the MTP and along the historical slurry line to the former Small Tailings Pile. Primary COIs exceed screening levels in subsurface samples up to 15 feet in depth near the former Glory Hole.
Soil	NR20	North of Chaparral Gulch	Metals	Primary COI concentrations in surface soil exceed screening levels and decrease with distance from the MTP.
Soil	RYSR	Residential Yard-Specific Risk	Metals	The majority of residential yards within the APSI have metal concentrations that are below screening levels. In yards with arsenic or lead EPCs exceeding screening levels, the higher concentrations generally occur north of the former Humboldt Smelter property in Humboldt Proper, along the historic Smelter Spur, and along Chaparral Gulch. Hot spots also occur in other areas due to placement of contaminated fill or non-site-related mechanisms. Of the 384 yards sampled, 19 yards have an arsenic EPC that exceeds the screening level, 90 yards have a lead EPC concentration that exceeds the provisional RSL, and 28 yards have a lead EPC concentration that exceeds the residential RSL.
Soil	RSAR-(A though H)	Residential Screening Area Risk	Metals	Hot spot identified in RSAR-D where a stormwater diversion berm was constructed using imported mine tailings. Otherwise, concentrations of arsenic and lead exceeded screening levels in only one sample. The concentrations of the primary COIs are generally near background levels, and the calculated EPCs are below screening levels.
Sediment	Sediment	Sitewide	Metals and dioxins	Concentrations of the primary COIs exceeded screening levels in most of the samples collected in Chaparral Gulch and Galena Gulch downstream from the Iron King Mine and Humboldt Smelter source areas. Site-related contamination in the Agua Fria River is primarily limited to locations near former Humboldt Smelter property source areas and the confluence with Chaparral Gulch. Upstream sediment samples indicate there are also naturally occurring sources of arsenic and copper within the Agua Fria River at concentrations exceeding screening levels.
Surface Water	Surface Water	Sitewide	Metals and cyanide	Concentrations of the primary COIs exceeded screening levels in most of the samples collected in Chaparral Gulch and Galena Gulch downstream from the former Iron King Mine and Humboldt Smelter property source areas. Site-related contamination in the Agua Fria River is limited to locations near the former Pyrometallurgical Operations Area and the confluence with Chaparral Gulch. Concentrations of the primary COIs were below screening levels in the furthest downstream locations in the Agua Fria River.

TABLE 7-1

Nature and Extent Summary

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Media	Designation	Name	COI(s) Exceeding Screening Levels	Nature and Extent Summary
Groundwater	Groundwater	Sitewide	Metals, TDS, major anions, and explosive compounds	Groundwater in the Hickey Formation and alluvium has been impacted by site-related activities, with arsenic, sulfate, and TDS most frequently exceeding screening levels. In general, sulfate and TDS impacts occur in shallow groundwater zones beneath and between the two properties and along Chaparral Gulch, and appear to be related to Site activities. The highest concentrations of arsenic in groundwater are localized on the properties, and are detected in wells located in former mine workings or tailings. Although arsenic exceeds screening levels in Precambrian basement groundwater beneath the former Iron King Mine property, the geochemical signature and lack of sulfate impact indicate this groundwater represents natural conditions and is not in communication with the overlying Hickey Formation groundwater. Regional exceedances of the arsenic screening levels in the Hickey Formation and Precambrian basement rocks are potentially naturally occurring and do not appear to all be attributable to site-related activities. Exceedances of the lead screening level in groundwater are isolated and restricted to wells screened in mine workings or tailings.
Ambient Air	Ambient Air	Sitewide	Metals	Ambient air at the former Iron King Mine had higher concentrations of arsenic than other sample stations. Concentrations of arsenic in Humboldt Proper were similar to background concentrations. No unacceptable residential health risks were identified for any of the ambient air monitoring stations near current residential areas.

Notes:

1. See Table 6-8 for Exposure Area descriptions.

2. Source material volume estimates are presented in Table 7-2.

APSI = area of potential site impact

COI = chemical of interest

EPC = exposure point concentration

MTP = Main Tailings Pile

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSAR = Residential Screening Area Risk

RSL = regional screening level

RYSR = Residential Yard-Specific Risk

SVOC = semivolatile organic compound

TDS = total dissolved solids

TABLE 7-2

Geotechnical Laboratory Test Results Summary – Main Tailings Pile

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Date	Area	Exposure Area	Material Type	Depth (feet)	Moisture Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (%)	Sand Content (%)	Gravel Content (%)	USCS Class	USCS Description	Specific Gravity[3]	Hydraulic Conductivity (cm/sec)	Friction Angle ϕ' (degrees)	Soil-Water Characteristics	Consolidation Test Completed	Calculated Saturation (%)
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	5	2.9															
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	10			NP		NP	41.5	58.5	0	SM	Silty sand	3.278					
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	11.5	4.1	119.1									3.278					19
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	20			NP		NP	40.2	59.8	0	SM	Silty sand	3.278					
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	21.5	6	113.1									3.278					24
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	27.5	22.3															
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	30			NP		NP	49.8	50.2	0	SM	Silty sand	3.278					
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	31.5-32	17.9	98.8									3.278	$3.48x10^{-5}$				55
MTP-SB01	4/2/2014	Lower MTP	NR17	Tailings	40			NP		NP	64.2	35.8	0	ML	Sandy silt	3.278					
MTP-SB01	4/2/2014	Lower MTP	NR17	Hickey Formation	47.5	12.9		35	18	17	52.1	36.7	11.2	CL	Sandy lean clay	2.793					
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	5																
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	10			NP		NP	66.3	33.7	0	ML	Sandy silt	3.355					
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	11.5	13.4	110.1									3.355					50
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	14	12.9	108.7									3.355					47
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	20	12.5	103.1	NP		NP	81.8	18.2	0	ML	Silt with sand	3.355					41
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	30	14.9	93.4									3.355					40
MTP-SB02	4/3/2014	Upper MTP	NR17	Tailings	34	14.7	118.6									3.355					64
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	40			NP		NP	90.4	9.6	0	ML	Silt	3.4					
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	41.5												$6.01x10^{-6}$		☑		
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	51.5															☑	
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	52.5-55	18.7	104.8									3.177	$6.38x10^{-6}$	39			67
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	60			NP		NP	88.5	11.5	0	ML	Silt	3.177					
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	61.5	25.2	105.8									3.177		33			92
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	65																
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	70			32	27	5	99	1	0	ML	Silt	3.2					
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	80			29	24	5	99.6	0.4	0	ML	Silt	3.177					
MTP-SB02	4/4/2014	Upper MTP	NR17	Tailings	81			NP		NP	47.8	46.1	6.1	SM	Silty sand	2.992					
MTP-SB02	4/4/2014	Upper MTP	NR17	Hickey Formation	81.5	18.3	115.5									2.992					89
MTP-SB02	4/4/2014	Upper MTP	NR17	Hickey Formation	84	19.5	113.3									2.992					90
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	5	7	103.3	NP		NP	60.6	39.4	0	ML	Sandy silt	3.699					21
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	25			NP		NP	66.7	33.3	0	ML	Sandy silt	3.287					
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	26.5	11.2	112.9									3.287					45
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	31.5	16.1	117.1									3.287					70
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	35			NP		NP	68.9	31.1	0	ML	Sandy silt	3.287					
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	36.5	14.3	115.5									3.287					61
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	46.5	2.1	126.1									3.095		36			12
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	48.5			NP		NP	83.9	16.1	0	ML	Silt with sand	3.095					
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	51.5															☑	
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	60-62.5												$9.55x10^{-6}$	37			
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	62.5			NP		NP	69	31	0	ML	Sandy silt	3.699					
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	63.5	15.9															
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	66.5												$1.61x10^{-5}$		☑		
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	75			NP		NP	84.6	15.4	0	ML	Silt with sand	3.287					
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	76.5	11.9	108.1									3.29		38			44
MTP-SB03	4/7/2014	Upper MTP	NR17	Tailings	86.5															☑	
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	91.5												$1.28x10^{-5}$		☑		
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	95			NP		NP	83.5	16.5	0	ML	Silt with sand	3.095					
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	95-97.5	7.8	114.1									3.095	$3.45x10^{-6}$				35
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	100-102.5	19.6	107.8									3.095	$2.06x10^{-6}$	34			77
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	105			23	20	3	95.8	4.2	0	ML	Silt	3.095					
MTP-SB03	4/8/2014	Upper MTP	NR17	Tailings	106	20.5															
MTP-SB03	4/8/2014	Upper MTP	NR17	Hickey Formation	106.5	22.1	113.7									3.1					98
MTP-SB03	4/8/2014	Upper MTP	NR17	Hickey Formation	108	12.2		34	18	16	47.1	33.6	19.3	SC	Clayey sand with gravel	3.095					

TABLE 7-2

Geotechnical Laboratory Test Results Summary – Main Tailings Pile

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Date	Area	Exposure Area	Material Type	Depth (feet)	Moisture Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (%)	Sand Content (%)	Gravel Content (%)	USCS Class	USCS Description	Specific Gravity[3]	Hydraulic Conductivity (cm/sec)	Friction Angle ϕ' (degrees)	Soil-Water Characteristics	Consolidation Test Completed	Calculated Saturation (%)
IKV-104	8/20/2008	Upper MTP	NR17	Tailings	0-2	20.6		33	28	5	66	32	2	ML	Sandy Silt	2.985					
IKV-104	8/20/2008	Upper MTP	NR17	Tailings	4-7	16.8		NP		NP	92	8	0	ML	Silt	3.09					
IKJ-526	9/25/2008	Upper MTP	NR17	Tailings	4-7	10.9		NP		NP	76	24	0	ML	Silt with sand	3.147					
MW-08-S	6/7/2012	Lower MTP	NR17	Tailings	9.5-11.5	32.9		NP		NP	94.2	5.8	0	ML	Silt	3.1				☑	
MW-08-S	6/7/2012	Lower MTP	NR17	Tailings	19.5-21.5	34.9	90.8	NP		NP						3.1		30			96
MW-08-S	6/7/2012	Lower MTP	NR17	Tailings	24.5-26.5	20.5		NP		NP	74.9	25.1	0	ML	Silt with sand	3.05					
MW-08-S	6/7/2012	Lower MTP	NR17	Tailings	29.5-31.5	20.3	114.9	NP		NP	68.2	31.8	0	ML	Sandy Silt	3.02	$4.60x10^{-5}$	36		☑	96
MW-08-S	6/7/2012	Lower MTP	NR17	Hickey Formation	36.1-36.5	18.7		42	17	25	56.7	33.9	9.4	CL	Sandy lean clay	2.85					
MW-09-S	5/4/2012	Upper MTP	NR17	Tailings	23.5-25.5	16.7		NP		NP	89.3	10.7	0	ML	Silt	3.09				☑	
MW-09-S	5/4/2012	Upper MTP	NR17	Tailings	33.5-35	22.7		NP		NP	94.9	5.1	0	ML	Silt	3.15				☑	
MW-09-S	5/4/2012	Upper MTP	NR17	Tailings	43.5-45.5	28.3	102.9	NP		NP						3.15		31			98
MW-09-S	5/4/2012	Upper MTP	NR17	Tailings	53.5-55.5	20.4		NP		NP	87.8	12.2	0	ML	Silt	3.13					
MW-09-S	5/4/2012	Upper MTP	NR17	Tailings	68.5-70.5	17.3	147.95	NP		NP	71	29	0	ML	Silt with sand	3.15	$6.3x10^{-4}$	32		☑	166
SB-1	5/3/2012	Lower MTP	NR17	Tailings	13.5-14.75	10.9	103.63	NP		NP	92.6	7.4	0	ML	Silt	3.1	$1.4x10^{-4}$	33	☑	☑	39
SB-1	5/3/2012	Lower MTP	NR17	Tailings	18.5-20	13.1	102.2	NP		NP	66.7	33.3	0	ML	Sandy silt	2.98		32			48
SB-1	5/3/2012	Lower MTP	NR17	Tailings	28.5-31	16.1		NP		NP	44.3	55.7	0	SM	Silty sand	3.09				☑	
SB-1	5/3/2012	Lower MTP	NR17	Tailings	43.5-44.5	23.9		NP		NP	72.7	27.3	0	ML	Silt with sand	3.23					
SB-2	5/4/2012	Upper MTP	NR17	Tailings	18.5-20.5	12.9		NP		NP	68	32	0	ML	Sandy silt	3.18					
SB-2	5/4/2012	Upper MTP	NR17	Tailings	23.5-25	24.3	100.4	NP		NP						3.3		31			76
SB-2	5/4/2012	Upper MTP	NR17	Tailings	33.5-35	28.3	103	NP		NP	63.5	36.5	0	ML	Sandy silt	3.35	$5.0x10^{-3}$	33		☑	92
SB-2	5/4/2012	Upper MTP	NR17	Tailings	43.5-45.5	24.1		NP		NP	89.5	10.5	0	ML	Silt	3.07					
IKJ-525	8/20/2008	Lower MTP	NR17	Tailings	0-2	14.6		NP		NP	55	43	2	ML	Sandy Silt	3.092					
IKJ-525-D	8/20/2008	Lower MTP	NR17	Tailings	0-2	13.4		NP		NP	53	45	2	ML	Sandy Silt	3.065					
IKJ-525	8/20/2008	Lower MTP	NR17	Tailings	4-7	13.3		25	22	3	73	27	0	ML	Silt with sand	3.026					
IKJ-525	8/20/2008	Lower MTP	NR17	Tailings	35-38	18		NP		NP	69	31	0	ML	Sandy Silt	3.12					

Notes:

1. The material type was obtained from the EA Initial RI (EA, 2010), the ERT Report (Lockheed Martin SERAS, 2015), or Appendix I.
2. The laboratory test results were obtained from the EA Initial RI Appendix D (EA, 2010), the ERT Report (Lockheed Martin SERAS, 2015), and unpublished test reports from Daniel B. Stephens & Associates, Inc. (DBS&A).
3. The specific gravity was estimated for some samples in order to calculate the degree of saturation (light grey text where estimated).
4. The dry density recorded by the laboratory is too high for the MW-09S sample collected at 68.5 to 70.5 feet, and is resulting in a calculated saturation of greater than 100 percent.

NP = Non-plastic

pcf = pounds per cubic foot

USCS = Unified Soil Classification System

TABLE 7-3

Geotechnical Laboratory Test Results Summary – Various

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Date	Area	Exposure Area	Material Type	Depth (feet)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Clay (%)	Silt (%)	Total Fines Content (%)	Sand Content (%)	Gravel Content (%)	USCS Class	USCS Description	Specific Gravity
CHU-SB02	2/27/2014	Upper Chaparral Gulch	NR3	Uppermost Channel Deposit	3	10.1	22	19	3	6.5	15.5	22	61.8	16.3	SM	Silty Sand with Gravel	
CHU-SB02	2/27/2014	Upper Chaparral Gulch	NR3	Principle Fluvial Gravel	9	3.3	NP		NP	2.8	10	12.8	53.4	33.7	SM	Silty Sand with Gravel	
CHU-SB13	2/28/2014	Upper Chaparral Gulch	NR3	Uppermost Channel Deposit	2.5	7.7	NP		NP	5.3	20.3	25.6	69.6	4.8	SM	Silty Sand	
CH-SB10	2/9/2014	Middle Chaparral Gulch	NR6	Uppermost Channel Deposit	0	8.2	29	23	6	8.7	25.4	34.1	43.5	22.4	SM	Silty Sand with Gravel	
CH-SB11	2/9/2014	Middle Chaparral Gulch	NR6	Lowermost Channel Deposit	7	14.2	NP		NP	6	24.5	30.5	49.4	20.2	SM	Silty Sand with Gravel	
CH-SB11	2/9/2014	Middle Chaparral Gulch	NR6	Principle Fluvial Gravel	17.5	12.8	29	17	12	4.6	9.1	13.7	44.6	41.7	SC	Clayey Sand with Gravel	
CH-SB17	2/10/2014	Middle Chaparral Gulch	NR6	Uppermost Channel Deposit	0	9	NP		NP	5.1	15.3	20.4	48.1	31.5	SM	Silty Sand with Gravel	
CH-SB17	2/10/2014	Middle Chaparral Gulch	NR6	Uppermost Channel Deposit	8.5	8.7	24	22	2	6.4	27.2	33.6	47.4	19.1	SM	Silty Sand with Gravel	
CH-SB25	2/11/2014	Middle Chaparral Gulch	NR6	Uppermost Channel Deposit	2.5	10.5	NP		NP	6.2	14.6	20.8	75	4.2	SM	Silty Sand	
CH-SB26	2/11/2014	Middle Chaparral Gulch	NR6	Uppermost Channel Deposit	0	7.7	NP		NP	9.7	31.3	41	58	1	SM	Silty Sand	
HSJ-501	9/4/2008	Smelter Tailings Swale	NR7	Tailings	4-7	12	45	28	17			37	49	13	SM	Silty Sand	2.6
HSJ-501	9/4/2008	Smelter Tailings Swale	NR7	Tailings	0-2	14	34	24	10			45	51	4	SM	Silty Sand	2.701
HSJ-532	8/28/2008	Ore Concentration Area	NR7	Not Specified	0-2	9.1	29	21	8			37	49	14	SC	Clayey Sand	2.757
STS-SB06	2/7/2014	Smelter Tailings Swale	NR7	Tailings	0	15.4	NP		NP	8.8	55.5	64.3	35.6	0	ML	Sandy Silt	
STS-SB06	2/7/2014	Smelter Tailings Swale	NR7	Hickey Conglomerate	5	21.8	47	32	15	9.8	37	46.8	43.3	9.9	SM	Silty Sand	
STS-SB08	2/7/2014	Smelter Tailings Swale	NR7	Tailings	0	15.1	NP		NP	5.7	84.7	90.4	9.5	0	ML	Silt	
STS-SB08	2/7/2014	Smelter Tailings Swale	NR7	Hickey Conglomerate	10.5	18.1	NP		NP	3.1	17.2	20.3	47.2	32.5	SM	Silty Sand with Gravel	
CHF-SB17	2/18/2014	Tailings Floodplain	NR8	Tailings	2.5	17.9	NP		NP	8.2	26.5	34.7	62.7	2.6	SM	Silty Sand	
CHF-SB17	2/18/2014	Tailings Floodplain	NR8	Tailings	11	35.9	NP		NP	11.6	46.7	58.3	41.4	0.2	ML	Sandy Silt	
CHF-SB22	2/19/2014	Tailings Floodplain	NR8	Tailings	9	26.5	NP		NP	6.8	60.3	67.1	32.9	0	ML	Sandy Silt	
CHF-SB24	2/19/2014	Tailings Floodplain	NR8	Uppermost Channel Deposit	0	31.9	35	29	6	17.4	62	79.4	20.1	0.5	ML	Silt with Sand	
CHF-SB30	2/21/2014	Tailings Floodplain	NR8	Tailings	10	30.1	NP		NP	10.1	46	56.1	43.9	0	ML	Sandy Silt	
CHF-SB36	2/22/2014	Tailings Floodplain	NR8	Humboldt Smelter Channel Deposit	10	6.1	NP		NP	2.3	14.7	17	61.5	21.5	SM	Silty Sand with Gravel	
CHF-SB37	2/22/2014	Tailings Floodplain	NR8	Tailings	5	14.8	30		5	7.5	20.4	27.9	70.4	1.7	SM	Silty Sand	
CHF-SB43	2/25/2014	Tailings Floodplain	NR8	Principle Fluvial Gravel	11.5	10.1	22		5	4.3	9.1	13.4	41	45.6	GC-GM	Silty Clayey Gravel with Sand	
DAM-SB02	2/19/2014	Tailings Floodplain	NR8	Tailings	6	26.6	31	23	8	12.2	34.6	46.8	46	7.2	SM	Silty Sand	
DAM-SB03	2/19/2014	Tailings Floodplain	NR8	Tailings	20	52.9	33	27	6	13.1	36.4	49.5	45.6	4.9	SM	Silty Sand	
DAM-SB05	2/20/2014	Tailings Floodplain	NR8	Tailings	12.5	48.8	60	15	45	32.9	64.7	97.6	2.2	0.2	CH	Fat Clay	
DAM-SB06	2/25/2015	Tailings Floodplain	NR8	Tailings	8	26.5	NP		NP	7.5	15.7	23.2	76.7	0.1	SM	Silty Sand	
DAM-SB06	2/25/2015	Tailings Floodplain	NR8	Tailings	15	28.1	NP		NP	8.7	25	33.7	66.2	0.2	SM	Silty Sand	
DAM-SB06	2/25/2014	Tailings Floodplain	NR8	Tailings	26	31.9	40	20	20	21.2	42.4	63.6	33	3.4	CL	Sandy Lean Clay	
HSJ-534	9/4/2008	Tailings Floodplain	NR8	Not Specified	0-2	42	38	28	10			73	26	1	ML	Silt with Sand	2.585
CG-16	9/5/2008	Tailings Floodplain	NR8	Not Specified	0 - 0.5	6	NP		NP			5	74	21	SP	Poorly-graded Sand with Gravel	2.854
ASH-C11	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	0.17	31.5	NP		NP	9.1	80.5	89.6	10.4	0	ML	Silt	
ASH-D06	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	0.17	32.1	NP		NP	8	65.5	73.5	25.3	1.2	ML	Silt with Sand	
ASH-D07	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	0.17	41.3	NP		NP	6.7	54.4	61.1	38.3	0.5	ML	Sandy Silt	
ASH-E08	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	0.17	21	NP		NP	1.8	25.2	27	72.7	0.3	SM	Silty Sand	
ASH-E09	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	2.17	59.3	NP		NP	4.2	44.8	49	51	0	SM	Silty Sand	
ASH-G09	2/11/2014	Former Pyrometallurgical Operations Area	NR11	Dross	0.17	17.3	NP		NP	1.5	23.9	25.4	71.3	3.2	SM	Silty Sand	
HSJ-504	9/9/2008	Former Pyrometallurgical Operations Area	NR11	Dross	4-7	18	64	28	36			34	52	14	SC	Clayey Sand	2.765
HSJ-504	9/9/2008	Former Pyrometallurgical Operations Area	NR11	Dross	0-2	15	67	30	37			44	46	10	SC	Clayey Sand	2.736
HSJ-507	8/27/2008	Former Pyrometallurgical Operations Area	NR11	Slag	4-7	19.7	46	32	14			41	52	7	SM	Silty Sand	2.828
HSJ-507	8/27/2008	Former Pyrometallurgical Operations Area	NR11	Slag	0-2	28.7	44	28	16			48	34	18	ML	Sandy Silt with Gravel	2.75
HSJ-515	8/27/2008	Former Pyrometallurgical Operations Area	NR11	Dross	0-2	19.8	NP		NP			19	80	1	SM	Silty Sand	2.993
HSJ-521	9/5/2008	Former Pyrometallurgical Operations Area	NR11	Dross	0-2	9	40	25	15			31	48	21	SC	Clayey Sand w/ Gravel	2.767
HSJ-525	8/28/2008	Former Pyrometallurgical Operations Area	NR11	Not Specified	0-2	6.1	NP		NP			22	54	24	SM	Silty Sand with Gravel	2.794
HSJ-527	8/28/2008	Former Pyrometallurgical Operations Area	NR11	Not Specified	0-2	9.3	34	30	4			48	37	15	SM	Silty Sand with Gravel	2.8
HSJ-511	9/3/2008	Smelter Plateau	NR12	Dross	4-7	12	33	25	8			33	45	22	SM	Silty Sand with Gravel	2.967
HSJ-511	9/3/2008	Smelter Plateau	NR12	Dross	0-2	9	44	27	17			35	47	18	SM	Silty Sand with Gravel	2.889
PS-SB01	2/26/2014	Smelter Plateau	NR12	Brown Clay	0	19.6	65	29	36	38.3	24.6	62.9	22.7	14.4	CH	Fat Clay with Sand	
PS-SB01	2/26/2014	Smelter Plateau	NR12	Hickey Conglomerate	6	21.1	48	31	17	6.8	30.5	37.3	55.6	7.1	SM	Silty Sand	
PS-SB03	2/26/2014	Smelter Plateau	NR12	Hickey Conglomerate	2	22.6	56	29	27	11.6	20.3	31.9	29.6	38.5	GC	Clayey Gravel with Sand	
PS-SB03	2/26/2014	Smelter Plateau	NR12	Hickey Conglomerate	6	13.6	37	25	12	12.2	65.8	78	16.4	5.7	ML	Silt with Sand	
OS-11	6/5/2008	Auto Yard	NR15	Not Specified	1.5					2	10	12	88	0	SM	Silty Sand	
OS-21	6/4/2008	Auto Yard	NR15	Not Specified	1.5					8	18	26	74	0	SM	Silty Sand	

TABLE 7-3

Geotechnical Laboratory Test Results Summary – Various

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Date	Area	Exposure Area	Material Type	Depth (feet)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Clay (%)	Silt (%)	Total Fines Content (%)	Sand Content (%)	Gravel Content (%)	USCS Class	USCS Description	Specific Gravity
IKJ-537	9/25/2008	North of Main Tailings Pile	NR19	Not Specified	4-7	1.6	20	17	3			12	36	52	GM	Silty Gravel with Sand	2.789
IKJ-537	9/23/2008	North of Main Tailings Pile	NR19	Not Specified	0-2	4.6	21	17	4			47	48	5	SC-SM	Silty Clayey Sand	2.798
CG-6	9/11/2008	North of Main Tailings Pile	NR19	Not Specified	0 - 0.5	15	NP		NP			5	82	13	SP	Poorly-graded Sand	2.885
OS-60	6/5/2008	Residential	RYSR	Not Specified	1.5					6	12	18	82	0	SM	Silty Sand	

Notes:

1. The material type was obtained from the EA Initial RI (EA, 2010), the ERT Report (Lockheed Martin SERAS, 2015), or Appendix I.
2. The laboratory test results were obtained from the EA Initial RI Appendix D (EA, 2010) and the ERT Report (Lockheed Martin SERAS, 2015).

NP = Non-plastic

USCS = Unified Soil Classification System

TABLE 7-4

Summary of Surface Soil Analytical Results – Former Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR16 Former Mineworks Area									
Metals									
Aluminum	45300	736	77000	Residential RSL	35600	30	30	0	1
Antimony	125	1.1	31	Residential RSL	2.42	38	24	7	18
Arsenic	4730	12.7	194	Residential 10-4 risk	112	86	86	53	68
Cadmium	37.3	0.31	70	Residential RSL	0.824	40	36	0	34
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	35.1	3.1	23	Residential RSL	43.6	30	28	6	0
Copper	660	20.7	3100	Residential RSL	182	86	86	0	15
Cyanide	7.4	0.05	21	Residential RSL	N/A	33	10	0	N/A
Iron	121000	18800	55000	Residential RSL	71900	83	83	35	10
Lead	65700	3.3	140	Provisional RSL	34.8	86	83	69	77
Lead	65700	3.3	400	Residential RSL	34.8	86	83	48	77
Manganese	7880	18.8	1800	Residential RSL	1600	73	73	1	1
Mercury	63.9	0.038	23	Residential RSL	0.0795	40	39	4	38
Silver	102	0.42	390	Residential RSL	N/A	40	37	0	N/A
Thallium	4.4	0.28	0.78	Residential RSL	2.8	40	22	20	8
Zinc	10400	70.8	23000	Residential RSL	136	86	86	0	82
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	0.076	0.076	0.15	Residential RSL	N/A	8	1	0	N/A
Benzo[a]pyrene	0.07	0.07	0.015	Residential RSL	N/A	8	1	1	N/A
Benzo[b]fluoranthene	0.055	0.055	0.15	Residential RSL	N/A	8	1	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	8	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	0.025	0.025	0.15	Residential RSL	N/A	8	1	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	8	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	8	0	0	N/A
Aroclor-1254	0.067	0.067	0.24	Residential RSL	N/A	8	1	0	N/A
Pesticides									
Dieldrin	0.0026	0.0026	0.033	Residential RSL	N/A	8	1	0	N/A
SVOCs									
Benzyl butyl phthalate	0.028	0.028	280	Residential RSL	N/A	8	1	0	N/A

TABLE 7-4

Summary of Surface Soil Analytical Results – Former Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR17 Main Tailings Pile									
Metals									
Aluminum	26600	4890	77000	Residential RSL	35600	22	22	0	0
Antimony	143	0.49	31	Residential RSL	2.42	29	23	15	21
Arsenic	12000	19	194	Residential 10-4 risk	112	64	63	37	38
Cadmium	54.3	1.3	70	Residential RSL	0.824	29	24	0	24
Chromium, Hexavalent	1.4	1.4	0.3	Residential RSL	N/A	10	1	1	N/A
Cobalt	29.5	6.9	23	Residential RSL	43.6	22	21	1	0
Copper	1180	22.9	3100	Residential RSL	182	49	49	0	15
Cyanide	6.5	0.06	21	Residential RSL	N/A	24	8	0	N/A
Iron	193000	23800	55000	Residential RSL	71900	41	41	21	18
Lead	7500	6.6	140	Provisional RSL	34.8	64	60	37	49
Lead	7500	6.6	400	Residential RSL	34.8	64	60	34	49
Manganese	1590	144	1800	Residential RSL	1600	37	37	0	0
Mercury	65	0.13	23	Residential RSL	0.0795	44	39	6	39
Silver	29.9	0.29	390	Residential RSL	N/A	29	23	0	N/A
Thallium	15.4	0.23	0.78	Residential RSL	2.8	29	13	6	4
Zinc	16400	50.6	23000	Residential RSL	136	49	49	0	37
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-4

Summary of Surface Soil Analytical Results – Former Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR18 North American Industries Operations Area									
Metals									
Aluminum	30200	15900	77000	Residential RSL	35600	18	18	0	0
Antimony	32.8	0.47	31	Residential RSL	2.42	25	11	1	6
Arsenic	3090	13	194	Residential 10-4 risk	112	37	37	18	24
Cadmium	24.6	1.1	70	Residential RSL	0.824	25	22	0	22
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	59.3	15.3	23	Residential RSL	43.6	18	18	6	1
Copper	470	27.3	3100	Residential RSL	182	26	26	0	2
Cyanide	0.26	0.09	21	Residential RSL	N/A	20	5	0	N/A
Iron	95500	15800	55000	Residential RSL	71900	22	22	4	1
Lead	16693	9.6	140	Provisional RSL	34.8	37	34	19	26
Lead	16693	9.6	400	Residential RSL	34.8	37	34	8	26
Manganese	1350	720	1800	Residential RSL	1600	19	19	0	0
Mercury	26	0.091	23	Residential RSL	0.0795	36	31	1	31
Silver	13	0.68	390	Residential RSL	N/A	25	7	0	N/A
Thallium	2.9	0.79	0.78	Residential RSL	2.8	25	2	2	1
Zinc	7580	91	23000	Residential RSL	136	26	26	0	23
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-4

Summary of Surface Soil Analytical Results – Former Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR19 Former Glory Hole and North of Main Tailings Pile									
Metals									
Aluminum	37600	7580	77000	Residential RSL	35600	63	63	0	1
Antimony	11.1	0.46	31	Residential RSL	2.42	63	27	0	18
Arsenic	1980	8.6	194	Residential 10-4 risk	112	211	211	68	94
Cadmium	12	0.037	70	Residential RSL	0.824	65	36	0	23
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	28	2.8	23	Residential RSL	43.6	63	63	3	0
Copper	308	19.1	3100	Residential RSL	182	200	200	0	4
Cyanide	0.55	0.06	21	Residential RSL	N/A	51	11	0	N/A
Iron	93600	17000	55000	Residential RSL	71900	196	196	40	13
Lead	4270	4.76	140	Provisional RSL	34.8	211	191	58	127
Lead	4270	4.76	400	Residential RSL	34.8	211	191	32	127
Manganese	2100	99.1	1800	Residential RSL	1600	195	195	3	3
Mercury	15.5	0.03	23	Residential RSL	0.0795	76	66	0	59
Silver	14.5	0.13	390	Residential RSL	N/A	65	43	0	N/A
Thallium	3.1	0.29	0.78	Residential RSL	2.8	65	28	21	2
Zinc	6620	48.9	23000	Residential RSL	136	200	200	0	143
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	3	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	3	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	3	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	3	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	3	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	4	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	4	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	4	0	0	N/A
Pesticides									
Dieldrin	0.0036	0.0036	0.033	Residential RSL	N/A	3	1	0	N/A
SVOCs									
Benzyl butyl phthalate	340	0.25	280	Residential RSL	N/A	3	2	1	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-5

Summary of Surface Soil Analytical Results – Former Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR7 Smelter Tailings Swale									
Metals									
Aluminum	86200	3520	77000	Residential RSL	35600	22	22	1	1
Antimony	22	2	31	Residential RSL	2.42	22	12	0	11
Arsenic	1100	10.6	194	Residential 10-4 risk	112	55	54	16	28
Cadmium	59.1	0.26	70	Residential RSL	0.824	22	14	0	8
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	2	0	0	N/A
Cobalt	51.9	1.6	23	Residential RSL	43.6	22	22	5	2
Copper	32900	25.6	3100	Residential RSL	182	55	55	7	40
Cyanide	0.76	0.11	21	Residential RSL	N/A	18	2	0	N/A
Iron	154000	14300	55000	Residential RSL	71900	32	32	4	2
Lead	971	8.9	140	Provisional RSL	34.8	55	55	30	47
Lead	971	8.9	400	Residential RSL	34.8	55	55	9	47
Manganese	3830	36.9	1800	Residential RSL	1600	32	30	1	2
Mercury	1.5	0.14	23	Residential RSL	0.0795	21	17	0	17
Silver	24.6	0.3	390	Residential RSL	N/A	22	22	0	N/A
Thallium	5.7	0.23	0.78	Residential RSL	2.8	22	17	14	5
Zinc	4660	39.9	23000	Residential RSL	136	55	55	0	46
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	1	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	1	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	1	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	5	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	5	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	5	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	5	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	5	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	5	0	0	N/A

TABLE 7-5

Summary of Surface Soil Analytical Results – Former Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR10 Agua Fria Tailings Pile									
Metals									
Aluminum	23900	23900	77000	Residential RSL	35600	1	1	0	0
Antimony	--	--	31	Residential RSL	2.42	1	0	0	0
Arsenic	4640	48.4	194	Residential 10-4 risk	112	13	13	9	9
Cadmium	0.85	0.85	70	Residential RSL	0.824	1	1	0	1
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	40.7	40.7	23	Residential RSL	43.6	1	1	1	0
Copper	2340	127	3100	Residential RSL	182	13	13	0	10
Cyanide	--	--	21	Residential RSL	N/A	1	0	0	N/A
Iron	42100	42100	55000	Residential RSL	71900	1	1	0	0
Lead	11500	63.5	140	Provisional RSL	34.8	13	13	10	13
Lead	11500	63.5	400	Residential RSL	34.8	13	13	9	13
Manganese	1410	1410	1800	Residential RSL	1600	1	1	0	0
Mercury	0.084	0.084	23	Residential RSL	0.0795	1	1	0	1
Silver	1.9	1.9	390	Residential RSL	N/A	1	1	0	N/A
Thallium	2.8	2.8	0.78	Residential RSL	2.8	1	1	1	1
Zinc	7550	134	23000	Residential RSL	136	13	13	0	12
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-5

Summary of Surface Soil Analytical Results – Former Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area									
Metals									
Aluminum	254000	290	77000	Residential RSL	35600	82	82	41	50
Antimony	118	0.67	31	Residential RSL	2.42	81	55	4	48
Arsenic	15100	7.7	194	Residential 10-4 risk	112	244	242	56	86
Cadmium	85.7	0.19	70	Residential RSL	0.824	82	73	1	68
Chromium, Hexavalent	1.7	1.7	0.3	Residential RSL	N/A	3	1	1	N/A
Cobalt	46	2	23	Residential RSL	43.6	82	82	15	1
Copper	28100	31.9	3100	Residential RSL	182	245	245	52	95
Cyanide	1.5	0.11	21	Residential RSL	N/A	50	13	0	N/A
Iron	251000	4880	55000	Residential RSL	71900	231	231	16	8
Lead	56600	11	140	Provisional RSL	34.8	245	245	200	231
Lead	56600	11	400	Residential RSL	34.8	245	245	143	231
Manganese	2830	18.4	1800	Residential RSL	1600	231	231	5	6
Mercury	8.1	0.021	23	Residential RSL	0.0795	82	70	0	67
Silver	397	0.073	390	Residential RSL	N/A	82	73	1	N/A
Thallium	3.8	0.29	0.78	Residential RSL	2.8	82	17	12	4
Zinc	17600	47.5	23000	Residential RSL	136	245	245	0	240
Dioxins/Furans									
TEQBird	0.00206	7.4E-10	0.0000049	Residential RSL	N/A	17	15	13	N/A
TEQFish	0.0013	7.4E-10	0.0000049	Residential RSL	N/A	17	15	11	N/A
TEQMammal	0.00116	2.22E-09	0.0000049	Residential RSL	N/A	17	15	11	N/A
PAHs									
Benzo[a]anthracene	0.71	0.71	0.15	Residential RSL	N/A	10	1	1	N/A
Benzo[a]pyrene	0.54	0.54	0.015	Residential RSL	N/A	10	1	1	N/A
Benzo[b]fluoranthene	0.72	0.72	0.15	Residential RSL	N/A	10	1	1	N/A
Dibenzo[a,h]anthracene	0.11	0.11	0.015	Residential RSL	N/A	10	1	1	N/A
Indeno(1,2,3-Cd)Pyrene	0.5	0.5	0.15	Residential RSL	N/A	10	1	1	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	4	0	0	N/A
Aroclor-1248	0.97	0.97	0.24	Residential RSL	N/A	4	1	1	N/A
Aroclor-1254	0.076	0.076	0.24	Residential RSL	N/A	4	1	0	N/A
Pesticides									
Dieldrin	0.0023	0.0023	0.033	Residential RSL	N/A	4	1	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	10	0	0	N/A

TABLE 7-5

Summary of Surface Soil Analytical Results – Former Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau									
Metals									
Aluminum	181000	6290	77000	Residential RSL	35600	41	41	3	13
Antimony	125	0.62	31	Residential RSL	2.42	41	35	1	19
Arsenic	20200	13	194	Residential 10-4 risk	112	125	125	40	70
Cadmium	41.4	0.41	70	Residential RSL	0.824	41	39	0	35
Chromium, Hexavalent	18	18	0.3	Residential RSL	N/A	1	1	1	N/A
Cobalt	59.2	2.2	23	Residential RSL	43.6	41	40	12	2
Copper	14200	29.4	3100	Residential RSL	182	125	125	5	48
Cyanide	0.85	0.1	21	Residential RSL	N/A	29	17	0	N/A
Iron	238000	55.1	55000	Residential RSL	71900	110	109	7	3
Lead	13100	14.5	140	Provisional RSL	34.8	125	125	84	119
Lead	13100	14.5	400	Residential RSL	34.8	125	125	49	119
Manganese	46000	101	1800	Residential RSL	1600	110	110	13	15
Mercury	7	0.046	23	Residential RSL	0.0795	41	40	0	38
Silver	41	0.37	390	Residential RSL	N/A	41	37	0	N/A
Thallium	9.2	0.5	0.78	Residential RSL	2.8	41	17	11	2
Zinc	58900	89.5	23000	Residential RSL	136	125	125	2	117
Dioxins/Furans									
TEQBird	0.000469	0.000469	0.0000049	Residential RSL	N/A	3	1	1	N/A
TEQFish	0.000249	0.000249	0.0000049	Residential RSL	N/A	3	1	1	N/A
TEQMammal	0.000224	0.000224	0.0000049	Residential RSL	N/A	3	1	1	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-6

Summary of Surface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR3 Upper Chaparral Gulch									
Metals									
Aluminum	17500	6710	77000	Residential RSL	35600	59	59	0	0
Antimony	13.4	0.57	31	Residential RSL	2.42	59	38	0	9
Arsenic	991	14.6	194	Residential 10-4 risk	112	171	171	32	74
Cadmium	4.8	0.2	70	Residential RSL	0.824	59	54	0	44
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	16.9	6.9	23	Residential RSL	43.6	59	59	0	0
Copper	496	21.9	3100	Residential RSL	182	161	161	0	1
Cyanide	0.49	0.051	21	Residential RSL	N/A	49	8	0	N/A
Iron	61800	13500	55000	Residential RSL	71900	131	131	4	0
Lead	3080	8	140	Provisional RSL	34.8	171	171	65	141
Lead	3080	8	400	Residential RSL	34.8	171	171	21	141
Manganese	910	306	1800	Residential RSL	1600	131	131	0	0
Mercury	4.1	0.023	23	Residential RSL	0.0795	56	53	0	45
Silver	8	0.1	390	Residential RSL	N/A	59	39	0	N/A
Thallium	0.79	0.04	0.78	Residential RSL	2.8	59	14	1	0
Zinc	1250	57.2	23000	Residential RSL	136	161	161	0	141
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-6

Summary of Surface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR5 Main Tailings Pile 1964 Blow Out Path									
Metals									
Aluminum	12900	11300	77000	Residential RSL	35600	2	2	0	0
Antimony	8.7	4.5	31	Residential RSL	2.42	2	2	0	2
Arsenic	2270	15.9	194	Residential 10-4 risk	112	51	51	33	43
Cadmium	5.2	3.4	70	Residential RSL	0.824	2	2	0	2
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	15.9	12.5	23	Residential RSL	43.6	2	2	0	0
Copper	978	23.7	3100	Residential RSL	182	51	51	0	2
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	39400	30600	55000	Residential RSL	71900	6	6	0	0
Lead	16400	21.3	140	Provisional RSL	34.8	51	51	40	49
Lead	16400	21.3	400	Residential RSL	34.8	51	51	22	49
Manganese	825	537	1800	Residential RSL	1600	6	6	0	0
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	5.7	4.5	390	Residential RSL	N/A	2	2	0	N/A
Thallium	0.35	0.35	0.78	Residential RSL	2.8	2	1	0	0
Zinc	5970	62.1	23000	Residential RSL	136	51	51	0	49
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-6

Summary of Surface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR6 Middle Chaparral Gulch									
Metals									
Aluminum	23500	11000	77000	Residential RSL	35600	5	5	0	0
Antimony	7.8	0.78	31	Residential RSL	2.42	5	5	0	3
Arsenic	3400	10.9	194	Residential 10-4 risk	112	100	100	60	75
Cadmium	4.3	1.1	70	Residential RSL	0.824	5	5	0	5
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	20.6	13.3	23	Residential RSL	43.6	5	5	0	0
Copper	296	17.6	3100	Residential RSL	182	101	101	0	7
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	46300	29400	55000	Residential RSL	71900	32	29	0	0
Lead	3420	16.3	140	Provisional RSL	34.8	101	101	73	90
Lead	3420	16.3	400	Residential RSL	34.8	101	101	46	90
Manganese	40800	282	1800	Residential RSL	1600	32	32	3	3
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	6.5	2.7	390	Residential RSL	N/A	5	5	0	N/A
Thallium	0.46	0.24	0.78	Residential RSL	2.8	5	3	0	0
Zinc	3570	44.3	23000	Residential RSL	136	101	101	0	90
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-6

Summary of Surface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR8 Tailings Floodplain									
Metals									
Aluminum	28100	1390	77000	Residential RSL	35600	12	12	0	0
Antimony	21.3	0.37	31	Residential RSL	2.42	12	10	0	7
Arsenic	3500	17.9	194	Residential 10-4 risk	112	93	93	61	87
Cadmium	9.4	0.11	70	Residential RSL	0.824	12	11	0	8
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	2	0	0	N/A
Cobalt	35.5	0.91	23	Residential RSL	43.6	12	12	2	0
Copper	19600	26.3	3100	Residential RSL	182	93	93	1	19
Cyanide	0.37	0.3	21	Residential RSL	N/A	6	2	0	N/A
Iron	88600	33.5	55000	Residential RSL	71900	69	66	7	3
Lead	12300	14.5	140	Provisional RSL	34.8	93	93	83	90
Lead	12300	14.5	400	Residential RSL	34.8	93	93	36	90
Manganese	65500	9.2	1800	Residential RSL	1600	69	66	6	6
Mercury	50.4	0.063	23	Residential RSL	0.0795	9	9	1	8
Silver	29	0.28	390	Residential RSL	N/A	12	10	0	N/A
Thallium	4.7	0.18	0.78	Residential RSL	2.8	12	9	4	1
Zinc	14700	40.4	23000	Residential RSL	136	93	93	0	89
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	1	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	1	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	1	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	1	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	1	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	1	0	0	N/A

TABLE 7-6

Summary of Surface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR9 Lower Chaparral Gulch									
Metals									
Aluminum	26800	4520	77000	Residential RSL	35600	4	4	0	0
Antimony	44.3	2.5	31	Residential RSL	2.42	4	4	1	4
Arsenic	4140	48.9	194	Residential 10-4 risk	112	24	24	11	15
Cadmium	6.7	0.91	70	Residential RSL	0.824	4	4	0	4
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	51.4	1.4	23	Residential RSL	43.6	4	4	2	1
Copper	1610	95.4	3100	Residential RSL	182	24	24	0	22
Cyanide	0.17	0.11	21	Residential RSL	N/A	2	2	0	N/A
Iron	53800	27000	55000	Residential RSL	71900	4	4	0	0
Lead	6060	35.2	140	Provisional RSL	34.8	24	24	15	24
Lead	6060	35.2	400	Residential RSL	34.8	24	24	7	24
Manganese	2570	56.4	1800	Residential RSL	1600	4	4	1	1
Mercury	0.6	0.056	23	Residential RSL	0.0795	2	2	0	1
Silver	36	0.38	390	Residential RSL	N/A	4	4	0	N/A
Thallium	2.6	0.32	0.78	Residential RSL	2.8	4	2	1	0
Zinc	8140	147	23000	Residential RSL	136	24	24	0	24
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR2 Humboldt Elementary School									
Metals									
Aluminum	24000	3310	77000	Residential RSL	35600	32	32	0	0
Antimony	3.8	0.6	31	Residential RSL	2.42	32	27	0	2
Arsenic	37.3	4.5	194	Residential 10-4 risk	112	32	32	0	0
Cadmium	2.7	0.057	70	Residential RSL	0.824	32	29	0	12
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	13.5	2.8	23	Residential RSL	43.6	32	32	0	0
Copper	94.4	5.5	3100	Residential RSL	182	32	32	0	0
Cyanide	0.89	0.13	21	Residential RSL	N/A	32	7	0	N/A
Iron	29900	9590	55000	Residential RSL	71900	32	32	0	0
Lead	68.3	4.8	140	Provisional RSL	34.8	32	32	0	14
Lead	68.3	4.8	400	Residential RSL	34.8	32	32	0	14
Manganese	805	190	1800	Residential RSL	1600	32	32	0	0
Mercury	0.18	0.035	23	Residential RSL	0.0795	32	18	0	13
Silver	0.71	0.11	390	Residential RSL	N/A	32	14	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	32	0	0	0
Zinc	286	24.1	23000	Residential RSL	136	32	32	0	15
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	2	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	2	0	0	N/A
Benzo[b]fluoranthene	0.12	0.12	0.15	Residential RSL	N/A	2	1	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	2	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	2	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	2	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR2 Dewey-Humboldt Town Hall									
Metals									
Aluminum	16600	13400	77000	Residential RSL	35600	10	10	0	0
Antimony	--	--	31	Residential RSL	2.42	10	0	0	0
Arsenic	14.9	8.41	194	Residential 10-4 risk	112	11	11	0	0
Cadmium	--	--	70	Residential RSL	0.824	10	0	0	0
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	14.9	10.6	23	Residential RSL	43.6	10	10	0	0
Copper	36.7	21.6	3100	Residential RSL	182	11	11	0	0
Cyanide	--	--	21	Residential RSL	N/A	10	0	0	N/A
Iron	22900	21000	55000	Residential RSL	71900	10	10	0	0
Lead	18.4	8.6	140	Provisional RSL	34.8	10	10	0	0
Lead	18.4	8.6	400	Residential RSL	34.8	10	10	0	0
Manganese	633	499	1800	Residential RSL	1600	10	10	0	0
Mercury	0.059	0.045	23	Residential RSL	0.0795	10	6	0	0
Silver	--	--	390	Residential RSL	N/A	10	0	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	10	0	0	0
Zinc	103	29.3	23000	Residential RSL	136	11	11	0	0
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR4 JT Septic Facility									
Metals									
Aluminum	11500	11500	77000	Residential RSL	35600	1	1	0	0
Antimony	25.5	25.5	31	Residential RSL	2.42	1	1	0	1
Arsenic	1940	16.4	194	Residential 10-4 risk	112	9	9	6	7
Cadmium	8.1	8.1	70	Residential RSL	0.824	1	1	0	1
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	11.9	11.9	23	Residential RSL	43.6	1	1	0	0
Copper	192	26.6	3100	Residential RSL	182	9	9	0	1
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	54800	54800	55000	Residential RSL	71900	1	1	0	0
Lead	3100	7.43	140	Provisional RSL	34.8	9	9	7	8
Lead	3100	7.43	400	Residential RSL	34.8	9	9	5	8
Manganese	496	496	1800	Residential RSL	1600	1	1	0	0
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	13.7	13.7	390	Residential RSL	N/A	1	1	0	N/A
Thallium	1.1	1.1	0.78	Residential RSL	2.8	1	1	1	0
Zinc	1940	57.4	23000	Residential RSL	136	9	9	0	8
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR13 Former Humboldt Smelter Property East of the Agua Fria River									
Metals									
Aluminum	15200	15200	77000	Residential RSL	35600	1	1	0	0
Antimony	4.8	4.8	31	Residential RSL	2.42	1	1	0	1
Arsenic	164	17.8	194	Residential 10-4 risk	112	11	11	0	3
Cadmium	8.3	8.3	70	Residential RSL	0.824	1	1	0	1
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	34.7	34.7	23	Residential RSL	43.6	1	1	1	0
Copper	1120	55.8	3100	Residential RSL	182	11	11	0	7
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	29000	29000	55000	Residential RSL	71900	1	1	0	0
Lead	424	24.9	140	Provisional RSL	34.8	11	11	7	10
Lead	424	24.9	400	Residential RSL	34.8	11	11	2	10
Manganese	1090	1090	1800	Residential RSL	1600	1	1	0	0
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	4.9	4.9	390	Residential RSL	N/A	1	1	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	1	0	0	0
Zinc	568	61.4	23000	Residential RSL	136	11	11	0	7
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR14 South of Former Iron King Mine Property									
Metals									
Aluminum	36000	15400	77000	Residential RSL	35600	5	5	0	1
Antimony	43.9	1.8	31	Residential RSL	2.42	5	4	1	2
Arsenic	3810	13.2	194	Residential 10-4 risk	112	60	60	23	32
Cadmium	5.2	0.95	70	Residential RSL	0.824	5	4	0	4
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	27.2	6.9	23	Residential RSL	43.6	5	5	1	0
Copper	147	22.9	3100	Residential RSL	182	58	58	0	0
Cyanide	--	--	21	Residential RSL	N/A	1	0	0	N/A
Iron	103000	29300	55000	Residential RSL	71900	40	40	29	11
Lead	13400	8.17	140	Provisional RSL	34.8	60	60	20	40
Lead	13400	8.17	400	Residential RSL	34.8	60	60	12	40
Manganese	1800	123	1800	Residential RSL	1600	40	40	1	2
Mercury	0.89	0.14	23	Residential RSL	0.0795	5	5	0	5
Silver	4.9	2.6	390	Residential RSL	N/A	5	3	0	N/A
Thallium	9.5	0.4	0.78	Residential RSL	2.8	5	3	1	1
Zinc	2370	61.8	23000	Residential RSL	136	58	58	0	51
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR15 Auto Yard									
Metals									
Aluminum	21300	17600	77000	Residential RSL	35600	7	7	0	0
Antimony	1.6	0.81	31	Residential RSL	2.42	15	3	0	0
Arsenic	110	15	194	Residential 10-4 risk	112	26	26	0	0
Cadmium	2.7	0.37	70	Residential RSL	0.824	15	4	0	3
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	24.3	14.8	23	Residential RSL	43.6	7	7	1	0
Copper	68.4	32.2	3100	Residential RSL	182	15	15	0	0
Cyanide	0.06	0.06	21	Residential RSL	N/A	8	1	0	N/A
Iron	36600	33800	55000	Residential RSL	71900	8	8	0	0
Lead	86.6	5.3	140	Provisional RSL	34.8	26	19	0	5
Lead	86.6	5.3	400	Residential RSL	34.8	26	19	0	5
Manganese	1170	727	1800	Residential RSL	1600	7	7	0	0
Mercury	0.17	0.035	23	Residential RSL	0.0795	26	3	0	2
Silver	1.4	0.12	390	Residential RSL	N/A	15	6	0	N/A
Thallium	2.9	2.9	0.78	Residential RSL	2.8	15	1	1	1
Zinc	321	58	23000	Residential RSL	136	15	15	0	4
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-7

Summary of Surface Soil Analytical Results – Non-Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR20 North of Chaparral Gulch									
Metals									
Aluminum	34200	9350	77000	Residential RSL	35600	28	28	0	0
Antimony	3.3	1.5	31	Residential RSL	2.42	28	4	0	2
Arsenic	609	12.3	194	Residential 10-4 risk	112	116	116	15	40
Cadmium	2.6	0.052	70	Residential RSL	0.824	28	8	0	3
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	16.2	8.9	23	Residential RSL	43.6	28	28	0	0
Copper	86.5	21	3100	Residential RSL	182	116	116	0	0
Cyanide	--	--	21	Residential RSL	N/A	22	0	0	N/A
Iron	60600	23300	55000	Residential RSL	71900	86	86	1	0
Lead	318	7	140	Provisional RSL	34.8	116	112	6	55
Lead	318	7	400	Residential RSL	34.8	116	112	0	55
Manganese	2030	311	1800	Residential RSL	1600	86	86	1	1
Mercury	2.5	0.021	23	Residential RSL	0.0795	25	20	0	14
Silver	3.9	0.4	390	Residential RSL	N/A	28	5	0	N/A
Thallium	1.6	0.21	0.78	Residential RSL	2.8	28	11	6	0
Zinc	821	45.3	23000	Residential RSL	136	116	116	0	64
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-8

Summary of Subsurface Soil Analytical Results – Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR16 Former Mineworks Area									
Metals									
Aluminum	20100	4810	77000	Residential RSL	35600	12	12	0	0
Antimony	83.7	4.8	31	Residential RSL	2.42	17	3	2	3
Arsenic	5060	8.6	194	Residential 10-4 risk	112	18	18	8	8
Cadmium	106	0.29	70	Residential RSL	0.824	18	15	1	13
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	51.7	6.6	23	Residential RSL	43.6	12	12	4	1
Copper	1060	23.3	3100	Residential RSL	182	18	18	0	8
Cyanide	26.5	0.04	21	Residential RSL	N/A	18	5	1	N/A
Iron	158000	19800	55000	Residential RSL	71900	18	18	4	3
Lead	7290	8.1	140	Provisional RSL	34.8	18	18	9	11
Lead	7290	8.1	400	Residential RSL	34.8	18	18	6	11
Manganese	1310	388	1800	Residential RSL	1600	12	12	0	0
Mercury	19.4	0.021	23	Residential RSL	0.0795	18	18	0	15
Silver	38	0.27	390	Residential RSL	N/A	18	17	0	N/A
Thallium	4.2	1.1	0.78	Residential RSL	2.8	18	12	12	4
Zinc	30600	53.5	23000	Residential RSL	136	18	18	1	15
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	4	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	4	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	4	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	4	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	4	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	4	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	4	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	4	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	4	0	0	N/A
SVOCs									
Benzyl butyl phthalate	0.02	0.02	280	Residential RSL	N/A	4	1	0	N/A

TABLE 7-8

Summary of Subsurface Soil Analytical Results – Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR17 Main Tailings Pile									
Metals									
Aluminum	30200	4420	77000	Residential RSL	35600	25	25	0	0
Antimony	360	25	31	Residential RSL	2.42	34	26	24	26
Arsenic	13000	13.1	194	Residential 10-4 risk	112	87	82	41	41
Cadmium	210	0.16	70	Residential RSL	0.824	34	30	4	27
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	22.8	11.5	23	Residential RSL	43.6	25	24	0	0
Copper	1500	25.7	3100	Residential RSL	182	74	73	0	25
Cyanide	172	0.14	21	Residential RSL	N/A	12	7	3	N/A
Iron	190000	34100	55000	Residential RSL	71900	62	62	23	19
Lead	24000	7.8	140	Provisional RSL	34.8	87	86	41	43
Lead	24000	7.8	400	Residential RSL	34.8	87	86	41	43
Manganese	1710	314	1800	Residential RSL	1600	62	62	0	1
Mercury	160	0.0096	23	Residential RSL	0.0795	46	44	12	43
Silver	98	8.2	390	Residential RSL	N/A	34	26	0	N/A
Thallium	3.2	0.58	0.78	Residential RSL	2.8	34	11	9	4
Zinc	75000	42.1	23000	Residential RSL	136	74	74	4	34
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-8

Summary of Subsurface Soil Analytical Results – Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR18 North American Industries Operations Area									
Metals									
Aluminum	22000	13700	77000	Residential RSL	35600	5	5	0	0
Antimony	1.4	1.4	31	Residential RSL	2.42	5	1	0	0
Arsenic	34.4	23.9	194	Residential 10-4 risk	112	5	5	0	0
Cadmium	2.5	0.65	70	Residential RSL	0.824	5	5	0	4
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	22.5	14.2	23	Residential RSL	43.6	5	5	0	0
Copper	62.9	33.2	3100	Residential RSL	182	5	5	0	0
Cyanide	--	--	21	Residential RSL	N/A	5	0	0	N/A
Iron	44900	28800	55000	Residential RSL	71900	5	5	0	0
Lead	21.5	7.8	140	Provisional RSL	34.8	5	5	0	0
Lead	21.5	7.8	400	Residential RSL	34.8	5	5	0	0
Manganese	1140	746	1800	Residential RSL	1600	5	5	0	0
Mercury	0.13	0.13	23	Residential RSL	0.0795	5	1	0	1
Silver	--	--	390	Residential RSL	N/A	5	0	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	5	0	0	0
Zinc	131	63.7	23000	Residential RSL	136	5	5	0	0
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	2	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	2	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	2	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	2	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	2	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	2	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	2	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	2	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	2	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	2	0	0	N/A

TABLE 7-8

Summary of Subsurface Soil Analytical Results – Iron King Mine Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR19 Former Glory Hole and North of Main Tailings Pile									
Metals									
Aluminum	24400	5280	77000	Residential RSL	35600	31	31	0	0
Antimony	5.4	0.74	31	Residential RSL	2.42	23	5	0	1
Arsenic	797	8.9	194	Residential 10-4 risk	112	42	42	5	8
Cadmium	36	0.2	70	Residential RSL	0.824	31	14	0	11
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	35	7.5	23	Residential RSL	43.6	31	31	3	0
Copper	811	21	3100	Residential RSL	182	42	42	0	2
Cyanide	--	--	21	Residential RSL	N/A	31	0	0	N/A
Iron	89200	16900	55000	Residential RSL	71900	40	40	5	1
Lead	4130	5.31	140	Provisional RSL	34.8	42	40	10	17
Lead	4130	5.31	400	Residential RSL	34.8	42	40	4	17
Manganese	1500	308	1800	Residential RSL	1600	40	40	0	0
Mercury	5.1	0.038	23	Residential RSL	0.0795	31	18	0	15
Silver	9.3	0.12	390	Residential RSL	N/A	31	22	0	N/A
Thallium	3.8	0.93	0.78	Residential RSL	2.8	31	12	12	2
Zinc	9840	49.2	23000	Residential RSL	136	42	42	0	17
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	0.12	0.059	0.15	Residential RSL	N/A	7	2	0	N/A
Benzo[a]pyrene	0.11	0.11	0.015	Residential RSL	N/A	7	1	1	N/A
Benzo[b]fluoranthene	0.083	0.083	0.15	Residential RSL	N/A	7	1	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	7	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	7	0	0	N/A
PCBs									
Aroclor-1016	6.1	6.1	4	Residential RSL	N/A	7	1	1	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	7	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	7	0	0	N/A
Pesticides									
Dieldrin	0.041	0.041	0.033	Residential RSL	N/A	7	1	1	N/A
SVOCs									
Benzyl butyl phthalate	45	0.27	280	Residential RSL	N/A	7	3	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-9

Summary of Subsurface Soil Analytical Results – Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR7 Smelter Tailings Swale									
Metals									
Aluminum	34700	18000	77000	Residential RSL	35600	8	8	0	0
Antimony	1.5	1.5	31	Residential RSL	2.42	7	1	0	0
Arsenic	310	9.41	194	Residential 10-4 risk	112	31	26	4	6
Cadmium	2.8	0.032	70	Residential RSL	0.824	8	3	0	2
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	2	0	0	N/A
Cobalt	29.6	15.7	23	Residential RSL	43.6	8	8	2	0
Copper	39800	23.4	3100	Residential RSL	182	31	31	3	7
Cyanide	--	--	21	Residential RSL	N/A	4	0	0	N/A
Iron	171000	19700	55000	Residential RSL	71900	27	27	2	2
Lead	934	11.8	140	Provisional RSL	34.8	31	31	6	8
Lead	934	11.8	400	Residential RSL	34.8	31	31	1	8
Manganese	3510	223	1800	Residential RSL	1600	27	25	8	13
Mercury	0.19	0.017	23	Residential RSL	0.0795	8	3	0	1
Silver	2.5	0.42	390	Residential RSL	N/A	8	4	0	N/A
Thallium	2.8	1.1	0.78	Residential RSL	2.8	8	4	4	1
Zinc	6240	37.8	23000	Residential RSL	136	31	29	0	15
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-9

Summary of Subsurface Soil Analytical Results – Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR10 Agua Fria Tailings Pile									
Metals									
Aluminum	--	--	77000	Residential RSL	35600	0	0	0	0
Antimony	--	--	31	Residential RSL	2.42	0	0	0	0
Arsenic	--	--	194	Residential 10-4 risk	112	0	0	0	0
Cadmium	--	--	70	Residential RSL	0.824	0	0	0	0
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	--	--	23	Residential RSL	43.6	0	0	0	0
Copper	--	--	3100	Residential RSL	182	0	0	0	0
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	--	--	55000	Residential RSL	71900	0	0	0	0
Lead	--	--	140	Provisional RSL	34.8	0	0	0	0
Lead	--	--	400	Residential RSL	34.8	0	0	0	0
Manganese	--	--	1800	Residential RSL	1600	0	0	0	0
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	--	--	390	Residential RSL	N/A	0	0	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	0	0	0	0
Zinc	--	--	23000	Residential RSL	136	0	0	0	0
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-9

Summary of Subsurface Soil Analytical Results – Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area									
Metals									
Aluminum	157000	5940	77000	Residential RSL	35600	23	23	4	7
Antimony	76.5	0.42	31	Residential RSL	2.42	23	11	2	6
Arsenic	1150	3.6	194	Residential 10-4 risk	112	72	63	11	14
Cadmium	40.1	0.3	70	Residential RSL	0.824	23	15	0	13
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	37.2	2.3	23	Residential RSL	43.6	23	23	5	0
Copper	21300	9.8	3100	Residential RSL	182	72	72	6	20
Cyanide	--	--	21	Residential RSL	N/A	15	0	0	N/A
Iron	104000	3140	55000	Residential RSL	71900	70	70	3	2
Lead	11400	2.8	140	Provisional RSL	34.8	72	72	36	52
Lead	11400	2.8	400	Residential RSL	34.8	72	72	24	52
Manganese	2110	183	1800	Residential RSL	1600	70	70	1	3
Mercury	3	0.0092	23	Residential RSL	0.0795	23	11	0	8
Silver	107	1.6	390	Residential RSL	N/A	23	13	0	N/A
Thallium	3	0.38	0.78	Residential RSL	2.8	22	6	4	1
Zinc	21800	11	23000	Residential RSL	136	72	72	0	53
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	6	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	6	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	6	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	6	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	6	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	6	0	0	N/A
Aroclor-1248	0.82	0.79	0.24	Residential RSL	N/A	6	2	2	N/A
Aroclor-1254	0.39	0.39	0.24	Residential RSL	N/A	6	1	1	N/A
Pesticides									
Dieldrin	0.0022	0.0022	0.033	Residential RSL	N/A	6	1	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	6	0	0	N/A

TABLE 7-9

Summary of Subsurface Soil Analytical Results – Humboldt Smelter Property Operation and Source Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau									
Metals									
Aluminum	155000	31400	77000	Residential RSL	35600	4	4	1	3
Antimony	24	2.3	31	Residential RSL	2.42	4	3	0	2
Arsenic	62.8	7.8	194	Residential 10-4 risk	112	11	7	0	0
Cadmium	14.1	0.16	70	Residential RSL	0.824	4	4	0	3
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	27.8	24.4	23	Residential RSL	43.6	4	4	4	0
Copper	8700	29.6	3100	Residential RSL	182	11	11	1	3
Cyanide	--	--	21	Residential RSL	N/A	4	0	0	N/A
Iron	30100	5450	55000	Residential RSL	71900	11	11	0	0
Lead	1330	5.1	140	Provisional RSL	34.8	11	11	4	7
Lead	1330	5.1	400	Residential RSL	34.8	11	11	2	7
Manganese	1630	256	1800	Residential RSL	1600	11	11	0	1
Mercury	0.32	0.035	23	Residential RSL	0.0795	4	4	0	3
Silver	19.6	0.51	390	Residential RSL	N/A	4	3	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	4	0	0	0
Zinc	4790	34.5	23000	Residential RSL	136	11	11	0	7
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-10

Summary of Subsurface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR3 Upper Chaparral Gulch									
Metals									
Aluminum	13900	13900	77000	Residential RSL	35600	1	1	0	0
Antimony	--	--	31	Residential RSL	2.42	1	0	0	0
Arsenic	251	14.2	194	Residential 10-4 risk	112	32	32	2	2
Cadmium	--	--	70	Residential RSL	0.824	1	0	0	0
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	10.9	10.9	23	Residential RSL	43.6	1	1	0	0
Copper	41.6	20.1	3100	Residential RSL	182	32	32	0	0
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	42700	26800	55000	Residential RSL	71900	32	32	0	0
Lead	371	10	140	Provisional RSL	34.8	32	32	2	4
Lead	371	10	400	Residential RSL	34.8	32	32	0	4
Manganese	1210	408	1800	Residential RSL	1600	32	32	0	0
Mercury	0.3	0.3	23	Residential RSL	0.0795	1	1	0	1
Silver	--	--	390	Residential RSL	N/A	1	0	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	1	0	0	0
Zinc	458	35.6	23000	Residential RSL	136	32	28	0	4
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-10

Summary of Subsurface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR5 Main Tailings Pile 1964 Blow Out Path									
Metals									
Aluminum	13800	13700	77000	Residential RSL	35600	2	2	0	0
Antimony	3.1	3.1	31	Residential RSL	2.42	2	1	0	1
Arsenic	540	13.1	194	Residential 10-4 risk	112	12	12	2	2
Cadmium	--	--	70	Residential RSL	0.824	2	0	0	0
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	8.8	7.3	23	Residential RSL	43.6	2	2	0	0
Copper	82.1	30.2	3100	Residential RSL	182	12	12	0	0
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	52000	16400	55000	Residential RSL	71900	12	12	0	0
Lead	302	11.9	140	Provisional RSL	34.8	12	12	1	1
Lead	302	11.9	400	Residential RSL	34.8	12	12	0	1
Manganese	1150	334	1800	Residential RSL	1600	12	12	0	0
Mercury	0.68	0.68	23	Residential RSL	0.0795	2	1	0	1
Silver	0.78	0.048	390	Residential RSL	N/A	2	2	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	2	0	0	0
Zinc	1710	41	23000	Residential RSL	136	12	12	0	9
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-10

Summary of Subsurface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR6 Middle Chaparral Gulch									
Metals									
Aluminum	12800	8790	77000	Residential RSL	35600	5	5	0	0
Antimony	30.1	1.6	31	Residential RSL	2.42	5	3	0	2
Arsenic	3390	14.2	194	Residential 10-4 risk	112	67	65	18	24
Cadmium	4.6	1.4	70	Residential RSL	0.824	5	5	0	5
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	1	0	0	N/A
Cobalt	13.7	1.5	23	Residential RSL	43.6	5	5	0	0
Copper	347	23.4	3100	Residential RSL	182	67	67	0	1
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	126000	38.9	55000	Residential RSL	71900	66	60	10	4
Lead	9500	11.9	140	Provisional RSL	34.8	67	67	15	34
Lead	9500	11.9	400	Residential RSL	34.8	67	67	8	34
Manganese	38900	202	1800	Residential RSL	1600	66	66	11	12
Mercury	0.82	0.16	23	Residential RSL	0.0795	4	3	0	3
Silver	22.6	0.16	390	Residential RSL	N/A	5	2	0	N/A
Thallium	2.1	2.1	0.78	Residential RSL	2.8	5	1	1	0
Zinc	1500	42.1	23000	Residential RSL	136	67	67	0	49
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-10

Summary of Subsurface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR8 Tailings Floodplain									
Metals									
Aluminum	33100	6160	77000	Residential RSL	35600	30	30	0	0
Antimony	79.6	0.34	31	Residential RSL	2.42	30	25	2	15
Arsenic	3640	7.8	194	Residential 10-4 risk	112	262	257	110	144
Cadmium	59.7	0.074	70	Residential RSL	0.824	30	26	0	20
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	7	0	0	N/A
Cobalt	102	0.6	23	Residential RSL	43.6	30	30	8	2
Copper	7900	23.2	3100	Residential RSL	182	262	262	3	27
Cyanide	10	0.23	21	Residential RSL	N/A	14	3	0	N/A
Iron	167000	35.5	55000	Residential RSL	71900	255	241	45	24
Lead	45900	4.4	140	Provisional RSL	34.8	262	258	139	195
Lead	45900	4.4	400	Residential RSL	34.8	262	258	66	195
Manganese	74000	32.5	1800	Residential RSL	1600	255	243	28	29
Mercury	34.7	0.0097	23	Residential RSL	0.0795	30	25	2	23
Silver	32.2	0.62	390	Residential RSL	N/A	30	23	0	N/A
Thallium	9.9	0.23	0.78	Residential RSL	2.8	30	22	12	7
Zinc	31800	35.6	23000	Residential RSL	136	262	261	1	220
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

TABLE 7-10

Summary of Subsurface Soil Analytical Results – Chaparral Gulch

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR9 Lower Chaparral Gulch									
Metals									
Aluminum	--	--	77000	Residential RSL	35600	0	0	0	0
Antimony	--	--	31	Residential RSL	2.42	0	0	0	0
Arsenic	--	--	194	Residential 10-4 risk	112	0	0	0	0
Cadmium	--	--	70	Residential RSL	0.824	0	0	0	0
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	--	--	23	Residential RSL	43.6	0	0	0	0
Copper	--	--	3100	Residential RSL	182	0	0	0	0
Cyanide	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	--	--	55000	Residential RSL	71900	0	0	0	0
Lead	--	--	140	Provisional RSL	34.8	0	0	0	0
Lead	--	--	400	Residential RSL	34.8	0	0	0	0
Manganese	--	--	1800	Residential RSL	1600	0	0	0	0
Mercury	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	--	--	390	Residential RSL	N/A	0	0	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	0	0	0	0
Zinc	--	--	23000	Residential RSL	136	0	0	0	0
Dioxins/Furans									
TEQBird	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
PAHs									
Benzo[a]anthracene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Benzo[a]pyrene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Benzo[b]fluoranthene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
Dibenzo[a,h]anthracene	--	--	0.015	Residential RSL	N/A	0	0	0	N/A
Indeno(1,2,3-Cd)Pyrene	--	--	0.15	Residential RSL	N/A	0	0	0	N/A
PCBs									
Aroclor-1016	--	--	4	Residential RSL	N/A	0	0	0	N/A
Aroclor-1248	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Aroclor-1254	--	--	0.24	Residential RSL	N/A	0	0	0	N/A
Pesticides									
Dieldrin	--	--	0.033	Residential RSL	N/A	0	0	0	N/A
SVOCs									
Benzyl butyl phthalate	--	--	280	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

RSL = EPA regional screening level

SVOC = semivolatile organic compound

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-11

NR11 Former Pyrometallurgical Operations Area – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area (Dross)										
Metals										
Aluminum	254000	66000	153788	77000	Residential RSL	35600	17	17	15	17
Antimony	17.4	4.5	12	31	Residential RSL	2.42	17	17	0	17
Arsenic	446	17.7	61	194	Residential 10-4 risk	112	79	77	2	8
Cadmium	21.9	4.4	16	70	Residential RSL	0.824	17	17	0	17
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	23.4	6.8	13	23	Residential RSL	43.6	17	17	1	0
Copper	10900	27.7	1282	3100	Residential RSL	182	79	79	13	18
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	43300	3140	14177	55000	Residential RSL	71900	79	79	0	0
Lead	1610	22.9	621	140	Provisional RSL	34.8	79	79	76	78
Lead	1610	22.9	621	400	Residential RSL	34.8	79	79	63	78
Manganese	1300	183	638	1800	Residential RSL	1600	79	79	0	0
Mercury	1.3	0.12	0.36	23	Residential RSL	0.0795	17	14	0	14
Silver	14	3.7	7.2	390	Residential RSL	N/A	17	16	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	16	0	0	0
Zinc	10100	369	3055	23000	Residential RSL	136	79	79	0	79
Dioxins/Furans										
TEQBird	0.00206	0.00119	0	0.0000049	Residential RSL	N/A	2	2	2	N/A
TEQFish	0.0013	0.000748	0	0.0000049	Residential RSL	N/A	2	2	2	N/A
TEQMammal	0.00116	0.000682	0	0.0000049	Residential RSL	N/A	2	2	2	N/A

TABLE 7-11

NR11 Former Pyrometallurgical Operations Area – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area (Non-Dross: Hickey Conglomerate)										
Metals										
Aluminum	--	--	--	77000	Residential RSL	35600	0	0	0	0
Antimony	--	--	--	31	Residential RSL	2.42	0	0	0	0
Arsenic	31.4	17.7	25	194	Residential 10-4 risk	112	7	2	0	0
Cadmium	--	--	--	70	Residential RSL	0.824	0	0	0	0
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	--	--	--	23	Residential RSL	43.6	0	0	0	0
Copper	69.6	30.5	47	3100	Residential RSL	182	7	7	0	0
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	53500	21900	37086	55000	Residential RSL	71900	7	7	0	0
Lead	34.3	12.5	21	140	Provisional RSL	34.8	7	7	0	N/A
Lead	34.3	12.5	21	400	Residential RSL	34.8	7	7	0	0
Manganese	1440	484	914	1800	Residential RSL	1600	7	7	0	0
Mercury	--	--	--	23	Residential RSL	0.0795	0	0	0	0
Silver	--	--	--	390	Residential RSL	N/A	0	0	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	0	0	0	0
Zinc	633	52.7	179	23000	Residential RSL	136	7	7	0	2
Dioxins/Furans										
TEQBird	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A

TABLE 7-11

NR11 Former Pyrometallurgical Operations Area – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area (Non-Dross: Native)										
Metals										
Aluminum	66100	28800	44540	77000	Residential RSL	35600	5	5	0	3
Antimony	2.2	0.86	1.6	31	Residential RSL	2.42	4	3	0	0
Arsenic	1320	7.8	114	194	Residential 10-4 risk	112	48	45	5	9
Cadmium	3.5	0.3	2.1	70	Residential RSL	0.824	5	4	0	3
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	25.9	2.3	15	23	Residential RSL	43.6	5	5	1	0
Copper	3440	31.3	197	3100	Residential RSL	182	48	48	1	5
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	251000	5910	43075	55000	Residential RSL	71900	48	48	5	4
Lead	2750	14.4	310	140	Provisional RSL	34.8	48	48	16	34
Lead	2750	14.4	310	400	Residential RSL	34.8	48	48	6	34
Manganese	2830	303	990	1800	Residential RSL	1600	48	48	1	3
Mercury	0.4	0.0092	0.13	23	Residential RSL	0.0795	5	5	0	2
Silver	--	--	--	390	Residential RSL	N/A	5	0	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	5	0	0	0
Zinc	4020	46.6	968	23000	Residential RSL	136	48	48	0	42
Dioxins/Furans										
TEQBird	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A

TABLE 7-11

NR11 Former Pyrometallurgical Operations Area – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area (Slag)										
Metals										
Aluminum	31800	290	14158	77000	Residential RSL	35600	10	10	0	0
Antimony	35.7	1.7	11	31	Residential RSL	2.42	10	4	1	2
Arsenic	551	11.4	166	194	Residential 10-4 risk	112	12	12	3	6
Cadmium	6.6	0.94	2.3	70	Residential RSL	0.824	10	9	0	9
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	26.4	5.8	20	23	Residential RSL	43.6	10	10	4	0
Copper	22900	260	3545	3100	Residential RSL	182	12	12	3	12
Cyanide	--	--	--	21	Residential RSL	N/A	9	0	0	N/A
Iron	247000	9070	48767	55000	Residential RSL	71900	10	10	1	1
Lead	2370	58.1	435	140	Provisional RSL	34.8	12	12	6	12
Lead	2370	58.1	435	400	Residential RSL	34.8	12	12	4	12
Manganese	999	18.4	448	1800	Residential RSL	1600	10	10	0	0
Mercury	0.95	0.084	0.41	23	Residential RSL	0.0795	10	7	0	7
Silver	19	0.42	3.9	390	Residential RSL	N/A	10	10	0	N/A
Thallium	3.7	1.8	2.8	0.78	Residential RSL	2.8	10	2	2	1
Zinc	17600	253	3761	23000	Residential RSL	136	12	12	0	12
Dioxins/Furans										
TEQBird	4.03E-08	4.03E-08	0	0.0000049	Residential RSL	N/A	3	1	0	N/A
TEQFish	4.03E-08	4.03E-08	0	0.0000049	Residential RSL	N/A	3	1	0	N/A
TEQMammal	4.28E-08	4.28E-08	0	0.0000049	Residential RSL	N/A	3	1	0	N/A

TABLE 7-11

NR11 Former Pyrometallurgical Operations Area – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR11 Former Pyrometallurgical Operations Area (Non-Dross: Tailings)										
Metals										
Aluminum	228000	40800	91557	77000	Residential RSL	35600	7	7	4	7
Antimony	12.2	3.2	6.1	31	Residential RSL	2.42	7	5	0	5
Arsenic	15100	24.6	419	194	Residential 10-4 risk	112	91	90	45	61
Cadmium	22.2	4.2	9.5	70	Residential RSL	0.824	7	7	0	7
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	36.6	12.9	20	23	Residential RSL	43.6	7	7	2	0
Copper	6550	35.5	418	3100	Residential RSL	182	91	91	4	13
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	84500	10100	38954	55000	Residential RSL	71900	91	91	11	4
Lead	56600	17.2	1382	140	Provisional RSL	34.8	91	91	88	90
Lead	56600	17.2	1382	400	Residential RSL	34.8	91	91	56	90
Manganese	2030	151	854	1800	Residential RSL	1600	91	91	1	1
Mercury	8.1	0.23	2.9	23	Residential RSL	0.0795	7	7	0	7
Silver	12	3.6	6.5	390	Residential RSL	N/A	7	4	0	N/A
Thallium	0.32	0.29	0.3	0.78	Residential RSL	2.8	7	2	0	0
Zinc	7430	75.9	1780	23000	Residential RSL	136	91	91	0	90
Dioxins/Furans										
TEQBird	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

RSL = EPA regional screening level

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-12

NR12 Smelter Plateau – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau (Dross)										
Metals										
Aluminum	166000	166000	166000	77000	Residential RSL	35600	1	1	1	1
Antimony	17.7	17.7	18	31	Residential RSL	2.42	1	1	0	1
Arsenic	251	33.7	77	194	Residential 10-4 risk	112	10	9	1	1
Cadmium	41.4	41.4	41	70	Residential RSL	0.824	1	1	0	1
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	21.6	21.6	22	23	Residential RSL	43.6	1	1	0	0
Copper	14200	91	1540	3100	Residential RSL	182	10	10	1	1
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	45900	55.1	15118	55000	Residential RSL	71900	10	10	0	0
Lead	987	160	493	140	Provisional RSL	34.8	10	10	10	10
Lead	987	160	493	400	Residential RSL	34.8	10	10	5	10
Manganese	30900	256	3660	1800	Residential RSL	1600	10	10	1	1
Mercury	0.21	0.21	0.21	23	Residential RSL	0.0795	1	1	0	1
Silver	39.7	39.7	40	390	Residential RSL	N/A	1	1	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	1	0	0	0
Zinc	4890	771	2377	23000	Residential RSL	136	10	10	0	10

TABLE 7-12

NR12 Smelter Plateau – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau (Non-Dross: Native)										
Metals										
Aluminum	55100	55100	55100	77000	Residential RSL	35600	1	1	0	1
Antimony	2.1	2.1	2.1	31	Residential RSL	2.42	1	1	0	0
Arsenic	190	30.3	89	194	Residential 10-4 risk	112	16	15	0	5
Cadmium	3.1	3.1	3.1	70	Residential RSL	0.824	1	1	0	1
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	21.5	21.5	22	23	Residential RSL	43.6	1	1	0	0
Copper	2090	36.7	207	3100	Residential RSL	182	16	16	0	1
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	46600	62	27322	55000	Residential RSL	71900	16	16	0	0
Lead	158	22.9	80	140	Provisional RSL	34.8	16	16	1	14
Lead	158	22.9	80	400	Residential RSL	34.8	16	16	0	14
Manganese	31700	503	6085	1800	Residential RSL	1600	16	16	4	4
Mercury	0.27	0.27	0.27	23	Residential RSL	0.0795	1	1	0	1
Silver	--	--	--	390	Residential RSL	N/A	1	0	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	1	0	0	0
Zinc	2990	91.4	642	23000	Residential RSL	136	16	16	0	14

TABLE 7-12

NR12 Smelter Plateau – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau (Slag)										
Metals										
Aluminum	32200	6290	21958	77000	Residential RSL	35600	5	5	0	0
Antimony	19.7	0.72	7.9	31	Residential RSL	2.42	5	4	0	2
Arsenic	1880	7.8	606	194	Residential 10-4 risk	112	5	5	3	3
Cadmium	4	0.16	1.7	70	Residential RSL	0.824	5	5	0	3
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	28	2.5	19	23	Residential RSL	43.6	5	5	3	0
Copper	2880	71.1	1530	3100	Residential RSL	182	5	5	0	4
Cyanide	0.1	0.1	0.1	21	Residential RSL	N/A	3	1	0	N/A
Iron	238000	13900	72320	55000	Residential RSL	71900	5	5	1	1
Lead	4460	5.1	1220	140	Provisional RSL	34.8	5	5	3	4
Lead	4460	5.1	1220	400	Residential RSL	34.8	5	5	3	4
Manganese	6680	180	1741	1800	Residential RSL	1600	5	5	1	1
Mercury	0.45	0.035	0.26	23	Residential RSL	0.0795	5	5	0	4
Silver	11.8	0.99	4.7	390	Residential RSL	N/A	5	4	0	N/A
Thallium	2.5	2.5	2.5	0.78	Residential RSL	2.8	5	1	1	0
Zinc	31600	43.4	7970	23000	Residential RSL	136	5	5	1	4

TABLE 7-12

NR12 Smelter Plateau – Surface and Subsurface Soil Results by Material Type

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Exceeding Screening Level	Number Exceeding Background
NR12 Smelter Plateau (Non-Dross: Tailings)										
Metals										
Aluminum	53500	24600	36580	77000	Residential RSL	35600	5	5	0	2
Antimony	8.6	1.9	5.4	31	Residential RSL	2.42	5	4	0	3
Arsenic	7470	41.6	484	194	Residential 10-4 risk	112	48	48	28	39
Cadmium	18	0.41	9.8	70	Residential RSL	0.824	5	5	0	4
Chromium, Hexavalent	--	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	25.5	2.2	16	23	Residential RSL	43.6	5	5	2	0
Copper	3190	29.4	303	3100	Residential RSL	182	48	48	1	5
Cyanide	--	--	--	21	Residential RSL	N/A	0	0	0	N/A
Iron	77900	77.2	36126	55000	Residential RSL	71900	48	47	5	1
Lead	13100	14.5	1286	140	Provisional RSL	34.8	48	48	43	47
Lead	13100	14.5	1286	400	Residential RSL	34.8	48	48	33	47
Manganese	46000	522	3516	1800	Residential RSL	1600	48	48	5	5
Mercury	7	0.48	2.6	23	Residential RSL	0.0795	5	5	0	5
Silver	8.8	4.7	6.5	390	Residential RSL	N/A	5	3	0	N/A
Thallium	--	--	--	0.78	Residential RSL	2.8	5	0	0	0
Zinc	15300	103	2448	23000	Residential RSL	136	48	48	0	47
Dioxins/Furans										
TEQBird	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQFish	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A
TEQMammal	--	--	--	0.0000049	Residential RSL	N/A	0	0	0	N/A

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

RSL = EPA regional screening level

TEQ = toxicity equivalent

UTL = 95th upper tolerance limit

TABLE 7-13

Summary of Surface Soil Analytical Results – Residential Areas

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Maximum Detection (mg/kg)	Minimum Detection (mg/kg)	Screening Level (mg/kg)	Screening Level Type	Background UTL (mg/kg)	Number of Results	Number of Detections	Number Samples Exceeding Screening Level (Number of Properties)	Number Exceeding Background
Residential Yard-Specific Risk (RYSR)									
Metals									
Aluminum	105000	7.4	77000	Residential RSL	35600	2074	2074	2 (1)	35
Antimony	160	0.16	31	Residential RSL	2.42	2061	1159	10 (8)	167
Arsenic	1630	1.8	194	Residential 10-4 risk	112	6017	5734	197 (73)	571
Cadmium	45.7	0.015	70	Residential RSL	0.824	2076	1627	0	1143
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	58.9	0.14	23	Residential RSL	43.6	2074	2072	155 (67)	11
Copper	7250	0.3	3100	Residential RSL	182	5603	5600	6 (5)	385
Cyanide	11.6	0.051	21	Residential RSL	N/A	1652	583	0	N/A
Iron	300000	13.7	55000	Residential RSL	71900	5518	5518	672 (91)	311
Lead	20500	0.37	140	Provisional RSL	N/A	6017	5832	782 (164)	3038
Lead	20500	0.37	400	Residential RSL	34.8	6017	5832	241	3038
Manganese	17500	0.4	1800	Residential RSL	1600	5518	5517	372 (90)	510
Mercury	42.1	0.007	23	Residential RSL	0.0795	2057	1589	2 (1)	1066
Silver	33.9	0.033	390	Residential RSL	N/A	2076	905	0	N/A
Thallium	6.1	0.033	0.78	Residential RSL	2.8	2076	368	122 (28)	19
Zinc	6780	0.3	23000	Residential RSL	136	5603	5574	0	3007
Residential Screening Area Risk (RSAR)									
Metals									
Aluminum	28300	8880	77000	Residential RSL	35600	33	33	0	0
Antimony	2.1	1.6	31	Residential RSL	2.42	16	2	0	0
Arsenic	227	8.42	194	Residential 10-4 risk	112	279	259	1	1
Cadmium	2	0.075	70	Residential RSL	0.824	33	25	0	7
Chromium, Hexavalent	--	--	0.3	Residential RSL	N/A	0	0	0	N/A
Cobalt	32	7.4	23	Residential RSL	43.6	33	33	1	0
Copper	167	18.8	3100	Residential RSL	182	279	279	0	0
Cyanide	0.39	0.27	21	Residential RSL	N/A	10	3	0	N/A
Iron	66600	34.2	55000	Residential RSL	71900	258	256	2	0
Lead	216	4.3	140	Provisional RSL	N/A	279	279	1	78
Lead	216	4.3	400	Residential RSL	34.8	279	279	0	78
Manganese	27700	319	1800	Residential RSL	1600	258	258	4	4
Mercury	0.46	0.02	23	Residential RSL	0.0795	29	18	0	10
Silver	3.5	2.6	390	Residential RSL	N/A	33	2	0	N/A
Thallium	--	--	0.78	Residential RSL	2.8	33	0	0	0
Zinc	438	41	23000	Residential RSL	136	279	279	0	88

Notes:

The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

-- = not detected

mg/kg = milligrams per kilogram

N/A = not available/applicable

RSL = EPA regional screening level

UTL = 95th upper tolerance limit

TABLE 7-14

Residential Screening Area Risk (RSAR) Soil Sampling Summary

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Number of Yards	Number of Samples	Arsenic EPC (mg/kg)	Lead EPC (mg/kg)
Screening Levels			***194***	***400***
RSAR-A	11	47	54	46
RSAR-B	5	19	39	43
RSAR-C	16	53	31	35
RSAR-D	15	53	25	54
RSAR-E	19	39	23	22
RSAR-F	16	32	24	30
RSAR-G	5	17	23	34
RSAR-H	5	19	99	38

Notes:

1. The arsenic screening level corresponds to a 1×10^{-4} risk and incorporates site-specific bioavailability (Section 9.4.5 and Appendix H).
2. The lead screening level of 400 mg/kg is the EPA Regional Screening Level for Residential Exposures, equating to 1×10^{-6} risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a).
3. Screening levels are used to identify the nature and extent of contamination, and they are not intended to infer the existence or absence of unacceptable risk, since they do not address cumulative risk or consider contributions from background levels.

EPC = exposure point concentration
mg/kg = milligrams per kilogram

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
O08	402-08-066M	2830 S FIRST ST	142	240	159	280	Overlaps Upper Chaparral Gulch exposure area
O15	402-10-068	12721 E RICHARDS LN	51	76	144	230	Located between Upper Chaparral Gulch and MTP 1964 Blow Out Path exposure areas
O16	402-10-069A	12769 E RICHARDS LN	48	79	395	882	Located between Upper Chaparral Gulch and MTP 1964 Blow Out Path exposure areas
O17	402-10-063C	12776 E RICHARDS LN	123	294	146	407	Within the flood plain of Upper Chaparral Gulch
105B	402-06-028J	2875 S AZURITE ST	74	93	698	698	Adjacent to and downwind of former Pyrometallurgical Operations area.
107A	402-06-028R	13325 E PRESCOTT ST	104	137	240	444	Adjacent to and downwind of former Pyrometallurgical Operations area.
107B	402-06-028R	13325 E PRESCOTT ST	127	377	335	785	Adjacent to and downwind of former Pyrometallurgical Operations area.
108	402-06-028S	2877 S AZURITE ST	116	346	419	1,430	Adjacent to and downwind of former Pyrometallurgical Operations area.
109	402-06-028U	E PRESCOTT ST	174	236	393	996	Adjacent to and downwind of former Pyrometallurgical Operations area.
116	402-07-017H	2840 S DANA ST	393	677	135	201	--
119	402-07-007C	13080 E MAIN ST	50	103	265	383	Adjacent to historic Smelter Spur rail alignment and loading and unloading area. The northwest boundary of the yard was as excavated as part of the TCRA on Yard 133 (E & E, 2012). Remaining samples with lead above 140 mg/kg were detected within and adjacent to Sweet Pea Lane.
120	402-07-017G	2832 S DANA ST	27	47	13,331	18,100	High lead EPC is driven by a localized hot spot in southwest corner of property, and does not correspond to elevated arsenic concentrations. Hot spot is likely due to placement during a historical operation or other activity rather than aerial dispersion from distant source areas.
127	402-10-043C 402-10-054A	2971 S THIRD ST 3025 S THIRD ST	108	633	144	871	Adjacent to Middle Chaparral Gulch exposure area
135	402-06-092	13239 E PHOENIX ST	39	74	148	278	--
138A	402-07-028D	2827 S CALUMET ST	40	56	187	303	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
138B	402-07-028D	2827 S CALUMET ST	81	241	408	1,880	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
141	402-07-031A	2790 S CALUMET ST	64	115	414	746	--
142	402-07-004	13052 E MAIN ST	69	125	204	415	Adjacent to historic Smelter Spur rail alignment and loading and unloading area. A lead hot spot on this property with a maximum detect of 1,150 mg/kg was excavated as part of the 2011 TCRA (E & E, 2012).
143	402-07-001 402-10-039	2893 S THIRD ST 2913 S THIRD ST	77	146	372	777	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
149	402-07-020A	2819 S CALUMET ST	23	33	315	362	--
153	402-10-023	12838 E CHAPARRAL ST	34	58	594	1,020	--
157	402-08-017B 402-08-018U	2560 S COLINA LN S PARKER ST	538	538	138	208	--
162	402-06-070	13029 E PHOENIX ST	102	176	1,350	1,350	--
163	402-07-053	2671 S OLD BLACK CANYON HWY	25	36	160	373	--
164	402-08-043	2699 S HILL ST	92	191	547	1,120	--
167A	402-11-003	13601 E AGUA FRIA LN	160	388	168	242	--
168	402-06-073	2745 S HECLA ST	22	32	159	262	--
176	402-10-028A	12972 E MAIN ST	60	106	503	760	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
178	402-06-074E	13032 E PRESCOTT ST	45	79	196	234	--
180	402-07-030A 402-07-030B	2787 S HECLA ST S HECLA ST	147	241	232	368	--
181	402-07-084A	2770 S BUTTE ST	113	300	367	1,140	--
182	402-07-081A	13065 E PRESCOTT ST	47	84	660	1,250	Property is the location of a commercial automotive repair shop.

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
188	402-07-080	13059 E PRESCOTT ST	46	73	266	479	--
190	402-07-092 402-07-093C 402-07-094	13007 E MAIN ST 13011 E MAIN ST 13027 E MAIN ST	50	72	184	228	--
195	402-10-032	12967 E MAIN ST	91	151	173	350	--
196	402-10-037	12928 E CHAPARRAL ST	31	37	168	287	--
203A	402-06-028M	13425 E PRESCOTT ST	119	237	249	602	Adjacent to and downwind of former Pyrometallurgical Operations area.
203B	402-06-028M	13425 E PRESCOTT ST	119	191	323	678	Adjacent to and downwind of former Pyrometallurgical Operations area.
211	402-09-016G	2557 S HILL ST	26	36	165	253	--
213	402-06-096	13190 E PRESCOTT ST	49	66	199	343	--
214B	402-08-045D	S THIRD ST	50	94	152	274	Adjacent to MTP 1964 Blow Out Path exposure area
215B	402-10-052	2940 S THIRD ST	58	84	204	402	Adjacent to Upper Chaparral Gulch exposure area
215C	402-10-052	2940 S THIRD ST	323	991	670	3,080	Within the flood plain of Upper Chaparral Gulch
222	402-10-005A	2820 S HECLA ST	83	216	2,849	9,150	Elevated lead concentrations observed along western boundary of the property, closest to the historic Smelter Spur rail alignment and loading area.
223	402-10-070E	12743 E RICHARDS LN	156	579	253	456	Adjacent to MTP 1964 Blow Out Path and Upper Chaparral Gulch exposure areas
225C	402-10-058	12786 E RICHARDS LN	159	342	218	586	Adjacent to MTP 1964 Blow Out Path and overlaps Upper Chaparral Gulch exposure area
226	402-10-055C 402-10-055A	12798 E RICHARDS LN 12818 E RICHARDS LN	273	618	408	904	Adjacent to MTP 1964 Blow Out Path and within flood plain of Upper Chaparral Gulch
227 and 70J	402-07-052M 402-07-061B	2660 S JONES ST 2670 S JONES ST	138	667	300	1,270	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
229 and 36W	402-07-041	13336 E WELLS ST	217	905	915	3,330	Small pile (approximately 8 inches high) of fine-grained grayish soil (or powder) was identified on southern boundary of property and was highly elevated in arsenic and lead. Discovery of this material resulted in EPA performing the accelerated residential sampling in August 2013 of multiple yards near the intersection of Jones and Wells Streets (Lockheed Martin SERAS, 2013c) (included in Appendix D).
232	402-10-008A	12908 E MAIN ST	28	28	2,833	7,310	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
233	402-10-040	2931 S THIRD ST	58	152	385	949	--
247	402-06-074E	13032 E PRESCOTT ST	435	785	544	1,170	Maximum concentrations of lead and arsenic are associated with an estimated 5 ft diameter area of yellow-orange tailings located on the southern portion of the yard near Prescott Street.
246 and 30W	402-07-042 402-07-042A	13318 E WELLS ST 13330 E WELLS ST	229	1,630	426	2,120	Elevated levels of lead and arsenic were detected along the northern boundary of the property, adjacent to Yard 229/36W.
252	402-08-039	3047 S THIRD ST	238	413	255	663	Adjacent to Middle Chaparral Gulch exposure area
258 and 00W	402-07-040B	13300 E WELLS ST	52	128	192	605	This property is adjacent to 229/36W, where a small pile (8 inches high) of fine-grained material was identified with highly elevated arsenic and lead concentrations.
262	402-06-066	13040 E PHOENIX ST	33	45	204	305	--
267	402-08-058	2689 S HILL ST	86	128	193	285	--
308	402-07-019A	2855 S CALUMET ST	56	78	198	376	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
1903	402-05-096C	13933 E LAZY RIVER DR	210	571	34	34	Property is located east of the Agua Fria River in an area of differing geology that is characterized by higher naturally occurring concentrations of arsenic (see Section 6.2), as well as other metals including iron and manganese. Field observations indicated that fill material had been obtained from a cut on the northern portion of the property and used during construction of the home and driveway. In situ XRF analysis from the cut detected similar concentrations as the samples of fill material (Lockheed Martin SERAS, 2015). Levels of arsenic and lead in surface soils surrounding this property (with the exception of a contiguous area in the yard to the west) are low, and exceedances are likely due to natural geology and not former mine and smelting operations.
2215	402-08-025B	12541 E CORLEY ST	429	832	56	96	Adjacent to Chaparral Gulch, downstream of former Iron King Mine and just upstream of the culvert under Highway 69.
2216	402-08-026B	2734 S COLINA LN	100	167	241	387	Adjacent to Chaparral Gulch, downstream of former Iron King Mine and just upstream of the culvert under Highway 69.
2328	402-09-023F	2535 S HURON ST	303	571	215	412	One hot spot is located near the front door that is approximately 3 feet by 2 feet in size and resembles silt or fine sands from storm water runoff. Elevated metals concentrations were limited to less than 2.5 inches in depth.
2393	402-08-032C	2555 S STATE ROUTE 69	519	1,470	4,714	13,600	Property has an automotive repair shop, bar, and small apartment. Some residents also indicated it was the location of a former gas station. Elevated concentrations of arsenic and lead were detected on the north side of the property. Field observations indicate the presence of mining-related fill material in this area.
2401	402-09-032	2728 S CORRAL ST	68	91	333	752	--
2404	402-09-031	2732 S CORRAL ST	27	35	147	204	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
2406	402-10-074C	E PRESCOTT ST	263	593	7,126	8,990	Within the historic Smelter Spur rail alignment and loading and unloading area. Yard 2406 appears to be the northernmost property impacted by rail operations.
2407	800-27-006M	E PRESCOTT ST	74	156	229	477	Within the historic Smelter Spur rail alignment and loading and unloading area.
2408	402-10-074D	E PRESCOTT ST	117	254	953	2,460	Within the historic Smelter Spur rail alignment and loading and unloading area.
2409	402-06-102R	E PRESCOTT ST	135	256	725	1,790	Within the historic Smelter Spur rail alignment and loading and unloading area.
2410	402-06-102U	2852 S HECLA ST	203	419	1,543	3,030	Within the historic Smelter Spur rail alignment and loading and unloading area.
2415	402-10-026A	12938 E MAIN ST	58	100	209	459	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
2417	402-10-009A 402-10-010A	12910 E MAIN ST 12912 E MAIN ST	44	87	169	499	Adjacent to historic Smelter Spur rail alignment and loading and unloading area.
2426	402-10-017	12913 E MAIN ST	312	397	123	304	--
2429	402-10-014	12847 E MAIN ST	29	38	163	245	--
2430	402-10-012 402-10-013	12827 E MAIN ST 12835 E MAIN ST	35	49	223	565	--
2444	402-10-050A	2901 S FIRST ST	323	778	980	2,120	Within the flood plain of Upper Chaparral Gulch
2502	402-06-060 402-06-059	13022 E MCCABE ST 13035 E MCCABE ST	41	64	144	347	--
2517	402-06-031	2662 S OLD BLACK CANYON HWY	36	44	158	369	--
2527	402-06-067A	13050 E PHOENIX ST	90	127	171	317	--
2529	402-06-064A	13030 E PHOENIX ST	52	106	676	2,240	Field observations indicated a previous house fire occurred at this property.
2530	402-06-063 402-06-062	13023 E SWENSONS ALLEY 2671 S HECLA ST	65	130	2,816	7,420	Adjacent to Yard 2529, where field observations indicate a house fire occurred.
2536	402-06-077	13101 E PHOENIX ST	42	54	148	276	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
2538	402-06-084	2714 S DANA ST	43	62	149	237	--
2550	402-06-083	13100 E PRESCOTT ST	44	75	288	625	Property was cleaned up and disked following 2014 sampling event; no hot spot could be identified during ERT hot spot assessment (Lockheed Martin SERAS, 2015).
2602	402-07-083A	13095 E PRESCOTT ST	442	863	18,699	20,500	Field observations of the property note a stockpile of scrap metal, solder, wires, and other metal materials. In addition, evidence of a fire was observed, and the existing metallic structure is in poor condition. These conditions may be contributing to the high levels of lead detected. In addition, field observations note that the rear of the property was elevated and may have received fill material in the past.
2603	402-07-082B	13075 E PRESCOTT ST	73	170	148	372	--
2615	402-07-023B	S BUTTE ST	778	1,110	57	128	Elevated arsenic is related to fill material from local quarry known to contain naturally occurring elevated arsenic.
2691	402-07-030C	2845 S HECLA ST	78	108	284	463	--
2708	402-07-045A	13370 E WELLS ST	43	65	156	348	--
2709	402-07-043	13370 E WELLS ST	42	63	223	542	--
2718	402-07-054	2689 S OLD BLACK CANYON HWY	66	87	293	384	--
2719	402-07-055A	2724 S JONES ST	299	601	8,527	10,500	Piles of fill material present at the property.
2725	402-07-055A	2724 S JONES ST	78	120	161	287	--
2741	402-07-074A	13430 E PRESCOTT ST	39	65	161	252	--

TABLE 7-15

Residential Properties – Supplemental Information for Properties with Arsenic or Lead Exposure Point Concentrations Exceeding Screening Levels

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Yard ID	Parcel Number	Property Address	Arsenic EPC (mg/kg)	Arsenic Maximum Detection (mg/kg)	Lead EPC (mg/kg)	Lead Maximum Detection (mg/kg)	Potential Sources of Contamination and Additional Field Observations
Screening Levels			***194 mg/kg (10^{-4} Risk Level [1])***		***400 mg/kg (Residential RSL [2])*** ***140 mg/kg (Provisional RSL [3])***		
3004	402-11-047C	13290 E MAGGY TRL	179	297	619	694	At the time of sampling, the property consisted of a half-leveled hill for a house site. The property contains naturally elevated lead and arsenic in rock outcroppings (in situ XRF analysis of rock outcropping detected lead at 1,830 mg/kg and arsenic at 1,570 mg/kg [Lockheed Martin SERAS, 2015]).
3005	402-11-038Y	E MAGGY TRAIL	155	262	187	531	Located adjacent to 3004 in an area of naturally elevated arsenic and lead concentrations.

Notes:

1. The arsenic screening level corresponds to a 1 x 10^{-4} risk and incorporates site-specific bioavailability (Section 9.4.5 and Appendix H).

2. The lead screening level of 400 mg/kg is the EPA Regional Screening Level for Residential Exposures, equating to 1x10^{-6} risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a).

3. The lead provisional RSL of 140 mg/kg has not been fully promulgated by EPA, is currently under review, and is not intended for general application at this time (see Section 9.6.3)

4. Yards were included in this table if the exposure point concentration (EPC) exceeded the arsenic 1x10^{-4} risk screening level of 194 mg/kg, the lead EPA Residential RSL of 400 mg/kg, or the lead provisional RSL of 140 mg/kg.

5. Screening levels are used to identify the nature and extent of contamination. Screening levels are not intended to infer the existence or absence of unacceptable risk, since they do not address cumulative risk or consider contributions from background levels.

6. Potential sources of contamination and additional field observations were identified as part of the fate and transport evaluation in this RI (see Section 8), the ERT data gap investigation (see Section 11 of Lockheed Martin SERAS, 2015) and/or information provided by EPA.

-- = no specific observations noted

EPC = exposure point concentration

TCRA = time-critical removal action

TABLE 7-16

Summary of Sediment Analytical Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Depth (ft bgs)	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	1,2,3,4,6,7,8-Hepta CDD	1,2,3,4,6,7,8-Hepta CDF	OCDD	OCDF
Screening Levels						***25500***	***2***	***9.79***	***130***	***0.99***	***43.4***	***50***	***31.6***	***20000***	***35.8***	***630***	***0.18***	***22.7***	***2.5***	***1***	***57***	***121***	***0.00000085***	***0.00000085***	***0.00000085***	***0.00000085***
Iron King Mine																										
IK-D7	Iron King Mine	NR17 Main Tailings Pile	Downstream	4/11/2002	0 - 0.25	--	**3.5**	**888**	**167**	**4.6**	17.3	--	**128**	**54900**	**777**	**914**	**4.8**	--	**9.1**	**5.1**	--	**1660**	--	--	--	--
IP-1	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	0 - 0.5	8530	**106**	**4490**	72.8	**12.5**	12.9	8.1	**269**	**151000**	**5530**	204	**27.2**	20.2	**52.2**	**31.6**	46	**4620**	--	--	--	--
IP-2	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	0 - 0.5	12600	**76.1**	**6340**	125	**4.3**	15.2	7.3	**207**	**173000**	**5460**	235	**13.1**	**23.1**	**50.6**	**29.9**	**155**	**1880**	--	--	--	--
IP-3	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	0 - 0.5	12000	**114**	**4520**	23.7	**40.7**	13.3	16.8	**545**	**136000**	**3670**	612	**17**	**25.5**	**47.2**	**19.1**	36.3	**14400**	--	--	--	--
IP-4	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	0 - 0.5	16000	**114**	**5070**	47.6	**12.5**	26.8	9.3	**463**	**137000**	**4340**	418	**13.9**	**24.4**	**48.2**	**18.3**	55.2	**4850**	--	--	--	--
IP-5	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/10/2008	0 - 0.5	10800	<6.5	**3010**	57.5	**24.8**	12.8	14.2	**299**	**91200**	**2490**	574	**12.9**	11.1	**30.3**	**13.6**	37.8	**7550**	--	--	--	--
IP-6	Iron King Mine	NR17 Main Tailings Pile	Downstream	8/16/2008	0 - 0.5	12200	**40.7**	**2790**	65.2	**5.6**	12.9	5	**84.8**	**64400**	**1200**	225	**9.3**	10.5	**11**	**6.6**	52	**979**	--	--	--	--
IP-7	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/2/2008	0 - 0.5	16000	**66**	**6920**	**177**	**3.4**	19.8	7.5	**142**	**150000**	**3180**	266	**15.5**	**22.9**	**33.7**	**15.1**	**67.2**	**1490**	--	--	--	--
IP-8	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/10/2008	0 - 0.5	7540	<3.5	**2340**	47	**1.9**	8	4	**76.6**	**49500**	**1030**	232	**4.7**	5	**15.1**	**6.1**	34.4	**949**	--	--	--	--
IP-9	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	0 - 0.5	4060	**189**	**5270**	64.7	**9.3**	8.2	4.9	**282**	**123000**	**9890**	86.2	**49.4**	16.6	**71.2**	**63.2**	26.1	**3240**	--	--	--	--
OW-10	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/8/2008	0 - 0.5	12700	<6.2	**262**	118	**2.6**	12.4	15.5	**70.9**	**29200**	**285**	**767**	**1**	14.7	**2.7**	**2.4**	45.4	**978**	--	--	--	--
OW-11	Iron King Mine	NR17 Main Tailings Pile	Downstream	8/16/2008	0 - 0.5	17900	<4.6	**156**	92	**4**	18.7	17.6	**73.5**	**40200**	**186**	**745**	**0.52**	16.3	<4.4	0.9	**73.5**	**625**	--	--	--	--
IP-10	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	0 - 0.5	16300	**15**	**1040**	**143**	**7.4**	16.6	15.5	**126**	**46500**	**1010**	**837**	**2.9**	22.7	**11.9**	**3.8**	48.1	**2630**	--	--	--	--
IP-11	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/5/2008	0 - 0.5	22600	**3.7**	**2770**	**264**	**12.4**	26.4	17	**280**	**83400**	**3210**	**788**	**6.4**	20	**26.1**	**12.9**	**70.9**	**5070**	--	--	--	--
IP-12	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	0 - 0.5	**26500**	**27.3**	**1780**	**233**	**12.7**	29.1	21.9	**209**	**70600**	**1850**	**1070**	**5.1**	**33.7**	**17.6**	**6.8**	**73.4**	**4400**	--	--	--	--
IP-13	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	17500	1.9	**1030**	114	**9.8**	13.4	14.3	**158**	**56000**	**1420**	610	**3.6**	12.5	**15.2**	**7.9**	**71**	**3200**	--	--	--	--
IP-14	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	12600	<1.8	**696**	59.8	**5.6**	9.9	11.5	**101**	**41000**	**971**	**667**	**5.2**	10.8	**11.6**	**6.1**	55.7	**1930**	--	--	--	--
IP-15	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	17200	**15.8**	**3210**	**273**	**26.2**	17.2	7.7	**551**	**106000**	**10500**	369	**43.3**	8.4	**72.5**	**45.3**	**66.4**	**9170**	--	--	--	--
IP-16	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	18300	**8.9**	**3710**	**148**	**20.3**	24	18.2	**342**	**101000**	**3680**	**714**	**10.8**	17.5	**32.7**	**17**	**62.4**	**7140**	--	--	--	--
IP-17	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/10/2008	0 - 0.5	15200	<7.5	**2020**	105	**10.3**	17.6	13.7	**224**	**78100**	**1990**	511	**3.4**	15.1	**19.3**	**11.1**	**58**	**4110**	--	--	--	--
IP-18	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	20000	**4.7**	**2490**	**237**	**16**	21.7	18.5	**246**	**75000**	**2770**	**680**	**12.9**	19.1	**23.1**	**12.2**	**68**	**5630**	--	--	--	--
OW-8	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/8/2008	0 - 0.5	9090	<6.1	**395**	70.9	**1**	7.9	8.8	**45.2**	**27400**	**194**	408	**0.86**	9	**3.3**	**1.9**	35.4	**510**	--	--	--	--
OW-1	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/26/2008	0 - 0.5	11900	<7.2	**102**	**244**	0.39	14.4	4.7	**114**	**32900**	**45.2**	224	0.082	7.3	2.4	0.7	**64.7**	**265**	--	--	--	--
OW-2	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/26/2008	0 - 0.5	14500	<6.9	**55.7**	**213**	0.28	14	16.3	**35.6**	**26200**	33.6	**900**	**0.24**	15	0.41	0.8	**57.3**	**288**	--	--	--	--
OW-3	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/26/2008	0 - 0.5	11700	<7	**331**	67.7	**2.3**	15.5	11	**53.3**	**31800**	**228**	589	**3**	9.1	**3.7**	**1.8**	56.1	**930**	--	--	--	--
OW-22	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	15000	0.71	**85.1**	**175**	**1.3**	11.3	12.6	**54.9**	**30000**	**269**	527	**1.2**	10.9	1.6	0.79	**58.9**	**579**	--	--	--	--
OW-23	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	13500	0.79	**53.3**	**154**	<0.51	12	12.7	**32.6**	**28400**	**46.1**	568	0.1	11.3	<3.6	<1	**59**	**164**	--	--	--	--
OW-24	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	3610	**23**	**1780**	44.6	<0.51	22.5	5.4	**155**	**91700**	**3150**	169	**4.1**	8.2	**42.5**	**6.7**	**72.9**	**554**	--	--	--	--
OW-25	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	13900	0.86	**87.8**	124	0.25	10.4	14.4	**42.6**	**30000**	**82**	**780**	0.16	10.5	<3.4	0.21	**60**	**316**	--	--	--	--
OW-26	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	13100	0.88	**84.6**	101	0.086	11.7	12.5	**41.8**	**28400**	**72.3**	530	0.17	10	<3.4	0.2	54.6	**259**	--	--	--	--
OW-27	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	14300	0.69	**23.3**	**140**	<0.5	13.5	15.9	**32.4**	**26100**	13.9	**787**	<0.097	13.5	<3.5	0.08	53.5	92.3	--	--	--	--
OW-28	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	16100	0.8	**127**	**172**	**1**	12.8	14.8	**51.5**	**30200**	**85.2**	**799**	**0.25**	12.4	<3.6	0.33	**57.5**	**466**	--	--	--	--
OW-29	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	24800	0.89	**54.6**	**276**	<0.5	17.1	16.4	**63.9**	**37600**	**85.8**	**723**	**0.37**	14.4	<3.5	0.41	**71.2**	**293**	--	--	--	--
OW-31	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	13500	1.4	**230**	52.1	**1.9**	16.1	12.4	**55.7**	**34400**	**162**	504	**0.6**	9.9	1.4	0.83	**65.4**	**846**	--	--	--	--
OW-32	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	15400	1.6	**281**	60.8	**1.6**	16.3	14	**58.4**	**38900**	**178**	539	**0.62**	12.4	2.2	0.83	**75.5**	**651**	--	--	--	--
OW-33	Iron King Mine	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	16100	1.5	**260**	125	**1.5**	15.4	15.5	**73**	**44600**	**131**	**748**	**1**	11.8	0.74	0.61	**78.7**	**677**	--	--	--	--
Galena Gulch																										
BKG-GG-1	Galena Gulch	Undeveloped	Upstream	9/10/2008	0 - 0.5	17900	--	**20.6**	**189**	<0.6	15.8	23	**47.5**	**38800**	23.2	**1020**	0.041	15.7	<4.2	**1.3**	**91.9**	106	--	--	--	--
BKG-GG-2	Galena Gulch	Undeveloped	Upstream	9/10/2008	0 - 0.5	13300	--	**14.1**	122	<0.55	10.9	18.3	**35.4**	**33100**	15.5	**983**	0.014	10.4	<3.8	**1.1**	**76.6**	84.6	--	--	--	--
BKG-GG-3	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	19700	<6.3	**13.5**	130	<0.52	16.6	25.2	**58**	**42900**	16.9	**1300**	<0.027	14	0.44	**1.3**	**90**	112	--	--	--	--
BKG-GG-4	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	14200	<6.2	**15.9**	**131**	<0.51	11.8	17.6	**36.8**	**33900**	15.6	**877**	<0.014	12	<3.6	**1.2**	**79.2**	76	--	--	--	--
BKG-GG-5	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	16300	<6.2	**21.8**	**183**	<0.52	15.2	20.1	**43.4**	**35200**	22.4	**949**	<0.058	14	0.42	**1.3**	**86.4**	93.9	--	--	--	--
BKG-GG-6	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	23900	<6.2	**34.2**	**133**	<0.51	15.2	27.4	**77.1**	**49500**	32.9	**1310**	0.12	14.7	0.67	**1.6**	**111**	**184**	--	--	--	--
BKG-GG-7	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	18100	<6.2	**22.6**	**207**	<0.52	17	21.4	**46.3**	**35700**	26.9	**976**	<0.061	15.9	0.45	**1.3**	**86.6**	106	--	--	--	--
BKG-GG-8	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	13100	<6.2	**14.5**	116	<0.51	13.3	14.3	**33.7**	**32300**	11.6	**664**	<0.026	10.4	<3.6	**1.1**	**75.9**	67.2	--	--	--	--
BKG-GG-9	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	17200	<6.2	**26.3**	**147**	<0.52	16.8	22.3	**46.6**	**37600**	15.3	**961**	<0.052	14.6	0.54	**1.3**	**91.8**	86	--	--	--	--
BKG-GG-10	Galena Gulch	Undeveloped	Upstream	9/6/2008	0 - 0.5	13800	<6.1	**27.4**	**151**	<0.51	13.9	21.1	**46.9**	**35900**	27.7	**1020**	<0.057	11.8	0.48	**1.3**	**88.4**	**123**	--	--	--	--
IK-D1	Galena Gulch	Undeveloped	Upstream	4/10/2002	0 - 0.5	--	<0.83	**25.5**	126	0.17	20.6	--	**56**	**43000**	11	**1080**	0.07	--	1.2	<0.24	--	91.4	--	--	--	--
GG-2	Galena Gulch	NR16 Former Mineworks Area	Downstream	9/2/2008	0 - 0.5	24400	**2.2**	**30.6**	**178**	0.52	29.1	24.1	**61.6**	**51800**	20	**1080**	<0.11	**24.6**	1.3	<1.1	**111**	119	--	--	--	--
GG-4	Galena Gulch	NR16 Former Mineworks Area	Downstream	8/16/2008	0 - 0.5	**27500**	<4.8	**110**	67	**5.2**	15.2	20.4	**88.4**	**50800**	**149**	**1150**	**0.19**	16.2	<4.2	0.47	**90.5**	**1060**	--	--	--	--
IK-D4	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/12/2002	0 - 0.5	--	**2.5**	**276**	90.9	**6.7**	17	--	**140**	**53200**	**454**	**1160**	**0.74**	--	**4**	**3**	--	**1750**	--	--	--	--
GG-5	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	9/11/2008	0 - 0.5	21500	<6.8	**489**	**131**	**5.1**	20.8	22.9	**176**	**56700**	**519**	**987**	**1.5**	15.5	**4.5**	**4**	**91.2**	**1560**	--	--	--	--
GG-8	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	9/6/2008	0 - 0.5	16400	<6.1	**151**	101	**3.6**	14.7	21.8	**125**	**39500**	**250**	**1120**	**0.63**	13.2	1.9	**2.1**	**77**	**958**	--	--	--	--
GG-10	Galena Gulch	Undeveloped	Downstream	9/11/2008	0 - 0.5	17000	<6.4	**142**	59.1	**1.2**	13.3	15.6	**194**	**39700**	**84.4**	**710**	**0.25**	10.2	1.6	**1.5**	**68.2**	**589**	--	--	--	--
GG-14	Galena Gulch	Undeveloped	Downstream	8/16/2008	0 - 0.5	23700	<2.6	**123**	123	**3.9**	19	19.6	**109**	**47600**	**123**	**853**	**0.22**	17.2	<4.6	0.73	**78.4**	**502**	--	--	--	--
IKJ-557-1	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	11800	**46.4**	**2800**	78.5	**13.1**	8.8	9.7	**416**	**77900**	**6410**	471	**7.3**	6.6	**7.9**	**46.2**	**110**	**2810**	--	--	--	--
IKJ-558	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	19100	**8.7**	**1010**	113	**5**	16.6	21	**166**	**54800**	**3110**	**1010**	**1.6**	11.5	0.99	**8.2**	**76.3**	**907**	--	--	--	--
IKJ-559	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	19500	**9.2**	**729**	95	**6.9**	16.6	7.7	**322**	**89100**	**2370**	608	**9.1**	9.3	**21.1**	**11.5**	**85.5**	**2730**	--	--	--	--
IKJ-560	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	24000	**8.3**	**1030**	90.3	**2.3**	14	**58.2**	**214**	**84000**	**518**	557	**0.88**	**47**	**2.8**	**5.1**	**103**	**1290**	--	--	--	--
IKJ-561	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	6260	**17.2**	**1270**	111	<0.53	7.1	2.9	**147**	**103000**	**1080**	87.8	**1**	2.7	**72.3**	**4.6**	**89.7**	**213**	--	--	--	--
IKJ-562	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	8560	0.51	**13.6**	**297**	<0.5	8.5	5.8	**88.2**	**21400**	15.1	382	<0.1	8.5	<3.5	<0.99	10.6	94.5	--	--	--	--
IKJ-563	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	21800	**4.6**	**314**	34.1	0.53	17.5	10.2	**127**	**76800**	**493**	565	**0.86**	8.4	**13.9**	**2.2**	**59.3**	**521**	--	--	--	--
IKJ-564	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	23200	**2.5**	**339**	**278**	**13.5**	10.6	26.2	**296**	**54900**	**238**	**920**	**0.27**	**22.8**	<3.5	**1.7**	**66.7**	<6.1	--	--	--	--
IKJ-565	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	17500	**13.4**	**1800**	**132**	**34**	6.1	8	**731**	**81900**	**2720**	551	**3.6**	5.3	**3**	**15.4**	**133**	**6060**	--	--	--	--
IKJ-566	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	6700	**28.3**	**2070**	**250**	**4.7**	3.2	3.1	**865**	**101000**	**14300**	364	**4.7**	1.9	**18.5**	**34.7**	**89.6**	**2410**	--	--	--	--
IKJ-567	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	18200	**3.2**	**293**	128	**2.4**	13.9	12.7	**154**	**39700**	**863**	543	**2.1**	10.1	**4.3**	**4.2**	**66.1**	**1080**	--	--	--	--
IKJ-568	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	15900	**2.5**	**305**	102	**1**	15.2	8.9	**104**	**40000**	**555**	391	**2.2**	10	**3.3**	**2.2**	**65.3**	**604**	--	--	--	--
IKJ-569	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	4/27/2009	0 - 0.5	17500	1.8	**106**	75.6	**2.9**	15.3	18.1	**116**	**36000**	**213**	**755**	**0.27**	11.7	0.9	**2**	**70.7**	**951**	--	--	--	--
OW-13	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	8/26/2008	0 - 0.5	14100	<6.7	**97.8**	118	0.17	11	15.6	**46.7**	**32400**	**75.3**	**868**	**0.21**	11.4	0.71	<1	56.5	**243**	--	--	--	--
OW-14	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	8/16/2008	0 - 0.5	12600	<3.7	**110**	51.7	**3.4**	11.6	12.7	**60.7**	**32000**	**168**	493	**0.41**	11.2	<4.2	0.71	55	**588**	--	--	--	--
OW-15	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	8/26/2008	0 - 0.5	10900	<4.2	**653**	33.4	**9.8**	15.1	21.1	**329**	**56200**	**687**	**1180**	**2.5**	9.4	**10.6**	**5**	38.1	**2910**	--	--	--	--
Humboldt Smelter																										
HSJ-568	Humboldt Smelter	Undeveloped	Downstream	5/5/2009	0 - 0.5	**32100**	**2.5**	**38**	**269**	0.19	**48.4**	15.7	**318**	**43200**	**134**	**1100**	0.082	**36.3**	<3.7	**2.6**	**75.8**	**261**	--	--	--	--
HSJ-569	Humboldt Smelter	Undeveloped	Downstream	5/1/2009	0 - 0.5	22600	1.2	**31.3**	**253**	**1**	42.6	16.5	**419**	**30800**	**61.4**	**1300**	0.16	**40.7**	<3.8	0.55	**58.7**	**302**	--	--	--	--
HSJ-570	Humboldt Smelter	Undeveloped	Downstream	5/1/2009	0 - 0.5	15200	2	**14.5**	**248**	0.56	36.5	18.2	**140**	**28300**	13.3	**1810**	<0.11	**40**	1.1	<1.1	53.9	113	--	--	--	--
HSJ-571	Humboldt Smelter	Undeveloped	Downstream	5/4/2009	0 - 0.5	**27400**	**3.4**	**59.4**	**275**	**1.5**	**52.7**	21.7	**847**	**45900**	**116**	**1570**	**0.19**	**44.3**	<3.5	**1.5**	**79**	**361**	--	--	--	--

TABLE 7-16

Summary of Sediment Analytical Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Depth (ft bgs)	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	1,2,3,4,6,7,8-Hepta CDD	1,2,3,4,6,7,8-Hepta CDF	OCDD	OCDF
Screening Levels						***25500***	***2***	***9.79***	***130***	***0.99***	***43.4***	***50***	***31.6***	***20000***	***35.8***	***630***	***0.18***	***22.7***	***2.5***	***1***	***57***	***121***	***0.00000085***	***0.00000085***	***0.00000085***	***0.00000085***
HSJ-572	Humboldt Smelter	Undeveloped	Downstream	5/1/2009	0 - 0.5	13100	1.6	**27.2**	**227**	<0.5	22.2	14.8	**178**	**25000**	**45.3**	**1600**	0.18	**31.6**	0.95	0.37	44.1	**162**	--	--	--	--
HSJ-573	Humboldt Smelter	Undeveloped	Downstream	5/1/2009	0 - 0.5	20900	1.6	**17.5**	**357**	<0.57	26	13.7	**48.7**	**26100**	11.5	**1120**	<0.11	**40.8**	0.98	<1.1	48.7	65.8	--	--	--	--
HSJ-574	Humboldt Smelter	Undeveloped	Downstream	5/1/2009	0 - 0.5	9250	1.9	**40.4**	**216**	**3.1**	14.6	12	**249**	**20200**	**122**	**1590**	**0.42**	21.1	1.1	0.57	33.5	**743**	--	--	--	--
HSJ-575	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	4/29/2009	0 - 0.5	19300	2	**21.2**	**431**	0.73	29.3	14.9	**73.1**	**27700**	27.8	**1350**	0.085	**39.2**	0.96	0.12	49.2	**158**	--	--	--	--
HSJ-576	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	4/29/2009	0 - 0.5	20800	2	**26.5**	**457**	0.8	30.6	21.7	**179**	**30300**	35.4	**2060**	0.061	**47.5**	1.1	0.14	53.4	**175**	--	--	--	--
IP-19	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	9/2/2008	0 - 0.5	**144000**	**19.8**	**52.7**	**235**	**9.2**	**316**	13.6	**5020**	**20500**	**470**	**780**	**0.29**	**184**	**5.9**	**3.2**	55.1	**3330**	--	--	--	--
IP-20	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	9/5/2008	0 - 0.5	**174000**	**15**	**68**	**224**	**15.9**	**338**	14.7	**6680**	15300	**1110**	**814**	**0.32**	**251**	**18.3**	**6.6**	**63**	**6320**	--	--	--	--
IP-21	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	9/2/2008	0 - 0.5	**198000**	**31**	**27.7**	**251**	**31.8**	**433**	15.3	**6960**	16700	**935**	**907**	0.18	**256**	**8.6**	**8**	47.6	**4640**	--	--	--	--
OW-21	Humboldt Smelter	NR11 Former Pyrometallurgical Operations Area	Downstream	8/26/2008	0 - 0.5	**52800**	<4.6	**181**	**306**	**11.8**	**141**	20.9	**3380**	**24500**	**525**	**881**	**0.87**	**135**	**6.2**	**8.6**	46.8	**3000**	--	--	--	--
OW-18	Humboldt Smelter	NR10 Agua Fria River Tailings Pile	Downstream	8/26/2008	0 - 0.5	6390	**32.5**	**1510**	75.6	**12.1**	11.8	2.4	**380**	**56100**	**7340**	192	**37.9**	3.7	**61.9**	**35.8**	25.9	**3190**	--	--	--	--
Chaparral Gulch																										
BKG-CG-3	Chaparral Gulch	NR20 North of Chaparral Gulch	Upstream	9/7/2008	0 - 0.5	9500	<6.1	**36.1**	103	0.19	11.2	13	30	19500	18.4	607	0.028	13.6	<3.5	0.23	39.1	78.1	--	--	--	--
BKG-CG-4	Chaparral Gulch	NR20 North of Chaparral Gulch	Upstream	9/7/2008	0 - 0.5	7360	<6	**24.5**	76.4	0.065	13	9.3	20.8	16700	8.8	447	<0.1	11	<3.5	0.15	34.7	50.1	--	--	--	--
BKG-CG-5	Chaparral Gulch	NR20 North of Chaparral Gulch	Upstream	9/7/2008	0 - 0.5	8790	<6.1	**32.3**	86.5	0.15	10.8	11.7	27.8	19300	14.3	531	0.031	12.6	<3.5	0.25	37.5	68.5	--	--	--	--
BKG-CG-6	Chaparral Gulch	Undeveloped	Upstream	9/7/2008	0 - 0.5	7510	<6.1	**27.8**	88.6	0.063	7.4	12.9	20.3	17500	12.5	557	<0.1	9.1	<3.5	0.15	31.6	50.6	--	--	--	--
BKG-CG-7	Chaparral Gulch	Undeveloped	Upstream	9/7/2008	0 - 0.5	11700	<6.3	**49**	122	0.24	14.7	17.3	**43.8**	**23900**	20.7	**730**	0.048	17.4	<3.6	0.26	47.3	93	--	--	--	--
BKG-CG-8	Chaparral Gulch	Undeveloped	Upstream	9/7/2008	0 - 0.5	8830	<6	**29.8**	81.6	0.082	11.4	12.1	28.5	**21400**	11	514	<0.1	12.5	<3.5	0.18	39.6	60.8	--	--	--	--
BKG-CG-9	Chaparral Gulch	Undeveloped	Upstream	9/7/2008	0 - 0.5	8560	<6	**31.1**	100	0.11	12.2	13.1	28	19200	12.8	629	<0.1	13.3	<3.5	0.19	38.3	63.6	--	--	--	--
BKG-CG-10	Chaparral Gulch	Undeveloped	Upstream	9/7/2008	0 - 0.5	10000	<6.1	**32.4**	**131**	0.18	11.2	13.7	30.4	**21900**	15.1	**728**	0.024	12.9	<3.5	0.23	44.4	80.4	--	--	--	--
OW-12	Chaparral Gulch	NR15 Auto Yard	Downstream	9/2/2008	0 - 0.5	15800	1.7	**27.5**	**177**	0.3	15.2	16.9	**40.2**	**36000**	13.5	**930**	<0.094	19.2	1.4	<1	**67.5**	89	--	--	--	--
CG-5	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/16/2008	0 - 0.5	22200	<1.9	**101**	**211**	**2.5**	22.8	17.5	**55.2**	**35000**	**79.6**	**843**	**0.22**	20.8	<5.2	0.39	**61**	**266**	--	--	--	--
CG-6	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	9/11/2008	0 - 0.5	6830	<6.3	**34.5**	56.8	<0.53	7.9	8.6	29.1	19800	19.7	291	<0.043	9.5	0.85	<0.69	35.3	93.2	--	--	--	--
CG-7	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/16/2008	0 - 0.5	15100	<4.7	**138**	112	**3.5**	16.1	16	**52**	**39000**	**100**	588	**0.43**	16.2	<4.3	0.55	**80.7**	**502**	--	--	--	--
CH-BIOSED08	Chaparral Gulch	RYSR	Downstream	5/9/2014	0 - 0.5	10900	<0.15	**93.5**	60.9	**1.3**	24.4	14	**44.1**	**36800**	35.8	427	0.066	12.4	1.1	<0.0029	**90**	**407**	--	--	--	--
CH-BIOSED09	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	5/9/2014	0 - 0.5	12300	<0.15	**60.6**	82.6	0.21	14.2	18.4	29.9	**36700**	15.5	505	0.049	13.5	0.47	<0.0028	**83.5**	105	--	--	--	--
CH-BIOSED10	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	5/8/2014	0 - 0.5	13100	<0.15	**46.2**	110	0.45	13.2	12.2	28.8	**32400**	**37.8**	607	0.074	10	0.43	<0.0028	**73.1**	**174**	--	--	--	--
IK-D2	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/10/2002	0 - 0.5	--	<0.79	**22.8**	77.5	0.15	12.8	--	24.8	**20900**	8.9	434	<0.05	--	<0.46	0.28	--	57.5	--	--	--	--
IK-D12	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/12/2002	0 - 0.5	--	**3.3**	**509**	55	0.29	11.9	--	**51**	**35100**	**339**	277	**1.2**	--	**5.4**	**1.9**	--	**185**	--	--	--	--
IKJ-572	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	4/28/2009	0 - 0.5	9520	0.61	**73.8**	96.3	0.43	11.6	15.6	**42.9**	**23100**	**58**	573	**0.19**	8.6	<3.5	0.15	44.7	**208**	--	--	--	--
OW-5	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	9/8/2008	0 - 0.5	12400	<6.2	**51.8**	**140**	<0.52	13.2	15.7	31.6	**28000**	**40.8**	**656**	0.12	11.2	0.62	**1.1**	**58.7**	115	--	--	--	--
BKG-CG-1	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	9/10/2008	0 - 0.5	9310	--	**37**	93	<0.54	12.8	10.9	28.5	**20900**	15	525	0.027	13.4	<3.8	0.79	39.1	79.4	--	--	--	--
BKG-CG-2	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	9/10/2008	0 - 0.5	9230	--	**38.7**	90.5	<0.54	13.3	12.3	30.1	**22100**	20	524	0.034	13	0.35	1	42.3	83.7	--	--	--	--
CG-2	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	9/7/2008	0 - 0.5	8560	<6	**33**	99.9	0.21	9.1	13.1	29.8	**22300**	21.8	530	0.028	11.4	<3.5	0.24	49.2	90	--	--	--	--
CG-24	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	5/3/2009	0 - 0.5	16400	1.7	**51.5**	82.8	<0.66	**45.4**	13.5	29.8	**36600**	32.8	591	0.17	**28.5**	<4.6	<1.3	**59.6**	**269**	--	--	--	--
CG-4	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	9/7/2008	0 - 0.5	7690	<6	**33.9**	86.7	0.27	8.1	9.6	23.2	15900	23.2	439	0.065	10.8	<3.5	0.24	29.5	104	--	--	--	--
OW-4	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	8/26/2008	0 - 0.5	8600	<6.7	**129**	85.5	0.54	12.6	10.1	**35.2**	**21700**	**80.7**	458	**0.41**	11.5	0.81	0.88	34.4	**313**	--	--	--	--
OW-6	Chaparral Gulch	Undeveloped	Downstream	9/2/2008	0 - 0.5	15400	1.3	**20.4**	**137**	0.3	14.7	15	**34**	**33700**	11	**771**	<0.11	19.2	1.4	<1	56.9	79	--	--	--	--
OW-7	Chaparral Gulch	Undeveloped	Downstream	9/8/2008	0 - 0.5	13400	<6.3	**250**	**170**	**1.8**	14.5	14.2	**51.4**	**26500**	**201**	**724**	**1.3**	17.3	2	**2.1**	41.8	**685**	--	--	--	--
OW-9	Chaparral Gulch	Undeveloped	Downstream	9/8/2008	0 - 0.5	11000	<6.2	**138**	**132**	0.95	12	13.4	**37.2**	**23700**	**102**	**720**	**0.63**	16.6	1.3	**1.8**	39.8	**454**	--	--	--	--
OW-16	Chaparral Gulch	Undeveloped	Downstream	9/8/2008	0 - 0.5	9990	<6.3	8.7	**150**	<0.52	13	13.3	20	14800	14.6	**740**	0.014	19.8	<3.7	<0.73	33.3	56.6	--	--	--	--
OW-17	Chaparral Gulch	Undeveloped	Downstream	9/8/2008	0 - 0.5	10800	<6.2	**41.5**	128	0.17	14.1	14.2	31.6	18900	**45.7**	**684**	0.11	16.7	0.57	<0.9	36.7	**172**	--	--	--	--
CG-9	Chaparral Gulch	Undeveloped	Downstream	8/16/2008	0 - 0.5	20800	<7.4	**230**	**170**	**4.6**	22.9	17.8	**75.5**	**43500**	**288**	**739**	**1.4**	19.1	0.72	**1.6**	**78.9**	**819**	--	--	--	--
CG-10	Chaparral Gulch	NR3 Upper Chaparral Gulch	Downstream	8/16/2008	0 - 0.5	**30400**	<7.3	**248**	**242**	**5.5**	28.3	24.2	**90.2**	**50800**	**237**	**1100**	**1.1**	**25.8**	<6.8	**1.2**	**90.7**	**935**	--	--	--	--
CH-BIOSED06	Chaparral Gulch	NR3 Upper Chaparral Gulch	Downstream	5/8/2014	0 - 0.5	10200	<0.15	**88.2**	90.3	**1.7**	13.7	11.7	**36.7**	**33700**	**38.7**	457	0.035	11.9	1	<0.0028	**79**	**591**	--	--	--	--
CH-BIOSED07	Chaparral Gulch	NR3 Upper Chaparral Gulch	Downstream	5/8/2014	0 - 0.5	12800	<0.15	**103**	83.4	**1.6**	14.5	12.7	**38**	**36400**	**77.2**	466	**0.36**	11.4	1.2	<0.0028	**68**	**642**	--	--	--	--
CG-1	Chaparral Gulch	NR4 JT Septic Facility	Downstream	8/16/2008	0 - 0.5	23500	**9.7**	**278**	**242**	**3**	30.9	15.4	**60.5**	**40100**	**522**	**696**	**0.86**	**28.3**	**2.9**	**3.2**	**61.6**	**457**	--	--	--	--
CG-11	Chaparral Gulch	NR5 Main Tailings Pile 1964 Blow Out Path	Downstream	8/16/2008	0 - 0.5	23900	**9.2**	**289**	**207**	**4.6**	28.9	18.5	**83.2**	**43100**	**374**	**820**	**0.96**	**24.4**	<4.6	**2.2**	**68**	**810**	--	--	--	--
CH-BIOSED05	Chaparral Gulch	NR5 Main Tailings Pile 1964 Blow Out Path	Downstream	5/6/2014	0 - 0.5	10600	1.7	**101**	101	0.75	12.2	9.6	**35.9**	**23900**	**112**	**674**	**0.31**	13.4	1.2	<0.0028	47.1	**234**	--	--	--	--
CH-BIOSED04	Chaparral Gulch	RYSR	Downstream	5/8/2014	0 - 0.5	10300	<0.15	**84.1**	73.2	**1**	14.3	14.2	**33.9**	**28900**	**40.5**	421	0.078	11.1	1.1	<0.0028	**72.6**	**350**	--	--	--	--
CH-BIOSED03	Chaparral Gulch	NR6 Middle Chaparral Gulch	Downstream	5/8/2014	0 - 0.5	11300	<0.15	**104**	63.6	**1.3**	15.3	11.2	**31.8**	**35400**	**59.9**	383	0.077	12	1.1	<0.0028	**82.3**	**516**	--	--	--	--
IK-D10	Chaparral Gulch	NR6 Middle Chaparral Gulch	Downstream	4/12/2002	0 - 0.25	--	1.1	**149**	66.6	0.86	9.6	--	**388**	**23500**	**84.7**	243	**0.22**	--	**2.6**	1	--	**502**	--	--	--	--
IK-D13	Chaparral Gulch	Undeveloped	Downstream	4/10/2002	0 - 0.5	--	**4.6**	**285**	70.3	**1.3**	12.3	--	**48.6**	**28800**	**298**	421	**0.79**	--	**4.2**	**1.8**	--	**463**	--	--	--	--
IK-D14	Chaparral Gulch	RYSR	Downstream	4/9/2002	0 - 0.5	--	**5**	**475**	69.5	**1.6**	11.2	--	**68.3**	**34100**	**513**	273	**2.9**	--	**5.8**	**3.3**	--	**606**	--	--	--	--
CG-12	Chaparral Gulch	RYSR	Downstream	8/16/2008	0 - 0.5	19800	<4	**124**	**256**	**2.9**	26.8	14.6	**59.7**	**33700**	**160**	610	**0.73**	**32.6**	<4.7	0.83	**64.6**	**408**	--	--	--	--
CG-13	Chaparral Gulch	RYSR	Downstream	9/11/2008	0 - 0.5	8580	<6.3	**103**	77.7	**1.3**	13.1	10.4	**38.6**	**22000**	**186**	512	**0.63**	11	1.3	**1.6**	36.5	**526**	--	--	--	--
CG-14	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	0 - 0.5	12100	<8.4	**343**	**148**	**2.6**	13.2	7	**558**	**37200**	**597**	216	**2.4**	11.4	**7.7**	**5.8**	40.5	**1160**	--	--	--	--
CG-15	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/11/2008	0 - 0.5	11200	<6.2	**194**	123	**3**	14.4	14.8	**56.4**	**27600**	**199**	**644**	**1.5**	17.8	2.2	**1.9**	46.3	**968**	--	--	--	--
CG-16	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/12/2008	0 - 0.5	--	--	**203**	--	--	--	--	**697**	--	**225**	--	--	--	--	--	--	**1081**	--	--	--	--
CG-16	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	0 - 0.5	4870	0.63	**107**	41.8	0.93	7.3	6.4	**464**	16800	**78.9**	172	0.15	8.2	2.3	**1.5**	20.5	**484**	--	--	--	--
CG-17	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	0 - 0.5	22400	<6.1	**219**	**219**	**5**	24.2	19.3	**407**	**42100**	**198**	**1010**	**0.43**	**23.4**	<1.8	**2.1**	**63.4**	**779**	--	--	--	--
CG-18	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	0 - 0.5	18300	**10**	**258**	**178**	**9.3**	26.1	19	**691**	**46900**	**370**	532	**1.2**	**25.7**	**5.9**	**3.6**	**71.3**	**1990**	--	--	--	--
CG-22	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/2/2009	0 - 0.5	10400	**3.3**	**257**	118	**1.3**	14.4	11.4	**554**	**33000**	**181**	504	**0.69**	14.3	**7.8**	**2.3**	39.4	**508**	--	--	--	--
CG-22	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/2/2009	0.5 - 2	6770	<2.5	**75.2**	49	**1.3**	8.9	7.7	**385**	18400	**52.8**	391	0.078	9	**2.7**	0.79	25.6	**518**	--	--	--	--
CG-22	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/2/2009	7 - 8	21000	**5.7**	**418**	**187**	**2.9**	21.4	14.6	**726**	**45800**	**631**	510	**2**	19.3	**9.5**	**6.1**	56.4	**1200**	--	--	--	--
CG-25	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	0 - 0.5	10800	2	**150**	74.9	0.78	13.4	12.8	**607**	**34300**	**103**	314	0.17	12.9	2.5	**1.4**	46.1	**751**	--	--	--	--
CH-BIOSED01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/9/2014	0 - 0.5	21900	**2.4**	**260**	**165**	**3.5**	29.6	19.6	**647**	**47200**	**273**	**676**	**1.4**	**23.2**	**6.7**	<0.0038	**78.7**	**1190**	--	--	--	--
CH-BIOSED02	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/9/2014	0 - 0.5	11900	<0.15	**92.2**	74.6	**1.4**	27.5	10.7	**38.2**	**37500**	**66.4**	436	0.073	13.4	1.2	<0.0028	**78.7**	**565**	--	--	--	--
DAM-SED01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	0 - 0.5	9780	<0.16	**110**	98.3	**1.6**	9	11.2	**688**	**26100**	**46**	351	0.12	12.1	**3.4**	<0.0031	38.1	**669**	--	--	--	--
DAM-SED01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	2.5 - 3	9300	**2.9**	**121**	67	**1.3**	11.6	10.2	**1040**	**27300**	**101**	206	0.1	11.8	**3.2**	<0.0035	43.3	**712**	--	--	--	--
DAM-SED01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	3.5 - 4	9820	<0.14	**103**	50.9	**1.1**	13.8	8	**479**	**30200**	**60.4**	224	0.17	12	**2.6**	<0.0027	39.3	**768**	--	--	--	--
DE-1	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	0 - 0.5	13900	<6.5	**211**	129	**4.2**	18.9	17.1	**654**	**40700**	**178**	485	**0.59**	18.6	<3.4	**2.5**	**59**	**834**	--	--	--	--
DE-2	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/25/2008	0 - 0.5	9310	**2.4**	**213**	106	**4.1**	10.8	16.9	**1020**	**29300**	**185**	376	**0.69**	13.8	**5.2**	**2.3**	35.1	**1310**	--	--	--	--
HS-38	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	1/28/2004	0 - 1	2190	<93.8	**2320**	99.2	**5**	3.5	8.8	**106**	**456000**	**89.1**	**678**	**0.75**	3.7	<54.7	<15.6	12.2	**1880**	--	--	--	--
HSJ-534	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	15500	**24.6**	**1200**	**161**	**1.7**	20	10.2	**733**	**63700**	**2460**	288	**7.8**	20	**31**	**16**	53.4	**591**	--	--	--	--
HSJ-535	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	17000	**13**	**682**	**165**	**4.1**	21.3	13.8	**1340**	**54300**	**822**	533	**11.6**	22.6	**17.2**	**7.1**	51.5	**1390**	--	--	--	--
HSJ-536	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	11600	**8.4**	**403**	125	**1.4**	16.9	7.5	**448**	**40200**	**356**	156	**1.8**	17.5	**10.8**	**6**	37.2	**526**	--	--	--	--
HSJ-548	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/10/2008	0 - 2	7780	**5.9**	**1430**	**247**	**2.6**	16.1	<5.6	**126**	**57500**	**2120**	208	**19.5**	8.2	**26.9**	**13.1**	42.8	**1250**	--	--	--	--

TABLE 7-16

Summary of Sediment Analytical Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Depth (ft bgs)	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	1,2,3,4,6,7,8-Hepta CDD	1,2,3,4,6,7,8-Hepta CDF	OCDD	OCDF
Screening Levels						***25500***	***2***	***9.79***	***130***	***0.99***	***43.4***	***50***	***31.6***	***20000***	***35.8***	***630***	***0.18***	***22.7***	***2.5***	***1***	***57***	***121***	***0.00000085***	***0.00000085***	***0.00000085***	***0.00000085***
HSJ-549	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/10/2008	0 - 2	8800	**9.2**	**1080**	102	**1.8**	22	<5.1	**174**	**49900**	**1260**	165	**9.5**	8.9	**15.5**	**9.5**	45.8	**1020**	--	--	--	--
HSJ-550	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/11/2008	0 - 2	8980	<6.5	**476**	106	**1.6**	12.3	7.9	**80.9**	**32800**	**495**	372	**3.2**	10.5	**9**	**3.2**	38.6	**647**	--	--	--	--
HSJ-551	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/15/2008	0 - 0.5	10200	**5.9**	**200**	77.8	**2.3**	16.6	12.5	**239**	**38200**	**224**	332	**0.91**	14.1	1.3	**1.8**	**61.8**	**304**	--	--	--	--
HSJ-582	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	0 - 0.5	22300	**2.9**	**365**	**157**	**9.9**	25.1	9.2	**211**	**53100**	**369**	278	**2.3**	17.7	2.5	**2.2**	**59**	**3730**	--	--	--	--
HSV-101	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	**26800**	**3.9**	**173**	**756**	**3.4**	**48.9**	23.4	**195**	**35600**	**254**	**760**	**1.6**	**94.7**	**3.3**	**1.4**	56.2	**886**	**0.0000078**	<0.0000016	**0.00019**	<0.000003
HSV-102	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	24200	<6.6	**18**	**568**	<0.55	**53.4**	26.6	**87.9**	**31700**	17.3	**849**	0.018	**112**	0.32	**1.4**	**72.4**	83.2	--	--	--	--
HSV-104	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	0 - 2	14500	<10.3	**1140**	**186**	**6.3**	24.2	11.8	**196**	**64200**	**1330**	412	**15.3**	17.3	**16.8**	**9.2**	**62.8**	**1820**	**0.000019**	**0.0000033**	**0.00039**	<0.0000061
HSV-105	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	10200	**11.5**	**541**	100	**2.2**	13	8.5	**663**	**45200**	**657**	196	**0.2**	14.9	**16.8**	**6.2**	32	**891**	**0.0000038**	<0.0000016	**0.000068**	<0.0000022
HSV-113	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/4/2008	0 - 2	12800	**12.4**	**975**	129	**2.9**	17.7	9.5	**540**	**56400**	**455**	255	**2.3**	17.8	**14.1**	**5.3**	41.5	**1100**	**0.0000091**	**0.0000045**	**0.0002**	**0.000011**
HSV-114	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	0 - 2	9290	<7.4	**528**	117	**1.4**	14.4	5.5	**306**	**36400**	**755**	191	**4.7**	10	**11.9**	**5.6**	37.2	**677**	--	--	--	--
HSV-115	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	0 - 2	11300	<7	**10.4**	**295**	<0.58	19	15.4	**35.6**	19100	13.1	**905**	<0.12	**33.5**	<4.1	<1.1	34.3	78.6	<0.00000029	<0.00000017	<0.0000021	<0.0000002
CG-19	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	0 - 0.5	8540	1.7	**166**	106	**4.1**	10.1	20.7	**693**	**25500**	**167**	**1430**	**0.48**	14.2	**3.3**	**1.4**	32.6	**1330**	--	--	--	--
CG-20	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	0 - 0.5	12100	**2.1**	**206**	76.3	**7.3**	7.7	7.2	**2260**	**29100**	**291**	180	**0.49**	7.7	**3.8**	**1.6**	21.6	**2240**	--	--	--	--
CG-21	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	0 - 0.5	8460	1.8	**169**	101	**2.8**	10.5	15.8	**500**	**23200**	**237**	551	**0.5**	12.1	**3**	**2.2**	28.8	**946**	--	--	--	--
CG-21	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	9/12/2008	0 - 0.5	--	--	**182**	--	--	--	--	**364**	--	**190**	--	--	--	--	--	--	**678**	--	--	--	--
CG-23	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	4/28/2009	0 - 0.5	9920	**2.5**	**135**	46.7	**3.6**	13.7	25.7	**328**	**28700**	**123**	**1690**	**0.73**	19.1	0.69	0.85	37.2	**1840**	--	--	--	--
CHD-BIOSED01	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/7/2014	0 - 0.5	15400	<0.3	**531**	**200**	**5.1**	19.5	**54.9**	**654**	**88600**	**182**	**16500**	**1.2**	**23.1**	**5.9**	<0.0059	50.7	**2510**	--	--	--	--
CHD-BIOSED02	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/7/2014	0 - 0.5	22800	**2.3**	**279**	**157**	**3.4**	26.6	15.3	**1330**	**60300**	**216**	**637**	**1.1**	18.6	**11.2**	**6.9**	**66.3**	**1190**	--	--	--	--
DAM-SED02	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	13800	<0.2	**205**	118	**1.9**	20.4	12.4	**599**	**34200**	**179**	456	**0.45**	15.1	**6.7**	<0.0039	55.5	**609**	--	--	--	--
DAM-SED02	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	1.5 - 2	16600	<0.2	**211**	**143**	**1.9**	22.9	12.2	**554**	**36700**	**222**	264	**0.85**	16.6	**5.2**	<0.0039	**59.4**	**794**	--	--	--	--
DAM-SED02	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	4 - 4.5	13600	**3.7**	**334**	104	**7.9**	22	19.5	**570**	**34400**	**387**	222	**2.2**	17	**7.7**	**3.9**	53.7	**1860**	--	--	--	--
DAM-SED03	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	19200	**2.7**	**298**	**183**	**3.9**	31.4	17.9	**2630**	**42300**	**223**	575	**0.58**	21.9	**6.7**	<0.0054	**79.4**	**991**	--	--	--	--
DAM-SED03	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	3 - 3.5	19200	**8.3**	**783**	**164**	**8.6**	31.2	16.9	**1220**	**61000**	**1350**	326	**11.5**	20.7	**19**	**10.7**	**66.5**	**2440**	--	--	--	--
DAM-SED04	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	1 - 1.5	21100	**2.3**	**297**	**194**	**2.7**	25.4	15.9	**803**	**41100**	**263**	**669**	**1.7**	18.1	**8.9**	**3.8**	**64.6**	**907**	--	--	--	--
DAM-SED05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	16100	**2.1**	**259**	120	**3.4**	18.9	16.1	**732**	**43200**	**267**	617	**1.3**	14.2	**7.1**	**3**	52.7	**1430**	--	--	--	--
DAM-SED05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	2.5 - 3	9840	0.95	**101**	73.9	**2**	18.6	11.5	**211**	**26800**	**43.7**	382	0.12	14.7	2	<0.0029	47.4	**897**	--	--	--	--
DAM-SED05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	3 - 3.5	18400	**7.9**	**718**	**176**	**4.1**	26.9	11.7	**932**	**52900**	**1540**	204	**7.6**	17.1	**23.5**	**8.9**	**68.8**	**1550**	--	--	--	--
DAM-SED05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	3.5 - 4	13400	**2.9**	**260**	**134**	**3.3**	27.2	14.6	**1240**	**35300**	**295**	202	**1.5**	20.3	**10.2**	**3.6**	54.2	**1420**	--	--	--	--
DAM-SED05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	4.5 - 5	13000	**4**	**287**	108	**4.6**	21.1	9.9	**986**	**33000**	**363**	153	**2.4**	14.6	**10.7**	**4.5**	47.4	**1770**	--	--	--	--
DAM-SED06	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	13400	1.9	**162**	72.6	**1.7**	21	14.2	**368**	**37600**	**133**	429	**0.39**	14.2	**3.9**	<0.0029	**62.9**	**533**	--	--	--	--
DAM-SED07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	13500	**2.9**	**303**	83.7	**4**	22.6	18.3	**669**	**39300**	**308**	547	**1.4**	17	**5.7**	**2.8**	**70.7**	**1410**	--	--	--	--
DAM-SED08	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	0 - 0.5	21700	**2.2**	**265**	**163**	**2.3**	30	16.9	**1030**	**50500**	**179**	584	**1.2**	21	**9.5**	**4.9**	**69.5**	**894**	--	--	--	--
DAM-SED08	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	1 - 1.5	10800	**2.2**	**203**	56	**2**	18.3	11.7	**176**	**29600**	**110**	415	0.15	14.7	2.3	<0.003	48.6	**682**	--	--	--	--
Humboldt Smelter/Agua Fria River																										
OW-20	Humboldt Smelter/Agua Fria River	Undeveloped	Downstream	8/26/2008	0 - 0.5	**110000**	<3.1	**163**	**203**	**12.7**	**1160**	28.1	**8030**	**29100**	**709**	**1010**	**0.77**	**877**	**7.1**	**11.2**	48.8	**4130**	--	--	--	--
OW-34	Humboldt Smelter/Agua Fria River	RYSR	Downstream	4/30/2009	0 - 0.5	10500	**6**	**14.3**	**378**	0.27	17.2	8.7	**105**	16400	30.3	**2020**	0.048	19.2	<3.4	0.2	31.8	113	--	--	--	--
OW-35	Humboldt Smelter/Agua Fria River	RYSR	Downstream	4/30/2009	0 - 0.5	12900	**6**	**16.7**	**206**	0.24	23	15.6	**94.3**	**23700**	22.3	**1340**	<0.097	**31.5**	1.2	<1	43.4	116	--	--	--	--
OW-36	Humboldt Smelter/Agua Fria River	RYSR	Downstream	4/30/2009	0 - 0.5	11700	**6**	**24.8**	**250**	0.77	25.7	14	**190**	**23000**	**41.8**	**2050**	<0.097	**32.3**	0.56	0.17	45.8	**129**	--	--	--	--
OW-37	Humboldt Smelter/Agua Fria River	RYSR	Downstream	4/30/2009	0 - 0.5	20300	**6**	**26.6**	**313**	**1.1**	40.1	16.5	**290**	**26300**	**51.2**	**1020**	0.091	**51**	1.3	0.29	49.2	**216**	--	--	--	--
OW-38	Humboldt Smelter/Agua Fria River	RYSR	Downstream	4/30/2009	0 - 0.5	11900	**6**	**17**	**262**	0.5	24.4	10.6	**137**	16700	26.2	**1160**	0.075	**37.3**	0.64	0.064	34.9	121	--	--	--	--
Agua Fria River																										
BKG-AF-1	Agua Fria River	RYSR	Upstream	8/26/2008	0 - 0.5	4390	<7.4	9.5	52.4	<0.61	5.6	5.3	12.7	11200	12.6	306	<0.12	6.8	<4.3	<0.58	19.6	32.7	--	--	--	--
BKG-AF-2	Agua Fria River	RYSR	Upstream	8/26/2008	0 - 0.5	7240	<10	**10.2**	95	<0.83	16.2	8.7	29.4	14800	11	231	<0.17	14	<5.8	<1	39.7	44.9	--	--	--	--
BKG-AF-3	Agua Fria River	Undeveloped	Upstream	8/25/2008	0 - 0.5	4270	<11.7	6.5	68.5	0.08	8.3	4.2	13.9	6990	4	203	<0.2	7.9	1	<2	16.2	21.5	--	--	--	--
BKG-AF-4	Agua Fria River	Undeveloped	Upstream	9/6/2008	0 - 0.5	3770	<7.3	7.1	38.6	<0.61	9.3	<5.4	13	9450	5.5	255	<0.12	6.5	<4.3	<0.5	19.4	24.3	--	--	--	--
BKG-AF-5	Agua Fria River	RYSR	Upstream	9/6/2008	0 - 0.5	9790	<6.1	**41.3**	**322**	<0.51	24.2	19.7	**45.8**	**24400**	13.6	**1370**	<0.013	**31.8**	<3.6	<0.98	48.8	59.6	--	--	--	--
BKG-AF-6	Agua Fria River	RYSR	Upstream	9/6/2008	0 - 0.5	11600	<6.2	**40.8**	**202**	<0.51	21.8	15.7	**37.2**	**24200**	9.6	**775**	<0.1	**34.5**	<3.6	<0.95	45.4	63.2	--	--	--	--
BKG-AF-7	Agua Fria River	RSAR-H	Upstream	9/6/2008	0 - 0.5	9980	<6.1	**39.6**	**197**	<0.51	27.5	18.7	**33.7**	**23700**	10.4	**718**	<0.1	**33.1**	<3.6	<0.79	44.7	54.7	--	--	--	--
BKG-AF-8	Agua Fria River	Undeveloped	Upstream	9/6/2008	0 - 0.5	3860	<9	4.2	45	<0.75	10.4	<5.1	16.2	9640	6.3	143	<0.15	6.8	0.64	<0.64	21	30.5	--	--	--	--
BKG-AF-9	Agua Fria River	Undeveloped	Upstream	9/6/2008	0 - 0.5	8240	<9.8	**11.9**	99.4	<0.82	16.5	10.5	**32.8**	18700	16.1	518	<0.028	13.3	<5.7	<0.92	40	58.2	--	--	--	--
BKG-AF-10	Agua Fria River	Undeveloped	Upstream	9/6/2008	0 - 0.5	6990	<8.1	**10.4**	75.3	<0.67	14.7	8.8	24.6	16200	9.8	398	<0.13	11.5	0.36	<0.75	35.6	42.1	--	--	--	--
AF-2	Agua Fria River	RYSR	Downstream	8/24/2008	0 - 0.5	3480	<7.5	7.2	35.4	<0.05	6.7	<5	12.9	8830	3.9	233	<0.12	7.1	<4.4	0.13	16.3	21.9	--	--	--	--
AF-3	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	8340	<9.7	**12.3**	104	0.25	14.3	9.4	30.8	15900	11.1	389	<0.16	14.5	<1	<1.6	39.1	51.1	--	--	--	--
AF-4	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	10300	<8.7	**16.9**	129	0.29	16	11.4	**34.4**	17900	13.6	556	<0.14	17	<5.1	<1.4	35.7	65.2	--	--	--	--
AF-5	Agua Fria River	Undeveloped	Downstream	8/26/2008	0 - 0.5	**35100**	<7.3	**30.9**	**135**	**1.2**	**109**	10	**1140**	**22300**	**137**	566	<0.12	**79.6**	1.9	**3.2**	**85.2**	**796**	--	--	--	--
AF-6	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	6900	<8.3	9.3	104	0.2	11	7.5	26	11300	8.5	356	<0.14	11.7	0.72	<1.4	27.2	43.2	--	--	--	--
AF-8	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	15300	<7.9	**22.3**	**207**	0.39	24.1	15.5	**53.9**	**25600**	18.2	629	<0.13	**25.6**	1.9	<1.3	**61.9**	84	--	--	--	--
AF-9	Agua Fria River	Undeveloped	Downstream	5/3/2009	0 - 0.5	15400	**3.1**	**21.4**	128	<0.84	34.5	15	**49.2**	**32300**	16.3	**645**	<0.17	**28.6**	1.5	<1.7	**63.9**	74.8	--	--	--	--
AF-10	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	11600	<9.3	**13.6**	**146**	<0.78	18.2	11.1	**33**	19400	14	525	<0.16	18.4	0.87	<1.2	40.9	68.4	--	--	--	--
AF-11	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	3990	<7.6	8	29.5	0.4	6.7	5.8	**31.8**	10700	6.3	227	<0.13	7.6	<4.5	<1.3	20.3	101	--	--	--	--
AF-12	Agua Fria River	Undeveloped	Downstream	8/24/2008	0 - 0.5	13400	1.8	**206**	**174**	**3.4**	16.7	16	**423**	**29200**	**361**	**635**	**1.2**	18.6	<3.8	**2.1**	48.5	**1060**	--	--	--	--
AF-13	Agua Fria River	Undeveloped	Downstream	4/28/2009	0 - 0.5	16400	1.1	**26.9**	**137**	<0.83	29.4	15.2	**94.1**	**30700**	29	494	<0.18	**23.8**	<5.8	0.14	**66.2**	**171**	--	--	--	--
AF-14	Agua Fria River	Undeveloped	Downstream	8/15/2008	0 - 0.5	14100	<1.4	**50.1**	**137**	**3.9**	22.1	15.8	**236**	**26400**	**53.3**	598	**0.39**	20.4	<0.7	0.36	51.2	**959**	--	--	--	--
AF-15	Agua Fria River	RYSR	Downstream	8/25/2008	0 - 0.5	4320	<7.3	**15.7**	41.6	0.34	9	8.5	30.4	10800	20.6	237	0.11	8.5	<4.3	<1.2	22	118	--	--	--	--
AF-16	Agua Fria River	RYSR	Downstream	4/28/2009	0 - 0.5	6570	0.52	**26.1**	55.8	<0.55	10.5	8.5	**44.1**	16400	12.6	383	<0.11	10.3	<3.8	<1.1	29.9	**141**	--	--	--	--
AF-17	Agua Fria River	Undeveloped	Downstream	5/3/2009	0 - 0.5	7030	0.58	**13.4**	64.9	<0.65	14	7.8	**40**	14600	10.3	401	<0.13	12.2	<4.5	<1.3	27.1	**142**	--	--	--	--
AF-18	Agua Fria River	Undeveloped	Downstream	5/3/2009	0 - 0.5	7060	0.54	**12.7**	41.7	<0.61	13.2	8.7	**36.9**	17500	7.7	342	<0.12	11.7	<4.3	<1.2	35	88.3	--	--	--	--
AG-BIOSED01	Agua Fria River	RYSR	Downstream	5/6/2014	0 - 0.5	24800	<0.48	**20.6**	**238**	0.27	**43.7**	13.5	**44.6**	**31100**	14.1	535	0.035	**26**	1.5	<0.0092	**73.6**	89	**0.0000129**	<0.0000025	**0.000148**	**0.00000509**
AG-BIOSED02	Agua Fria River	Undeveloped	Downstream	5/6/2014	0 - 0.5	6300	**2.7**	**17.9**	54.4	0.058	9.4	9.4	16.5	16800	5.3	350	<0.006	7.6	0.27	<0.0031	32.8	30.3	<0.00000242	<0.00000242	**0.00000937**	<0.00000484
AG-BIOSED03	Agua Fria River	Undeveloped	Downstream	5/6/2014	0 - 0.5	6140	<0.16	**13.5**	38.4	0.045	10.9	5.4	22	15400	3.1	256	<0.006	7.2	0.17	<0.0031	29.5	27.4	<0.00000248	<0.00000248	<0.00000495	<0.00000495
AG-BIOSED04	Agua Fria River	Undeveloped	Downstream	5/6/2014	0 - 0.5	8210	<0.16	**127**	67.6	0.11	11.2	8.4	27.1	**22400**	6.7	290	0.013	10.8	0.3	<0.003	51.7	50.5	<0.00000239	<0.00000239	<0.00000479	<0.00000479
AG-BIOSED05	Agua Fria River	Undeveloped	Downstream	5/7/2014	0 - 0.5	6030	<0.17	**14**	35.5	0.052	9.3	5.1	12.4	14200	3.1	226	0.0066	8.1	0.25	<0.0033	27.9	30.6	<0.00000248	<0.00000248	<0.00000496	<0.00000496
AG-BIOSED06	Agua Fria River	RYSR	Downstream	5/7/2014	0 - 0.5	9310	<0.15	**14.6**	45.1	0.066	12.5	7.9	20.7	**23100**	3.7	374	<0.0056	10.4	0.26	<0.0029	44.1	44.4	--	--	--	--
AG-BIOSED07	Agua Fria River	Undeveloped	Downstream	5/7/2014	0 - 0.5	12100	**3.3**	**49.7**	84.7	0.14	33.6	15.1	29	**30100**	7.2	**646**	<0.0069	22.6	0.23	<0.0036	**71.2**	54.4	--	--	--	--
AG-BIOSED08	Agua Fria River	Undeveloped	Downstream	5/7/2014	0 - 0.5	7920	<0.17	**11.7**	40.9	0.042	11.9	7.3	20.4	**20500**	<0.0093	501	<0.0063	11.8	0.18	<0.0033	34.3	36.2	--	--	--	--
AG-BIOSED09	Agua Fria River	Undeveloped	Downstream	5/8/2014	0 - 0.5	7510	<0.19	**14.3**	41.3	0.091	13.8	8.4	20.8	19400	5.9	279	<0.0071	11	0.2	<0.0037	44.9	43.5	--	--	--	--
AG-BIOSED10	Agua Fria River	Undeveloped	Downstream	5/8/2014	0 - 0.5	9960	<0.16	**17.2**	110	0.33	23.3	12	**74.3**	**29600**	6.9	**3020**	0.0065	**27.2**	0.35	<0.003	49.4	**143**	--	--	--	--

TABLE 7-16

Summary of Sediment Analytical Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Depth (ft bgs)	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	1,2,3,4,6,7,8-Hepta CDD	1,2,3,4,6,7,8-Hepta CDF	OCDD	OCDF
Screening Levels						***25500***	***2***	***9.79***	***130***	***0.99***	***43.4***	***50***	***31.6***	***20000***	***35.8***	***630***	***0.18***	***22.7***	***2.5***	***1***	***57***	***121***	***0.00000085***	***0.00000085***	***0.00000085***	***0.00000085***
AG-BIOSED11	Agua Fria River	Undeveloped	Downstream	5/8/2014	0 - 0.5	6810	<0.17	**23.1**	41.1	0.11	14.9	7.8	26	**23300**	12.5	401	0.01	11.3	0.42	<0.0033	**57.2**	70	--	--	--	--
HS-39	Agua Fria River	Undeveloped	Downstream	1/28/2004	0 - 1	5840	<14.7	**12**	46.4	<1.2	14.7	8.3	18.9	17500	4.8	323	<0.12	10.2	<8.6	<2.4	36.6	30.9	--	--	--	--
HS-41	Agua Fria River	RYSR	Downstream	1/28/2004	0 - 1	8090	<17.1	**12.8**	90.6	<1.4	15.5	11	23.5	**22100**	9.5	566	<0.14	14.8	<10	<2.8	56.7	45.4	--	--	--	--
IK-D20	Agua Fria River	Undeveloped	Downstream	4/12/2002	0 - 0.5	--	<0.9	9	98.6	<0.12	11.2	--	24.1	13800	6.3	**662**	<0.06	--	<0.52	<0.26	--	79.2	--	--	--	--
IK-D3	Agua Fria River	Undeveloped	Downstream	4/12/2002	0 - 0.25	--	1.3	**13.7**	45.2	<0.11	11.9	--	19.7	16700	**38.3**	253	<0.06	--	<0.49	**27.1**	--	42.4	--	--	--	--
OW-19	Agua Fria River	RYSR	Downstream	8/26/2008	0 - 0.5	10500	<6.6	**52**	**276**	<0.55	35.5	15.6	**41.1**	**26000**	13.2	**2030**	0.033	**34.4**	<3.8	<1.1	56.3	48.7	--	--	--	--

Notes:

1. All units are mg/kg = milligrams per kilogram

2. Concentrations exceeding screening levels are **BOLD.**

3. The screening levels are used solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

4. Screening levels are described in Table 6-3.

5. Samples grouped as "Humboldt Smelter/Agua Fria River" are samples that are not within a Humboldt Smelter exposure area, but were collected in the following areas: (1) along the surface water drainage pathway from NR11 to the Agua Fria River or (2) adjacent to the Agua Fria River and slag piles near the eastern boundary of NR11.

6. "Upstream" sample locations were identified as locations collected upstream of the former Iron King Mine property boundary in Chaparral Gulch and Galena Gulch or upstream of the drainage ditch emanating from the former Humboldt Smelter property in the Agua Fria River. However, there was a waste rock pile that was identified during the ERT Data Gap Investigation (Lockheed Martin SERAS, 2015) that is located west of the former Mineworks area in the area of the upstream Galena Gulch locations.

< = Analyte was not detected at the specified detection limit.

ft bgs = feet below ground surface

MTP = Main Tailings Pile

NAI = North American Industries

RSAR = Residential Screening Area Risk

RYSR = Residential Yard-Specific Risk

TABLE 7-17

Summary of Surface Water Analytical Results (Total)

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Alkalinity (As Caco3)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
Screening Levels					***20***	***0.087***	***0.03***	***0.15***	***0.004***	***0.00066***	***0.00028***	***0.086***	***0.023***	***0.0094***	***0.0052***	***1***	***0.0032***	***0.12***	***0.000012***	***0.052***	***0.002***	***0.00038***	***--***	***0.15***	***0.02***	***0.122***
Iron King Mine																										
IP-1	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	--	**939**	**0.212**	**180**	<0.0013	**0.0139**	**2.83**	**0.553**	**1.19**	**33.4**	<0.01	**6000**	**0.152**	**41.5**	**0.0016**	**0.879**	**0.718**	**0.251**	27000	**0.335**	**0.619**	**1490**
IP-2	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	--	**969**	**0.21**	**187**	<0.05	**0.0142**	**2.88**	**0.572**	**1.22**	**34.8**	<0.01	**4450**	**0.135**	**42.4**	**0.00062**	**0.899**	**0.746**	**0.262**	--	**0.35**	**0.632**	**1610**
IP-3	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	--	**186**	<0.0035	0.143	<0.008	**0.005**	**1.74**	0.0167	**0.797**	**10.1**	<0.01	**15.6**	**0.949**	**50.6**	**0.00036**	**0.501**	**0.346**	**0.0066**	9900	<0.0014	0.0016	**652**
IP-4	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	--	**176**	<0.0014	0.044	<0.0075	**0.0048**	**1.77**	0.018	**0.8**	**9.54**	<0.01	**13.2**	**0.836**	**48.4**	<0.0002	**0.506**	**0.341**	**0.0054**	--	<0.0014	0.003	**649**
IP-6	Iron King Mine	NR17 Main Tailings Pile	Downstream	8/16/2008	--	**165**	0.0155	**8.98**	**0.0187**	**0.004**	**0.652**	0.0438	**0.163**	**2.54**	<0.01	**261**	**0.377**	**13.8**	**0.0034**	**0.101**	**0.0535**	**0.0018**	--	<0.001	0.0131	**187**
IP-7	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/2/2008	--	**355**	0.0113	**15.7**	<0.0038	**0.0114**	**1.27**	**0.161**	**0.655**	**10.1**	<0.01	**455**	**0.103**	**32**	**0.0011**	**0.424**	**0.0865**	**0.0401**	16000	0.0357	**0.0233**	**461**
IP-9	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	--	**671**	**0.556**	**191**	**0.036**	**0.025**	**2.76**	**0.501**	**1.32**	**47.2**	<0.01	**13000**	**0.815**	**28.3**	**0.0179**	**0.57**	**0.486**	**0.476**	--	**0.648**	**2.17**	**1510**
SW-1	Iron King Mine	NR17 Main Tailings Pile	Downstream	3/20/2008	--	--	--	**198**	--	--	--	--	--	--	--	--	**1.54**	--	--	--	--	--	--	--	--	--
IP-10	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	--	**0.2**	0.0046	0.0508	**0.024**	<0.002	**0.0108**	0.0009	0.0024	**0.0209**	**0.183**	0.672	**0.0286**	**1.23**	<0.0002	0.024	**0.0175**	<0.00013	--	<0.00024	<0.0013	**1.66**
IP-11	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/5/2008	--	**0.279**	0.0048	0.047	**0.0262**	<0.001	**0.0147**	<0.002	0.0032	**0.0176**	**0.0415**	0.754	**0.0269**	**1.57**	**0.00011**	0.0301	**0.0153**	<0.001	1100	<0.001	0.00087	**2.5**
IP-12	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	--	**0.235**	0.005	0.0555	**0.0249**	<0.002	**0.0108**	<0.0016	0.0023	**0.0178**	**0.033**	0.837	**0.0394**	**1.19**	**0.000093**	0.0238	**0.0151**	**0.00074**	--	<0.00032	<0.0018	**1.61**
SW-2	Iron King Mine	NR18 North American Industries Operations Area	Downstream	3/20/2008	--	--	--	0.0654	--	--	--	--	--	--	--	--	**0.0493**	--	--	--	--	--	--	--	--	--
Galena Gulch																										
GG-4	Galena Gulch	NR16 Former Mineworks Area	Downstream	8/16/2008	--	**126**	<0.002	0.0133	**1.79**	**0.0053**	**0.0027**	0.0474	**0.0833**	**0.148**	<0.01	**218**	**0.129**	**5.37**	**0.0006**	**0.0526**	**0.005**	<0.00091	--	<0.00069	**0.174**	**0.554**
OW-14	Galena Gulch	NR14 South of Former Iron King Mine Property	Downstream	8/16/2008	--	**14.5**	0.0148	**0.505**	**0.182**	**0.0016**	**0.117**	0.0106	**0.101**	**0.59**	**0.0055**	**35.1**	**1.74**	**7.38**	**0.0043**	**0.0576**	**0.0191**	**0.008**	--	<0.001	**0.0238**	**26.5**
GG-14	Galena Gulch	Undeveloped	Downstream	8/16/2008	--	**139**	<0.002	**0.157**	**1.31**	**0.004**	**0.0175**	0.0656	**0.101**	**0.712**	<0.0016	**259**	**1.31**	**5.6**	**0.0043**	**0.064**	<0.01	**0.008**	--	<0.00073	**0.236**	**3.93**
Chaparral Gulch																										
OW-11	Chaparral Gulch	NR17 Main Tailings Pile	Downstream	8/16/2008	--	**73.9**	0.0041	**0.443**	**0.554**	**0.0015**	**0.0105**	0.0373	**0.0566**	**0.22**	<0.01	**131**	**1.43**	**2.95**	**0.0053**	0.0437	<0.0048	**0.0067**	--	<0.00051	**0.118**	**3.01**
CG-5	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/16/2008	--	**280**	<0.002	0.107	**2.84**	**0.0117**	**0.0051**	**0.0933**	**0.129**	**0.26**	<0.01	**385**	**0.289**	**11**	**0.0016**	**0.127**	**0.005**	**0.0018**	--	0.0013	**0.193**	**1.09**
CG-7	Chaparral Gulch	NR19 Former Glory Hole and North of Main Tailings Pile	Downstream	8/16/2008	--	**281**	<0.002	**0.168**	**3.29**	**0.0146**	**0.0081**	**0.103**	**0.152**	**0.304**	<0.01	**376**	**0.562**	**13.6**	**0.0025**	**0.16**	**0.005**	**0.0033**	--	0.0014	**0.192**	**1.79**
CG-24	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	5/3/2009	--	0.0552	<0.002	0.0077	**0.0329**	<0.001	**0.00081**	0.00028	0.0036	0.0021	**0.0129**	<0.1	**0.0044**	0.0247	<0.0002	0.0031	**0.0023**	<0.001	--	<0.001	0.0022	**0.371**
CG-9	Chaparral Gulch	Undeveloped	Downstream	8/16/2008	--	**206**	0.0037	**2.13**	**3.01**	**0.0085**	**0.0852**	0.062	**0.126**	**0.593**	**0.0055**	**382**	**10.2**	**10.4**	**0.0801**	**0.103**	**0.0297**	**0.0379**	--	0.0023	**0.206**	**26.7**
SWD-01	Chaparral Gulch	Undeveloped	Downstream	7/30/2014	--	**91.5**	0.00052	**0.65**	**0.957**	**0.0049**	**0.0043**	**0.212**	**0.0343**	**0.124**	--	**52.1**	**1.51**	**12.4**	**0.0068**	0.0425	**0.008**	**0.0028**	--	0.00083	**0.347**	**0.757**
CG-10	Chaparral Gulch	NR3 Upper Chaparral Gulch	Downstream	8/16/2008	--	**414**	<0.002	**0.405**	**3.7**	**0.0152**	**0.0398**	**0.097**	**0.145**	**0.392**	<0.0034	**594**	**3.63**	**15.4**	**0.0175**	**0.14**	**0.006**	**0.0144**	--	0.0017	**0.205**	**9.91**
CG-12	Chaparral Gulch	RYSR	Downstream	8/16/2008	--	**31.5**	<0.002	0.0854	**0.324**	**0.0012**	**0.0022**	0.0281	0.0183	**0.126**	<0.01	**38.8**	**0.351**	**0.94**	**0.0015**	0.0443	<0.0019	**0.002**	--	<0.00019	**0.0576**	**0.636**
CG-1	Chaparral Gulch	NR4 JT Septic Facility	Downstream	8/16/2008	--	**57.2**	0.004	**0.375**	**0.424**	**0.0012**	**0.0068**	0.0324	**0.0415**	**0.175**	<0.01	**103**	**1.11**	**2.06**	**0.005**	0.0367	**0.0051**	**0.0059**	--	<0.00026	**0.0936**	**2.48**
CG-11	Chaparral Gulch	NR5 Main Tailings Pile 1964 Blow Out Path	Downstream	8/16/2008	--	**133**	0.0084	**1.11**	**1.1**	**0.0025**	**0.0242**	0.0633	**0.121**	**0.523**	<0.01	**275**	**4.71**	**5.52**	**0.0203**	**0.0788**	**0.0135**	**0.0229**	--	0.0011	**0.198**	**8.98**
SWD-09	Chaparral Gulch	NR5 Main Tailings Pile 1964 Blow Out Path	Downstream	8/15/2014	--	**7.01**	0.004	**0.162**	**0.118**	0.00017	**0.0014**	0.0078	0.0065	**0.0435**	--	**9.87**	**0.233**	**1.21**	**0.0014**	0.0076	**0.008**	**0.0012**	--	<0.0000089	0.0191	**0.351**
SWD-02	Chaparral Gulch	NR6 Middle Chaparral Gulch	Downstream	8/15/2014	--	**38.4**	0.0012	**0.271**	**0.37**	**0.0014**	**0.0036**	0.0628	0.0173	**0.071**	--	**37.9**	**0.618**	**1.65**	**0.0038**	0.0255	**0.0051**	**0.0019**	--	0.0004	**0.132**	**1.71**
CG-14	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	--	**60.1**	<0.002	**0.308**	**0.006**	**0.0051**	**0.318**	0.0319	**0.416**	**14.7**	<0.01	**495**	0.0028	**28.9**	**0.0012**	**0.216**	**0.015**	**0.00077**	--	<0.001	**0.0292**	**168**
CG-16	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	--	**2.13**	<0.002	0.0464	**0.035**	0.00032	**0.026**	<0.002	**0.0626**	**0.726**	<0.01	**26.4**	0.0022	**6.43**	**0.00015**	0.0274	**0.0024**	<0.001	1100	<0.001	0.0019	**10.6**
CG-17	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	--	**0.907**	<0.002	0.0086	**0.167**	<0.0002	**0.0419**	<0.0012	**0.0566**	**1.51**	0.002	0.474	0.0018	**4.15**	**0.00019**	**0.0592**	**0.0148**	<0.001	--	<0.001	0.0022	**8.06**
CG-18	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	--	**2.73**	<0.002	0.0858	**0.0666**	<0.00038	**0.0499**	0.0065	**0.111**	**0.925**	<0.01	**16.7**	**0.014**	**8.62**	**0.00033**	0.0472	**0.0065**	<0.001	--	<0.001	0.0034	**16.3**
CG-22	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	--	**7.53**	0.0036	0.115	**0.0888**	0.00014	**0.0097**	0.0054	**0.0959**	**0.324**	0.0034	**22.5**	**0.125**	**21.4**	**0.00061**	0.0442	**0.0066**	**0.002**	2100	0.00062	0.0108	**1.85**
CG-25	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	--	**5.78**	<0.00078	0.0366	**0.0246**	**0.00081**	**0.0371**	0.00079	**0.0567**	**1.5**	0.001	**19.1**	0.0022	**4.95**	**0.00011**	0.0328	<0.0046	0.000059	1100	0.00014	0.00036	**13**
DAM-SW01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	**280**	**0.266**	<0.00035	0.0153	**0.0475**	<0.00009	**0.00066**	<0.000017	0.0068	**0.0322**	--	**2.32**	**0.0056**	**4.77**	<0.000091	0.0095	<0.00025	<0.0000026	2000	<0.0000089	<0.00047	0.099
DAM-SW02	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	**320**	**1.11**	<0.00035	**0.71**	**0.0391**	<0.00009	**0.0018**	<0.000017	0.0206	**0.0995**	--	**39.7**	**0.0566**	**4.75**	**0.00029**	0.0104	<0.00025	<0.0000026	1300	<0.0000089	0.0027	**1.15**
DE-1	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2008	--	**2.28**	<0.002	0.0638	**0.0754**	<0.00054	**0.0682**	<0.0017	**0.142**	**1.24**	0.0015	**16.4**	**0.0067**	**9.75**	**0.00021**	**0.0596**	**0.0063**	<0.001	--	<0.001	0.0021	**22.2**
DE-2	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/25/2008	--	**1.75**	<0.00067	0.0199	**0.0364**	<0.00033	**0.0446**	0.0023	**0.0973**	**0.773**	<0.01	**15**	0.0017	**8.67**	<0.0002	**0.0524**	<0.0015	<0.00012	1200	<0.001	<0.00065	**15.7**
HS-38	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	1/28/2004	--	**0.229**	<0.06	**0.214**	**0.0216**	<0.005	<0.005	0.0022	**0.0256**	0.0061	0.0022	**46**	<0.01	**5.64**	<0.0002	0.0035	<0.035	<0.01	1100	0.0114	<0.05	**0.496**
SWD-03	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	7/30/2014	--	**474**	--	**1.3**	**0.157**	**0.0167**	**0.0242**	**0.64**	**0.191**	**25**	--	**87.3**	**0.217**	**49.2**	**0.0368**	**0.0993**	**0.0393**	**0.0072**	--	0.0032	**0.889**	**3.32**
SWD-03	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	10/2/2014	--	**891**	**0.247**	**40.1**	<0.0028	**0.0157**	**0.186**	**0.232**	**11.8**	**402**	--	**6650**	<0.015	**15.1**	**0.00068**	**1.59**	**2.24**	--	--	--	**0.249**	**49.6**
SWD-04	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	7/30/2014	--	**65.2**	0.0028	**0.771**	**0.186**	**0.0114**	**0.244**	0.0731	**0.641**	**42.5**	--	**44.8**	**0.666**	**93**	**0.0071**	**0.289**	**0.0583**	**0.0065**	--	0.0043	**0.179**	**204**
SWD-04	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/15/2014	--	**253**	0.0016	**2.72**	**0.0264**	**0.0216**	**0.296**	**0.25**	**0.992**	**89.6**	--	**87.1**	**0.255**	**205**	**0.0075**	**0.402**	**0.13**	**0.0108**	--	0.0014	**0.606**	**396**
CG-19	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	--	**2.64**	<0.0019	0.105	**0.0502**	<0.00019	**0.0249**	0.004	**0.0696**	**0.421**	<0.01	**15**	**0.058**	**7.74**	**0.00033**	0.0408	<0.0026	<0.00086	1000	<0.001	0.0057	**8.97**
CG-20	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	--	**0.426**	<0.0004	0.0498	**0.0298**	<0.001	**0.0161**	<0.0018	**0.0547**	**0.138**	<0.01	**6.43**	**0.005**	**9.19**	<0.0002	0.0345	<0.0017	<0.00013	--	<0.001	<0.00065	**5.58**
CG-21	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	--	**0.297**	<0.00039	0.0244	**0.0314**	<0.001	**0.0154**	<0.0018	**0.0572**	**0.164**	<0.01	**2.56**	**0.0035**	**10.2**	<0.0002	0.0348	<0.0019	<0.000074	--	<0.001	<0.00048	**4.15**
CG-23	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	4/28/2009	--	**0.682**	0.002	0.0436	**0.025**	0.00013	**0.0112**	0.00031	**0.0243**	**0.172**	0.0013	**5.93**	**0.0045**	**3.57**	<0.0002	0.0169	<0.0022	0.00002	--	0.000075	0.00027	**3.58**
CHD-BIOSW01	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/7/2014	--	**1.66**	<0.00035	0.133	**0.0509**	<0.00009	**0.00052**	<0.000017	0.0069	**0.082**	--	**20.2**	**0.0263**	**4.61**	**0.000098**	0.0078	<0.00025	<0.0000026	--	<0.0000089	0.004	**0.272**
DAM-SW03	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	**520**	**27.5**	<0.0018	**16**	**1.01**	**0.0013**	**0.0248**	0.0374	**0.0764**	**2.3**	--	**2230**	**0.912**	**33**	**0.0053**	0.0362	**0.029**	**0.0072**	1400	<0.000045	**0.116**	**19**
DAM-SW04	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	**330**	**3.52**	<0.00035	**0.162**	**0.0561**	0.00012	**0.00053**	0.004	0.0078	**0.117**	--	**19.3**	**0.0452**	**5.49**	**0.00019**	0.008	<0.00025	<0.0000026	1400	<0.0000089	0.0086	**0.269**
SWD-05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	7/30/2014	**240**	**121**	--	**1.76**	**0.824**	**0.008**	**0.0222**	**0.312**	**0.0928**	**3.89**	--	**115**	**1.29**	**31.6**	**0.0255**	**0.0752**	**0.0145**	**0.0079**	940	0.0025	**0.604**	**4.16**
SWD-05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/4/2014	--	**87.3**	--	**0.542**	**1.19**	**0.0067**	**0.0119**	**0.183**	**0.0701**	**0.595**	--	**58.5**	**0.675**	**19.9**	**0.0096**	**0.0593**	**0.0087**	**0.0038**	--	0.0024	**0.309**	**1.86**
SWD-05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/15/2014	<5	**339**	0.0032	**5.04**	**0.144**	**0.0098**	**0.0716**	**0.3**	**0.329**	**124**	--	**1050**	**0.356**	**21.1**	**0.0059**	**0.102**	**0.166**	**0.0291**	2700	0.0021	**0.627**	**53.8**
SWD-07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	7/30/2014	--	**99.9**	0.00042	**1.58**	**0.994**	**0.007**	**0.0166**	**0.228**	**0.0967**	**0.907**	--	**112**	**1.15**	**27.8**	**0.0176**	**0.0663**	**0.0119**	**0.007**	--	0.0022	**0.516**	**3.67**
SWD-07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/4/2014	**120**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	350	--	--	--
SWD-07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/15/2014	--	**204**	0.0013	**1.89**	**0.396**	**0.011**	**0.0488**	**0.276**	**0.151**	**21**	--	**104**	**0.845**	**24.5**	**0.0069**	**0.0927**	**0.043**	**0.0204**	--	0.0021	**0.609**	**30.7**
DAM-SW06	Chaparral Gulch	Undeveloped	Downstream	5/6/2014	**190**	0.0306	<0.00035	0.0045	**0.0862**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0067	<0.000091	0.0026	<0.00025	<0.0000026	53	<0.0000089	0.0052	0.0028
Agua Fria River																										
BKG-AF-1	Agua Fria River	RYSR	Upstream	8/26/2008	--	0.0858	<0.00028	0.0042	**0.113**	<0.001	<0.00004	0.0016	<0.00074	<0.002	<0.01	0.103	<0.00015	0.0491	<0.000026	0.0041	<0.0018	<0.000056	54	<0.001	0.0062	0.0075
BKG-AF-2	Agua Fria River	RYSR	Upstream	8/26/2008	--	**1.65**	<0.00036	0.0057	**0.104**	<0.001	<0.000095	0.0031	0.0019	0.0068	<0.01	**1.57**	0.0011	0.0667	<0.000033	0.0053	<0.0011	<0.001	46	<0.001	0.012	0.0195
BKG-AF-3	Agua Fria River	BKG	Upstream	8/25/2008	--	**0.238**	<0.00033	0.0051	**0.105**	<0.001	<0.000073	0.0037	0.0013	0.004	**0.0056**	0.192	<0.00027	0.0271	<0.0002	0.0156	<0.0012	<0.001	--	<0.001	0.0093	0.0134
BKG-AF-3	Agua Fria River	BKG	Upstream	8/26/2008	--	--	--	--	--	--	--	--	--	--	--	0.066	--	--	--	--	--	--	52	--	--	--
BKG-AF-4	Agua Fria River	Undeveloped	Upstream	9/6/2008	--	0.0365	<0.002	0.0036	**0.111**	<0.001	<0.001	0.0016	0.00062	<0.0019	<0.01	0.111	0.000098	0.0223	<0.0002	0.0038	<0.005	<0.001	--	<0.001	0.0053	0.0038

TABLE 7-17

Summary of Surface Water Analytical Results (Total)

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Alkalinity (As Caco3)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
Screening Levels					***20***	***0.087***	***0.03***	***0.15***	***0.004***	***0.00066***	***0.00028***	***0.086***	***0.023***	***0.0094***	***0.0052***	***1***	***0.0032***	***0.12***	***0.000012***	***0.052***	***0.002***	***0.00038***	*--*	***0.15***	***0.02***	***0.122***
BKG-AF-8	Agua Fria River	Undeveloped	Upstream	9/6/2008	--	<0.222	<0.002	0.0027	**0.0883**	<0.001	<0.001	<0.002	0.00031	<0.0011	<0.01	0.111	<0.001	0.0398	<0.0002	0.0022	<0.005	<0.001	--	<0.001	0.0035	0.0028
BKG-AF-9	Agua Fria River	Undeveloped	Upstream	9/6/2008	--	**0.531**	<0.002	0.0172	**0.0769**	<0.001	<0.001	0.0032	0.00077	0.0048	0.0039	0.583	0.00077	0.0572	<0.0002	0.0025	<0.005	<0.001	--	<0.001	0.0141	0.0068
BKG-AF-10	Agua Fria River	Undeveloped	Upstream	9/6/2008	--	**0.175**	<0.002	0.0181	**0.0631**	<0.001	<0.001	0.003	0.00033	0.0022	<0.01	0.197	0.00016	0.0094	<0.0002	0.0019	<0.005	<0.001	--	<0.001	0.0167	0.002
AF-2	Agua Fria River	RYSR	Downstream	8/24/2008	--	**0.658**	<0.00025	0.0061	**0.11**	<0.001	<0.000068	0.0024	0.0014	0.0044	**0.0056**	0.686	<0.00056	0.0498	<0.0002	0.0048	<0.0014	<0.000064	--	<0.001	0.0107	0.0241
AF-3	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.297**	<0.00025	0.0062	**0.101**	<0.001	<0.000077	0.006	0.0016	0.0041	<0.01	0.252	<0.0003	0.0287	<0.0002	0.0152	<0.0013	<0.000083	--	<0.001	0.0113	0.0095
AF-4	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.188**	<0.00026	0.0064	**0.0937**	<0.001	<0.00007	0.0039	0.0016	0.0039	**0.0072**	0.168	<0.00016	0.0178	<0.0002	0.0195	<0.0014	<0.000085	--	<0.001	0.0114	0.0192
AF-5	Agua Fria River	Undeveloped	Downstream	8/26/2008	--	**0.259**	<0.00024	0.005	**0.116**	<0.001	<0.000041	0.0018	<0.00097	0.0029	<0.01	0.277	<0.00034	0.0502	<0.000022	0.0044	<0.0018	<0.001	54	<0.001	0.007	0.0065
AF-6	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.23**	<0.00023	0.0066	**0.0966**	<0.001	<0.000067	0.0028	0.0016	0.004	<0.01	0.192	<0.00019	0.0181	<0.0002	0.0171	<0.00099	<0.001	--	<0.001	0.0114	0.0118
AF-8	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.357**	<0.00026	0.0043	**0.11**	<0.001	<0.000031	0.0044	0.0012	0.0027	<0.01	0.366	<0.00028	0.0315	<0.0002	0.0207	<0.0012	<0.00005	--	<0.001	0.0067	0.0061
AF-9	Agua Fria River	Undeveloped	Downstream	5/3/2009	--	**0.61**	<0.00013	0.0055	**0.0848**	0.000039	0.0001	0.0022	0.0022	0.0049	**0.0077**	0.493	0.00062	0.0319	<0.0002	0.0053	0.0011	<0.001	--	<0.001	0.0131	0.0277
AF-10	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.865**	<0.00023	0.0047	**0.114**	<0.001	<0.000033	0.0026	0.0011	0.0036	<0.01	0.949	<0.00066	0.0456	<0.0002	0.0078	<0.0014	<0.001	--	<0.001	0.0072	0.0163
AF-11	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.505**	<0.0003	0.0069	**0.112**	<0.001	**0.0021**	0.0042	0.0047	**0.114**	<0.01	0.559	**0.006**	**0.242**	<0.0002	0.0182	<0.0017	<0.000083	96	<0.001	0.0062	**0.635**
AF-12	Agua Fria River	Undeveloped	Downstream	8/24/2008	--	**0.51**	<0.0002	0.0049	**0.11**	<0.001	**0.0025**	<0.0019	0.0052	**0.154**	<0.01	0.562	<0.001	**0.257**	<0.0002	0.006	<0.0013	<0.001	--	<0.001	0.005	**0.738**
AF-13	Agua Fria River	Undeveloped	Downstream	4/28/2009	--	**1.65**	<0.004	0.0053	**0.0829**	0.000049	0.00016	0.0021	0.002	0.0053	**0.0082**	**1.6**	0.00066	0.0436	<0.0002	0.0052	<0.0011	<0.002	--	<0.002	0.0137	0.0452
AF-14	Agua Fria River	Undeveloped	Downstream	8/15/2008	--	**3.04**	<0.002	0.0098	**0.122**	<0.0001	<0.001	0.0043	0.0025	**0.0137**	<0.01	**3.53**	**0.0044**	**0.18**	**0.00013**	0.0067	<0.005	<0.001	--	<0.001	0.0138	**0.215**
AF-15	Agua Fria River	RYSR	Downstream	8/25/2008	--	**12.1**	<0.00052	0.0124	**0.169**	<0.00032	<0.00043	0.0149	0.0057	**0.0277**	<0.01	**11.6**	**0.0088**	**0.295**	<0.0002	0.0235	<0.0009	<0.000078	62	<0.001	**0.0272**	0.106
AF-16	Agua Fria River	RYSR	Downstream	4/28/2009	--	**1.55**	0.002	0.0063	**0.0846**	0.000066	0.00013	0.0021	0.0021	0.0063	**0.0083**	**1.45**	0.00077	0.0414	<0.0002	0.0054	<0.0012	<0.001	--	0.0000088	0.0146	0.0433
AF-17	Agua Fria River	Undeveloped	Downstream	5/3/2009	--	**0.221**	<0.00047	0.0049	**0.0938**	<0.001	0.0001	0.00082	0.00076	0.0046	<0.01	0.22	0.00021	0.0512	**0.000072**	0.0038	<0.0015	<0.001	--	<0.001	0.0064	0.0148
AF-18	Agua Fria River	Undeveloped	Downstream	5/3/2009	--	**0.154**	<0.002	0.005	**0.287**	<0.001	0.000078	0.0011	0.0012	0.0053	0.0031	0.0702	0.00061	0.0519	<0.0002	0.0042	0.0015	<0.001	--	<0.001	0.0065	0.0378
AG-BIOSW01	Agua Fria River	RYSR	Downstream	5/6/2014	**230**	0.0557	<0.00035	0.004	**0.105**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0053	<0.000091	0.0028	<0.00025	<0.0000026	48	<0.0000089	0.0046	<0.00098
AG-BIOSW02	Agua Fria River	Undeveloped	Downstream	5/6/2014	--	0.0265	<0.00035	0.0047	**0.102**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0023	<0.000091	0.003	<0.00025	<0.0000026	--	<0.0000089	0.0061	<0.00098
AG-BIOSW03	Agua Fria River	Undeveloped	Downstream	5/6/2014	--	<0.00054	<0.00035	0.0046	**0.0974**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0011	<0.000091	0.003	<0.00025	<0.0000026	--	<0.0000089	0.0061	0.002
AG-BIOSW04	Agua Fria River	Undeveloped	Downstream	5/6/2014	--	0.0335	<0.00035	0.0046	**0.0932**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0017	<0.000091	0.0028	<0.00025	<0.0000026	--	<0.0000089	0.0058	0.00099
AG-BIOSW05	Agua Fria River	Undeveloped	Downstream	5/7/2014	--	0.0252	<0.00035	0.0038	**0.101**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0025	<0.000091	0.0027	<0.00025	<0.0000026	--	<0.0000089	0.0041	<0.00098
AG-BIOSW06	Agua Fria River	RYSR	Downstream	5/7/2014	<5	<0.00054	<0.00035	0.0043	**0.101**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.00065	<0.000091	0.0027	<0.00025	<0.0000026	53	<0.0000089	0.0039	<0.00098
AG-BIOSW07	Agua Fria River	Undeveloped	Downstream	5/7/2014	--	0.0212	<0.00035	0.0041	**0.103**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.00093	<0.000091	0.003	<0.00025	<0.0000026	--	<0.0000089	0.0045	<0.00098
AG-BIOSW08	Agua Fria River	Undeveloped	Downstream	5/7/2014	--	0.0377	<0.00035	0.0044	**0.099**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0027	<0.000091	0.0028	<0.00025	<0.0000026	--	<0.0000089	0.0049	0.0011
AG-BIOSW09	Agua Fria River	Undeveloped	Downstream	5/8/2014	--	<0.00054	<0.00035	0.0039	**0.0929**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0064	<0.000091	0.0026	<0.00025	<0.0000026	--	<0.0000089	0.0043	0.004
AG-BIOSW10	Agua Fria River	Undeveloped	Downstream	5/8/2014	--	0.0285	<0.00035	0.0039	**0.0933**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0101	<0.000091	0.0027	<0.00025	<0.0000026	--	<0.0000089	0.0039	0.0024
AG-BIOSW11	Agua Fria River	Undeveloped	Downstream	5/8/2014	**230**	<0.00054	<0.00035	0.0041	**0.0974**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0013	<0.000091	0.0028	<0.00025	<0.0000026	62	<0.0000089	0.0037	0.0015
DAM-SW05	Agua Fria River	Undeveloped	Downstream	5/6/2014	**200**	0.0277	<0.00035	0.0043	**0.0853**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	--	<0.00067	<0.000021	0.0016	<0.000091	0.0025	<0.00025	<0.0000026	50	<0.0000089	0.0054	0.0011
HS-39	Agua Fria River	Undeveloped	Downstream	1/28/2004	--	**0.952**	<0.06	0.0059	**0.116**	0.00005	<0.005	0.0021	<0.05	0.0032	0.0022	0.954	<0.01	0.0559	<0.0002	0.0032	<0.035	<0.01	60	<0.025	0.0059	0.0044
HS-41	Agua Fria River	RYSR	Downstream	1/28/2004	--	**0.244**	<0.06	0.0024	**0.105**	<0.005	<0.005	0.0011	<0.05	0.0016	0.0027	0.222	<0.01	0.0232	<0.0002	0.0016	<0.035	<0.01	58	<0.025	0.0048	0.0014
SWD-06	Agua Fria River	RYSR	Downstream	8/4/2014	**320**	**81.3**	--	0.0836	**2.24**	**0.0072**	**0.0013**	**0.191**	**0.0587**	**0.115**	--	**51.6**	**0.172**	**22.1**	**0.002**	**0.0671**	**0.0053**	**0.00065**	28	0.002	**0.374**	**0.276**
SWD-06	Agua Fria River	RYSR	Downstream	8/15/2014	**160**	**103**	--	0.144	**1.86**	**0.0083**	**0.0029**	**0.238**	**0.0675**	**0.267**	--	**60**	**0.28**	**10.6**	**0.00076**	**0.0844**	**0.0072**	**0.0014**	29	0.0015	**0.426**	**1.34**
SWD-08	Agua Fria River	Undeveloped	Downstream	8/4/2014	**340**	**80.2**	--	0.0378	**1.53**	**0.0068**	**0.0012**	**0.156**	**0.0347**	**0.0671**	--	**34.5**	**0.112**	**9.17**	**0.00047**	**0.0565**	**0.0046**	<0.0000026	15	0.0013	**0.249**	**0.148**
SWD-08	Agua Fria River	Undeveloped	Downstream	8/15/2014	**200**	**97.2**	--	0.0579	**1.22**	**0.0061**	**0.0011**	**0.23**	**0.0434**	**0.0997**	--	**57.4**	**0.12**	**6.5**	<0.000031	**0.0692**	**0.0059**	0.00027	39	0.0014	**0.356**	**0.633**

Notes:

1. All units are mg/L = milligrams per liter
2. Concentrations exceeding screening levels are **BOLD**
3. The screening levels are used solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.
4. Cadmium, chromium, copper, lead, nickel, silver, and zinc have hardness dependent criteria and assume a default hardness value of 100 mg/L as $CaCO_3$.
5. Water quality criteria are based on dissolved concentrations for arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The dissolved water quality criteria were conservatively applied to the total fraction for identifying potential COIs and evaluating the nature and extent evaluation.
6. Screening levels are described in Table 6-4.
7. "Upstream" sample locations were identified as locations collected upstream of the drainage ditch emanating from the former Humboldt Smelter property in the Agua Fria River.

TABLE 7-18

Summary of Surface Water Analytical Results (Dissolved)

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Screening Levels					0.087	0.03	0.15	0.004	0.00066	0.00025	0.074	0.023	0.009	1	0.0025	0.12	0.00001	0.052	0.002	0.00032	0.15	0.02	0.12
Iron King Mine																							
IP-1	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	**964**	**0.211**	**185**	<0.001	**0.0135**	**2.87**	**0.566**	**1.22**	**35**	**4310**	**0.13**	**43.4**	**0.00012**	**0.873**	**0.731**	**0.257**	**0.342**	**0.632**	**1450**
IP-2	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	**939**	**0.209**	**183**	<0.05	**0.0143**	**2.88**	**0.568**	**1.22**	**34**	**4220**	**0.13**	**42.4**	**0.0001**	**0.878**	**0.719**	**0.254**	**0.34**	**0.613**	**1640**
IP-3	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	**183**	<0.0013	0.035	<0.0076	**0.0048**	**1.79**	0.0169	**0.82**	**9.98**	**13.5**	**0.885**	**49.8**	<0.0002	**0.513**	**0.36**	**0.0057**	<0.0014	0.0013	**668**
IP-4	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	**175**	<0.0013	0.0306	<0.0076	**0.0048**	**1.74**	0.0168	**0.795**	**9.55**	**12.9**	**0.827**	**48.1**	<0.0002	**0.493**	**0.338**	**0.0058**	<0.0014	0.0015	**645**
IP-7	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/2/2008	**326**	0.0088	**13.7**	<0.0021	**0.0103**	**1.28**	**0.161**	**0.652**	**9.09**	**412**	**0.0195**	**30.2**	<0.0002	**0.415**	**0.0818**	**0.0358**	0.0332	0.016	**457**
IP-9	Iron King Mine	NR17 Main Tailings Pile	Downstream	9/4/2008	**636**	**0.563**	**205**	**0.0244**	**0.0228**	**2.75**	**0.493**	**1.31**	**44.8**	**11900**	**0.347**	**27**	**0.0012**	**0.576**	**0.445**	**0.448**	**0.627**	**2.06**	**1740**
IP-10	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	<0.2	0.005	0.0166	**0.022**	<0.002	**0.0098**	<0.00068	0.0087	**0.0116**	0.0147	0.0015	**1.01**	<0.0002	0.0242	**0.0179**	**0.00074**	<0.00029	<0.00077	**1.43**
IP-11	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/5/2008	<0.222	0.0043	0.0141	**0.0222**	<0.001	**0.0135**	<0.002	0.0023	**0.011**	0.448	<0.001	**1.41**	<0.000033	0.0284	**0.0145**	<0.001	<0.001	<0.005	**2.33**
IP-12	Iron King Mine	NR18 North American Industries Operations Area	Downstream	9/2/2008	<0.2	0.0051	0.0161	**0.0214**	<0.002	**0.0095**	<0.00072	0.0073	**0.0106**	0.0169	<0.00033	**0.875**	<0.0002	0.0226	**0.0177**	**0.00084**	<0.00034	<0.00079	**1.29**
Chaparral Gulch																							
CG-24	Chaparral Gulch	NR20 North of Chaparral Gulch	Downstream	5/3/2009	<0.2	<0.00021	0.0038	**0.0289**	<0.001	**0.00029**	0.000054	0.0102	<0.00081	<0.1	0.000059	0.013	<0.0002	0.0034	**0.0022**	<0.001	<0.001	0.0013	**0.149**
CG-14	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	**60.5**	<0.002	**0.265**	**0.0054**	**0.005**	**0.315**	0.0311	**0.412**	**14.6**	**499**	0.00071	**29.8**	**0.00023**	**0.212**	**0.0128**	<0.001	<0.001	**0.0267**	**162**
CG-16	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	9/5/2008	<0.222	<0.002	0.0074	**0.0324**	<0.001	**0.0233**	<0.002	**0.0636**	**0.0534**	**6.19**	<0.001	**6.68**	<0.00006	0.0274	<0.005	<0.001	<0.001	<0.005	**9.57**
CG-22	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	<0.2	<0.0014	0.0334	**0.027**	<0.001	**0.0084**	0.00016	**0.0847**	**0.052**	**9.13**	0.00018	**20.3**	**0.000068**	0.0353	**0.0033**	<0.000074	0.00028	0.00017	**1.59**
CG-25	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/4/2009	0.0647	<0.00059	0.0095	**0.0233**	0.000024	**0.0303**	0.00006	**0.058**	**0.0686**	0.717	0.000035	**5.02**	<0.0002	0.0321	<0.0029	<0.001	0.00013	0.000018	**10.1**
DAM-SW01	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	<0.00054	<0.00035	0.0051	**0.0424**	<0.00009	0.00018	<0.000017	0.0055	0.0089	<0.00067	<0.000021	**4.36**	<0.000091	0.0082	<0.00025	<0.0000026	<0.0000089	<0.00047	0.0291
DAM-SW02	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	5/6/2014	<0.00054	<0.00035	0.0262	**0.0262**	<0.00009	0.00018	<0.000017	0.0211	<0.000039	**2.32**	<0.000021	**4.85**	<0.000091	0.0107	<0.00025	<0.0000026	<0.0000089	<0.00047	**0.59**
DE-2	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/25/2008	<0.0808	<0.00074	0.0035	**0.0349**	<0.001	**0.0387**	0.00031	**0.103**	**0.0308**	0.0482	<0.001	**8.44**	<0.0002	0.0444	<0.0021	<0.001	<0.001	<0.005	**10.7**
HS-38	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	1/28/2004	**0.0924**	<0.06	0.0537	**0.018**	<0.005	<0.005	0.0012	**0.0251**	0.0018	**28.2**	<0.01	**5.58**	<0.0002	0.0038	<0.035	<0.01	0.0108	<0.05	**0.416**
SWD-03	Chaparral Gulch	NR8 Tailings Floodplain	Downstream	8/4/2014	**2.23**	<0.00035	0.0037	**0.159**	**0.002**	**0.0231**	0.00021	**0.497**	**3.19**	0.12	0.00072	**22.5**	**0.000086**	**0.112**	**0.0255**	<0.0000026	<0.0000089	0.0014	**10.3**
CG-19	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	<0.0679	<0.00049	0.0274	**0.0281**	<0.001	**0.0219**	0.00034	**0.0721**	**0.0195**	0.161	<0.001	**7.61**	<0.0002	0.0308	<0.0016	<0.001	<0.001	<0.005	**7.83**
CG-20	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	<0.0869	<0.00042	0.0178	**0.0278**	<0.001	**0.0142**	0.00033	**0.0557**	**0.0141**	0.0618	<0.001	**9.11**	<0.0002	0.025	<0.002	<0.001	<0.001	<0.00036	**4.69**
CG-21	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/25/2008	<0.0802	<0.00038	0.0104	**0.0297**	<0.001	**0.0137**	0.00036	**0.0592**	**0.0366**	0.422	<0.001	**9.96**	<0.0002	0.0247	<0.0021	<0.001	<0.001	<0.005	**3.08**
CG-23	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	4/28/2009	<0.2	0.002	0.0066	**0.0231**	<0.001	**0.006**	0.00015	**0.0253**	**0.0119**	<0.1	0.000084	**3.51**	<0.0002	0.0164	<0.0019	<0.001	0.000066	0.000051	**1.15**
CHD-BIOSW01	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/7/2014	<0.00054	<0.00035	0.0055	**0.0191**	<0.00009	0.000056	<0.000017	0.0031	0.0027	<0.00067	<0.000021	**2.15**	<0.000091	0.0064	<0.00025	<0.0000026	<0.0000089	<0.00047	0.0239
DAM-SW03	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	<0.00054	0.0022	0.003	**0.0406**	<0.00009	0.000046	<0.000017	0.0053	0.0023	<0.00067	<0.000021	**4.61**	<0.000091	0.007	<0.00025	<0.0000026	<0.0000089	<0.00047	0.0887
DAM-SW04	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	5/6/2014	<0.00054	<0.00035	0.0075	**0.0213**	<0.00009	0.000064	<0.000017	0.0034	0.0026	<0.00067	<0.000021	**2.63**	<0.000091	0.0073	<0.00025	<0.0000026	<0.0000089	<0.00047	0.0279
SWD-05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/4/2014	<0.00054	0.00066	0.0835	**0.0919**	<0.00009	<0.000028	<0.000017	0.0065	<0.000039	**4.16**	0.000087	**8.61**	**0.000039**	0.0059	0.001	<0.0000026	<0.0000089	0.0019	0.0103
SWD-05	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/15/2014	**47.4**	--	0.0256	**0.109**	**0.0051**	**0.132**	0.0039	**0.917**	**92.8**	**8.95**	**0.0051**	**15.8**	--	**0.166**	**0.053**	<0.0000026	0.00033	<0.00047	**44.8**
SWD-07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/4/2014	<0.00054	0.00056	0.0114	**0.314**	<0.00009	0.00013	<0.000017	0.0114	0.0081	<0.00067	0.000021	**4.64**	**0.000054**	0.0083	0.001	<0.0000026	<0.0000089	0.0018	0.0281
SWD-07	Chaparral Gulch	NR9 Lower Chaparral Gulch	Downstream	8/15/2014	**19.7**	--	0.0073	**0.0807**	**0.0034**	**0.193**	0.00062	**0.838**	**0.527**	<0.0013	**0.0027**	**16.1**	**0.000048**	**0.161**	**0.0391**	--	0.00037	<0.00047	**45.6**
DAM-SW06	Chaparral Gulch	Undeveloped	Downstream	5/6/2014	<0.00054	<0.00035	0.0043	**0.082**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	0.0075	<0.000091	0.003	<0.00025	<0.0000026	<0.0000089	0.0052	0.0063
Agua Fria River																							
BKG-AF-1	Agua Fria River	RYSR	Upstream	8/26/2008	<0.027	<0.00019	0.0041	**0.11**	<0.001	0.00002	0.0014	0.0038	<0.0015	0.0185	<0.001	0.0535	<0.0002	0.0044	<0.0016	<0.000063	<0.001	0.0058	0.0125
BKG-AF-2	Agua Fria River	RYSR	Upstream	8/26/2008	<0.0379	<0.00061	0.0056	**0.0911**	<0.001	<0.0001	0.0013	0.0061	0.0042	0.0358	<0.001	0.0274	<0.0002	0.005	<0.0017	<0.000064	<0.001	0.0093	0.0241
BKG-AF-3	Agua Fria River	Undeveloped	Upstream	8/25/2008	<0.03	<0.00095	0.005	**0.101**	<0.001	<0.0001	0.0014	0.0052	0.0032	0.0131	<0.000077	0.0245	<0.0002	0.0046	<0.0018	<0.001	<0.001	0.0084	0.0158
BKG-AF-4	Agua Fria River	Undeveloped	Upstream	9/6/2008	<0.222	<0.002	0.0033	**0.108**	<0.001	<0.001	<0.002	0.0027	<0.0013	0.0132	<0.001	0.0174	<0.000031	0.0039	<0.005	<0.001	<0.001	0.0049	0.0024
BKG-AF-8	Agua Fria River	Undeveloped	Upstream	9/6/2008	<0.222	<0.002	0.0028	**0.0881**	<0.001	<0.001	<0.002	0.0027	<0.002	0.0223	<0.001	0.0389	<0.000017	0.0025	<0.005	<0.001	<0.001	0.0033	0.0038
BKG-AF-9	Agua Fria River	Undeveloped	Upstream	9/6/2008	<0.222	<0.002	0.0162	**0.0701**	<0.001	<0.001	0.0026	0.0048	0.0023	0.0537	<0.001	0.0327	<0.000033	0.0024	<0.005	<0.001	<0.001	0.0121	0.0073
BKG-AF-10	Agua Fria River	Undeveloped	Upstream	9/6/2008	<0.222	<0.002	0.0175	**0.0602**	<0.001	<0.001	0.0027	0.004	<0.0016	0.0052	<0.001	0.009	<0.000028	0.0023	<0.005	<0.001	<0.001	0.0161	<0.002
AF-2	Agua Fria River	RYSR	Downstream	8/24/2008	<0.0872	<0.00068	0.0058	**0.106**	<0.001	<0.000075	0.0013	0.0039	0.0029	0.14	<0.00012	0.0398	<0.0002	0.0045	<0.0018	<0.001	<0.001	0.0091	0.0102
AF-3	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.0294	<0.00072	0.0059	**0.0963**	<0.001	<0.000076	0.0013	0.0067	0.003	0.0151	<0.001	0.0273	<0.0002	0.0049	<0.0015	<0.001	<0.001	0.0105	0.0092
AF-4	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.0327	<0.00077	0.0065	**0.0935**	<0.001	<0.000074	0.0013	0.0065	0.0033	0.049	<0.000071	0.0198	<0.0002	0.0051	<0.0018	<0.000049	<0.001	0.0114	0.01
AF-5	Agua Fria River	Undeveloped	Downstream	8/26/2008	<0.0275	<0.00074	0.0046	**0.111**	<0.001	<0.000042	0.0013	0.003	<0.0019	0.014	<0.001	0.0393	<0.0002	0.0045	<0.0019	<0.001	<0.001	0.0064	0.0067
AF-6	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.026	<0.00058	0.0066	**0.0952**	<0.001	<0.000073	0.0013	0.005	0.0033	0.0386	<0.001	0.0159	<0.0002	0.0048	<0.0017	<0.000058	<0.001	0.0114	0.0088
AF-8	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.0283	<0.00024	0.004	**0.104**	<0.001	0.00002	0.0015	0.0051	<0.0015	0.0254	<0.001	0.0206	<0.0002	0.0044	<0.0014	<0.001	<0.001	0.0055	0.0111
AF-9	Agua Fria River	Undeveloped	Downstream	5/3/2009	<0.2	<0.00019	0.0051	**0.0737**	<0.001	0.000061	0.001	0.0074	0.0032	<0.1	0.00014	0.0183	<0.0002	0.0047	0.001	<0.001	<0.001	0.0113	0.0186
AF-10	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.0356	<0.00073	0.0039	**0.107**	<0.001	<0.000026	0.0013	0.005	<0.0016	0.0198	<0.001	0.0231	<0.0002	0.0043	<0.0019	<0.001	<0.001	0.0051	0.0031
AF-11	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.0328	<0.00024	0.0038	**0.108**	<0.001	**0.0017**	0.0023	0.0039	**0.0342**	0.0264	<0.001	**0.217**	<0.0002	0.0053	<0.0019	<0.001	<0.001	0.0047	**0.415**
AF-12	Agua Fria River	Undeveloped	Downstream	8/24/2008	<0.026	<0.00052	0.0035	**0.108**	<0.001	**0.0023**	0.0012	0.0079	**0.0523**	0.0409	<0.001	**0.256**	<0.0002	0.0062	<0.0019	<0.001	<0.001	0.0043	**0.52**
AF-13	Agua Fria River	Undeveloped	Downstream	4/28/2009	<0.2	<0.004	0.0055	**0.0755**	<0.002	0.000099	0.0018	0.0062	0.0038	<0.1	0.00012	0.0249	<0.0002	0.0052	<0.0013	<0.002	<0.002	0.0133	0.0295
AF-15	Agua Fria River	RYSR	Downstream	8/25/2008	<0.0406	<0.00054	0.0073	**0.0962**	<0.001	<0.00025	0.001	0.0022	0.0075	0.0265	<0.001	0.0754	<0.0002	0.0043	<0.0015	<0.001	<0.001	0.0098	0.0246
AF-16	Agua Fria River	RYSR	Downstream	4/28/2009	<0.2	0.002	0.0063	**0.0786**	<0.001	0.00014	0.0018	0.0065	0.0045	<0.1	0.00013	0.0196	<0.0002	0.0051	<0.0012	<0.001	<0.001	0.0135	0.0358
AF-17	Agua Fria River	Undeveloped	Downstream	5/3/2009	<0.2	<0.0013	0.0046	**0.0873**	<0.001	0.000074	0.00096	0.0012	0.0024	<0.1	0.000079	0.0067	<0.0002	0.0037	<0.0017	0.000019	0.000013	0.0065	0.0117
AF-18	Agua Fria River	Undeveloped	Downstream	5/3/2009	<0.2	<0.000044	0.0047	**0.0816**	<0.001	0.000065	0.00079	0.0054	0.0022	<0.1	0.000084	0.0246	<0.0002	0.0041	0.0015	<0.001	<0.001	0.0049	0.0111
AG-BIOSW01	Agua Fria River	RYSR	Downstream	5/6/2014	<0.00054	<0.00035	0.0044	**0.102**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.003	<0.00025	<0.0000026	<0.0000089	0.0044	0.0014
AG-BIOSW02	Agua Fria River	Undeveloped	Downstream	5/6/2014	<0.00054	0.0021	0.005	**0.0993**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0033	<0.00025	<0.0000026	<0.0000089	0.0065	0.0012
AG-BIOSW03	Agua Fria River	Undeveloped	Downstream	5/6/2014	<0.00054	<0.00035	0.0051	**0.0976**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0037	<0.00025	<0.0000026	<0.0000089	0.006	0.0045
AG-BIOSW04	Agua Fria River	Undeveloped	Downstream	5/6/2014	<0.00054	0.0024	0.005	**0.0964**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0032	<0.00025	<0.0000026	<0.0000089	0.0063	0.0017
AG-BIOSW05	Agua Fria River	Undeveloped	Downstream	5/7/2014	<0.00054	<0.00035	0.0039	**0.105**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.003	<0.00025	<0.0000026	<0.0000089	0.0044	0.0015
AG-BIOSW06	Agua Fria River	RYSR	Downstream	5/7/2014	<0.00054	0.0022	0.0041	**0.105**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0031	<0.00025	<0.0000026	<0.0000089	0.0048	0.0011
AG-BIOSW07	Agua Fria River	Undeveloped	Downstream	5/7/2014	<0.00054	0.0022	0.0042	**0.101**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0032	<0.00025	<0.0000026	<0.0000089	0.0047	0.001
AG-BIOSW08	Agua Fria River	Undeveloped	Downstream	5/7/2014	<0.00054	<0.00035	0.0043	**0.0975**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	<0.00032	<0.000091	0.0032	<0.00025	<0.0000026	<0.0000089	0.0052	0.0012
AG-BIOSW09	Agua Fria River	Undeveloped	Downstream	5/8/2014	<0.00054	<0.00035	0.0042	**0.0964**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	0.0073	<0.000091	0.0033	<0.00025	<0.0000026	<0.0000089	0.0045	0.0026

TABLE 7-18

Summary of Surface Water Analytical Results (Dissolved)

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Sample Area	Exposure Area	Located Upstream or Downstream of Source Areas?	Sample Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Screening Levels					0.087	0.03	0.15	0.004	0.00066	0.00025	0.074	0.023	0.009	1	0.0025	0.12	0.00001	0.052	0.002	0.00032	0.15	0.02	0.12
AG-BIOSW10	Agua Fria River	Undeveloped	Downstream	5/8/2014	<0.00054	<0.00035	0.004	**0.0968**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	0.011	<0.000091	0.0029	<0.00025	<0.0000026	<0.0000089	0.0041	0.0023
AG-BIOSW11	Agua Fria River	Undeveloped	Downstream	5/8/2014	<0.00054	<0.00035	0.0039	**0.0943**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	0.0017	<0.000091	0.0031	<0.00025	<0.0000026	<0.0000089	0.0039	0.0015
DAM-SW05	Agua Fria River	Undeveloped	Downstream	5/6/2014	<0.00054	<0.00035	0.0041	**0.0826**	<0.00009	<0.000028	<0.000017	<0.0000057	<0.000039	<0.00067	<0.000021	0.0022	<0.000091	0.0033	<0.00025	<0.0000026	<0.0000089	0.0053	0.0021
HS-39	Agua Fria River	Undeveloped	Downstream	1/28/2004	0.0147	<0.06	<0.015	**0.104**	<0.005	<0.005	0.0011	0.00075	0.0023	<0.1	<0.01	0.0118	<0.0002	0.0019	<0.035	<0.01	<0.025	0.0041	0.0024
HS-41	Agua Fria River	RYSR	Downstream	1/28/2004	0.0095	<0.06	0.0036	**0.102**	<0.005	<0.005	0.00096	<0.05	0.0023	<0.1	<0.01	0.0161	<0.0002	<0.04	<0.035	<0.01	<0.025	0.004	0.0041
IK-W3	Agua Fria River	Undeveloped	Downstream	5/16/2002	--	--	--	--	--	--	--	--	--	<0.009	--	0.0016	<0.0001	--	<0.002	--	0.0072	--	--
IK-W20	Agua Fria River	Undeveloped	Downstream	5/16/2002	--	--	--	--	--	--	--	--	--	<0.009	--	0.0225	**0.0001**	--	<0.002	--	0.0073	--	--
IK-W30	Agua Fria River	Undeveloped	Downstream	5/16/2002	--	--	--	--	--	--	--	--	--	<0.009	--	0.0181	<0.0001	--	<0.002	--	0.0055	--	--
SWD-06	Agua Fria River	RYSR	Downstream	8/4/2014	0.0502	0.00094	0.0124	**0.0823**	<0.00009	0.00008	<0.000017	0.0021	0.0027	0.434	0.00015	**1.47**	**0.000034**	0.0045	0.00044	<0.0000026	<0.0000089	0.0091	0.0036
SWD-06	Agua Fria River	RYSR	Downstream	8/15/2014	<0.00054	0.00062	0.0098	**0.0994**	--	0.000032	--	<0.0000057	**0.0098**	<0.00067	0.000034	0.061	--	0.0025	0.0011	--	--	0.0096	0.0027
SWD-08	Agua Fria River	Undeveloped	Downstream	8/4/2014	<0.00054	<0.00035	0.0144	**0.155**	<0.00009	<0.000028	<0.000017	0.0026	<0.000039	0.0699	0.000031	**3**	**0.000081**	0.0055	0.0004	<0.0000026	<0.0000089	0.0042	0.0022
SWD-08	Agua Fria River	Undeveloped	Downstream	8/15/2014	0.0356	0.00039	0.0076	**0.114**	--	--	0.00022	<0.0000057	0.0043	<0.00067	0.000044	0.0084	--	0.0024	0.0011	--	--	0.0122	0.0028

Notes:

1. All units are mg/L = milligrams per liter
2. Concentrations exceeding screening levels are **BOLD**
3. The screening levels are used solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.
4. Cadmium, chromium, copper, lead, nickel, silver, and zinc have hardness dependent criteria and assume a default hardness value of 100 mg/L as $CaCO_3$.
5. Screening levels are described in Table 6-4.
6. "Upstream" sample locations were identified as locations collected upstream of the drainage ditch emanating from the former Humboldt Smelter property in the Agua Fria River.

TABLE 7-19

Summary of Groundwater Analytical Results for Metals – EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Unit	Sample Date	Aluminum (Dissolved)	Aluminum (Total)	Antimony (Dissolved)	Antimony (Total)	Arsenic (Dissolved)	Arsenic (Total)	Beryllium (Total)	Cadmium (Dissolved)	Cadmium (Total)	Chromium (Total)	Cobalt (Dissolved)	Cobalt (Total)	Copper (Total)	Iron (Dissolved)	Iron (Total)	Lead (Dissolved)	Lead (Total)	Manganese (Dissolved)	Manganese (Total)	Mercury (Total)	Nickel (Total)	Selenium (Dissolved)	Selenium (Total)	Thallium (Total)	Vanadium (Total)	Zinc (Dissolved)	Zinc (Total)
Screening Levels				***0.2***	***0.2***	***0.006***	***0.006***	***0.01***	***0.01***	***0.004***	***0.005***	***0.005***	***0.1***	***0.006***	***0.006***	***1.3***	***0.3***	***0.3***	***0.015***	***0.015***	***0.05***	***0.05***	***0.002***	***0.1***	***0.05***	***0.05***	***0.002***	***0.086***	***5***	***5***
CHF-MW-01	NR8 Tailings Floodplain	Alluvium	29-Jul-14	<0.00054	**9.92**	<0.00035	0.0022	**0.0687**	**0.526**	0.0008	--	0.0016	0.0284	**0.0124**	**0.0151**	0.146	**6.35**	**38.8**	<0.000021	**0.163**	**1.94**	**2.86**	0.00069	0.0138	0.00074	0.0023	<0.0000089	0.0526	0.003	0.288
CHF-MW-01	NR8 Tailings Floodplain	Alluvium	21-Oct-14	<0.00054	**14.7**	0.0015	0.0028	**0.275**	**0.622**	0.00064	<0.000028	0.0027	0.0306	**0.0142**	**0.0199**	0.332	**35.2**	**52**	<0.000021	**0.134**	**3.15**	**5.99**	0.00041	0.0172	<0.00025	0.0022	<0.0000094	0.0447	0.0297	0.411
CHF-MW-02	NR8 Tailings Floodplain	Alluvium	29-Jul-14	<0.00054	**5.09**	<0.00035	0.00069	0.0039	**0.0295**	0.00018	0.0036	**0.0051**	0.014	**0.0185**	**0.0216**	0.0338	--	**8.47**	<0.000021	**0.0295**	**2.29**	**2.42**	0.00039	0.0178	0.0242	0.0301	<0.0000089	0.0159	0.373	0.495
CHF-MW-02	NR8 Tailings Floodplain	Alluvium	21-Oct-14	<0.00054	**10.6**	<0.00035	<0.00012	0.0034	**0.0547**	0.00039	**0.0057**	**0.0072**	0.0236	**0.0202**	**0.024**	0.0435	0.218	**14.6**	<0.000021	**0.0469**	**1.4**	**1.81**	0.00015	0.0192	**0.064**	**0.0763**	<0.0000094	0.0381	0.425	0.52
CHF-MW-03	NR8 Tailings Floodplain	Alluvium	29-Jul-14	<0.00054	**0.82**	<0.00035	<0.0007	**0.0106**	0.0028	<0.00018	<0.000028	<0.000056	0.0107	**0.0106**	0.0038	<0.000078	<0.00067	**0.698**	<0.000021	<0.000042	**2.34**	0.0171	0.00029	0.0157	0.0483	0.046	<0.000018	<0.00094	0.0663	0.01
CHF-MW-03	NR8 Tailings Floodplain	Alluvium	21-Oct-14	<0.00054	**3.84**	<0.00035	<0.00012	0.0013	**0.013**	0.0002	**0.0428**	**0.0402**	0.0093	**0.05**	**0.0493**	0.167	<0.00067	**4.65**	<0.000021	0.0137	**1.62**	**1.68**	0.000062	0.0328	**0.174**	**0.18**	<0.0000094	0.0113	4.68	4.93
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Sep-08	<0.2	<0.2	<0.00097	<0.00083	**0.0156**	**0.0178**	<0.001	0.0036	0.0033	0.0214	0.0047	0.0023	0.0178	<0.0152	0.0208	<0.00032	<0.00052	**0.629**	**0.615**	0.00011	0.047	**0.211**	**0.205**	<0.0006	0.0041	0.243	0.252
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	30-Sep-08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Apr-09	<0.2	<0.2	0.002	0.002	**0.0114**	**0.0123**	<0.001	0.002	0.0018	0.002	0.0046	0.0025	0.011	<0.1	<0.1	0.0003	0.00037	**0.47**	**0.488**	0.00012	0.0239	**0.125**	**0.123**	0.00038	0.0041	0.006	0.007
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	13-Oct-09	<0.0197	<0.0279	<0.00073	<0.0007	**0.0135**	**0.0126**	<0.001	0.0045	0.005	0.0048	0.0029	0.0023	0.0213	0.089	0.0733	0.0029	0.0053	**0.627**	**0.631**	0.00019	0.0309	**0.23**	**0.222**	<0.00043	0.0032	0.0196	0.0088
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	04-May-10	0.101	**0.915**	<0.06	<0.06	0.0049	0.0058	<0.00089	0.0049	**0.0054**	<0.01	0.006	0.005	0.0614	0.0356	0.0875	<0.01	0.007	**0.786**	**0.815**	0.00027	0.0324	**0.306**	**0.341**	<0.025	0.004	0.0108	0.0349
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	17-Oct-12	--	**0.807**	--	<0.002	--	**0.0179**	<0.001	--	0.0044	0.0188	--	0.0039	0.0752	--	**2.91**	--	0.009	--	**0.868**	<0.0002	0.0466	--	**0.311**	<0.001	<0.005	--	0.0523
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Jul-14	<0.00054	**1.16**	<0.00035	<0.0018	0.0028	0.0096	<0.00045	<0.000028	0.0026	0.0124	0.0024	**0.0102**	0.0587	<0.00067	0.212	<0.000021	0.0084	**0.186**	**0.567**	0.00081	0.0618	**0.0587**	**0.213**	<0.000045	<0.0024	<0.00032	0.0288
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	22-Oct-14	<0.00054	**1.51**	<0.00035	<0.00012	0.0046	0.0057	0.000082	0.0013	0.0012	0.0083	0.0028	0.0029	0.0679	<0.00067	<0.0016	<0.000021	**0.0155**	**0.43**	**0.456**	0.000056	0.023	**0.118**	**0.133**	<0.0000094	0.0056	<0.00032	0.0321
MW-02D	NR7 Smelter Tailings Swale	Precambrian Bedrock	31-Jul-14	**0.483**	**9.17**	0.00088	<0.00035	**0.0328**	**0.0371**	0.00069	<0.000028	<0.000028	0.0111	<0.0000057	0.0019	0.0105	<0.00067	**5.24**	<0.000021	0.0078	0.0093	**0.216**	0.000044	0.0043	0.0012	0.0015	<0.0000089	0.0214	0.0144	0.1
MW-02D	NR7 Smelter Tailings Swale	Precambrian Bedrock	21-Oct-14	**1.46**	**8.2**	0.001	<0.00012	**0.0529**	**0.0641**	0.00075	<0.000028	<0.000023	0.0094	<0.0000057	0.0016	0.0142	**0.513**	**4.47**	0.0044	0.0131	0.0187	**0.139**	<0.000013	0.0043	<0.00025	0.0025	<0.0000094	0.0137	0.0362	0.123
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	30-Sep-08	<0.2	<0.2	<0.00024	<0.002	0.0061	0.0053	<0.001	<0.00026	<0.00031	0.0166	0.0045	0.0044	0.0034	<0.0266	0.0354	<0.00023	<0.00048	0.014	0.0213	<0.0002	0.0045	0.0308	0.0287	<0.001	0.0063	0.0951	0.121
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	29-Apr-09	<0.2	<0.2	<0.004	<0.002	0.0032	0.0029	--	0.000084	0.00013	0.0048	**0.0073**	0.0055	0.0029	<0.1	<0.1	0.00014	0.00021	0.0041	0.001	<0.0002	0.0025	0.0258	0.0296	<0.001	0.0067	0.0055	0.0051
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	12-Oct-09	0.0095	0.0201	<0.002	<0.002	0.0041	0.0034	<0.001	0.0013	0.0016	0.0045	**0.0062**	0.0051	0.0056	0.0333	0.0272	<0.00061	<0.00069	0.0035	0.0029	<0.0002	0.0027	0.0232	0.0184	<0.001	0.006	0.0086	0.0071
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	03-May-10	<0.2	<0.2	<0.06	<0.06	0.0027	<0.01	<0.00092	<0.005	<0.005	0.004	**0.0068**	0.0051	<0.025	<0.1	0.0397	<0.01	<0.01	<0.015	<0.015	<0.0002	<0.04	0.023	0.0216	<0.025	0.0078	0.0045	0.0033
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	17-Oct-12	--	<0.02	--	<0.002	--	0.0027	<0.001	--	<0.001	0.0024	--	0.0049	0.0239	--	0.272	--	<0.001	--	<0.001	<0.0002	0.0011	--	0.0182	<0.001	0.0064	--	0.0096
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	29-Jul-14	<0.00054	**14.1**	<0.00035	<0.00035	0.0012	**0.0124**	0.00051	<0.000028	0.00018	**0.436**	0.0052	**0.0142**	0.11	<0.00067	**16.8**	<0.000021	0.0058	**0.37**	**0.807**	<0.000031	**0.18**	0.0225	0.0247	<0.0000089	0.0283	0.0169	0.167
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	23-Oct-14	<0.00054	**3.12**	<0.00035	<0.00035	0.0032	0.0072	0.0001	<0.000028	<0.000028	0.0236	0.0041	0.0053	0.0275	<0.00067	**3.87**	<0.000021	0.0033	0.0046	**0.0989**	<0.000013	0.0122	0.0316	0.0327	<0.0000089	0.0152	0.0218	0.0262
MW-03S	NR17 Main Tailings Pile	Hickey Formation	27-Sep-08	0.0177	0.0657	<0.0014	<0.00046	0.004	0.0043	<0.001	0.00024	0.00025	0.0037	**0.0089**	**0.0081**	0.0014	0.0293	0.0741	<0.00048	<0.00037	0.0355	0.0376	<0.0002	0.0067	0.0103	0.0098	<0.001	0.0034	0.0198	0.0214
MW-03S	NR17 Main Tailings Pile	Hickey Formation	27-Apr-09	<0.2	<0.2	<0.002	<0.00086	0.0012	0.0014	<0.001	0.0007	0.00077	0.00092	**0.01**	**0.0078**	0.0018	<0.1	<0.1	0.00034	0.00033	0.0056	0.0016	<0.0002	0.004	0.0108	0.0111	0.000015	0.0038	0.0401	0.0122
MW-03S	NR17 Main Tailings Pile	Hickey Formation	13-Oct-09	<0.2	<0.0617	<0.002	<0.002	0.0028	0.0035	<0.001	<0.00026	<0.00025	<0.0013	**0.0081**	**0.0071**	0.0045	0.0306	0.0767	<0.00035	0.0036	0.0032	0.0032	<0.0002	0.0036	0.0097	0.0107	<0.001	0.0035	0.006	0.0098
MW-03S	NR17 Main Tailings Pile	Hickey Formation	03-May-10	<0.2	<0.0728	<0.06	<0.06	<0.01	0.0032	<0.00089	<0.005	<0.005	<0.01	**0.01**	**0.0094**	<0.025	<0.1	<0.1	<0.01	<0.01	0.0019	<0.015	<0.0002	<0.04	<0.035	0.0063	<0.025	0.0051	0.0115	0.0038
MW-03S	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	<0.02	--	<0.002	--	0.0017	<0.001	--	<0.001	<0.002	--	**0.0065**	<0.002	--	**1.17**	--	<0.001	--	0.0011	<0.0002	0.0039	--	0.0162	<0.001	0.0024	--	0.0061
MW-03S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	<0.00054	**74.3**	<0.00035	0.00069	0.0028	**0.276**	**0.0063**	<0.000028	**0.0281**	**0.162**	0.0028	**0.106**	**2.8**	<0.00067	**81.6**	<0.000021	**0.306**	0.0017	**4.2**	**0.0101**	**0.129**	0.0454	**0.0576**	<0.0000089	**0.433**	0.0025	**13.5**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	<0.00054	**0.3**	<0.00035	<0.00012	0.0022	0.0026	0.000074	<0.000028	<0.000023	<0.00013	0.0038	0.0039	0.0286	<0.00067	0.239	<0.000021	<0.000017	<0.00004	0.0067	<0.000013	0.0073	0.036	0.0366	<0.0000094	0.0034	0.0317	0.0115
MW-04S	NR17 Main Tailings Pile	Hickey Formation	30-Sep-08	0.0209	<0.2	<0.00029	<0.00025	0.007	0.0079	<0.001	<0.00049	<0.00067	0.0043	0.0031	0.003	0.0024	<0.0352	0.11	<0.00021	<0.00035	**0.216**	**0.207**	<0.0002	0.0175	<0.005	<0.005	<0.001	0.0036	0.293	0.314
MW-04S	NR17 Main Tailings Pile	Hickey Formation	28-Apr-09	<0.2	0.0947	<0.002	<0.002	<0.001	<0.001	<0.001	0.00061	0.00053	0.00088	0.0056	0.0035	0.0015	<0.1	0.0603	0.00048	0.00077	0.022	0.0139	0.00015	0.0103	<0.0014	<0.0014	<0.001	0.0025	0.061	0.0133
MW-04S	NR17 Main Tailings Pile	Hickey Formation	14-Oct-09	<0.2	<0.0212	<0.002	<0.002	0.0023	0.0024	<0.001	<0.00075	<0.00077	<0.0012	0.0033	0.0026	0.0037	0.0917	0.0437	<0.00037	0.0037	0.0099	0.0085	0.00026	0.0091	<0.005	<0.005	<0.001	0.004	0.0104	0.008
MW-04S	NR17 Main Tailings Pile	Hickey Formation	05-May-10	<0.2	<0.2	<0.06	<0.06	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	0.0036	0.0031	<0.025	<0.1	<0.1	<0.01	<0.01	0.0093	0.0075	0.00015	<0.04	<0.035	<0.035	<0.025	0.0037	0.0061	0.0032
MW-04S	NR17 Main Tailings Pile	Hickey Formation	16-Oct-12	--	<0.02	--	<0.002	--	0.0017	<0.001	--	<0.001	<0.002	--	0.0028	<0.002	--	**2.21**	--	<0.001	--	0.0081	<0.0002	0.007	--	0.0015	<0.001	0.0023	--	0.0066
MW-04S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	--	**0.619**	--	<0.0007	0.0015	0.0025	<0.00018	--	<0.000056	0.0053	0.0019	0.004	<0.000078	--	**0.62**	<0.000021	<0.000042	0.002	0.0106	0.00072	0.0138	--	0.0006	<0.000018	<0.00094	<0.00032	0.0054
MW-04S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	<0.00054	**0.242**	<0.00035	<0.00012	0.0018	0.0034	<0.000034	<0.000028	<0.000023	0.003	0.004	0.0042	0.0502	<0.00067	**0.322**	<0.000021	<0.000017	0.0036	0.0093	0.00021	0.0095	<0.00025	<0.00036	<0.0000094	0.0047	0.0216	0.0216
MW-05S	NR17 Main Tailings Pile	Hickey Formation	27-Sep-08	<0.2	0.0464	<0.00054	<0.00074	0.0071	0.0069	<0.001	<0.001	<0.00013	0.0042	0.0022	0.0014	0.0043	0.0368	0.0658	<0.0002	<0.00054	**0.292**	**0.269**	<0.0002	0.016	0.014	0.0147	<0.001	0.0031	0.223	0.302
MW-05S	NR17 Main Tailings Pile	Hickey Formation	28-Apr-09	<0.2	0.103	<0.002	<0.002	<0.001	<0.001	<0.001	0.00033	0.00035	0.00072	0.0032	0.0014	0.0041	<0.1	0.0243	0.00065	0.00079	**0.0989**	**0.095**	<0.0002	0.0134	0.0189	0.0197	<0.001	0.0015	0.0219	0.0196
MW-05S	NR17 Main Tailings Pile	Hickey Formation	14-Oct-09	<0.2	<0.0126	<0.00047	<0.002	0.0025	0.0023	<0.001	0.0015	0.0013	<0.0014	0.002	<0.00054	0.0048	0.041	<0.1	**0.0564**	0.0031	0.0303	0.0285	<0.0002	0.011	0.016	0.0148	<0.001	0.0034	0.0086	0.0071
MW-05S	NR17 Main Tailings Pile	Hickey Formation	04-May-10	<0.2	<0.2	<0.06	<0.06	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	0.0014	<0.05	<0.025	<0.1	<0.1	<0.01	<0.01	0.0123	0.0117	<0.0002	<0.04	0.0177	0.0191	<0.025	0.0026	0.0046	0.0035
MW-05S	NR17 Main Tailings Pile	Hickey Formation	17-Oct-12	--	0.0297	--	<0.002	--	0.001	<0.001	--	<0.001	0.0152	--	<0.001	0.002	--	**1.3**	--	<0.001	--	0.0038	<0.0002	0.0149	--	0.0156	<0.001	<0.005	--	0.108
MW-05S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	<0.00054	**1.89**	<0.00035	<0.0011	0.0016	0.0067	<0.00027	<0.000028	<0.000084	0.0033	0.0011	<0.000017	<0.00012	<0.00067	**1.53**	<0.000021	0.0047	0.0014	0.019	0.00032	0.0146	0.0081	0.0164	<0.000027	<0.0014	<0.00032	0.0196
MW-05S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	<0.00054	**3.38**	<0.00035	<0.00012	0.0018	0.0048	0.0002	<0.000028	<0.000023	0.0032	0.0019	0.0022	0.0053	<0.00067	**2.3**	<0.000021	0.0048	0.0021	0.03	0.00019	0.0077	0.0158	0.0159	<0.0000094	0.0071	0.0024	0.0146
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	13-Oct-08	<0.2	0.174	<0.0004	<0.0004	**0.024**	**0.0239**	<0.001	<0.00031	<0.00033	<0.0015	0.0031	0.002	<0.0018	<0.1	**0.507**	<0.00021	<0.00062	**0.241**	**0.242**	<0.0002	0.0024	0.0054	0.0055	<0.001	0.0026	0.268	0.359
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	30-Apr-09	<0.2	<0.2	0.002	0.002	**0.0256**	**0.0261**	<0.001	0.000077	0.0001	0.0007	0.00056	0.00029	0.00099	<0.1	0.0163	0.001	0.001	0.003	**0.0536**	<0.0002	0.0016	<0.0043	<0.004	0.0000098	0.00087	0.0401	0.0412
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	14-Oct-09	<0.2	<0.0737	<0.002	<0.002	**0.0264**	**0.0276**	<0.001	<0.00041	<0.0004	<0.0017	<0.001	<0.00056	0.0038	0.0193	0.2	0.0116	<0.0006	0.0037	**0.184**	<0.0002	0.0019	0.0045	0.0049	<0.000073	0.0026	0.0648	0.0891
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	05-May-10	<0.2	<0.2	<0.06	<0.06	**0.0284**	**0.0299**	<0.005	<0.005	<0.005	<0.01	<0.05	<0.05	<0.025	<0.1	0.0588	<0.01	<0.01	<0.015	**0.0698**	<0.0002	<0.04	<0.035	<0.035	<0.025	0.0018	0.029	0.0369
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	17-Oct-12	--	<0.02	--	<0.002	--	**0.0312**	<0.001	--	<0.001	<0.002	--	<0.001	<0.002	--	<0.2	--	<0.001	--	0.0323	<0.0002	0.00069	--	0.0046	<0.001	<0.005	--	0.036
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	28-Jul-14	<0.00054	<0.00054	<0.00035	<0.00035	**0.0367**	**0.0358**	<0.00009	<0.000028	0.00042	<0.000017	<0.0000057	<0.0000057	<0.000039	<0.00067	0.0075	<0.000021	<0.000021	0.0037	0.0038	<0.000031	0.0016	0.0046	0.0049	<0.0000089	<0.00047	0.0382	0.0368
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	23-Oct-14	<0.00054	<0.00054	<0.00035	<0.00035	**0.0363**	**0.0378**	<0.00009	<0.000028	<0.000028	<0.000017	<0.0000057	<0.0000057	<0.000039	<0.00067	<0.00067	<0.000021	<0.000021	0.0021	0.0019	<0.000013	0.0016	0.0046	0.0046	<0.0000089	0.0019	0.0345	0.0371
MW-07D	UNDEV	Precambrian Bedrock	16-Oct-12	--	0.0927	--	<0.002	--	**0.0128**	<0.001	--	<0.001	<0.002	--	0.0046	<0.002	--	**0.558**	--	<0.001	--	**0.85**	0.000012	<0.001	--	<0.005	<0.001	<0.005	--	0.0073
MW-07D	UNDEV	Precambrian Bedrock	30-Jul-14	0.0219	0.133	<0.00035	<0.00035	**0.0355**	**0.0473**	<0.00009	<0.000028	0.000069	0.007	0.0021	0.0024	<0.000039	<0.00067	0.231	<0.000021	0.0011	<0.00004	0.0456	<0.000031	0.0106	<0.00025	0.00028	<0.0000089	<0.00047	0.0025	0.0394
MW-07D	UNDEV	Precambrian Bedrock	22-Oct-14	**0.692**	0.0253	0.0037	0.0029	**0.0472**	**0.0432**	<0.000034	<0.000028	<0.000023	<0.00013	0.0025	0.002	0.0058	**1.23**	<0.0016	0.0084	0.0015	**0.0782**	0.0017	<0.000013	0.0014	<0.00025	0.00055	<0.0000094	<0.00021	0.14	0.038
MW-07S	UNDEV	Hickey Formation	16-Oct-12	--	<0.02	--	<0.002	--	0.0089	<0.001	--	<0.001	<0.002	--	0.0032	0.0039	--	**1.97**	--	0.0073	--	**0.677**	<0.0002	0.0083	--	0.0044	<0.001	0.0016	--	0.0568
MW-07S	UNDEV	Hickey Formation	30-Jul-14	--	0.183	<0.00035	0.00068	**0.0182**	**0.0194**	<0.00009	<0.000028	0.00036	0.00039	0.0052	0.0054	0.0048	--	0.173	0.0089	0.0143	**1.35**	**1.2**	<0.000031	0.0124	0.0029	0.0026	<0.0000089	0.0058	0.0692	0.0987
MW-07S	UNDEV	Hickey Formation	22-Oct-14	<0.00054	**1.62**	0.00053	<0.00012	**0.0102**	**0.0329**	0.00008	<0.000028	<0.000023	0.0612	**0.0088**	**0.0092**	0.018	<0.00067	**1.82**	0.0068	**0.0517**	**3.21**	**3.32**	0.00015	0.0353	<0.00025	0.0028	<0.0000094	0.0085	0.037	0.0954
MW-08D	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	0.0496	--	<0.002	--	**0.0527**	<0.001	--	<0.001	<0.002	--	0.0042	<0.002	--	**5.55**	--	0.0051	--	**1.04**	<0.0002	0.0095	--	<0.005	<0.001	0.00086	--	0.0207
MW-08D	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	0.0234	**2.02**	**0.0133**	**0.0319**	**0.095**	**0.174**	0.00012	<0.000028	0.0015	0.0053	**0.0064**	**0.0184**	0.0141	<0.00067	**3.33**	**0.0222**	**0.278**	**0.318**	**1.02**	**0.0087**	0.0371	--	0.0027	<0.0000089	0.0101	0.0651	0.634
MW-08D	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	<0.00054	**7.82**	0.00054	**0.0086**	**0.0268**	**0.731**	0.0005	<0.000028	0.0031	0.0294	0.0032	**0.0076**	0.441	**2.93**	**23.1**	<0.000021	**0.611**	**0.841**	**1.24**	0.0017	0.0177	<0.00025	0.0037	<0.0000094	0.0362	0.0285	0.808
MW-08S	NR17 Main Tailings Pile	Tailings	15-Oct-12	--	<0.02	--	<0.002	--	**0.0728**	<0.001	--	<0.001	0.0022	--	0.0017	0.0026	--	**0.329**	--	0.002	--	**0.432**	<0.0002	0.0044	--	0.0018	<0.001	<0.005	--	0.0158
MW-09D	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	**0.309**	--	0.0035	--	**0.0305**	<0.001	--	<0.001	<0.002	--	**0.0148**	0.0156	--	**1.1**	--	**0.0327**	--	**0.609**	<0.0002	0.0072	--	0.0065	<0.001	0.0035	--	0.0999
MW-09D	NR17 Main Tailings Pile	Hickey Formation	28-Jul-14	<0.00054	**0.716**	0.0028	0.0029	**0.034**	**0.0441**	<0.00009	--	0.00021	0.0013	**0.011**	**0.0124**	0.0041	<0.00067	**0.856**	0.0021	**0.0224**	**0.13**	**0.173**	<0.000031	0.0064	0.0175	0.016	<0.0000089	0.0055	0.0095	0.0672
MW-09D	NR17 Main Tailings Pile	Hickey Formation	23-Oct-14	<0.00054	**17.3**	0.0021	0.0045	**0.0313**	**0.444**	0.00091	<0.000028	0.0025	0.0234	0.006	**0.0142**	0.0458	<0.00067	**17.2**	0.0011	**0.723**	**0.228**	**1.26**	**0.0027**	0.0129	0.0062	0.0092	<0.0000089	0.0536	0.0177	0.717
MW-09S	NR17 Main Tailings Pile	Tailings	15-Oct-12	--	**1.44**	--	**0.0247**	--	**1.28**	<0.001	--	**0.0113**	0.0038	--	0.0048	0.114	--	**46.2**	--	**1.37**	--	**1.24**	<0.0002	0.0085	--	0.0105	<0.001	0.0083	--	3.67
MW-10D	NonYard	Precambrian Bedrock	31-Jul-14	0.089	**1.82**	<0.00035	<0.00035	**0.037**	**0.0398**	0.00019	<0.000028	<0.000028	0.0023	<0.0000057	<0.0000057	<0.000039	<0.00067	**0.64**	<0.000021	<0.000021	0.0037	0.0114	0.00029	0.0019	0.00049	0.00047	<0.0000089	0.0068	0.0052	0.0124
MW-10D	NonYard	Precambrian Bedrock	23-Oct-14	<0.00054	**1.8**	0.00046	<0.00035	**0.0345**	**0.0365**	0.00012	<0.000028	<0.000028	0.0043	<0.0000057	<0.0000057	<0.000039	<0.00067	**0.65**	<0.000021	<0.000021	0.0077	0.0179	<0.000013	0.002	<0.00025	0.00032	<0.0000089	0.0057	<0.00032	0.0151
MW-10S	NonYard	Hickey Formation	30-Jul-14	<0.00054	**5.97**	<0.00035	<0.0007	0.0012	0.0052	0.00023	<0.000028	<0.000056	0.0131	0.0035	**0.0064**	0.008	<0.00067	**6.46**	<0.000021	0.002	**0.718**	**0.928**	0.000099	0.0115	0.0018	0.0018	<0.0000089	0.0147	<0.00032	0.0177
MW-10S	NonYard	Hickey Formation	22-Oct-14	<0.00054	0.149	<0.00035	<0.00012	0.0018	0.002	<0.000034	<0.000028	<0.000023	<0.00013	0.0028	0.003	<0.00014	<0.00067	<0.0016	<0.000021	<0.000017	**0.258**	**0.275**	<0.000013	0.0034	<0.00025	0.0023	<0.0000094	0.0016	<0.00032	<0.00032
MW-11S	UNDEV	Hickey Formation	29-Jul-14	0.0323	--	0.0026	--	0.0023	--	--	<0.000028	--	--	0.0027	--	--	<0.00067	--	<0.000021	--	**0.0526**	--	--	--	0.0019	--	--	--	<0.00032	--
MW-12D	NonYard	Hickey Formation	30-Jul-14	<0.00054	**0.858**	<0.00035	<0.00035	0.0066	0.0074	<0.00009	<0.000028	<0.000028	0.0187	<0.0000057	<0.0000057	<0.000039	<0.00067	**0.613**	<0.000021	0.0015	0.0048	0.0243	0.000058	0.0103	0.0041	0.004	<0.0000089	0.0108	0.0063	0.0084
MW-12D	NonYard	Hickey Formation	23-Oct-14	<0.00054	**0.72**	<0.00035	<0.00035	0.0057	0.0058	<0.00009	<0.000028	<0.000028	0.0034	<0.0000057	<0.0000057	<0.000039	<0.00067	**0.315**	<0.000021	0.0011	0.0031	0.0085	<0.000013	0.0023	0.0034	0.0035	<0.0000089	0.0088	<0.00032	0.0024
MW-12S	NonYard	Hickey Formation	30-Jul-14	<0.00054	**2.31**	--	<0.00035	0.0017	0.0075	<0.00009	--	<0.000028	0.0211	<0.0000057	0.0022	0.0033	--	**2.5**	--	0.0025	**0.188**	**0.29**	0.000044	0.0105	0.0028	0.004	<0.0000089	0.0109	<0.00032	0.0082
MW-12S	NonYard	Hickey Formation	22-Oct-14	<0.00054	**5.47**	<0.00035	<0.00012	0.0024	0.007	0.00025	<0.000028	<0.000023	0.0113	<0.0000057	0.0026	0.0065	<0.00067	**4.85**	<0.000021	0.0015	0.046	**0.171**	<0.000013	0.0088	<0.00025	0.0031	<0.0000094	0.014	<0.00032	0.0119

TABLE 7-19

Summary of Groundwater Analytical Results for Metals – EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Unit	Sample Date	Aluminum (Dissolved)	Aluminum (Total)	Antimony (Dissolved)	Antimony (Total)	Arsenic (Dissolved)	Arsenic (Total)	Beryllium (Total)	Cadmium (Dissolved)	Cadmium (Total)	Chromium (Total)	Cobalt (Dissolved)	Cobalt (Total)	Copper (Total)	Iron (Dissolved)	Iron (Total)	Lead (Dissolved)	Lead (Total)	Manganese (Dissolved)	Manganese (Total)	Mercury (Total)	Nickel (Total)	Selenium (Dissolved)	Selenium (Total)	Thallium (Total)	Vanadium (Total)	Zinc (Dissolved)	Zinc (Total)
Screening Levels				***0.2***	***0.2***	***0.006***	***0.006***	***0.01***	***0.01***	***0.004***	***0.005***	***0.005***	***0.1***	***0.006***	***0.006***	***1.3***	***0.3***	***0.3***	***0.015***	***0.015***	***0.05***	***0.05***	***0.002***	***0.1***	***0.05***	***0.05***	***0.002***	***0.086***	***5***	***5***
STS-MW-04I	NR8 Tailings Floodplain	Quaternary Alluvium	29-Jul-14	0.0438	**103**	<0.00035	<0.00035	0.0036	**0.248**	**0.0086**	**0.0108**	**0.0367**	**0.336**	**0.0538**	**0.29**	**4.28**	<0.00067	**98.7**	<0.000021	**0.116**	**6.44**	**12**	0.0016	**0.403**	0.0449	**0.0613**	<0.000018	**0.488**	0.693	**12.5**
STS-MW-04I	NR8 Tailings Floodplain	Quaternary Alluvium	21-Oct-14	<0.00054	**0.953**	<0.00035	<0.00012	0.0014	0.0031	<0.000034	**0.0278**	**0.0271**	0.0031	**0.0419**	**0.0438**	0.0807	<0.00067	**1.07**	<0.000021	<0.000017	**1.67**	**1.76**	<0.000013	0.0248	**0.132**	**0.141**	<0.0000094	0.0042	2.55	2.71

Notes:

1. All results reported in milligrams per liter (mg/L), except pH which is reported in standard units

2. Concentrations exceeding screening levels are **BOLD**

3. Refer to Table 6-5 for a description of groundwater screening levels

4. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

< = Analyte was not detected at the specified detection limit.

-- = Not analyzed

TABLE 7-20

Summary of Groundwater Analytical Results for Other Parameters – EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Unit	Sample Date	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Chloride	Fluoride	Nitrate As N	Nitrate+Nitrite As N	Nitrobenzene	Nitroglycerin	pH	Sulfate	Total Dissolved Solids
Screening Levels				***0.00024***	***0.000048***	***250***	***4***	***10***	***10***	***0.00014***	***0.002***	***--***	***250***	***500***
CHF-MW-01	NR8 Tailings Floodplain	Alluvium	29-Jul-14	--	--	--	0.26	--	1.1	--	--	7.35	**500**	**1800**
CHF-MW-01	NR8 Tailings Floodplain	Alluvium	21-Oct-14	--	--	44	0.27	--	<0.05	--	--	6.79	**920**	**1300**
CHF-MW-02	NR8 Tailings Floodplain	Alluvium	29-Jul-14	--	--	--	0.35	--	<0.05	--	--	6.62	**1000**	**2100**
CHF-MW-02	NR8 Tailings Floodplain	Alluvium	21-Oct-14	--	--	58	0.36	--	2.9	--	--	6.66	**1400**	**2000**
CHF-MW-03	NR8 Tailings Floodplain	Alluvium	29-Jul-14	--	--	--	0.32	--	3.2	--	--	7.89	**940**	**1900**
CHF-MW-03	NR8 Tailings Floodplain	Alluvium	21-Oct-14	--	--	69	0.33	--	4.6	--	--	6.37	**1100**	**2200**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Sep-08	<0.005	<0.005	**5300**	0.69	**360**	--	<0.005	--	--	**410**	--
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	30-Sep-08	--	--	--	--	--	--	--	--	--	--	**13000**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Apr-09	--	--	**3700**	0.68	**200**	--	--	--	7.09	**350**	**9000**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	04-May-10	--	--	**4300**	0.72	--	--	--	--	7.11	**500**	**9900**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	17-Oct-12	--	--	**5400**	0.6	--	**530**	--	--	6.96	**510**	**14000**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	29-Jul-14	--	--	--	**11**	--	**250**	--	--	7.22	**350**	**18000**
MW-01S	NR11 Former Pyrometallurgical Operations Area	Hickey Formation	22-Oct-14	--	--	**3000**	2.8	--	**300**	--	--	7.29	**380**	**7000**
MW-02D	NR7 Smelter Tailings Swale	Precambrian Bedrock	31-Jul-14	--	--	--	1.2	--	0.48	--	--	8.43	130	**900**
MW-02D	NR7 Smelter Tailings Swale	Precambrian Bedrock	21-Oct-14	--	--	96	1	--	1.1	--	--	8.76	120	**780**
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	30-Sep-08	<0.0048	<0.0048	--	--	4	--	<0.0048	--	--	200	--
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	29-Apr-09	--	--	32	0.17	4.6	--	--	--	7.14	220	**580**
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	03-May-10	--	--	29	0.16	--	--	--	--	7.33	200	**560**
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	17-Oct-12	--	--	33	0.24	--	5.6	--	--	7.23	240	**620**
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	29-Jul-14	--	--	--	0.66	--	4.3	--	--	7.92	250	**780**
MW-02S	NR7 Smelter Tailings Swale	Hickey Formation	23-Oct-14	--	--	32	0.14	--	4.8	--	--	7.39	250	**590**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	27-Sep-08	<0.0049	<0.0049	74	0.11	2.5	--	<0.0049	--	--	**370**	**970**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	27-Apr-09	<0.0004	<0.0002	69	0.1	2.8	--	<0.0004	<0.003	6.65	**420**	**1100**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	03-May-10	--	--	73	0.12	--	--	--	--	6.84	**390**	**1000**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	--	90	0.19	--	4.1	--	--	6.71	**770**	**1600**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	--	--	--	0.13	--	7.9	--	--	7.27	**1400**	**2600**
MW-03S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	--	--	41	0.089	--	7.7	--	--	7.03	**1500**	**2400**
MW-04S	NR17 Main Tailings Pile	Hickey Formation	30-Sep-08	<0.0048	<0.0048	--	--	<0.1	--	<0.0048	--	--	**1900**	--
MW-04S	NR17 Main Tailings Pile	Hickey Formation	28-Apr-09	<0.0004	<0.0002	50	<0.1	0.09	--	<0.0004	<0.003	6.45	**1800**	**3100**
MW-04S	NR17 Main Tailings Pile	Hickey Formation	05-May-10	--	--	53	--	--	--	--	--	6.58	**1600**	**3000**
MW-04S	NR17 Main Tailings Pile	Hickey Formation	16-Oct-12	--	--	45	<0.1	--	<0.03	--	--	6.5	**1600**	**2900**
MW-04S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	--	--	--	<0.05	--	0.071	--	--	6.79	**1700**	**3100**
MW-04S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	--	--	44	<0.05	--	0.066	--	--	6.89	**1700**	**2900**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	27-Sep-08	<0.0049	<0.0049	8.3	0.14	2.4	--	<0.0049	--	--	**1800**	**3100**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	28-Apr-09	**0.0004**	**0.0002**	6.6	0.13	1.8	--	**0.0004**	**0.003**	6.43	**2000**	**3300**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	04-May-10	--	--	6.7	0.38	--	--	--	--	6.63	**1800**	**3200**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	17-Oct-12	--	--	4.9	0.12	--	2.3	--	--	6.44	**1800**	**3100**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	--	--	--	0.085	--	1.9	--	--	7.11	**1700**	**3100**
MW-05S	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	--	--	6.1	0.067	--	2.1	--	--	6.88	**1800**	**3100**
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	13-Oct-08	<0.0049	<0.0049	53	0.33	1.2	--	<0.0049	--	7.42	76	450
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	30-Apr-09	<0.0004	<0.0002	55	0.31	0.37	--	<0.0004	<0.003	7.19	69	460
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	05-May-10	--	--	53	0.3	--	--	--	--	7.27	72	430
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	17-Oct-12	--	--	52	0.36	--	1.2	--	--	4.86	66	420
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	28-Jul-14	--	--	--	0.36	--	1.2	--	--	7.42	65	470
MW-06D	NR19 Former Glory Hole and North of Main Tailings Pile	Precambrian Bedrock	23-Oct-14	--	--	53	0.27	--	1.2	--	--	7.33	66	420
MW-07D	UNDEV	Precambrian Bedrock	16-Oct-12	--	--	41	0.55	--	0.022	--	--	4.6	190	**540**
MW-07D	UNDEV	Precambrian Bedrock	30-Jul-14	--	--	--	1.1	--	<0.05	--	--	10.19	75	350
MW-07D	UNDEV	Precambrian Bedrock	22-Oct-14	--	--	43	0.85	--	0.51	--	--	10.3	94	320
MW-07S	UNDEV	Hickey Formation	16-Oct-12	--	--	12	0.11	--	0.22	--	--	6.8	**1900**	**3000**
MW-07S	UNDEV	Hickey Formation	30-Jul-14	--	--	--	0.24	--	1.4	--	--	7.15	**1900**	**3300**
MW-07S	UNDEV	Hickey Formation	22-Oct-14	--	--	19	0.58	--	1.4	--	--	6.48	**2200**	**3200**
MW-08D	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	--	4.8	0.34	--	0.016	--	--	6.2	**1900**	**3900**
MW-08D	NR17 Main Tailings Pile	Hickey Formation	29-Jul-14	--	--	--	0.63	--	<0.05	--	--	6.69	**1800**	**4100**
MW-08D	NR17 Main Tailings Pile	Hickey Formation	22-Oct-14	--	--	6.5	0.3	--	<0.05	--	--	6.59	**1900**	**3800**
MW-08S	NR17 Main Tailings Pile	Tailings	15-Oct-12	--	--	9.4	0.16	--	--	--	--	--	55	260
MW-09D	NR17 Main Tailings Pile	Hickey Formation	15-Oct-12	--	--	110	0.37	--	1.3	--	--	7.26	**390**	**880**
MW-09D	NR17 Main Tailings Pile	Hickey Formation	28-Jul-14	--	--	--	0.22	--	3.1	--	--	7.82	**750**	**1500**
MW-09D	NR17 Main Tailings Pile	Hickey Formation	23-Oct-14	--	--	78	0.24	--	1.4	--	--	6.76	**780**	**1400**
MW-09S	NR17 Main Tailings Pile	Tailings	15-Oct-12	--	--	22	1.2	--	--	--	--	--	**2400**	**3600**
MW-10D	NonYard	Precambrian Bedrock	31-Jul-14	--	--	--	1.8	--	0.46	--	--	8.57	49	400
MW-10D	NonYard	Precambrian Bedrock	23-Oct-14	--	--	31	1.8	--	0.25	--	--	8.29	44	380

TABLE 7-20

Summary of Groundwater Analytical Results for Other Parameters – EPA Monitoring Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Unit	Sample Date	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Chloride	Fluoride	Nitrate As N	Nitrate+Nitrite As N	Nitrobenzene	Nitroglycerin	pH	Sulfate	Total Dissolved Solids
Screening Levels				***0.00024***	***0.000048***	***250***	***4***	***10***	***10***	***0.00014***	***0.002***	***--***	***250***	***500***
MW-10S	NonYard	Hickey Formation	30-Jul-14	--	--	--	0.3	--	**16**	--	--	8.59	240	**760**
MW-10S	NonYard	Hickey Formation	22-Oct-14	--	--	45	0.22	--	**20**	--	--	7.8	**260**	**730**
MW-12D	NonYard	Hickey Formation	30-Jul-14	--	--	--	0.33	--	**20**	--	--	8.04	100	**1000**
MW-12D	NonYard	Hickey Formation	23-Oct-14	--	--	210	0.28	--	**24**	--	--	7.58	100	**870**
MW-12S	NonYard	Hickey Formation	30-Jul-14	--	--	--	0.23	--	**14**	--	--	8.64	160	**710**
MW-12S	NonYard	Hickey Formation	22-Oct-14	--	--	59	0.18	--	**16**	--	--	7.76	160	**560**
STS-MW-04I	NR8 Tailings Floodplain	Quaternary Alluvium	29-Jul-14	--	--	--	0.66	--	0.96	--	--	7.55	**1100**	**2500**
STS-MW-04I	NR8 Tailings Floodplain	Quaternary Alluvium	21-Oct-14	--	--	61	0.41	--	5	--	--	6.29	**1300**	**2100**

Notes:

1. All results reported in milligrams per liter (mg/L), except pH which is reported in standard units

2. Concentrations exceeding screening levels are **BOLD**

3. Refer to Table 6-5 for a description of groundwater screening levels

4. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

< = Analyte was not detected at the specified detection limit.

-- = Not analyzed

TABLE 7-21

Summary of Groundwater Analytical Results for Metals – Supply and Other Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Sample Date	Aluminum (Dissolved)	Aluminum (Total)	Antimony (Dissolved)	Antimony (Total)	Arsenic (Dissolved)	Arsenic (Total)	Beryllium (Total)	Cadmium (Dissolved)	Cadmium (Total)	Chromium (Total)	Cobalt (Dissolved)	Cobalt (Total)	Copper (Total)	Iron (Dissolved)	Iron (Total)	Lead (Dissolved)	Lead (Total)	Manganese (Dissolved)	Manganese (Total)	Mercury (Total)	Nickel (Total)	Selenium (Dissolved)	Selenium (Total)	Thallium (Total)	Vanadium (Total)	Zinc (Dissolved)	Zinc (Total)
Screening Levels			***0.2***	***0.2***	***0.006***	***0.006***	***0.01***	***0.01***	***0.004***	***0.005***	***0.005***	***0.1***	***0.006***	***0.006***	***1.3***	***0.3***	***0.3***	***0.015***	***0.015***	***0.05***	***0.05***	***0.002***	***0.1***	***0.05***	***0.05***	***0.002***	***0.086***	***5***	***5***
Cistern	NR19 Former Glory Hole and North of Main Tailings Pile	29-Oct-08	<0.2	<0.2	<0.002	<0.0019	**0.0147**	**0.0156**	<0.001	0.00064	0.00077	<0.00054	**0.0449**	**0.0456**	<0.00073	<0.024	**0.53**	0.00022	0.00022	**3.38**	**3.42**	<0.0002	0.0269	<0.0044	<0.0044	<0.001	<0.001	**5.42**	**5.57**
GW-502562	NonYard	01-Feb-06	--	0.198	--	<0.002	--	0.0033	<0.001	--	<0.001	0.0016	--	0.00031	0.0166	--	0.0424	--	0.002	--	0.00033	<0.0002	0.0023	--	0.0141	<0.001	0.0054	--	0.0349
GW-507388	BKG	01-Feb-06	--	0.183	--	<0.002	--	**0.0172**	<0.001	--	<0.001	0.0047	--	<0.001	0.00058	--	<0.1	--	0.00018	--	0.00014	<0.0002	0.00068	--	0.0021	<0.001	0.0055	--	0.0853
GW-511246	BKG	24-Sep-08	<0.222	<0.0304	<0.0002	<0.00017	0.0059	0.0061	<0.001	<0.001	<0.001	0.0051	0.0022	<0.00047	<0.0014	<0.111	<0.0059	<0.001	<0.001	0.0035	<0.00021	<0.00003	0.003	<0.00084	0.00038	<0.001	0.0087	0.0409	0.0365
GW-512734	BKG	24-May-06	--	<0.02	--	<0.001	--	**0.017**	<0.0005	--	<0.001	0.0085	--	<0.0005	0.0035	--	<0.1	--	<0.002	--	<0.002	<0.00003	0.00064	--	0.0022	<0.002	0.0084	--	0.054
GW-533639	RSAR-G	31-Jan-06	--	0.0829	--	<0.002	--	**0.0119**	<0.001	--	<0.001	0.00098	--	0.00019	0.0131	--	0.104	--	0.0038	--	0.0016	<0.0002	0.0011	--	0.0034	<0.001	0.011	--	0.197
GW-550566	RYSR	31-Jan-06	--	<0.2	--	<0.002	--	0.0049	<0.001	--	<0.001	0.0002	--	0.0019	0.0105	--	0.078	--	0.00083	--	0.00033	<0.0002	0.00086	--	0.0019	<0.001	0.0062	--	0.0268
GW-551459	NR18 North American Industries Operations Area	14-May-02	--	--	--	<0.002	--	**0.0225**	--	--	<0.001	<0.001	--	--	<0.001	--	0.0532	--	<0.001	--	0.0022	<0.0001	--	--	0.0034	**0.0069**	--	--	0.0454
GW-551459	NR18 North American Industries Operations Area	26-Sep-08	<0.2	<0.2	<0.002	<0.002	**0.0186**	**0.0206**	<0.001	<0.001	<0.001	0.0031	**0.0065**	0.0054	<0.0016	0.285	**0.654**	<0.00062	0.0015	0.0061	0.0019	<0.0002	0.0023	0.0051	<0.0047	<0.001	0.0061	0.182	0.183
GW-551874	BKG	24-May-06	--	<0.02	--	<0.001	--	**0.02**	<0.0005	--	<0.001	0.0037	--	<0.0005	0.0077	--	<0.1	--	<0.002	--	<0.002	<0.00003	<0.001	--	0.0031	<0.002	0.0067	--	0.017
GW-558708	UNDEV	31-Jan-06	--	0.0649	--	<0.002	--	0.0057	<0.001	--	<0.001	0.00019	--	0.0003	0.0019	--	0.0138	--	0.00014	--	0.00075	<0.0002	0.0015	--	<0.005	<0.001	0.0055	--	0.0309
GW-566350	UNDEV	31-Jan-06	--	0.0694	--	<0.002	--	0.0012	<0.001	--	<0.001	0.00009	--	0.0036	0.003	--	**0.799**	--	0.0002	--	**0.0509**	<0.0002	0.0043	--	0.0024	<0.001	0.0023	--	0.0146
GW-567387	RYSR	01-Feb-06	--	**1.57**	--	0.00037	--	**0.306**	<0.001	--	<0.001	0.0052	--	0.0017	0.327	--	**2.45**	--	**0.0186**	--	**0.0552**	<0.0002	0.0056	--	<0.005	<0.001	0.0264	--	0.109
GW-573389	BKG	26-Sep-08	<0.2	<0.2	<0.0013	<0.002	0.0068	0.0078	<0.001	<0.001	<0.001	<0.0013	0.0022	<0.001	0.0146	<0.0279	0.0285	0.0019	0.0036	0.0072	0.0027	<0.0002	0.0014	<0.005	<0.005	<0.001	0.0034	0.339	0.355
GW-575380	RYSR	31-Jan-06	--	0.0987	--	<0.002	--	0.0045	<0.001	--	<0.001	0.00018	--	0.0029	0.0013	--	0.0225	--	0.00027	--	0.00016	<0.0002	0.00083	--	<0.005	<0.001	0.0058	--	0.0319
GW-576555	UNDEV	14-May-02	--	--	--	<0.002	--	0.0056	--	--	<0.001	<0.001	--	--	<0.001	--	0.27	--	<0.001	--	0.0034	<0.0001	--	--	0.0035	**0.0071**	--	--	2.37
GW-586144	UNDEV	24-May-06	--	<0.02	--	<0.001	--	**0.015**	<0.0005	--	<0.001	0.0055	--	<0.0005	0.044	--	<0.1	--	0.0093	--	<0.002	<0.00003	<0.001	--	0.0021	<0.002	0.013	--	0.044
GW-586144	UNDEV	23-Sep-08	<0.222	<0.222	<0.00049	<0.00011	**0.0106**	**0.0105**	<0.001	<0.001	<0.001	0.0048	<0.00017	<0.000094	0.0024	<0.111	<0.0121	<0.001	<0.00043	<0.00026	<0.00024	<0.000018	<0.00095	<0.0014	0.001	<0.001	0.0107	0.0141	0.0802
GW-586482	BKG	14-May-02	--	--	--	<0.002	--	0.0047	--	--	<0.001	0.0012	--	--	<0.001	--	**1.95**	--	<0.001	--	**0.34**	<0.0001	--	--	<0.002	**0.0063**	--	--	0.0031
GW-592720	NR18 North American Industries Operations Area	26-Sep-08	<0.2	<0.2	<0.002	<0.002	**0.0124**	**0.0148**	<0.001	<0.001	<0.001	<0.00091	0.0041	0.0019	0.0024	0.024	**0.5**	<0.00074	**0.018**	0.0236	0.0166	<0.0002	0.0031	<0.005	<0.0017	<0.001	0.0022	0.106	0.192
GW-592720	NR18 North American Industries Operations Area	30-Apr-09	<0.2	<0.2	<0.002	<0.002	**0.0138**	**0.0139**	<0.001	0.000047	<0.001	0.002	**0.0084**	**0.0067**	0.0019	0.0172	0.06	0.0012	0.0012	0.005	0.0025	<0.0002	0.0018	0.0116	0.0114	<0.001	0.0038	0.324	0.348
GW-599489	BKG	24-May-06	--	<0.02	--	<0.001	--	**0.011**	<0.0005	--	<0.001	<0.001	--	0.00087	0.011	--	<0.1	--	<0.002	--	<0.002	0.000034	0.0012	--	0.0064	<0.002	0.0039	--	0.081
GW-623784	UNDEV	31-Jan-06	--	0.0535	--	<0.002	--	0.0059	<0.001	--	<0.001	0.00076	--	0.00006	0.0038	--	0.029	--	0.00084	--	0.00041	<0.0002	0.0012	--	<0.005	<0.001	0.0082	--	0.0441
GW-634755	RYSR	24-May-06	--	<0.02	--	<0.001	--	**0.05**	<0.0005	--	<0.001	<0.001	--	<0.0005	0.0045	--	<0.1	--	<0.002	--	<0.002	<0.00003	<0.001	--	0.0024	<0.002	0.0074	--	0.15
GW-805189	RYSR	01-Feb-06	--	0.0999	--	<0.002	--	**0.0475**	<0.001	--	<0.001	0.0016	--	0.00004	0.0036	--	0.0211	--	0.00032	--	0.0011	<0.0002	0.00077	--	0.0019	<0.001	0.0061	--	0.0131
GW-900344	RYSR	24-May-06	--	<0.02	--	<0.001	--	**0.15**	<0.0005	--	<0.001	<0.001	--	<0.0005	0.0014	--	<0.1	--	<0.002	--	0.0015	<0.00003	0.0034	--	0.0013	<0.002	<0.004	--	0.079
GW-900905	NR19 Former Glory Hole and North of Main Tailings Pile	31-Jan-06	--	0.104	--	<0.002	--	0.0037	<0.001	--	<0.001	0.00011	--	0.0033	0.0013	--	0.0293	--	0.00021	--	0.00049	<0.0002	0.0012	--	0.0027	<0.001	0.0043	--	0.045
GW-999901	RYSR	12-Sep-08	<0.026	<0.0332	<0.002	<0.00011	**0.0146**	**0.0145**	<0.001	<0.001	<0.000027	<0.0014	<0.001	<0.00046	0.0068	<0.0933	<0.0035	0.00067	<0.00058	0.0052	<0.00011	<0.000048	<0.0006	0.0027	<0.0026	<0.001	0.0139	0.0956	0.0685
GW-999902	RYSR	19-Sep-08	<0.222	<0.222	<0.00042	<0.0004	0.0045	0.0046	<0.001	<0.000027	0.000032	<0.00056	0.0023	0.0023	0.0051	0.0294	0.0086	<0.00025	<0.00031	<0.00086	0.00018	0.000018	0.0014	0.0014	<0.0017	<0.001	0.0058	0.029	0.024
GW-999902	RYSR	11-May-10	--	<0.2	--	<0.06	--	0.005	<0.00016	--	<0.00019	<0.00039	--	<0.0031	0.0171	--	<0.0188	--	0.0018	--	<0.015	<0.0002	<0.04	--	0.0036	**0.0021**	<0.0065	--	<0.0293
GW-999903	RYSR	19-Sep-08	<0.222	<0.0298	<0.00018	<0.00015	0.0024	0.0028	<0.001	0.000018	0.00002	0.00093	0.0055	0.0036	<0.00048	0.0412	0.0834	<0.001	<0.00006	0.006	0.0026	0.000024	0.002	0.0116	0.0117	<0.001	0.006	0.0757	0.079
GW-999903	RYSR	06-May-10	--	<0.2	--	<0.06	--	0.0034	<0.005	--	<0.005	<0.01	--	0.0035	<0.025	--	0.183	--	<0.01	--	0.0024	<0.0002	<0.04	--	0.0101	<0.025	0.0067	--	0.0327
GW-999904	RYSR	19-Sep-08	<0.222	<0.0408	<0.00012	<0.002	0.0024	0.0027	<0.001	<0.001	<0.001	<0.0005	<0.00046	0.00035	0.0104	0.0074	0.0492	<0.000072	0.0016	<0.00025	0.00018	0.000047	0.0038	0.0054	0.0059	<0.001	0.0036	0.0264	0.0273
GW-999904	RYSR	06-May-10	--	<0.2	--	<0.06	--	<0.01	<0.005	--	<0.005	<0.01	--	<0.05	0.0054	--	0.104	--	<0.01	--	0.002	0.00012	<0.04	--	<0.035	<0.025	0.0033	--	0.0422
GW-999905	BKG	22-Sep-08	<0.222	<0.0325	<0.00014	<0.002	**0.0136**	**0.0139**	<0.001	<0.001	<0.001	0.0019	<0.00017	<0.00011	0.0177	0.0115	<0.005	<0.00046	<0.00047	<0.000095	<0.001	<0.0002	0.0014	0.0015	<0.0017	<0.001	0.0077	0.0084	0.014
GW-999906	BKG	19-Sep-08	<0.222	<0.0375	<0.00067	<0.00062	0.0031	0.0032	<0.001	<0.001	<0.001	0.00045	0.0015	<0.00015	0.0042	0.0328	0.0319	<0.001	<0.00019	0.0043	0.0137	<0.0002	0.00088	0.00036	<0.0005	<0.001	<0.00048	0.0029	0.0057
GW-999907	BKG	22-Sep-08	<0.222	<0.222	<0.00015	<0.002	**0.0269**	**0.0266**	<0.001	<0.001	<0.001	0.00042	<0.0006	<0.00017	0.0129	0.0216	<0.0076	<0.001	0.0011	0.0012	0.00026	<0.0002	0.0019	0.0021	<0.0022	<0.001	0.0033	0.0672	0.0803
GW-999907	BKG	11-May-10	--	<0.0518	--	<0.0026	--	**0.0287**	<0.005	--	<0.005	<0.01	--	<0.05	<0.0043	--	<0.0197	--	<0.01	--	<0.0011	<0.0002	<0.04	--	<0.0021	<0.0014	0.0039	--	0.0821
GW-999908	RYSR	22-Sep-08	<0.222	<0.222	<0.00014	<0.00043	**0.017**	**0.0173**	<0.001	0.000022	<0.001	0.0015	0.0011	<0.00057	<0.002	0.0614	<0.0257	<0.001	<0.00013	0.0015	0.0003	<0.000018	0.0006	0.0028	<0.0025	<0.001	0.0156	0.0089	0.0135
GW-999909	RYSR	22-Sep-08	<0.222	<0.222	<0.00011	<0.0002	0.0039	0.0039	<0.001	<0.001	<0.001	0.00039	0.0012	<0.00056	0.0063	0.0068	<0.0117	<0.00041	<0.00047	0.0051	0.00092	<0.000036	0.0025	0.0036	<0.0035	<0.001	0.0028	0.0776	0.084
GW-999909	RYSR	06-May-10	--	<0.2	--	<0.06	--	0.0043	<0.005	--	<0.005	<0.01	--	<0.05	0.0064	--	<0.1	--	<0.01	--	<0.015	<0.0002	0.002	--	<0.035	<0.025	0.0026	--	0.0895
GW-999910	BKG	22-Sep-08	<0.222	<0.222	<0.00061	<0.00013	**0.0167**	**0.0164**	<0.001	<0.001	<0.001	0.004	0.0022	<0.00012	0.0043	<0.111	<0.0093	<0.00022	<0.0003	0.0042	0.00033	<0.0002	0.00097	<0.002	<0.0018	<0.001	0.0065	0.0259	0.0371
GW-999911	BKG	22-Sep-08	<0.222	<0.222	<0.00039	<0.0001	0.0024	0.0026	<0.001	<0.000045	0.000033	0.0006	0.0021	<0.00051	0.0098	0.0081	<0.0135	<0.00044	<0.00049	0.0048	0.001	<0.000032	0.0056	<0.0045	0.0052	<0.001	0.0091	0.0908	0.0857
GW-999912	RYSR	23-Sep-08	<0.222	<0.222	<0.00051	<0.00022	0.0076	0.008	<0.001	<0.001	<0.001	<0.00042	0.0026	<0.00018	<0.00081	<0.111	0.0545	<0.00021	<0.00042	0.0055	0.0012	<0.000017	0.0016	<0.0024	0.0017	<0.001	0.0069	0.146	0.148
GW-999912	RYSR	08-May-10	--	<0.2	--	<0.06	--	<0.0081	<0.005	--	<0.00011	<0.01	--	<0.05	<0.002	--	0.0123	--	<0.01	--	<0.0034	<0.0002	<0.04	--	<0.0018	<0.0022	0.005	--	0.276
GW-999913	RYSR	23-Sep-08	<0.222	<0.222	<0.00035	<0.0001	0.003	0.0033	<0.001	<0.001	<0.001	<0.00042	0.0037	0.0013	0.009	0.006	0.145	<0.000075	<0.0005	0.0063	0.0031	<0.0002	0.0013	<0.0014	0.00064	<0.001	0.0043	0.009	0.0148
GW-999913	RYSR	13-May-10	--	<0.2	--	<0.06	--	0.0032	<0.005	--	<0.00013	<0.01	--	<0.001	<0.025	--	<0.0172	--	0.0015	--	<0.015	<0.0002	<0.04	--	0.0023	0.0018	<0.0052	--	<0.0034
GW-999914	RYSR	23-Sep-08	<0.222	<0.222	<0.0003	0.000098	0.0037	0.0036	<0.001	<0.001	<0.001	<0.00044	0.0024	<0.001	0.0063	<0.111	0.0131	<0.00013	<0.00045	0.0029	<0.001	<0.000017	0.0014	<0.0014	0.00083	<0.001	0.0046	0.0101	0.0118
GW-999914	RYSR	13-May-10	--	<0.2	--	<0.06	--	0.0028	<0.005	--	<0.00011	<0.01	--	<0.00045	<0.025	--	<0.1	--	0.0013	--	<0.015	<0.0002	<0.04	--	0.0037	<0.025	<0.0048	--	<0.0046
GW-999915	RYSR	23-Sep-08	<0.222	<0.222	<0.00029	<0.002	**0.0174**	**0.0176**	<0.001	0.000023	<0.001	<0.0015	0.0029	<0.00049	0.0224	<0.111	0.0614	<0.00038	<0.00034	0.0046	<0.001	<0.0002	<0.00084	<0.003	0.0028	<0.001	0.0161	0.0123	0.0209
GW-999916	BKG	23-Sep-08	<0.222	<0.222	<0.00027	<0.002	**0.0238**	**0.0231**	<0.001	<0.00008	<0.000041	<0.00032	0.0019	<0.00034	<0.00073	<0.111	0.0243	0.009	0.0081	0.0071	0.0041	<0.0002	0.0013	<0.0017	0.0013	<0.001	0.0012	3.27	3.48
GW-999917	BKG	23-Sep-08	<0.222	<0.0262	<0.00021	<0.002	0.0092	0.0096	<0.001	<0.001	<0.001	0.0054	0.0012	<0.000049	<0.0014	0.0088	0.0845	<0.00012	<0.00021	0.0023	<0.001	<0.0002	<0.00075	<0.0015	0.0014	<0.001	0.0105	0.0219	0.0198
GW-999918	BKG	23-Sep-08	<0.222	<0.222	<0.00027	<0.00043	0.0046	0.0045	<0.001	0.000017	<0.001	<0.00029	0.0022	<0.00019	0.0166	0.0163	0.0271	<0.00084	<0.00095	0.0042	<0.000077	<0.000018	0.0024	<0.00072	0.00029	<0.001	0.003	0.0128	0.0168
GW-999919	BKG	23-Sep-08	<0.222	<0.222	<0.00022	<0.00015	0.005	0.0049	<0.001	<0.001	<0.001	<0.00036	0.002	<0.000089	0.0077	0.0217	0.0138	<0.000091	<0.00021	0.0042	<0.00071	<0.0002	0.0011	<0.00098	0.00055	<0.001	0.0037	0.011	0.0144
GW-999920	BKG	24-Sep-08	<0.222	<0.0326	<0.00011	<0.00038	0.0011	0.0012	<0.001	<0.001	<0.001	<0.00047	0.0027	<0.00043	0.0038	0.0133	**0.34**	<0.00012	<0.000096	0.0052	0.004	<0.0002	0.0028	<0.0021	0.0016	<0.001	0.0018	0.0714	0.068
GW-999921	BKG	24-Sep-08	<0.222	<0.222	<0.0007	0.000089	0.0023	0.0022	<0.001	0.000021	<0.001	<0.00056	0.0023	<0.000084	0.0045	<0.111	<0.0143	<0.00084	0.0011	0.0042	<0.00026	<0.0002	0.0011	<0.0022	0.0016	<0.001	0.0145	0.215	0.213
GW-999922	BKG	24-Sep-08	<0.222	<0.222	<0.00039	0.000094	**0.0216**	**0.0216**	<0.001	0.000018	<0.001	0.0035	0.0016	<0.000054	0.0224	<0.111	<0.0443	<0.000076	<0.001	0.003	<0.001	<0.00003	<0.00078	<0.0018	0.0013	<0.001	0.0063	0.0066	0.007
GW-999923	BKG	24-Sep-08	<0.222	<0.222	<0.00029	<0.002	0.0073	0.0089	<0.001	<0.001	<0.001	<0.00043	0.0016	<0.00017	0.0371	<0.111	0.154	0.0024	0.0049	0.005	0.0041	<0.000021	0.0022	<0.0035	0.0024	<0.001	0.0032	3.06	3.1
GW-999924	RYSR	24-Sep-08	<0.222	<0.222	<0.00019	<0.002	0.0024	0.0022	<0.001	0.000019	<0.001	<0.0003	0.0016	<0.00013	0.0072	<0.111	<0.0208	<0.001	<0.00095	0.0032	<0.000088	<0.0002	0.0024	<0.0019	0.001	<0.001	0.0019	0.128	0.127
GW-999924	RYSR	06-May-10	--	<0.2	--	<0.06	--	<0.01	<0.005	--	<0.005	<0.01	--	<0.05	0.0073	--	<0.1	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.035	<0.025	0.002	--	0.173
GW-999925	BKG	24-Sep-08	<0.222	<0.222	<0.00024	<0.002	0.0058	0.0055	<0.001	<0.000028	<0.001	<0.00038	0.0025	<0.00037	0.069	<0.111	<0.0146	<0.00026	<0.00021	0.004	<0.001	<0.00002	0.0035	<0.0037	0.002	<0.001	0.0113	0.0082	0.0085
GW-999926	BKG	24-Sep-08	<0.222	<0.222	<0.00024	<0.002	0.0023	0.0024	<0.001	<0.001	<0.001	<0.0011	0.0019	<0.00017	0.024	<0.111	<0.022	<0.00015	0.0029	0.0035	<0.00054	<0.000018	0.0021	<0.00091	0.00055	<0.001	0.0094	0.0116	0.148
GW-999927	RYSR	24-Sep-08	<0.222	<0.142	<0.00014	<0.002	**0.0306**	**0.041**	<0.001	<0.001	<0.001	<0.0018	0.0016	<0.00059	0.0063	<0.111	**0.666**	<0.000074	<0.00067	0.0071	0.0383	<0.000028	0.002	<0.0021	0.0015	<0.001	0.0083	0.0046	0.0231
GW-999927	RYSR	10-May-10	--	<0.2	--	<0.0023	--	**0.0342**	<0.005	--	<0.005	<0.01	--	<0.05	<0.0156	--	<0.047	--	<0.01	--	<0.0033	<0.0002	<0.04	--	<0.0032	<0.025	0.0043	--	0.0108
GW-999928	BKG	25-Sep-08	<0.222	0.0948	<0.00014	<0.00021	0.0086	0.0088	<0.001	<0.001	<0.001	0.0012	0.0028	0.00023	0.0659	0.0168	0.127	0.0031	0.0146	0.0065	0.0056	<0.0002	0.0036	0.0018	<0.0023	<0.001	0.0049	0.126	0.188
GW-999929	RSAR-B	25-Sep-08	<0.222	<0.222	<0.002	<0.002	0.0022	0.0022	<0.001	<0.001	<0.001	0.00041	<0.00014	0.00013	0.0033	0.0159	0.0112	<0.001	0.00027	<0.00019	0.00015	<0.0002	0.0016	0.00067	<0.0011	<0.001	0.0038	0.035	0.0287
GW-999930	RYSR	25-Sep-08	<0.222	<0.222	<0.002	<0.002	<0.0003	**0.0208**	<0.001	<0.001	<0.001	0.00091	<0.000064	0.00014	0.223	0.0221	0.0114	<0.001	0.0057	<0.000068	0.00058	<0.0002	0.002	<0.005	<0.0018	<0.001	0.0071	0.0073	0.0161
GW-999930	RYSR	06-May-10	--	<0.2	--	<0.06	--	**0.0197**	<0.005	--	<0.005	<0.01	--	<0.05	0.0056	--	<0.1	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.035	<0.025	0.0074	--	0.0055
GW-999931	RSAR-D	25-Sep-08	<0.222	<0.222	<0.00024	<0.00022	0.0027	0.0028	<0.001	<0.001	<0.001	0.00053	0.0017	0.00019	0.0117	0.0219	0.04	<0.001	0.00052	0.0038	0.00097	<0.0002	0.0036	0.0013	<0.0015	<0.001	0.004	0.327	0.338
GW-999931	RSAR-D	11-May-10	--	<0.0203	--	<0.0022	--	<0.0048	<0.005	--	<0.005	<0.01	--	<0.05	<0.0091	--	<0.0379	--	<0.01	--	<0.00061	<0.0002	<0.0027	--	<0.0014	<0.0012	0.0028	--	0.131
GW-999932	BKG	25-Sep-08	<0.222	<0.222	<0.002	<0.0001	0.0076	0.0083	<0.001	<0.001	0.000056	0.0015	0.002	0.000089	0.0027	0.0151	0.0497	<0.00024	0.0011	0.0046	0.00085	<0.0002	0.0019	0.0011	<0.0012	<0.001	0.0092	0.524	0.546
GW-999933	BKG	25-Sep-08	<0.222	<0.222	<0.002	<0.00018	0.0034	0.0041	<0.001	<0.001	0.000062	0.00044	0.0028	0.001	0.0218	0.0284	0.131	0.0055	0.0133	0.0069	0.0043	<0.0002	0.0027	0.00085	<0.0016	<0.001	0.0024	4.19	4.31
GW-999934	RYSR	25-Sep-08	<0.222	<0.222	<0.002	<0.002	**0.0194**	**0.0196**	<0.001	<0.001	<0.001	0.00084	0.0014	0.00014	0.0428	0.0244	0.0073	<0.00014	0.0012	0.004	0.0015	<0.0002	0.0021	0.0016	<0.002	<0.001	0.0067	0.0155	0.0241
GW-999935	BKG	26-Sep-08	<0.2	<0.2	<0.00053	<0.002	**0.0186**	**0.0191**	<0.001	<0.001	<0.001	0.0037	0.0025	<0.001	0.0264	<0.0386	0.0223	0.0053	0.008	0.0064	0.0021	<0.0002	0.0015	<0.002	<0.0025	<0.001	0.0075	0.0112	0.0192
GW-999936	BKG	26-Sep-08	<0.2	0.0197	<0.00031	<0.002	**0.0213**	**0.0212**	<0.001	<0.001	<0.001	0.0055	0.0016	<0.001	0.0404	<0.0165	0.0894	<0.00045	0.0048	0.0041	0.0021	0.00031	0.0015	<0.0018	<0.0016	<0.001	0.0101	0.0369	0.0775

TABLE 7-21

Summary of Groundwater Analytical Results for Metals – Supply and Other Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Sample Date	Aluminum (Dissolved)	Aluminum (Total)	Antimony (Dissolved)	Antimony (Total)	Arsenic (Dissolved)	Arsenic (Total)	Beryllium (Total)	Cadmium (Dissolved)	Cadmium (Total)	Chromium (Total)	Cobalt (Dissolved)	Cobalt (Total)	Copper (Total)	Iron (Dissolved)	Iron (Total)	Lead (Dissolved)	Lead (Total)	Manganese (Dissolved)	Manganese (Total)	Mercury (Total)	Nickel (Total)	Selenium (Dissolved)	Selenium (Total)	Thallium (Total)	Vanadium (Total)	Zinc (Dissolved)	Zinc (Total)
Screening Levels			***0.2***	***0.2***	***0.006***	***0.006***	***0.01***	***0.01***	***0.004***	***0.005***	***0.005***	***0.1***	***0.006***	***0.006***	***1.3***	***0.3***	***0.3***	***0.015***	***0.015***	***0.05***	***0.05***	***0.002***	***0.1***	***0.05***	***0.05***	***0.002***	***0.086***	***5***	***5***
GW-999937	BKG	26-Sep-08	<0.2	0.125	<0.00028	<0.0002	0.0075	**0.0163**	<0.001	<0.001	<0.00014	<0.0014	0.0027	<0.00014	0.0057	<0.0391	**0.431**	<0.00078	0.0072	0.0144	0.0101	<0.0002	0.0029	<0.0033	<0.0042	<0.001	0.0046	2.23	2.34
GW-999938	BKG	26-Sep-08	<0.2	0.0214	<0.002	<0.00021	0.0049	0.005	<0.00012	<0.001	<0.00013	<0.0011	0.0017	<0.00016	0.172	0.0278	0.0355	0.0013	0.0148	0.0067	0.0034	<0.0002	0.0066	<0.0037	<0.0035	<0.0001	0.0055	0.147	0.211
GW-999939	BKG	26-Sep-08	<0.2	<0.2	<0.00026	<0.0002	**0.0249**	**0.0234**	<0.001	<0.001	<0.001	0.0055	0.0015	<0.001	0.0357	0.0303	0.0253	<0.00074	0.0049	0.004	<0.00094	<0.0002	0.0014	<0.0025	<0.002	<0.001	0.0089	0.0166	0.0378
GW-999940	BKG	30-Sep-08	<0.2	0.0179	<0.00037	<0.002	0.0045	0.0048	<0.001	<0.001	<0.001	<0.0011	0.0026	0.0001	0.0292	0.0175	0.0386	<0.0007	0.0033	0.0054	0.0015	0.0013	0.0022	0.0028	0.002	<0.001	0.0068	0.0088	0.023
GW-999941	UNDEV	01-Oct-08	<0.2	<0.2	<0.00031	<0.002	**0.0115**	**0.0118**	<0.001	<0.001	<0.001	<0.00096	0.0019	<0.001	0.0697	0.026	0.0279	0.0012	0.0072	0.0046	0.0022	<0.0002	0.0035	0.0053	0.0054	<0.001	0.006	0.0681	0.344
GW-999943	BKG	14-Oct-08	<0.2	<0.2	<0.00048	<0.00054	**0.0219**	**0.0209**	<0.00014	<0.001	<0.00018	0.0027	0.0035	<0.00012	0.0349	<0.1	<0.1	<0.00054	<0.00081	0.0069	0.0013	<0.0002	0.0022	<0.005	<0.0017	<0.00017	0.0082	0.0171	0.0152
GW-999944	BKG	13-Oct-08	<0.2	<0.2	<0.00026	<0.00028	**0.0156**	**0.0159**	<0.001	<0.001	<0.001	<0.0015	0.0011	<0.001	0.0025	<0.1	<0.1	<0.00065	<0.00042	0.0043	<0.00081	<0.0001	<0.00096	<0.0021	<0.002	<0.001	0.0089	0.0197	0.0615
GW-999945	RYSR	14-Oct-08	<0.2	<0.2	<0.00027	<0.002	0.0033	0.0044	<0.001	<0.001	<0.001	<0.002	0.0057	0.0032	0.0099	<0.1	**0.652**	<0.00022	<0.00085	0.0206	0.0248	<0.0002	0.0041	<0.0033	<0.0037	<0.001	0.0034	0.0148	0.022
GW-999945	RYSR	29-Apr-09	<0.2	<0.2	0.002	0.002	0.001	0.0015	<0.001	<0.001	<0.001	0.002	0.004	0.0032	0.006	<0.1	**0.507**	0.001	0.00079	0.0337	0.031	<0.0002	0.0056	<0.0041	<0.0041	<0.001	0.0018	0.0187	0.022
GW-999945	RYSR	11-Oct-09	<0.2	<0.2	<0.002	<0.002	0.0016	0.0045	<0.001	<0.001	<0.001	<0.00087	0.0039	0.0034	0.0213	0.0989	**0.516**	0.0015	0.0021	0.0137	0.0162	<0.0002	0.0055	0.0038	0.0035	<0.001	0.0024	0.0461	0.0203
GW-999945	RYSR	08-May-10	--	<0.2	--	<0.0066	--	<0.0021	<0.005	--	<0.005	<0.01	--	<0.0019	<0.0017	--	**0.464**	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.0027	<0.0015	0.0017	--	0.0095
GW-999945	RYSR	15-Oct-12	--	0.0151	--	<0.002	--	0.0016	<0.001	--	<0.001	<0.002	--	0.0039	0.0238	--	**1.84**	--	0.0047	--	0.0166	0.000011	0.003	--	0.0025	<0.001	<0.005	--	0.177
GW-999946	BKG	29-Oct-08	0.0098	0.0799	<0.00041	<0.0011	0.0022	0.0022	<0.001	<0.001	<0.001	0.0046	0.0022	<0.00014	0.125	<0.0146	<0.0506	0.0019	0.0082	0.0084	0.007	<0.0002	0.0169	<0.005	<0.005	<0.001	0.0038	0.0374	0.092
GW-999947	RYSR	30-Apr-09	<0.2	<0.2	0.002	0.002	0.0056	0.0061	<0.001	0.0001	0.00061	0.0192	0.0022	0.0016	0.18	<0.1	**5.98**	0.001	0.009	0.0072	**0.209**	<0.0002	0.0155	0.0248	0.0241	0.000027	0.0078	0.163	4.07
GW-999947	RYSR	11-Oct-09	0.012	0.0091	<0.002	<0.00033	0.0072	0.0071	<0.001	<0.00012	<0.0001	<0.0013	0.0013	<0.00043	0.0105	0.0272	0.0319	<0.00072	0.0016	0.003	0.0016	<0.0002	0.007	0.0377	0.0363	<0.00017	0.0055	0.0391	0.106
GW-999947	RYSR	06-May-10	--	<0.2	--	<0.06	--	0.0046	<0.005	--	<0.005	<0.01	--	<0.05	0.0061	--	<0.1	--	<0.01	--	<0.015	<0.0002	0.0035	--	0.0131	<0.025	0.007	--	0.0333
GW-999948	NR11 Former Pyrometallurgical Operations Area	04-May-09	<0.2	**3.17**	<0.002	<0.002	**0.341**	**0.29**	0.00046	<0.001	0.00008	0.0125	0.0033	**0.0105**	0.012	<0.1	**1.31**	0.000066	0.0021	0.0148	**1.18**	<0.0002	0.01	0.0017	0.0016	0.000027	0.0312	0.0045	0.0157
GW-999948	NR11 Former Pyrometallurgical Operations Area	13-Oct-09	<0.0126	**2.86**	<0.002	<0.002	**0.272**	**0.268**	<0.001	<0.001	<0.00018	0.0033	0.0012	0.0013	0.0077	0.0381	**1.67**	<0.0006	0.0049	0.0091	**0.122**	<0.0002	0.003	0.0021	0.0024	<0.001	0.0205	0.0064	0.0054
GW-999948	NR11 Former Pyrometallurgical Operations Area	04-May-10	<0.2	**0.819**	<0.06	<0.06	**0.362**	**0.366**	<0.005	<0.005	<0.005	<0.01	0.0013	<0.05	<0.025	<0.1	0.193	<0.01	<0.01	0.0066	**0.0785**	<0.0002	<0.04	<0.035	<0.035	<0.025	0.0227	<0.06	0.0018
GW-999948	NR11 Former Pyrometallurgical Operations Area	17-Oct-12	--	**1.16**	--	<0.002	--	**1.95**	<0.001	--	<0.001	<0.002	--	0.0014	<0.002	--	**0.509**	--	<0.001	--	**0.155**	<0.0002	0.0018	--	<0.005	<0.001	<0.001	<0.005	--	0.0046
GW-999949	RYSR	04-May-09	<0.2	<0.2	<0.000067	<0.000035	**0.0174**	**0.0168**	<0.001	<0.001	<0.001	0.0011	0.00065	0.0006	0.0328	<0.1	<0.1	0.0004	0.00055	0.00012	0.00012	<0.0002	0.00084	0.0028	0.0027	<0.001	0.0164	0.014	0.0131
GW-999950	BKG	05-May-09	<0.2	<0.2	<0.002	<0.002	0.0046	0.0046	<0.001	<0.001	<0.001	0.000069	0.0011	0.00015	0.0077	<0.1	<0.1	0.0012	0.00071	0.0021	<0.00009	<0.0002	0.0018	0.00074	0.00073	<0.001	0.0032	0.0161	0.0105
GW-999951	RSAR-G	05-May-09	<0.2	<0.2	<0.002	<0.002	0.0037	0.0038	<0.001	<0.001	<0.001	0.00034	0.0013	0.00013	0.0474	<0.1	<0.1	0.00077	0.0075	0.0043	0.0018	<0.0002	0.0012	0.0021	0.0021	<0.001	0.0054	0.0363	0.0694
GW-999951	RSAR-G	10-May-10	--	<0.2	--	<0.0016	--	0.008	<0.005	--	<0.005	<0.00033	--	<0.05	<0.0027	--	<0.0394	--	<0.01	--	<0.0015	<0.0002	<0.04	--	<0.0032	<0.025	0.0081	--	0.0134
GW-999952	UNDEV	05-May-09	<0.2	<0.2	<0.002	<0.002	**0.0174**	**0.0173**	<0.001	<0.001	<0.001	0.0011	0.0019	0.00059	0.0022	<0.1	<0.1	0.00044	0.00018	0.0031	<0.00068	<0.0002	0.0012	0.0032	0.0029	<0.001	0.0172	0.0109	0.0061
GW-999952	UNDEV	10-May-10	--	<0.2	--	<0.004	--	**0.0205**	<0.005	--	<0.005	<0.0003	--	<0.05	<0.0237	--	<0.1	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.0037	<0.025	0.0169	--	0.0306
GW-999953	RYSR	30-Apr-09	<0.2	0.085	0.002	0.002	0.0055	0.0062	<0.001	<0.001	0.00017	0.00081	0.002	0.00086	0.334	<0.1	0.0328	0.0008	**0.0498**	0.0037	0.0147	<0.0002	0.0099	0.0121	0.0118	0.00002	0.0078	0.0187	0.399
GW-999954	NR16 Former Mineworks Area	30-Apr-09	0.0808	0.1	0.0047	0.002	**0.956**	**1.04**	0.000045	0.0047	0.0046	0.002	**0.112**	**0.119**	0.0071	**35.8**	**35.4**	**0.0357**	**0.041**	**5.91**	**6.32**	<0.0002	0.0468	<0.004	<0.0044	0.000096	0.0002	**12.9**	**12.7**
GW-999954	NR16 Former Mineworks Area	11-Oct-09	0.0149	0.0196	0.0054	0.0044	**1.01**	**1.02**	<0.001	0.0047	0.0048	<0.00091	**0.105**	**0.104**	0.0064	**29.6**	**31.1**	**0.0242**	**0.0342**	**5.11**	**5.05**	<0.0002	0.042	0.0039	0.0031	<0.00015	<0.0005	**11.8**	**12**
GW-999954	NR16 Former Mineworks Area	03-May-10	--	<0.095	--	**0.0062**	--	**1.22**	<0.00094	--	**0.0122**	<0.01	--	**0.13**	0.0085	--	**37.1**	--	**0.0551**	--	**5.87**	<0.0002	0.0464	--	<0.035	<0.025	<0.05	--	**14.6**
GW-999955	RYSR	11-May-10	--	<0.2	--	<0.0019	--	<0.0055	<0.005	--	<0.005	<0.01	--	<0.0018	<0.0026	--	<0.0435	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.0029	<0.025	0.005	--	0.148
GW-999956	RYSR	10-May-10	--	<0.2	--	<0.0018	--	**0.0139**	<0.005	--	<0.005	<0.01	--	<0.05	<0.0058	--	<0.1	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.0026	<0.0013	0.0039	--	0.103
GW-999957	RYSR	07-May-10	--	<0.2	--	<0.06	--	0.0063	<0.005	--	<0.005	<0.01	--	<0.05	0.0053	--	<0.1	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.035	<0.025	0.0058	--	0.0141
GW-999958	RYSR	07-May-10	--	0.0582	--	<0.06	--	0.0034	<0.005	--	<0.005	<0.01	--	0.0027	0.104	--	**0.893**	--	**0.0168**	--	0.0053	<0.0002	<0.04	--	0.0172	<0.025	0.0058	--	0.156
GW-999959	RYSR	08-May-10	--	<0.2	--	<0.0016	--	0.0049	<0.005	--	<0.005	<0.00048	--	<0.05	<0.0027	--	<0.1	--	<0.01	--	<0.00067	<0.0002	<0.04	--	<0.0034	<0.025	0.0051	--	0.0633
GW-999960	BKG	07-May-10	--	<0.0269	--	<0.0018	--	<0.0031	<0.005	--	<0.005	<0.01	--	<0.05	0.0944	--	0.0071	--	0.0043	--	<0.015	<0.0002	<0.0026	--	<0.0039	<0.025	0.0021	--	0.0528
GW-999961	RYSR	08-May-10	--	<0.2	--	<0.0025	--	**0.0131**	<0.005	--	<0.005	<0.01	--	<0.05	0.0422	--	<0.1	--	<0.01	--	<0.00052	<0.0002	<0.0021	--	<0.0027	<0.025	0.0071	--	0.111
GW-999962	RSAR-G	10-May-10	--	<0.2	--	<0.0036	--	**0.0212**	<0.005	--	<0.005	0.0005	--	<0.05	<0.0015	--	<0.0351	--	<0.01	--	<0.015	<0.0002	<0.04	--	<0.0039	<0.025	0.0173	--	0.016
GW-999963	NR2 Dewey-Humboldt Town Hall	12-May-10	--	<0.2	--	<0.06	--	0.0023	<0.005	--	<0.00019	<0.01	--	<0.00094	<0.025	--	**1.21**	--	0.0021	--	**2.92**	0.000021	<0.0019	--	0.0032	<0.025	<0.0012	--	<0.0026
GW-999964	UNDEV	12-May-10	--	**0.572**	--	<0.06	--	0.0025	<0.005	--	<0.000068	<0.0015	--	<0.05	<0.025	--	**0.711**	--	0.0016	--	0.0301	<0.0002	<0.0011	--	0.0035	<0.025	<0.0044	--	<0.0041
GW-999965	RYSR	13-May-10	--	<0.2	--	<0.06	--	**0.0176**	0.00022	--	<0.00027	<0.0027	--	<0.0011	<0.025	--	0.0219	--	<0.01	--	0.0032	<0.0002	<0.0019	--	0.0062	<0.025	<0.0077	--	<0.0089
GW-999966	RYSR	13-May-10	--	<0.2	--	<0.06	--	0.0046	<0.005	--	<0.005	<0.00037	--	<0.05	0.0483	--	0.0619	--	0.004	--	0.0017	<0.0002	<0.0032	--	0.0066	0.0015	<0.0086	--	0.0672
SW-08	RYSR	30-Sep-08	<0.2	0.0235	<0.00058	<0.002	0.0097	0.009	<0.001	<0.001	<0.001	<0.00081	**0.0374**	**0.0414**	0.0042	0.0281	0.0461	<0.00047	<0.00042	**0.0647**	0.0377	<0.0002	0.0032	0.0048	0.0055	<0.001	0.0061	0.138	0.0304
SW-08	RYSR	28-Apr-09	<0.2	0.175	<0.002	<0.002	0.0061	0.0062	--	<0.001	<0.001	0.00087	**0.0445**	**0.041**	0.0134	<0.1	0.126	0.00034	0.00048	0.0046	0.0035	<0.0002	0.0031	0.0055	0.0054	<0.001	0.0031	0.0124	0.0115
SW-08	RYSR	14-Oct-09	<0.0235	<0.0188	<0.002	<0.002	0.0059	0.0058	<0.001	<0.000097	<0.001	0.0116	**0.0395**	**0.0388**	0.007	0.0315	0.0803	0.0074	0.0012	0.0035	0.0034	0.00027	0.0029	0.0046	0.0044	<0.001	0.0037	0.015	0.0157
SW-08	RYSR	06-May-10	--	<0.2	--	<0.06	--	0.0057	<0.005	--	<0.005	<0.01	--	**0.0332**	0.117	--	**0.555**	--	0.0026	--	0.0189	<0.0002	0.0035	--	<0.035	<0.025	0.0035	--	0.481

Notes:

1. All results reported in milligrams per liter (mg/L), except pH which is reported in standard units
2. Concentrations exceeding screening levels are **BOLD**
3. Refer to Table 6-5 for a description of groundwater screening levels
4. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

< = Analyte was not detected at the specified detection limit.

-- = Not analyzed

TABLE 7-22

Summary of Groundwater Analytical Results for Other Parameters – Supply and Other Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Sample Date	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Chloride	Fluoride	Nitrate As N	Nitrate+Nitrite As N	Nitrobenzene	Nitroglycerin	pH	Sulfate	Total Dissolved Solids
Screening Levels			***0.00024***	***0.000048***	***250***	***4***	***10***	***10***	***0.00014***	***0.002***	***--***	***250***	***500***
Cistern	NR19 Former Glory Hole and North of Main Tailings Pile	29-Oct-08	--	--	71	1	0.6	--	--	--	--	**4800**	**7200**
GW-511246	BKG	24-Sep-08	--	--	--	--	--	--	--	--	7.28	--	--
GW-551459	NR18 North American Industries Operations Area	14-May-02	--	--	--	--	1.2	--	--	--	--	82	--
GW-551459	NR18 North American Industries Operations Area	26-Sep-08	--	--	--	--	--	--	--	--	7.29	--	--
GW-573389	BKG	26-Sep-08	--	--	--	--	--	--	--	--	7.06	--	--
GW-576555	UNDEV	14-May-02	--	--	--	--	**12**	--	--	--	--	130	--
GW-586144	UNDEV	23-Sep-08	--	--	--	--	--	--	--	--	7.1	--	--
GW-586482	BKG	14-May-02	--	--	--	--	0.1	--	--	--	--	**480**	--
GW-592720	NR18 North American Industries Operations Area	26-Sep-08	--	--	--	--	--	--	--	--	7.53	--	--
GW-592720	NR18 North American Industries Operations Area	30-Apr-09	--	--	49	0.27	5.5	--	--	--	7.37	220	**670**
GW-999902	RYSR	19-Sep-08	--	--	--	--	--	--	--	--	7.17	--	--
GW-999902	RYSR	11-May-10	--	--	25	0.24	--	--	--	--	7.19	97	400
GW-999903	RYSR	19-Sep-08	--	--	--	--	--	--	--	--	7.19	--	--
GW-999903	RYSR	06-May-10	--	--	47	0.16	--	--	--	--	7.27	**270**	**690**
GW-999904	RYSR	19-Sep-08	--	--	--	--	--	--	--	--	7.02	--	--
GW-999904	RYSR	06-May-10	--	--	190	0.2	--	--	--	--	6.75	170	**1000**
GW-999905	BKG	22-Sep-08	--	--	--	--	--	--	--	--	6.47	--	--
GW-999906	BKG	19-Sep-08	--	--	--	--	--	--	--	--	7.57	--	--
GW-999907	BKG	22-Sep-08	--	--	--	--	--	--	--	--	6.79	--	--
GW-999907	BKG	11-May-10	--	--	42	0.29	--	--	--	--	7.11	34	400
GW-999908	RYSR	22-Sep-08	--	--	--	--	--	--	--	--	7.54	--	--
GW-999909	RYSR	22-Sep-08	--	--	--	--	--	--	--	--	6.93	--	--
GW-999909	RYSR	06-May-10	--	--	130	0.23	--	--	--	--	6.67	43	**700**
GW-999910	BKG	22-Sep-08	--	--	--	--	--	--	--	--	7.27	--	--
GW-999911	BKG	22-Sep-08	--	--	--	--	--	--	--	--	6.59	--	--
GW-999912	RYSR	23-Sep-08	--	--	--	--	9.1	--	--	--	6.93	45	--
GW-999912	RYSR	08-May-10	--	--	68	0.16	--	--	--	--	6.78	39	440
GW-999913	RYSR	23-Sep-08	--	--	--	--	--	--	--	--	7.17	--	--
GW-999913	RYSR	13-May-10	--	--	36	0.26	--	--	--	--	7.02	40	360
GW-999914	RYSR	23-Sep-08	--	--	--	--	**11**	--	--	--	7.14	44	--
GW-999914	RYSR	13-May-10	--	--	42	0.25	--	--	--	--	6.99	44	370
GW-999915	RYSR	23-Sep-08	--	--	--	--	5.2	--	--	--	7.5	47	--
GW-999916	BKG	23-Sep-08	--	--	--	--	--	--	--	--	7.1	--	--
GW-999917	BKG	23-Sep-08	--	--	--	--	--	--	--	--	7.37	--	--
GW-999918	BKG	23-Sep-08	--	--	--	--	--	--	--	--	7.24	--	--
GW-999919	BKG	23-Sep-08	--	--	--	--	--	--	--	--	6.97	--	--
GW-999920	BKG	24-Sep-08	--	--	--	--	5.1	--	--	--	6.9	72	--
GW-999921	BKG	24-Sep-08	--	--	--	--	--	--	--	--	7.4	--	--
GW-999922	BKG	24-Sep-08	--	--	--	--	--	--	--	--	7.4	--	--
GW-999923	BKG	24-Sep-08	--	--	--	--	--	--	--	--	6.97	--	--
GW-999924	RYSR	24-Sep-08	--	--	--	--	--	--	--	--	7.12	--	--
GW-999924	RYSR	06-May-10	--	--	30	0.16	--	--	--	--	6.78	25	350
GW-999925	BKG	24-Sep-08	--	--	--	--	--	--	--	--	6.7	--	--
GW-999926	BKG	24-Sep-08	--	--	--	--	--	--	--	--	7.07	--	--
GW-999927	RYSR	24-Sep-08	--	--	--	--	--	--	--	--	7.13	--	--
GW-999927	RYSR	10-May-10	--	--	36	0.49	--	--	--	--	7.04	17	350
GW-999928	BKG	25-Sep-08	--	--	--	--	--	--	--	--	7.65	--	--
GW-999929	RSAR-B	25-Sep-08	--	--	--	--	--	--	--	--	7.41	--	--
GW-999930	RYSR	25-Sep-08	--	--	--	--	--	--	--	--	7.54	--	--
GW-999930	RYSR	06-May-10	--	--	47	0.49	--	--	--	--	6.8	24	370
GW-999931	RSAR-D	25-Sep-08	--	--	--	--	--	--	--	--	7.33	--	--
GW-999931	RSAR-D	11-May-10	--	--	41	0.09	--	--	--	--	7.19	58	450
GW-999932	BKG	25-Sep-08	--	--	--	--	--	--	--	--	7.63	--	--
GW-999933	BKG	25-Sep-08	--	--	--	--	--	--	--	--	7.12	--	--
GW-999934	RYSR	25-Sep-08	--	--	--	--	--	--	--	--	7.34	--	--
GW-999935	BKG	26-Sep-08	--	--	--	--	--	--	--	--	7.2	--	--
GW-999936	BKG	26-Sep-08	--	--	--	--	--	--	--	--	7.26	--	--
GW-999937	BKG	26-Sep-08	--	--	--	--	--	--	--	--	7.13	--	--
GW-999938	BKG	26-Sep-08	--	--	--	--	--	--	--	--	6.91	--	--
GW-999939	BKG	26-Sep-08	--	--	--	--	--	--	--	--	7.36	--	--
GW-999940	BKG	30-Sep-08	--	--	--	--	--	--	--	--	6.86	--	--
GW-999941	UNDEV	01-Oct-08	--	--	--	--	--	--	--	--	7	--	--

TABLE 7-22

Summary of Groundwater Analytical Results for Other Parameters – Supply and Other Wells

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Location	Exposure Area	Sample Date	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Chloride	Fluoride	Nitrate As N	Nitrate+Nitrite As N	Nitrobenzene	Nitroglycerin	pH	Sulfate	Total Dissolved Solids
Screening Levels			***0.00024***	***0.000048***	***250***	***4***	***10***	***10***	***0.00014***	***0.002***	***--***	***250***	***500***
GW-999943	BKG	14-Oct-08	--	--	--	--	--	--	--	--	7.49	--	--
GW-999944	BKG	13-Oct-08	--	--	--	--	--	--	--	--	7.49	--	--
GW-999945	RYSR	14-Oct-08	--	--	--	--	--	--	--	--	7.05	--	--
GW-999945	RYSR	29-Apr-09	--	--	35	0.19	1.8	--	--	--	7.11	**1100**	**1900**
GW-999945	RYSR	08-May-10	--	--	32	0.2	--	--	--	--	6.91	**1300**	**2000**
GW-999945	RYSR	15-Oct-12	--	--	39	0.21	--	1.3	--	--	7	**1300**	**2000**
GW-999946	BKG	29-Oct-08	--	--	--	--	--	--	--	--	6.78	--	--
GW-999947	RYSR	30-Apr-09	--	--	**1000**	0.22	**59**	--	--	--	7.25	190	**3000**
GW-999947	RYSR	06-May-10	--	--	**760**	0.26	--	--	--	--	6.79	170	**2200**
GW-999948	NR11 Former Pyrometallurgical Operations Area	04-May-09	--	--	16	2.3	1.4	--	--	--	7.51	25	500
GW-999948	NR11 Former Pyrometallurgical Operations Area	04-May-10	--	--	16	2.3	--	--	--	--	7.78	23	490
GW-999948	NR11 Former Pyrometallurgical Operations Area	17-Oct-12	--	--	40	**9.9**	--	<0.03	--	--	7.54	73	**1500**
GW-999949	RYSR	04-May-09	--	--	34	0.83	5.3	--	--	--	7.77	49	**510**
GW-999950	BKG	05-May-09	--	--	62	0.18	1.3	--	--	--	7.99	13	470
GW-999951	RSAR-G	05-May-09	--	--	23	0.15	6	--	--	--	7.35	48	330
GW-999951	RSAR-G	10-May-10	--	--	34	0.25	--	--	--	--	6.93	44	320
GW-999952	UNDEV	05-May-09	--	--	34	0.92	5	--	--	--	7.87	49	460
GW-999952	UNDEV	10-May-10	--	--	35	0.97	--	--	--	--	7.21	52	**560**
GW-999953	RYSR	30-Apr-09	--	--	**640**	0.2	**45**	--	--	--	7.35	160	**2100**
GW-999954	NR16 Former Mineworks Area	30-Apr-09	<0.0004	<0.0002	71	2	<0.1	--	<0.0004	<0.003	6.02	**4700**	**7600**
GW-999954	NR16 Former Mineworks Area	03-May-10	--	--	68	1.1	--	--	--	--	--	**4500**	**7300**
GW-999955	RYSR	11-May-10	--	--	41	0.19	--	--	--	--	7.29	45	360
GW-999956	RYSR	10-May-10	--	--	48	1.5	--	--	--	--	7.52	32	460
GW-999957	RYSR	07-May-10	--	--	50	0.12	--	--	--	--	6.84	49	460
GW-999958	RYSR	06-May-10	--	--	--	--	--	--	--	--	7.25	--	--
GW-999958	RYSR	07-May-10	--	--	55	0.62	--	--	--	--	--	220	**670**
GW-999959	RYSR	08-May-10	--	--	67	0.36	--	--	--	--	6.88	150	**28000**
GW-999960	BKG	07-May-10	--	--	40	0.14	--	--	--	--	6.61	81	**520**
GW-999961	RYSR	08-May-10	--	--	65	0.13	--	--	--	--	7.05	64	**540**
GW-999962	RSAR-G	10-May-10	--	--	35	0.94	--	--	--	--	7.25	52	**550**
GW-999963	NR2 Dewey-Humboldt Town Hall	12-May-10	--	--	43	0.13	--	--	--	--	--	57	**600**
GW-999964	UNDEV	12-May-10	--	--	8.8	0.27	--	--	--	--	--	47	280
GW-999965	RYSR	13-May-10	--	--	33	0.38	--	--	--	--	6.96	61	390
GW-999966	RYSR	13-May-10	--	--	**340**	0.21	--	--	--	--	6.71	150	**1200**
SW-08	RYSR	30-Sep-08	--	--	--	--	--	--	--	--	6.83	--	--
SW-08	RYSR	28-Apr-09	--	--	76	0.21	1.1	--	--	--	7.32	**500**	**1000**
SW-08	RYSR	06-May-10	--	--	67	0.2	--	--	--	--	6.89	**620**	**1200**

Notes:

1. All results reported in milligrams per liter (mg/L), except pH which is reported in standard units
2. Concentrations exceeding screening levels are **BOLD**
3. Refer to Table 6-5 for a description of groundwater screening levels
4. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.

< = Analyte was not detected at the specified detection limit.

-- = Not analyzed

TABLE 7-23

Summary of Air Analytical Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	Area	Screening Level (µg/m^3)	Number of Results	Number of Detections	Number Exceeding Screening Level	Maximum Detection (µg/m^3)	Minimum Detection (µg/m^3)
Background							
Aluminum	Background	5.2	42	9	1	64	0.14
Arsenic	Background	0.00065	42	9	7	0.012	0.00037
Beryllium	Background	0.0012	42	2	1	0.0018	0.00087
Cadmium	Background	0.0016	42	3	0	0.0014	0.00012
Lead	Background	0.15	42	12	0	0.012	0.00062
Nickel	Background	0.011	42	7	2	0.028	0.00046
Humboldt Proper							
Aluminum	Humboldt Proper	5.2	50	20	0	1.5	0.38
Arsenic	Humboldt Proper	0.00065	50	10	7	0.011	0.00046
Beryllium	Humboldt Proper	0.0012	50	3	1	0.0014	0.00005
Cadmium	Humboldt Proper	0.0016	50	6	2	0.0033	0.00020
Lead	Humboldt Proper	0.15	50	10	0	0.0087	0.0012
Nickel	Humboldt Proper	0.011	50	14	2	0.020	0.00042
Former Humboldt Smelter							
Aluminum	Former Humboldt Smelter	5.2	47	25	3	16	0.48
Arsenic	Former Humboldt Smelter	0.00065	47	13	9	0.0075	0.00038
Beryllium	Former Humboldt Smelter	0.0012	47	2	1	0.016	0.00085
Cadmium	Former Humboldt Smelter	0.0016	47	7	2	0.0019	0.000058
Lead	Former Humboldt Smelter	0.15	47	22	1	0.18	0.0019
Nickel	Former Humboldt Smelter	0.011	47	16	4	.050	0.000058
Former Iron King Mine							
Aluminum	Former Iron King Mine	5.2	63	9	0	1.0	0.087
Arsenic	Former Iron King Mine	0.00065	63	20	20	0.035	0.00083
Beryllium	Former Iron King Mine	0.0012	63	0	0	--	--
Cadmium	Former Iron King Mine	0.0016	63	9	4	0.0036	0.000067
Lead	Former Iron King Mine	0.15	63	22	0	0.045	0.0029
Nickel	Former Iron King Mine	0.011	63	12	4	0.14	0.00015

Notes:

1. Data presented are for samples collected using BGI PQ100 samplers.
2. The screening levels used herein are solely to provide a perspective for identifying the nature and extent of contamination, and they are not intended to infer the existence of unacceptable risk.
3. Sample group was designated in the EA Engineering, Science, and Technology, Inc. (EA) Remedial Investigation (RI) Table 2-9 and Figure 5-60 (EA, 2010) (included in Appendix N of this RI).
4. Screening levels are the EPA Risk Screening Level (RSL) for Residential Exposures, equating to 1 x 10-6 risk for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (EPA, 2015a)

µg/m^3 = micrograms per cubic meter

EPA = U.S. Environmental Protection Agency

TABLE 7-24

Source Material – Volume Estimates

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Source Area	Exposure Area	Material Type	Volume (cubic yards)	Reported Uncertainty	Areal Extent (acres)	Areal Extent (square feet)	EA Classification (EA, 2010)	Depth (feet)	Source
Former Iron King Mine Property and Adjacent Galena Gulch									
Main Tailings Pile	NR17	Tailings	3,500,000	+/- 500,000 cubic yards	55	NA	Principal Threat Waste	Upper MTP: up to 105 Lower MTP: up to 60	Section 6.7 and Section 7.1
Former Mineworks Area	NR16	Waste rock and impacted soil	90,800	+/- 30%	5.6	245,000	Low-level Threat Waste	10	EA, 2010
Former Fertilizer Plant	NR16	Waste rock and tailings-impacted surface soil	11,100	+/- 30%	3.4	150,000	Low-level Threat Waste	2	
NAI Operations Area	NR18	Tailings-impacted surface soil	14,800	+/- 30%	4.6	200,000	Low-level Threat Waste	2	EA, 2010
NAI Operations Area Retention Ponds	NR18	Tailings-impacted surface soil/sediment	4,400	+/- 30%	1.4	60,000	Low-level Threat Waste	2	EA, 2010
North of MTP	NR19	Waste rock and tailings-impacted surface soil	7,400	+/- 30%	2.3	100,000	Low-level Threat Waste	2	EA, 2010
South of Former Iron King Mine Property (Galena Gulch)	NR14	Waste rock and tailings-impacted soil/sediment	37,000	+/- 30%	11	500,000	Low-level Threat Waste	2	EA, 2010
Former Humboldt Smelter Property and Chaparral Gulch									
Chaparral Gulch from Third Street to Dam, Smelter Tailings Swale, and Tailings Floodplain	NR3, NR5, NR6, NR7, and NR8	Contaminated UCD, tailings, HSCD, and LCD deposits	280,000	NA	NA	NA	Principal Threat Waste	97% of estimated volume occurs from 0 to 10 feet; up to 20 feet in Tailings Floodplain upstream of Chaparral Gulch Dam	Lockheed Martin SERAS, 2015; see also Table 7-2B
Lower Chaparral Gulch from Dam to Confluence with Agua Fria River	NR9	Tailings and impacted sediment	1,800	+/- 30%	0.6	24,000	Low-level Threat Waste	2	EA, 2010
Agua Fria Tailings Pile	NR10	Tailings	6,700	+/- 30%	1.0	45,000	Low-level Threat Waste	4	EA, 2010
Dross Area and Piles	NR11 and NR12	Dross and Contaminated Soil	207,000 (47,000 classified as dross)	NA	15	NA	Principal Threat Waste	Up to 7	Lockheed Martin SERAS, 2015
Slag Piles	NR11 and NR12	Slag	1,700,000	+/- 30%	8	300,000	Low-level Threat Waste	150	EA, 2010

Sources:

EA Engineering, Science, and Technology, Inc. 2010. *Remedial Investigation Report Iron King Mine - Humboldt Smelter Superfund Site Dewey-Humboldt, Yavapai County, Arizona.* March.

Lockheed Martin Scientific, Engineering, Response, and Analytical Services (Lockheed Martin SERAS). 2015. *Final Report Iron King Mine Site, Dewey-Humboldt, Arizona.* Prepared for Donald Bussey, EPA/ERT. February 3.

Notes:

MTP = Main Tailings Pile

NA = not applicable or not available

NAI = North American Industries, Inc.

HSCD = Humboldt Smelter Channel Deposit

LCD = Lowermost Channel Deposit

UCD = Uppermost Channel Deposit

The volume of source materials will be reevaluated in the feasibility study. In particular, the thickness and volume of the slag piles is considered to be overestimated.

TABLE 7-25

Smelter Tailings Swale, Tailings Floodplain, and Chaparral Gulch – Volume Estimates

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Material Type	Volume (cubic yards)	Comments
NR3, NR5, NR6, NR7, and NR8	**Channel deposits (UCD, tailings, HSCD, and LCD)**	**349,150**	Includes both contaminated and uncontaminated channel deposits.
	Channel deposits that exceed concentration thresholds	*280,610*	
	Contaminated deposits, 0 to 5 feet below grade	179,560	See Figure 6-6a of the ERT Report
	Contaminated deposits, 5 to 10 feet below grade	91,650	See Figure 6-6b of the ERT Report
	Contaminated deposits, 10 to 15 feet below grade	9,400	See Figure 6-6c of the ERT Report
	Channel deposits below concentration thresholds	*68,540*	Determined by subtracting the estimated volume of channel deposits that exceed concentration thresholds (280,610 yd^3) from the total volume of channel deposits (349,150 yd^3)
NR6, NR7, and NR8	**Tailings**	**187,380**	
	Oxidized tailings in the Smelter Tailings Swale	14,090	
	Oxidized tailings (unsaturated zone) in the Tailings Floodplain	113,985	
	Reduced tailings (saturated zone) in the Tailings Floodplain	59,305	
	Tailings that exceed concentration thresholds	114,390	
	Tailings below concentration thresholds	72,990	Determined by subtracting the estimated volume of tailings that exceed concentration thresholds (114,390 yd^3) from the total volume of tailings (187,380 yd^3)
NR3, NR5, NR6, NR7, and NR8	**UCD, HSCD, and LCD Deposits that exceed concentration thresholds**	166,220	Determined by subtracting the volume of tailings that exceed concentration thresholds (114,390 yd^3) from the volume of channel deposits that exceed concentration thresholds (280,610 yd^3)

Source:

ERT Report: Lockheed Martin Scientific, Engineering, Response, and Analytical Services (Lockheed Martin SERAS). 2015. *Final Report Iron King Mine Site, Dewey-Humboldt, Arizona.* Prepared for Donald Bussey, EPA/ERT. February 3.

Note:

Concentration thresholds of 200 mg/kg arsenic and/or 400 mg/kg lead were defined for the ERT Data Gap Investigation.

HSCD = Humboldt Smelter Channel Deposit

LCD = Lowermost Channel Deposit

mg/kg = milligrams per kilogram

UCD = Uppermost Channel Deposit

TABLE 8-1

Acid-Base Accounting Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Exposure Area	Exposure Area Name	Material	Sample Date	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Total S (percent)	Sulfide (percent)	Sulfate (percent)	pH, paste	AP (kg $CaCO_3$/tn)	NP (kg $CaCO_3$/tn)	NNP (kg $CaCO_3$/tn)	NPR (unitless)
STS-SB06	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	0	0	1.78	0.17	1.61	3.56	56	<35	-56	<0.054
STS-SB06	NR07	Smelter Tailings Swale	Hickey Formation	02/07/14	SOIL	5	5	0.87	NA	NA	7.28	27	53	26	20
STS-SB08	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	0	0	1.67	0.02	1.65	5.04	52	3	-49	0.058
STS-SB08	NR07	Smelter Tailings Swale	Colluvium	02/07/14	SOIL	10.5	10.5	0.01	NA	NA	7.5	<2	239	239	>120
CG-22	NR08	Tailings Floodplain	Tailings	05/02/09	SD	0.5	2	0.49	ND	0.34	6.3	15	8	-7	0.53
CG-22	NR08	Tailings Floodplain	Tailings	05/02/09	SD	7	8	0.48	0.02	0.19	5.6	15	6	-9	0.4
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	0	0	1.44	0.06	1.39	5.68	45	7	-38	0.16
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	11	11	6.9	6.12	0.78	6.18	216	35	-181	0.16
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	15	15	0.16	NA	NA	7.01	5	20	15	4
CHF-SB20	NR08	Tailings Floodplain	UCD	02/18/14	SOIL	0	0	4.35	0.53	3.82	3.35	136	<35	-136	<0.022
CHF-SB20	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	10	10	0.93	NA	NA	7.29	29	60	31	2.1
CHF-SB29	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	10	10	1.77	1.95	NA	7.35	55	37	-18	0.67
CHF-SB31	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	10	10	ND	NA	NA	6.88	<2	6	6	>3
CHF-SB32	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	15	15	1.11	NA	NA	7.4	35	34	-1	0.97
DAM-SB04	NR08	Tailings Floodplain	UCD	02/20/14	SOIL	0	0	2.74	0.11	2.62	5.95	85	3	-82	0.035
DAM-SB04	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	6	6	1.09	0.07	1.02	5.82	34	6	-28	0.18
DAM-SB04	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	15	15	4.41	4.3	0.11	7	138	48	-90	0.35
DAM-SB05	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	7.5	7.5	9.03	8.09	0.95	5.19	282	26	-256	0.092
HSJ-582	NR08	Tailings Floodplain	Tailings	05/04/09	SD	0	0.5	2.02	0.09	1.78	3.2	63	<0.5	-63	<0.0079
HSJ-583	NR08	Tailings Floodplain	Tailings	05/02/09	SOIL	0	0.5	3.57	0.2	2.99	1.9	112	<0.5	-112	<0.0045
HSJ-584	NR08	Tailings Floodplain	Tailings	05/02/09	SOIL	0	0.5	2.57	0.06	2.31	3.7	80	<0.5	-80	<0.0063
STS-SB12	NR08	Tailings Floodplain	Tailings	02/08/14	SOIL	6	6	2.64	0.15	2.49	2.68	82	<35	-82	<0.037
STS-SB12	NR08	Tailings Floodplain	Brown Clay	02/08/14	SOIL	9	9	0.81	NA	NA	7.19	25	78	53	3.1
ASH-C11	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	0.31	NA	NA	7.89	10	98	88	9.8
ASH-E08	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	0.14	NA	NA	8.32	4	92	88	23
ASH-E09	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	1.83	2.17	0.17	NA	NA	8.3	5	89	84	18
ASH-G09	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	0.06	NA	NA	8.35	2	59	57	30
HSJ-580	NR11	Former Pyrometallurgical Operations Area	Dross	05/01/09	SOIL	0	0.5	0.22	0.02	0.17	7.2	7	81	74	12
SL-SS01	NR11	Former Pyrometallurgical Operations Area	Slag	04/10/14	SOIL	0	0.17	0.89	NA	NA	7.94	28	29	1	1
SL-SS02	NR12	Smelter Plateau	Slag	04/10/14	SOIL	0	0.17	0.86	NA	NA	7.92	27	26	-1	0.96
SL-SS03	NR12	Smelter Plateau	Slag	04/10/14	SOIL	0	0.17	0.13	NA	NA	7.31	4	20	16	5
OS-11	NR15	Auto Yard	Soil	06/05/08	SOIL	0	0.5	ND	ND	ND	NA	<0.3	14.1	14	>47
OS-21	NR15	Auto Yard	Soil	06/04/08	SOIL	1	1.5	ND	ND	ND	NA	<0.3	66.7	67	>222
WR-SS01	NR16	Former Mineworks Area	Waste Rock	04/09/14	SOIL	0	0.17	1	NA	NA	7.61	31	161	130	5.2
WR-SS02	NR16	Former Mineworks Area	Waste Rock	04/09/14	SOIL	0	0.17	4.5	1.97	2.58	6.25	141	22	-119	0.16
IKJ-583	NR17	Main Tailings Pile	Tailings	05/02/09	SOIL	0	0.5	8.49	5.57	2.82	2.2	265	<0.5	-265	<0.0019
MTP-SB01	NR17	Main Tailings Pile	Tailings	04/02/14	SOIL	5	5	12.95	12.95	0.11	7.5	405	123	-282	0.3
MTP-SB01	NR17	Main Tailings Pile	Tailings	04/02/14	SOIL	27.5	27.5	12.18	11.41	0.77	6.98	381	152	-229	0.4
MTP-SB01	NR17	Main Tailings Pile	Hickey Formation	04/02/14	SOIL	47.5	47.5	0.18	NA	NA	7.06	6	7	1	1.2
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/03/14	SOIL	5	5	15.16	15.07	0.12	7.25	474	151	-323	0.32
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/04/14	SOIL	65	65	10.24	9.38	0.85	7.06	320	181	-139	0.57
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/04/14	SOIL	81	81	8.86	9.62	NA	7.11	277	147	-130	0.53
MTP-SB02	NR17	Main Tailings Pile	Hickey Formation	04/04/14	SOIL	84	84	0.16	NA	NA	7.5	5	15	10	3
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/07/14	SOIL	5	5	15.41	16.4	NA	7.21	482	171	-311	0.35
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/07/14	SOIL	63.5	63.5	13.78	14.43	NA	7.12	431	160	-271	0.37
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/08/14	SOIL	106	106	11.39	11.25	0.14	6.99	356	211	-145	0.59
MTP-SB03	NR17	Main Tailings Pile	Hickey Formation	04/08/14	SOIL	108	108	2.53	2.73	NA	7.36	79	32	-47	0.41
MW-08S	NR17	Main Tailings Pile	Tailings	08/10/12	SOIL	9.5	11.5	9.34	8.68	0.31	7.4	292	191	-101	0.65
MW-08S	NR17	Main Tailings Pile	Tailings	08/10/12	SOIL	29.5	31.5	11.7	11.1	0.02	7.4	366	190	-176	0.52
MW-09S	NR17	Main Tailings Pile	Tailings	08/09/12	SOIL	33.5	35	15.7	14.2	1.11	7.2	491	228	-263	0.46
MW-09S	NR17	Main Tailings Pile	Tailings	08/09/12	SOIL	68.5	70.5	19.2	17.1	1.53	7.4	600	183	-417	0.3

TABLE 8-1

Acid-Base Accounting Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Sample Location	Exposure Area	Exposure Area Name	Material	Sample Date	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Total S (percent)	Sulfide (percent)	Sulfate (percent)	pH, paste	AP (kg $CaCO_3$/tn)	NP (kg $CaCO_3$/tn)	NNP (kg $CaCO_3$/tn)	NPR (unitless)
IKJ-579	NR19	Former Small Tailings Pile	Tailings	05/02/09	SOIL	0	0.5	1.86	0.13	1.46	3	58	<0.5	-58	<0.0086
OS-60	RYSR	Residential Yard-Specific Risk	Soil	06/05/08	SOIL	1	1.5	ND	ND	ND	NA	<0.3	148	148	>493
OS-50	UNDEV	Undeveloped Area	Soil	06/07/08	SOIL	0	0.5	ND	ND	ND	NA	<0.3	128	128	>427
WR-SS03	UNDEV	Undeveloped Area	Waste Rock	04/09/14	SOIL	0	0.17	0.05	NA	NA	7.88	2	123	121	62

Notes:

< = not detected; reporting limit is indicated

AP = acid-generating potential

ft bgs= feet below ground surface

kg $CaCO_3$/tn = kilograms of calcium carbonate per metric ton

MTP = Main Tailings Pile

NA = not analyzed

ND = not detected

NNP = net neutralizing potential

NP = neutralizing potential

NPR = neutralization potential ratio

RYSR = Residential Yard Screening Area

SD = sediment

tn = metric ton

red font = value indicates acid-generating

blue font = falls in between acid-generating and neutralizing

green font = value indicates acid-neutralizing

TABLE 8-2

Synthetic Precipitation Leaching Procedure (SPLP) Leachate Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Surface Water Screening Levels [1]	0.087	0.03	0.15	0.004	0.00066	0.00025	0.074	0.023	0.009	0.0052	1	0.0025	0.12	0.00001	0.052	0.002	0.00032	0.15	0.02	0.12
Groundwater Screening Levels [2]	0.2	0.006	0.01	2	0.004	0.005	0.1	0.006	1.3	0.2	0.3	0.015	0.05	0.002	0.1	0.05	0.1	0.002	0.086	5

Sample Location	Exposure Area	Exposure Area Name	Material	Sample Date	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Extraction	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
HSJ-501	NR07	Smelter Tailings Swale	Tailings	09/04/08	SOIL	0	2	SPLP	ND	ND	ND	0.026 J	ND	0.003 J	ND	ND	ND	ND	ND	ND	ND	0.00012	ND	ND	ND	ND	ND	ND
HSJ-501	NR07	Smelter Tailings Swale	Tailings	9/4/08	SOIL	4	7	SPLP	NA	NA	NA	0.046 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00002 J	NA	NA	NA	NA	NA	NA
HSJ-501 Duplicate	NR07	Smelter Tailings Swale	Tailings	09/04/08	SOIL	0	2	SPLP	ND	ND	ND	0.031 J	ND	0.002 J	ND	ND	ND	ND	ND	ND	ND	0.00007	ND	ND	ND	ND	ND	ND
STS-SB06	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	0	0	SPLP	14	NA	ND	ND	NA	ND	ND	NA	5.7 J	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	1.1
STS-SB06	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	5	5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	0.91	ND	NA	ND	ND	NA	NA	ND
STS-SB08	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	0	0	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
STS-SB08	NR07	Smelter Tailings Swale	Tailings	02/07/14	SOIL	10.5	10.5	SPLP	33	NA	ND	ND	NA	0.037 J	ND	NA	22	NA	6.9 J	ND	2.4	ND	NA	ND	ND	NA	NA	6
CG-16	NR08	Tailings Floodplain	UCD	09/05/08	SD	0	0.5	SPLP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.038 J	0.00003	ND	ND	ND	ND	ND	ND
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	0	0	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00002 J	NA	ND	ND	NA	NA	ND
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	11	11	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	14	0.00002 J	NA	ND	ND	NA	NA	ND
CHF-SB17	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	15	15	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	0.88	ND	NA	ND	ND	NA	NA	ND
CHF-SB20	NR08	Tailings Floodplain	UCD	02/18/14	SOIL	0	0	SPLP	55	NA	0.14 J	ND	NA	0.42	ND	NA	5.8	NA	63	ND	9	0.00033	NA	ND	ND	NA	NA	150
CHF-SB20	NR08	Tailings Floodplain	Tailings	02/18/14	SOIL	10	10	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
CHF-SB29	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	10	10	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00021 J	NA	ND	ND	NA	NA	ND
CHF-SB31	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	10	10	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00004 J	NA	ND	ND	NA	NA	ND
CHF-SB32	NR08	Tailings Floodplain	Tailings	02/21/14	SOIL	15	15	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00018 J	NA	ND	ND	NA	NA	ND
DAM-SB04	NR08	Tailings Floodplain	UCD	02/20/14	SOIL	0	0	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	ND	ND	ND	0.67	0.0001 J	NA	ND	ND	NA	NA	ND
DAM-SB04	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	6	6	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	ND	ND	ND	0.98	0.00003 J	NA	ND	ND	NA	NA	ND
DAM-SB04	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	15	15	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00009 J	NA	ND	ND	NA	NA	ND
DAM-SB05	NR08	Tailings Floodplain	Tailings	02/20/14	SOIL	7.5	7.5	SPLP	ND	NA	0.14 J	ND	NA	0.052	ND	NA	ND	ND	ND	ND	3	0.00003 J	NA	ND	ND	NA	NA	1.4
STS-SB12	NR08	Tailings Floodplain	Smelter	02/08/14	SOIL	6	6	SPLP	ND	NA	ND	NA	NA	ND	ND	NA	1.1	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
STS-SB12	NR08	Tailings Floodplain	Brown Clay	02/08/14	SOIL	9	9	SPLP	ND	NA	ND	NA	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
ASH-C11	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
ASH-E08	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
ASH-E09	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	1.83	2.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
ASH-G09	NR11	Former Pyrometallurgical Operations Area	Dross	02/11/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
HSJ-504	NR11	Former Pyrometallurgical Operations Area	Dross	09/09/08	SOIL	0	2	SPLP	4.1 J	ND	ND	0.043 J	ND	ND	0.008 J	ND	ND	ND	2.5 J	ND	ND	0.0001 J	ND	0.012 J	ND	ND	0.014 J	ND
HSJ-504	NR11	Former Pyrometallurgical Operations Area	Dross	9/9/08	SOIL	4	7	SPLP	0.93 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.59 J	NA	NA	0.0001	NA	NA	NA	NA	0.017 J	NA
HSJ-504 (dup)	NR11	Former Pyrometallurgical Operations Area	Dross	9/9/08	SOIL	4	7	SPLP	0.71 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00004	NA	NA	NA	NA	0.021	NA
HSJ-507	NR11	Former Pyrometallurgical Operations Area	Slag	08/27/08	SOIL	0	2	SPLP	9.7	ND	0.028	0.14	ND	ND	0.015	ND	0.15	ND	5.9	0.019 J	0.034 J	ND	ND	ND	ND	ND	0.021	0.1
HSJ-507	NR11	Former Pyrometallurgical Operations Area	Slag	8/27/08	SOIL	4	7	SPLP	4.2	NA	0.029	0.048 J	NA	NA	NA	NA	NA	NA	1.6	NA	0.029 J	NA	NA	NA	NA	NA	0.018 J	NA
HSJ-514	NR11	Former Pyrometallurgical Operations Area	Dross	09/11/08	SOIL	0	2	SPLP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HSJ-539	NR11	Former Pyrometallurgical Operations Area	Dross	08/23/08	SOIL	0	0.5	SPLP	ND	ND	ND	0.092 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.062	ND	ND	ND	ND
SL-SS01	NR11	Former Pyrometallurgical Operations Area	Slag	04/10/14	SOIL	0	0.17	SPLP	ND	NA	0.15 J	ND	NA	ND	ND	NA	ND	NA	ND	0.39	ND	0.00003	NA	ND	ND	NA	NA	ND
HSJ-580	NR11	Former Pyrometallurgical Operations Area	Tailings	05/01/09	SOIL	0	0.5	SPLP	ND	ND	0.017 J	0.17	ND	ND	ND	ND	ND	ND	ND	ND	0.071	0.00014	ND	0.025	0.006 J	ND	ND	ND
HSJ-580	NR11	Former Pyrometallurgical Operations Area	Tailings	05/01/09	SOIL	0	0.5	SPLP	1.1	ND	0.014 J	0.18	ND	ND	ND	ND	0.05	ND	ND	ND	0.071	0.00013	ND	0.027	0.006 J	ND	ND	0.052 J
HSJ-561	NR12	Smelter Plateau	Slag	04/29/09	SOIL	0	2	SPLP	0.55 J	0.088	0.19	0.045 J	ND	ND	ND	ND	0.25	NA	3.2	0.15	0.027 J	0.00006	ND	ND	ND	ND	ND	0.66
SL-SS02	NR12	Smelter Plateau	Slag	04/10/14	SOIL	0	0.17	SPLP	ND	NA	0.28	ND	NA	ND	ND	NA	0.47	NA	9.4 J	ND	0.27 J	0.00004	NA	ND	ND	NA	NA	1.4
SL-SS03	NR12	Smelter Plateau	Slag	04/10/14	SOIL	0	0.17	SPLP	ND	NA	0.2	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
IKJ-522	NR16	Former Mineworks Area	Waste Rock	08/22/08	SOIL	0	2	SPLP	32	ND	0.01 J	0.18	0.0006 J	0.063	0.018	0.046	1.1	ND	9.7	ND	2	ND	0.041 J	ND	ND	ND	ND	11
IKJ-522	NR16	Former Mineworks Area	Waste Rock	08/22/08	SOIL	4	7	SPLP	25	ND	ND	0.16	0.004	0.065	0.006 J	0.17	0.85	ND	ND	ND	7.5	ND	0.085	ND	ND	ND	ND	15
IKV-137	NR16	Former Mineworks Area	Waste Rock	08/22/08	SOIL	4	7	SPLP	1.5	ND	ND	0.045 J	ND	ND	ND	ND	ND	ND	1.9	ND	0.058	ND	ND	ND	ND	ND	0.013 J	ND
WR-SS01	NR16	Former Mineworks Area	Waste Rock	04/09/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
WR-SS02	NR16	Former Mineworks Area	Waste Rock	04/09/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	2.8	ND	NA	ND	ND	NA	NA	1.5
IKJ-525	NR17	Main Tailings Pile	Tailings	08/20/08	SOIL	0	2	SPLP	ND	ND	0.14	0.066	ND	0.11	ND	0.12	ND	ND	ND	ND	7.7	ND	0.08	0.029	ND	ND	ND	34
IKJ-525	NR17	Main Tailings Pile	Tailings	08/20/08	SOIL	4	7	SPLP	ND	ND	0.013 J	0.11	ND	0.006	ND	ND	ND	ND	ND	ND	1.4	ND	ND	0.02	ND	ND	ND	0.23
IKJ-525	NR17	Main Tailings Pile	Tailings	08/20/08	SOIL	35	38	SPLP	ND	ND	ND	0.13	ND	0.002 J	ND	ND	ND	ND	ND	ND	0.23	ND	ND	0.044	ND	ND	ND	ND
IKJ-583	NR17	Main Tailings Pile	Tailings	05/02/09	SOIL	0	0.5	SPLP	12	ND	0.36	0.064	ND	0.05	0.044	0.043	0.59	NA	180	ND	1.7	0.00002 J	0.025 J	ND	ND	ND	ND	16
MTP-SB01	NR17	Main Tailings Pile	Tailings	04/02/14	SOIL	5	5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	0.94	0.00084	NA	ND	ND	NA	NA	0.52 J
MTP-SB01	NR17	Main Tailings Pile	Tailings	04/02/14	SOIL	27.5	27.5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00015 J	NA	0.14 J	ND	NA	NA	ND
MTP-SB01	NR17	Main Tailings Pile	Tailings	04/02/14	SOIL	47.5	47.5	SPLP	8.5 J	NA	ND	ND	NA	ND	ND	NA	ND	NA	8.9 J	ND	ND	0.001	NA	ND	ND	NA	NA	ND
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/03/14	SOIL	5	5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	1	0.00018	NA	ND	ND	NA	NA	ND
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/04/14	SOIL	65	65	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/04/14	SOIL	81	81	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	0.74	0.0004	NA	ND	ND	NA	NA	ND
MTP-SB02	NR17	Main Tailings Pile	Tailings	04/04/14	SOIL	84	84	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/07/14	SOIL	5	5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00015	NA	ND	ND	NA	NA	ND
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/07/14	SOIL	63.5	63.5	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	0.48 J	0.00048	NA	ND	ND	NA	NA	ND
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/08/14	SOIL	106	106	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00007	NA	ND	ND	NA	NA	ND
MTP-SB03	NR17	Main Tailings Pile	Tailings	04/08/14	SOIL	108	108	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	0.00006	NA	ND	ND	NA	NA	ND
S02	NR17	Main Tailings Pile	Tailings	03/20/08	SOIL	0	0.5	SPLP	NA	NA	0.024	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA
S19	NR17	Main Tailings Pile	Tailings	03/20/08	SOIL	0	0.5	SPLP	NA	NA	1.9	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA
S19 Duplicate	NR17	Main Tailings Pile	Tailings	03/20/08	SOIL	0	0.5	SPLP	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA
S25	NR17	Main Tailings Pile	Tailings	03/20/08	SOIL	0	0.5	SPLP	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA
IKJ-531	NR18	North American Industries Operations Area	Soil	08/18/08	SOIL	4	7	SPLP	ND	ND	0.02	0.04 J	ND	ND	ND	ND	ND	ND	ND	ND	5.2	ND	ND	ND	ND	ND	ND	ND
IKJ-532	NR18	North American Industries Operations Area	Soil	08/18/08	SOIL	4	7	SPLP	ND	ND	ND	0.04 J	ND	ND	ND	ND	ND	ND	ND	ND	30	ND	ND	ND	ND	ND	ND	ND
IKJ-532 Duplicate	NR18	North American Industries Operations Area	Soil	08/18/08	SOIL	4	7	SPLP	ND	ND	ND	0.035 J	ND	ND	ND	ND	ND	ND	ND	ND	26	ND	ND	ND	ND	ND	ND	ND
S13	NR18	North American Industries Operations Area	Soil	03/19/08	SOIL	0	0.5	SPLP	NA	NA	0.013	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 8-2

Synthetic Precipitation Leaching Procedure (SPLP) Leachate Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Surface Water Screening Levels [1]	**0.087**	**0.03**	**0.15**	**0.004**	**0.00066**	**0.00025**	**0.074**	**0.023**	**0.009**	**0.0052**	**1**	**0.0025**	**0.12**	**0.00001**	**0.052**	**0.002**	**0.00032**	**0.15**	**0.02**	**0.12**
Groundwater Screening Levels [2]	**0.2**	**0.006**	**0.01**	**2**	**0.004**	**0.005**	**0.1**	**0.006**	**1.3**	**0.2**	**0.3**	**0.015**	**0.05**	**0.002**	**0.1**	**0.05**	**0.1**	**0.002**	**0.086**	**5**

Sample Location	Exposure Area	Exposure Area Name	Material	Sample Date	Matrix	Start Depth (ft bgs)	End Depth (ft bgs)	Extraction	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CG-6	NR19	North of Main Tailings Pile	Tailings	09/11/08	SD	0	0.5	SPLP	0.72 J	ND	0.037	ND	ND	ND	ND	ND	ND	ND	1.1	ND	ND	0.00005	ND	ND	ND	ND	ND	ND
IKJ-537	NR19	North of Main Tailings Pile	Tailings	08/21/08	SOIL	0	2	SPLP	1.2	ND	0.017 J	0.15	ND	ND	ND	ND	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
IKJ-537	NR19	North of Main Tailings Pile	Tailings	08/21/08	SOIL	4	7	SPLP	0.58 J	ND	0.016 J	0.11	ND	ND	ND	ND	ND	ND	0.66 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
IKJ-579	NR19	Former Small Tailings Pile	Tailings	05/02/09	SOIL	0	0.5	SPLP	8	ND	0.014 J	0.06	ND	0.007	ND	ND	0.2	NA	ND	ND	0.14	0.0004	ND	ND	ND	ND	ND	1.9
WR-SS03	UNDEV	Undeveloped Area	Waste Rock	04/09/14	SOIL	0	0.17	SPLP	ND	NA	ND	ND	NA	ND	ND	NA	ND	NA	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND

Notes:

1. Refer to Table 6-4 for listing of screening types for surface water; dissolved criteria are used for this table.
2. Refer to Table 6-5 for listing of screening types for groundwater.
3. The screening levels used herein are solely to provide a perspective for identifying the nature and extent and fate and transport of contamination, and they are not intended to infer the existence of unacceptable risk.

ft bgs = feet below ground surface

J = Result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL) and the concentration is an approximate value.

mg/L = milligrams per liter

MTP = Main Tailings Pile

NA = not analyzed

ND = not detected

SD = sediment

SPLP = synthetic precipitation leaching procedure

UJ = The analyte was not detected at or above the reported value

red font = exceeds both surface water and groundwater screening levels

blue font = exceeds surface water screening level only

green font = exceeds groundwater screening level only

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
Soil				
40W	Residential Yard-Specific Risk (RYSR)	X		
80J	Residential Yard-Specific Risk (RYSR)	X		
103	Residential Yard-Specific Risk (RYSR)	X		
104	Residential Yard-Specific Risk (RYSR)	X		
105A	Residential Yard-Specific Risk (RYSR)	X		
105B	Residential Yard-Specific Risk (RYSR)	X		
106	Residential Yard-Specific Risk (RYSR)	X		
107A	Residential Yard-Specific Risk (RYSR)	X		
107B	Residential Yard-Specific Risk (RYSR)	X		
108	Residential Yard-Specific Risk (RYSR)	X		
109	Residential Yard-Specific Risk (RYSR)	X		
110	Residential Yard-Specific Risk (RYSR)	X		
112	Residential Yard-Specific Risk (RYSR)	X		
113	Residential Yard-Specific Risk (RYSR)	X		
114	Residential Yard-Specific Risk (RYSR)	X		
115	Residential Yard-Specific Risk (RYSR)	X		
116	Residential Yard-Specific Risk (RYSR)	X		
117	Residential Yard-Specific Risk (RYSR)	X		
119	Residential Yard-Specific Risk (RYSR)	X		
120	Residential Yard-Specific Risk (RYSR)	X		
121	Residential Yard-Specific Risk (RYSR)	X		
122	Residential Yard-Specific Risk (RYSR)	X		
126	Residential Yard-Specific Risk (RYSR)	X		
127	Residential Yard-Specific Risk (RYSR)	X		
129	Residential Yard-Specific Risk (RYSR)	X		
130	Residential Yard-Specific Risk (RYSR)	X		
131	Residential Yard-Specific Risk (RYSR)	X		
133	Residential Yard-Specific Risk (RYSR)	X		
134	Residential Yard-Specific Risk (RYSR)	X		
135	Residential Yard-Specific Risk (RYSR)	X		
136	Residential Yard-Specific Risk (RYSR)	X		
137	Residential Yard-Specific Risk (RYSR)	X		
138A	Residential Yard-Specific Risk (RYSR)	X		
138B	Residential Yard-Specific Risk (RYSR)	X		
138C	Residential Yard-Specific Risk (RYSR)	X		
139	Residential Yard-Specific Risk (RYSR)	X		
140	Residential Yard-Specific Risk (RYSR)	X		
141	Residential Yard-Specific Risk (RYSR)	X		
142	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
143	Residential Yard-Specific Risk (RYSR)	X		
144	Residential Yard-Specific Risk (RYSR)	X		
145	Residential Yard-Specific Risk (RYSR)	X		
146	Residential Yard-Specific Risk (RYSR)	X		
147	Residential Yard-Specific Risk (RYSR)	X		
149	Residential Yard-Specific Risk (RYSR)	X		
150	Residential Yard-Specific Risk (RYSR)	X		
151	Residential Yard-Specific Risk (RYSR)	X		
152	Residential Yard-Specific Risk (RYSR)	X		
153	Residential Yard-Specific Risk (RYSR)	X		
154	Residential Yard-Specific Risk (RYSR)	X		
155	Residential Yard-Specific Risk (RYSR)	X		
156	Residential Yard-Specific Risk (RYSR)	X		
157	Residential Yard-Specific Risk (RYSR)	X		
158	Residential Yard-Specific Risk (RYSR)	X		
159	Residential Yard-Specific Risk (RYSR)	X		
160	Residential Yard-Specific Risk (RYSR)	X		
161	Residential Yard-Specific Risk (RYSR)	X		
162	Residential Yard-Specific Risk (RYSR)	X		
163	Residential Yard-Specific Risk (RYSR)	X		
164	Residential Yard-Specific Risk (RYSR)	X		
165 and 60J	Residential Yard-Specific Risk (RYSR)	X		
166	Residential Yard-Specific Risk (RYSR)	X		
167A	Residential Yard-Specific Risk (RYSR)	X		
167B	Residential Yard-Specific Risk (RYSR)	X		
167C	Residential Yard-Specific Risk (RYSR)	X		
168	Residential Yard-Specific Risk (RYSR)	X		
169	Residential Yard-Specific Risk (RYSR)	X		
170A	Residential Yard-Specific Risk (RYSR)	X		
170B	Residential Yard-Specific Risk (RYSR)	X		
172	Residential Yard-Specific Risk (RYSR)	X		
173	Residential Yard-Specific Risk (RYSR)	X		
174	Residential Yard-Specific Risk (RYSR)	X		
175	Residential Yard-Specific Risk (RYSR)	X		
176	Residential Yard-Specific Risk (RYSR)	X		
177	Residential Yard-Specific Risk (RYSR)	X		
178	Residential Yard-Specific Risk (RYSR)	X		
179	Residential Yard-Specific Risk (RYSR)	X		
180	Residential Yard-Specific Risk (RYSR)	X		
181	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
182	Residential Yard-Specific Risk (RYSR)	X		
183	Residential Yard-Specific Risk (RYSR)	X		
184	Residential Yard-Specific Risk (RYSR)	X		
185	Residential Yard-Specific Risk (RYSR)	X		
186	Residential Yard-Specific Risk (RYSR)	X		
187	Residential Yard-Specific Risk (RYSR)	X		
188	Residential Yard-Specific Risk (RYSR)	X		
189	Residential Yard-Specific Risk (RYSR)	X		
190	Residential Yard-Specific Risk (RYSR)	X		
191A	Residential Yard-Specific Risk (RYSR)	X		
191B	Residential Yard-Specific Risk (RYSR)	X		
192	Residential Yard-Specific Risk (RYSR)	X		
193	Residential Yard-Specific Risk (RYSR)	X		
194	Residential Yard-Specific Risk (RYSR)	X		
195	Residential Yard-Specific Risk (RYSR)	X		
196	Residential Yard-Specific Risk (RYSR)	X		
197	Residential Yard-Specific Risk (RYSR)	X		
198	Residential Yard-Specific Risk (RYSR)	X		
199	Residential Yard-Specific Risk (RYSR)	X		
201	Residential Yard-Specific Risk (RYSR)	X		
202	Residential Yard-Specific Risk (RYSR)	X		
203A	Residential Yard-Specific Risk (RYSR)	X		
203B	Residential Yard-Specific Risk (RYSR)	X		
204	Residential Yard-Specific Risk (RYSR)	X		
205	Residential Yard-Specific Risk (RYSR)	X		
206	Residential Yard-Specific Risk (RYSR)	X		
207	Residential Yard-Specific Risk (RYSR)	X		
209	Residential Yard-Specific Risk (RYSR)	X		
210	Residential Yard-Specific Risk (RYSR)	X		
211	Residential Yard-Specific Risk (RYSR)	X		
212	Residential Yard-Specific Risk (RYSR)	X		
213	Residential Yard-Specific Risk (RYSR)	X		
214A	Residential Yard-Specific Risk (RYSR)	X		
214B	Residential Yard-Specific Risk (RYSR)	X		
215A	Residential Yard-Specific Risk (RYSR)	X		
215B	Residential Yard-Specific Risk (RYSR)	X		
215C	Residential Yard-Specific Risk (RYSR)	X		
216	Residential Yard-Specific Risk (RYSR)	X		
217	Residential Yard-Specific Risk (RYSR)	X		
218	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
219	Residential Yard-Specific Risk (RYSR)	X		
220	Residential Yard-Specific Risk (RYSR)	X		
221	Residential Yard-Specific Risk (RYSR)	X		
222	Residential Yard-Specific Risk (RYSR)	X		
223	Residential Yard-Specific Risk (RYSR)	X		
224	Residential Yard-Specific Risk (RYSR)	X		
225A	Residential Yard-Specific Risk (RYSR)	X		
225C	Residential Yard-Specific Risk (RYSR)	X		
226	Residential Yard-Specific Risk (RYSR)	X		
227 and 70J	Residential Yard-Specific Risk (RYSR)	X		
228 and 55J	Residential Yard-Specific Risk (RYSR)	X		
229 and 36W	Residential Yard-Specific Risk (RYSR)	X		
230	Residential Yard-Specific Risk (RYSR)	X		
231	Residential Yard-Specific Risk (RYSR)	X		
232	Residential Yard-Specific Risk (RYSR)	X		
233	Residential Yard-Specific Risk (RYSR)	X		
234 and 45J	Residential Yard-Specific Risk (RYSR)	X		
235	Residential Yard-Specific Risk (RYSR)	X		
236 and 85J	Residential Yard-Specific Risk (RYSR)	X		
237	Residential Yard-Specific Risk (RYSR)	X		
238	Residential Yard-Specific Risk (RYSR)	X		
239	Residential Yard-Specific Risk (RYSR)	X		
240	Residential Yard-Specific Risk (RYSR)	X		
241	Residential Yard-Specific Risk (RYSR)	X		
242	Residential Yard-Specific Risk (RYSR)	X		
243	Residential Yard-Specific Risk (RYSR)	X		
245	Residential Yard-Specific Risk (RYSR)	X		
246 and 30W	Residential Yard-Specific Risk (RYSR)	X		
247	Residential Yard-Specific Risk (RYSR)	X		
248	Residential Yard-Specific Risk (RYSR)	X		
249	Residential Yard-Specific Risk (RYSR)	X		
251	Residential Yard-Specific Risk (RYSR)	X		
252	Residential Yard-Specific Risk (RYSR)	X		
253	Residential Yard-Specific Risk (RYSR)	X		
254	Residential Yard-Specific Risk (RYSR)	X		
255	Residential Yard-Specific Risk (RYSR)	X		
256	Residential Yard-Specific Risk (RYSR)	X		
257	Residential Yard-Specific Risk (RYSR)	X		
258 and 00W	Residential Yard-Specific Risk (RYSR)	X		
261	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
262	Residential Yard-Specific Risk (RYSR)	X		
263	Residential Yard-Specific Risk (RYSR)	X		
265	Residential Yard-Specific Risk (RYSR)	X		
267	Residential Yard-Specific Risk (RYSR)	X		
268	Residential Yard-Specific Risk (RYSR)	X		
303	Residential Yard-Specific Risk (RYSR)	X		
307	Residential Yard-Specific Risk (RYSR)	X		
308	Residential Yard-Specific Risk (RYSR)	X		
309	Residential Yard-Specific Risk (RYSR)	X		
310	Residential Yard-Specific Risk (RYSR)	X		
311	Residential Yard-Specific Risk (RYSR)	X		
1101A	Residential Yard-Specific Risk (RYSR)	X		
1101B	Residential Yard-Specific Risk (RYSR)	X		
1102	Residential Yard-Specific Risk (RYSR)	X		
1104A	Residential Yard-Specific Risk (RYSR)	X		
1104B	Residential Yard-Specific Risk (RYSR)	X		
1106	Residential Yard-Specific Risk (RYSR)	X		
1107	Residential Yard-Specific Risk (RYSR)	X		
1108	Residential Yard-Specific Risk (RYSR)	X		
1902	Residential Yard-Specific Risk (RYSR)	X		
1903	Residential Yard-Specific Risk (RYSR)	X		
1906	Residential Yard-Specific Risk (RYSR)	X		
1907	Residential Yard-Specific Risk (RYSR)	X		
1908	Residential Yard-Specific Risk (RYSR)	X		
1909	Residential Yard-Specific Risk (RYSR)	X		
1910	Residential Yard-Specific Risk (RYSR)	X		
1911	Residential Yard-Specific Risk (RYSR)	X		
1912	Residential Yard-Specific Risk (RYSR)	X		
1913	Residential Yard-Specific Risk (RYSR)	X		
1914	Residential Yard-Specific Risk (RYSR)	X		
1915	Residential Yard-Specific Risk (RYSR)	X		
1917	Residential Yard-Specific Risk (RYSR)	X		
2102	Residential Yard-Specific Risk (RYSR)	X		
2103A	Residential Yard-Specific Risk (RYSR)	X		
2103B	Residential Yard-Specific Risk (RYSR)	X		
2105	Residential Yard-Specific Risk (RYSR)	X		
2108	Residential Yard-Specific Risk (RYSR)	X		
2109	Residential Yard-Specific Risk (RYSR)	X		
2110	Residential Yard-Specific Risk (RYSR)	X		
2111A	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
2111B	Residential Yard-Specific Risk (RYSR)	X		
2112	Residential Yard-Specific Risk (RYSR)	X		
2114	Residential Yard-Specific Risk (RYSR)	X		
2115	Residential Yard-Specific Risk (RYSR)	X		
2116	Residential Yard-Specific Risk (RYSR)	X		
2117	Residential Yard-Specific Risk (RYSR)	X		
2118	Residential Yard-Specific Risk (RYSR)	X		
2119A	Residential Yard-Specific Risk (RYSR)	X		
2119B	Residential Yard-Specific Risk (RYSR)	X		
2201	Residential Yard-Specific Risk (RYSR)	X		
2202	Residential Yard-Specific Risk (RYSR)	X		
2203	Residential Yard-Specific Risk (RYSR)	X		
2204	Residential Yard-Specific Risk (RYSR)	X		
2205	Residential Yard-Specific Risk (RYSR)	X		
2209	Residential Yard-Specific Risk (RYSR)	X		
2211	Residential Yard-Specific Risk (RYSR)	X		
2214	Residential Yard-Specific Risk (RYSR)	X		
2215	Residential Yard-Specific Risk (RYSR)	X		
2216	Residential Yard-Specific Risk (RYSR)	X		
2304	Residential Yard-Specific Risk (RYSR)	X		
2305	Residential Yard-Specific Risk (RYSR)	X		
2307	Residential Yard-Specific Risk (RYSR)	X		
2308	Residential Yard-Specific Risk (RYSR)	X		
2310	Residential Yard-Specific Risk (RYSR)	X		
2311	Residential Yard-Specific Risk (RYSR)	X		
2312	Residential Yard-Specific Risk (RYSR)	X		
2313	Residential Yard-Specific Risk (RYSR)	X		
2314	Residential Yard-Specific Risk (RYSR)	X		
2315	Residential Yard-Specific Risk (RYSR)	X		
2316	Residential Yard-Specific Risk (RYSR)	X		
2317	Residential Yard-Specific Risk (RYSR)	X		
2318	Residential Yard-Specific Risk (RYSR)	X		
2319A	Residential Yard-Specific Risk (RYSR)	X		
2322	Residential Yard-Specific Risk (RYSR)	X		
2323	Residential Yard-Specific Risk (RYSR)	X		
2324	Residential Yard-Specific Risk (RYSR)	X		
2325	Residential Yard-Specific Risk (RYSR)	X		
2326	Residential Yard-Specific Risk (RYSR)	X		
2327	Residential Yard-Specific Risk (RYSR)	X		
2328	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
2329	Residential Yard-Specific Risk (RYSR)	X		
2330	Residential Yard-Specific Risk (RYSR)	X		
2393	Residential Yard-Specific Risk (RYSR)	X		
2394	Residential Yard-Specific Risk (RYSR)	X		
2396	Residential Yard-Specific Risk (RYSR)	X		
2401	Residential Yard-Specific Risk (RYSR)	X		
2402	Residential Yard-Specific Risk (RYSR)	X		
2403	Residential Yard-Specific Risk (RYSR)	X		
2404	Residential Yard-Specific Risk (RYSR)	X		
2406	Residential Yard-Specific Risk (RYSR)	X		
2407	Residential Yard-Specific Risk (RYSR)	X		
2408	Residential Yard-Specific Risk (RYSR)	X		
2409	Residential Yard-Specific Risk (RYSR)	X		
2410	Residential Yard-Specific Risk (RYSR)	X		
2415	Residential Yard-Specific Risk (RYSR)	X		
2416	Residential Yard-Specific Risk (RYSR)	X		
2417	Residential Yard-Specific Risk (RYSR)	X		
2420	Residential Yard-Specific Risk (RYSR)	X		
2422	Residential Yard-Specific Risk (RYSR)	X		
2425	Residential Yard-Specific Risk (RYSR)	X		
2426	Residential Yard-Specific Risk (RYSR)	X		
2427	Residential Yard-Specific Risk (RYSR)	X		
2428	Residential Yard-Specific Risk (RYSR)	X		
2429	Residential Yard-Specific Risk (RYSR)	X		
2430	Residential Yard-Specific Risk (RYSR)	X		
2433	Residential Yard-Specific Risk (RYSR)	X		
2434	Residential Yard-Specific Risk (RYSR)	X		
2435	Residential Yard-Specific Risk (RYSR)	X		
2437A	Residential Yard-Specific Risk (RYSR)	X		
2439A	Residential Yard-Specific Risk (RYSR)	X		
2444	Residential Yard-Specific Risk (RYSR)	X		
2449	Residential Yard-Specific Risk (RYSR)	X		
2456	Residential Yard-Specific Risk (RYSR)	X		
2457	Residential Yard-Specific Risk (RYSR)	X		
2458	Residential Yard-Specific Risk (RYSR)	X		
2459A	Residential Yard-Specific Risk (RYSR)	X		
2459B	Residential Yard-Specific Risk (RYSR)	X		
2462	Residential Yard-Specific Risk (RYSR)	X		
2490	Residential Yard-Specific Risk (RYSR)	X		
2502	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
2504	Residential Yard-Specific Risk (RYSR)	X		
2505	Residential Yard-Specific Risk (RYSR)	X		
2507	Residential Yard-Specific Risk (RYSR)	X		
2508	Residential Yard-Specific Risk (RYSR)	X		
2509	Residential Yard-Specific Risk (RYSR)	X		
2511	Residential Yard-Specific Risk (RYSR)	X		
2512	Residential Yard-Specific Risk (RYSR)	X		
2514	Residential Yard-Specific Risk (RYSR)	X		
2515	Residential Yard-Specific Risk (RYSR)	X		
2516	Residential Yard-Specific Risk (RYSR)	X		
2517	Residential Yard-Specific Risk (RYSR)	X		
2518	Residential Yard-Specific Risk (RYSR)	X		
2520	Residential Yard-Specific Risk (RYSR)	X		
2521	Residential Yard-Specific Risk (RYSR)	X		
2522	Residential Yard-Specific Risk (RYSR)	X		
2523	Residential Yard-Specific Risk (RYSR)	X		
2524	Residential Yard-Specific Risk (RYSR)	X		
2525	Residential Yard-Specific Risk (RYSR)	X		
2526	Residential Yard-Specific Risk (RYSR)	X		
2527	Residential Yard-Specific Risk (RYSR)	X		
2529	Residential Yard-Specific Risk (RYSR)	X		
2530	Residential Yard-Specific Risk (RYSR)	X		
2532	Residential Yard-Specific Risk (RYSR)	X		
2535	Residential Yard-Specific Risk (RYSR)	X		
2536	Residential Yard-Specific Risk (RYSR)	X		
2537	Residential Yard-Specific Risk (RYSR)	X		
2538	Residential Yard-Specific Risk (RYSR)	X		
2539	Residential Yard-Specific Risk (RYSR)	X		
2540	Residential Yard-Specific Risk (RYSR)	X		
2541	Residential Yard-Specific Risk (RYSR)	X		
2542	Residential Yard-Specific Risk (RYSR)	X		
2545	Residential Yard-Specific Risk (RYSR)	X		
2549	Residential Yard-Specific Risk (RYSR)	X		
2550	Residential Yard-Specific Risk (RYSR)	X		
2602	Residential Yard-Specific Risk (RYSR)	X		
2603	Residential Yard-Specific Risk (RYSR)	X		
2606	Residential Yard-Specific Risk (RYSR)	X		
2610	Residential Yard-Specific Risk (RYSR)	X		
2612	Residential Yard-Specific Risk (RYSR)	X		
2615	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
2691	Residential Yard-Specific Risk (RYSR)	X		
2693	Residential Yard-Specific Risk (RYSR)	X		
2701	Residential Yard-Specific Risk (RYSR)	X		
2702	Residential Yard-Specific Risk (RYSR)	X		
2704	Residential Yard-Specific Risk (RYSR)	X		
2707	Residential Yard-Specific Risk (RYSR)	X		
2708	Residential Yard-Specific Risk (RYSR)	X		
2709	Residential Yard-Specific Risk (RYSR)	X		
2710	Residential Yard-Specific Risk (RYSR)	X		
2713B	Residential Yard-Specific Risk (RYSR)	X		
2715	Residential Yard-Specific Risk (RYSR)	X		
2718	Residential Yard-Specific Risk (RYSR)	X		
2719	Residential Yard-Specific Risk (RYSR)	X		
2720	Residential Yard-Specific Risk (RYSR)	X		
2723	Residential Yard-Specific Risk (RYSR)	X		
2724	Residential Yard-Specific Risk (RYSR)	X		
2725	Residential Yard-Specific Risk (RYSR)	X		
2726	Residential Yard-Specific Risk (RYSR)	X		
2736	Residential Yard-Specific Risk (RYSR)	X		
2740	Residential Yard-Specific Risk (RYSR)	X		
2741	Residential Yard-Specific Risk (RYSR)	X		
2743A	Residential Yard-Specific Risk (RYSR)	X		
2743BC	Residential Yard-Specific Risk (RYSR)	X		
2743D	Residential Yard-Specific Risk (RYSR)	X		
2743E	Residential Yard-Specific Risk (RYSR)	X		
2748	Residential Yard-Specific Risk (RYSR)	X		
2749	Residential Yard-Specific Risk (RYSR)	X		
2752	Residential Yard-Specific Risk (RYSR)	X		
2753	Residential Yard-Specific Risk (RYSR)	X		
2755	Residential Yard-Specific Risk (RYSR)	X		
2756	Residential Yard-Specific Risk (RYSR)	X		
2801	Residential Yard-Specific Risk (RYSR)	X		
2804	Residential Yard-Specific Risk (RYSR)	X		
2805	Residential Yard-Specific Risk (RYSR)	X		
2806	Residential Yard-Specific Risk (RYSR)	X		
2807	Residential Yard-Specific Risk (RYSR)	X		
2808	Residential Yard-Specific Risk (RYSR)	X		
2810	Residential Yard-Specific Risk (RYSR)	X		
2901	Residential Yard-Specific Risk (RYSR)	X		
2903	Residential Yard-Specific Risk (RYSR)	X		

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
3001	Residential Yard-Specific Risk (RYSR)	X		
3004	Residential Yard-Specific Risk (RYSR)	X		
3005	Residential Yard-Specific Risk (RYSR)	X		
3006A	Residential Yard-Specific Risk (RYSR)	X		
3006B	Residential Yard-Specific Risk (RYSR)	X		
3008	Residential Yard-Specific Risk (RYSR)	X		
3009	Residential Yard-Specific Risk (RYSR)	X		
3010	Residential Yard-Specific Risk (RYSR)	X		
3011	Residential Yard-Specific Risk (RYSR)	X		
3012	Residential Yard-Specific Risk (RYSR)	X		
3013A	Residential Yard-Specific Risk (RYSR)	X		
3013B	Residential Yard-Specific Risk (RYSR)	X		
3015	Residential Yard-Specific Risk (RYSR)	X		
45065	Residential Yard-Specific Risk (RYSR)	X		
45066	Residential Yard-Specific Risk (RYSR)	X		
O08	Residential Yard-Specific Risk (RYSR)	X		
O09	Residential Yard-Specific Risk (RYSR)	X		
O10	Residential Yard-Specific Risk (RYSR)	X		
O11	Residential Yard-Specific Risk (RYSR)	X		
O12	Residential Yard-Specific Risk (RYSR)	X		
O13	Residential Yard-Specific Risk (RYSR)	X		
O14	Residential Yard-Specific Risk (RYSR)	X		
O15	Residential Yard-Specific Risk (RYSR)	X		
O16	Residential Yard-Specific Risk (RYSR)	X		
O17	Residential Yard-Specific Risk (RYSR)	X		
Parcel Group A	Residential Screening Area Risk (RSAR)	X		
Parcel Group B	Residential Screening Area Risk (RSAR)	X		
Parcel Group C	Residential Screening Area Risk (RSAR)	X		
Parcel Group D Hotspot	Residential Screening Area Risk (RSAR)	X		
Parcel Group D (excluding hotspot)	Residential Screening Area Risk (RSAR)	X		
Parcel Group E	Residential Screening Area Risk (RSAR)	X		
Parcel Group F	Residential Screening Area Risk (RSAR)	X		
Parcel Group G	Residential Screening Area Risk (RSAR)	X		
Parcel Group H	Residential Screening Area Risk (RSAR)	X		
NR3 Upper Chaparral Gulch	Non-Residential, Possible Future Residential	X	X	X
NR13 Smelter East of River	Non-Residential, Possible Future Residential	X	X	X
NR19 North of Main Tailings Pile	Non-Residential, Possible Future Residential	X	X	X
NR20 North of Chaparral Gulch	Non-Residential, Possible Future Residential	X	X	X
NR2 Dewey-Humboldt Town Hall	Non-Residential	X	X	X
NR2 Humboldt Elementary School	Non-Residential	X	X	X

TABLE 9-1

Exposure Areas and Scenarios Considered for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Exposure Scenario Evaluated		
		Resident	Occupational Worker	Recreational Visitor
NR4 JT Septic Facility	Non-Residential	X	X	X
NR5 Main Tailings Pile 1964 Blow Out Path	Non-Residential	X	X	X
NR6 Middle Chaparral Gulch	Non-Residential	X	X	X
NR7 Smelter Tailings Swale	Non-Residential	X	X	X
NR8 Tailings Floodplain	Non-Residential	X	X	X
NR9 Lower Chaparral Gulch	Non-Residential	X	X	X
NR10 Agua Fria Tailings Pile	Non-Residential	X	X	X
NR11 Former Pyrometallurgical Operations Area	Non-Residential	X	X	X
NR12 Smelter Plateau	Non-Residential	X	X	X
NR14 South of Former Iron King Mine Property	Non-Residential	X	X	X
NR15 Auto Yard	Non-Residential	X	X	X
NR16 Former Mineworks Area	Non-Residential	X	X	X
NR17 Main Tailings Pile	Non-Residential	X	X	X
NR18 North American Industries Operations Area	Non-Residential	X	X	X
Sediment				
AF-01	Agua Fria River - Upstream			X
AF-02	Aqua Fria River - Adjacent to Smelter			X
AF-03	Aqua Fria River - Downstream			X
Surface Water				
AF-01	Agua Fria River - Upstream			X
AF-02	Aqua Fria River - Adjacent to Smelter			X
AF-03	Aqua Fria River - Downstream			X

TABLE 9-2

Exposure Assumptions for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Parameter	Symbol	Units	Resident	Source	Occupational Worker	Source	Recreator	Source
Exposure Concentration	C_s	mg/kg-dry	95% UCL or maximum	a	95% UCL or maximum	a	95% UCL or maximum	a
Adult Body Weight	BW_a	kg	80	b	80	b	--	--
Child Body Weight	BW_c	kg	15	b	--	--	--	--
Adolescent Body Weight	BW_{ad}	kg	--	--	--	--	36.3	c
Exposure Frequency	EF	days/yr	350	b	250	b	52	d
Adult Exposure Duration	ED_a	yrs	20	b	25	b	--	--
Child Exposure Duration	ED_c	yrs	6	b	--	--	--	--
Adolescent Exposure Duration	ED_{ad}	yrs	--	--	--	--	9	d
Inhalation Exposure Time Fraction	ETF	unitless	1.00	e	0.33	e	0.08	e
Carcinogenic Averaging Time	AT_c	yrs	70	b	70	b	70	b
Adult Noncarcinogenic Averaging Time	AT_a	yrs	20	b	25	b	--	--
Child Noncarcinogenic Averaging Time	AT_c	yrs	6	b	25	b	--	--
Adolescent Noncarcinogenic Averaging Time	AT_{ad}	yrs	--	--	--	--	9	d
Adult Incidental Soil Ingestion Rate	IRS_a	mg/day-dry	100	b	100	b	--	--
Child Incidental Soil Ingestion Rate	IRS_c	mg/day-dry	200	b	--	--	--	--
Adolescent Incidental Soil/Sediment Ingestion Rate	IRS_{ad}	mg/day-dry	--	--	--	--	100	b
Adolescent Water Ingestion Rate	IRW_{ad}	L/day	--	--	--	--	0.05	f
Adult Skin Surface Area (soil)	SA_a	cm^2	6,032	b,g	3,527	b,g	--	--
Child Skin Surface Area (soil)	SA_c	cm^2	2,373	b,g	--	--	--	--
Adolescent Skin Surface Area (soil/sediment)	SA_{ad}	cm^2	--	--	--	--	3,250	b,g
Adolescent Skin Surface Area (surface water)	SA_{adw}	cm^2	--	--	--	--	11,750	h
Dermal Absorption Fraction (from soil)	AF_s	unitless	Chemical-specific	i	Chemical-specific	i	Chemical-specific	i
Dermal Permeability Coefficient (water)	AF_w	unitless	Chemical-specific	i	Chemical-specific	i	Chemical-specific	i
Adult Event Duration (water)	ET_{ad}	hr/event	--	--	--	--	1.0	j
Adult Soil-to-Skin Adherence Factor	AF_a	mg/cm^2	0.07	b	0.12	b	--	--
Child Soil-to-Skin Adherence Factor	AF_c	mg/cm^2	0.2	b	--	--	--	--
Adolescent Soil-to-Skin Adherence Factor	AF_{ad}	mg/cm^2	--	--	--	--	0.2	b
Adolescent Sediment-to-Skin Adherence Factor	Af_{ads}	mg/cm^2	--	--	--	--	0.3	k
Particulate Emission Factor	PEF	m^3/kg	1.36E+09	l	1.36E+09	l	--	--
Volatilization Factor	VF	m^3/kg	Chemical-specific	l	Chemical-specific	l	--	--

Notes:

cm^2 = square centimeter

days/yr = days per year

kg = kilogram

L/day = liter per day

m^3/kg = cubic meter per kilogram

mg/cm^2 = milligram per square centimeter

mg/day-dry = milligram per day, dry weight basis

mg/kg-dry = milligram per kilogram, dry weight basis

yrs = years

UCL = upper confidence limit

[a] Based on remedial investigation sampling.

[b] EPA. 2014. *Human Health Exposure Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors* OSWER Directive 92100.1-120. February 6.

[c] Assumes adolescent recreator is 10 years old. EPA, 1997b. *Exposure Factors Handbook, Volume I General Factors,* Table 7-3 Average Body Weight for Boys and Girls.

[d] Professional Judgement: adolescent recreators are assumed onsite 4 hours per day, 2 days per week, for 26 weeks per year over a 9 year exposure duration. Exposure duration is from IDEQ (2004)

[e] Fraction of exposure time applied to calculation of inhalation risk (resident equates to 24 hr/day, worker equates to 8 hr/day, and recreator equates to 2 hr/day)

[f] Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final (EPA, 1989).

[g] Skin surface areas for adult and child residents, and recreational users assume exposed head, hands, forearms, lower legs, and feet for soil/sediment exposure. Surface area for adult workers assumes exposed head, hands, and forearms for soil exposure. Recreator values are for 10-year-old from Exhibit C-1 of EPA, 2004b.

[h] Skin surface area for recreational users assume full body exposed for surface water exposure during swimming. Recreator value is average of male/female for 10-year-old from Exhibit C-1 of EPA, 2004b.

[i] Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final (EPA, 2004b).

[j] Professional judgment. Assumes a one-hour swimming, wading, or contact event per day.

[k] From Exhibit 3-3 in EPA (2004b). Value for residential adults as gardeners and value for children playing in wet soil.

[l] *Soil Screening Guidance: Users Guide* (EPA, 1996).

TABLE 9-3

Toxicity Factors for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CASRN	Mutagen	Volatile Organic Compound	Volatilization Factor (m^3/kg)	Water Permeability Constant (Kp) (cm/hr)	Dermal Absorption Fraction[a]	Gastrointestinal Absorption Fraction[a]	Oral Slope Factor (mg/kg-day)$^{-1}$	Source	Inhalation Unit Risk (µg/m^3)	Source	Oral Reference Dose (mg/kg-day)	Source	Inhalation Reference Concentration (RfC) (mg/m^3)	Source	Surrogate
4,4'-DDD	72-54-8	--	--	--	--	0.1	1	0.24	I	0.000069	C	--	--	--	--	--
4,4'-DDE	72-55-9	--	V	2,100,000	--	--	1	0.34	I	0.000097	C	--	--	--	--	--
4,4'-DDT	50-29-3	--	--	--	--	0.03	1	0.34	I	0.000097	I	0.0005	I	--	--	--
4-Chloroaniline	106-47-8	--	--	--	--	0.1	1	0.2	P	--	--	0.004	I	--	--	--
Acenaphthene	83-32-9	--	V	141,000	--	0.13	1	--	--	--	--	0.06	I	--	--	--
Acetone	67-64-1	--	V	13,700	--	--	1	--	--	--	--	0.9	I	31	A	--
Acetophenone	98-86-2	--	V	59,700	--	--	1	--	--	--	--	0.1	I	--	--	--
Alpha-Chlordane	5103-71-9	--	V	902,000	--	0.04	1	0.35	I	0.0001	I	0.0005	I	0.0007	I	Chlordane
Aluminum	7429-90-5	--	--	--	0.001	--	1	--	--	--	--	1	P	0.005	P	--
Anthracene	120-12-7	--	V	523,000	--	0.13	1	--	--	--	--	0.3	I	--	--	--
Antimony	7440-36-0	--	--	--	0.001	--	0.15	--	--	--	--	0.0004	I	--	--	--
Aroclor-1242	53469-21-9	--	V	793,000	--	0.14	1	2	S	0.00057	S	0.00002	I	--	--	Aroclor-1254 for RfD
Aroclor-1248	12672-29-6	--	V	514,000	--	0.14	1	2	S	0.00057	S	0.00002	I	--	--	Aroclor-1254 for RfD
Aroclor-1254	11097-69-1	--	V	843,000	--	0.14	1	2	S	0.00057	S	0.00002	I	--	--	--
Aroclor-1260	11096-82-5	--	V	1,310,000	--	0.14	1	2	S	0.00057	S	0.00002	I	--	--	Aroclor-1254 for RfD
Arsenic	7440-38-2	--	--	--	0.001	0.005	1	1.5	I	0.0043	I	0.0003	I	0.000015	C	--
Barium	7440-39-3	--	--	--	0.001	--	0.07	--	--	--	--	0.2	I	0.0005	H	--
Benzaldehyde	100-52-7	--	V	22,500	--	--	1	--	--	--	--	0.1	I	--	--	--
Benzo[a]anthracene	56-55-3	M	V	4,410,000	--	0.13	1	0.73	E	0.00011	C	--	--	--	--	--
Benzo[a]pyrene	50-32-8	M	--	--	--	0.13	1	7.3	I	0.0011	C	--	--	--	--	--
Benzo[b]fluoranthene	205-99-2	M	--	--	--	0.13	1	0.73	E	0.00011	C	--	--	--	--	--
Benzo[g,h,i]perylene	191-24-2	--	V	2,380,000	--	0.13	1	--	--	--	--	0.03	I	--	--	Pyrene
Benzo[k]fluoranthene	207-08-9	M	--	--	--	0.13	1	0.073	E	0.00011	C	--	--	--	--	--
Benzyl butyl phthalate	85-68-7	--	--	--	--	0.1	1	0.0019	P	--	--	0.2	I	--	--	--
Beryllium	7440-41-7	--	--	--	0.001	--	0.007	--	--	0.0024	I	0.002	I	0.00002	I	--
Beta-BHC	319-85-7	--	--	--	--	0.1	1	1.8	I	0.00053	I	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	--	--	0.1	1	0.014	I	0.0000024	C	0.02	I	--	--	--
Cadmium (Diet)	7440-43-9	--	--	--	--	0.001	0.025	--	--	0.0018	I	0.001	I	0.00001	A	--
Cadmium (Water)	7440-43-9	--	--	--	0.001	0.001	0.05	--	--	0.0018	I	0.0005	I	0.00001	A	--
Caprolactam	105-60-2	--	--	--	--	0.1	1	--	--	--	--	0.5	I	0.0022	C	--
Carbazole	122-39-4	--	--	--	--	0.1	1	--	--	--	--	0.025	I	--	--	N,N-diphenylamine
Carbon disulfide	75-15-0	--	V	1,170	--	--	1	--	--	--	--	0.1	I	0.7	I	--
Chloroform	67-66-3	--	V	2,630	--	--	1	0.031	C	0.000023	I	0.01	I	0.098	A	--
Chromium	7440-47-3	--	--	--	--	--	0.013	--	--	--	--	1.5	--	--	--	Chromium(III), Insoluble Salts
Chromium, Hexavalent	18540-29-9	M	--	--	0.002	--	0.025	0.5	J	0.084	S	0.003	I	0.0001	I	--
Chrysene	218-01-9	M	--	--	--	0.13	1	0.0073	E	0.000011	C	--	--	--	--	--
Cobalt	7440-48-4	--	--	--	0.0004	--	1	--	--	0.009	P	0.0003	P	0.000006	P	--
Copper	7440-50-8	--	--	--	0.001	--	1	--	--	--	--	0.04	H	--	--	--
Cyanide	57-12-5	--	--	--	0.001	--	1	--	--	--	--	0.001	I	--	--	Sodium cyanide
Delta-BHC	319-86-8	--	--	--	--	0.1	1	1.8	I	0.00053	I	--	--	--	--	Beta-BHC
Dibenzo[a,h]anthracene	53-70-3	M	--	--	--	0.13	1	7.3	E	0.0012	C	--	--	--	--	--
Dieldrin	60-57-1	--	--	--	--	0.1	1	16	I	0.0046	I	0.00005	I	--	--	--
Dimethyl phthalate	131-11-3	--	--	--	--	0.1	1	--	--	--	--	0.8	I	--	--	Diethyl phthalate
Di-n-butyl phthalate	84-74-2	--	--	--	--	0.1	1	--	--	--	--	0.1	I	--	--	--
Endosulfan I	959-98-8	--	V	410,000	--	--	1	--	--	--	--	0.006	I	--	--	Endosulfan
Endrin Ketone	53494-70-5	--	--	--	--	0.1	1	--	--	--	--	0.0003	I	--	--	Endrin
Ethylbenzene	100-41-4	--	V	5,670	--	--	1	0.011	C	0.0000025	C	0.1	I	1	I	--
Fluoranthene	206-44-0	--	--	--	--	0.13	1	--	--	--	--	0.04	I	--	--	--
Fluoride	16984-48-8	--	--	--	0.001	--	1	--	--	--	--	0.04	C	0.013	C	--
Gamma-Chlordane	12789-03-6	--	V	902,000	--	0.04	1	0.35	I	0.0001	I	0.0005	I	0.0007	I	--
Heptachlor	76-44-8	--	V	479,000	--	--	1	4.5	I	0.0013	I	0.0005	I	--	--	--
Heptachlor Epoxide	1024-57-3	--	V	843,000	--	--	1	9.1	I	0.0026	I	0.000013	I	--	--	--
Indeno[1,2,3-cd]pyrene	193-39-5	M	--	--	--	0.13	1	0.73	E	0.00011	C	--	--	--	--	--
Iron	7439-89-6	--	--	--	0.001	--	1	--	--	--	--	0.7	P	--	--	--
Lead	7439-92-1	--	--	--	--	--	1	--	--	--	--	--	--	--	--	IEUBK and ALM models
Manganese	7439-96-5	--	--	--	0.001	--	1	--	--	--	--	0.14	I	0.00005	I	--
Mercury	7439-97-6	--	--	--	0.001	--	0.07	--	--	--	--	0.0003	I	0.0003	S	Mercuric chloride
Methyl ethyl ketone	78-93-3	--	V	12,200	--	--	1	--	--	--	--	0.6	I	5	I	--
Nickel	7440-02-0	--	--	--	0.0002	--	0.04	--	--	0.00026	C	0.02	I	0.00009	A	--
Nitrate as N	14797-55-8	--	--	--	0.001	--	1	--	--	--	--	1.6	I	--	--	--
Nitrite As N	14797-65-0	--	--	--	0.001	--	1	--	--	--	--	0.1	I	--	--	--
p- & m-Xylenes	179601-23-1	--	V	5,470	--	--	1	--	--	--	--	0.2	S	0.1	S	m-Xylene

TABLE 9-3

Toxicity Factors for the Human Health Risk Assessment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Analyte	CASRN	Mutagen	Volatile Organic Compound	Volatilization Factor (m^3/kg)	Water Permeability Constant (Kp) (cm/hr)	Dermal Absorption Fraction[a]	Gastrointestinal Absorption Fraction[a]	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Source	Inhalation Unit Risk ($\mu g/m^3$)	Source	Oral Reference Dose (mg/kg-day)	Source	Inhalation Reference Concentration (RfC) (mg/m^3)	Source	Surrogate
Perchlorate	14797-73-0	--	--	--	--	--	1	--	--	--	--	0.0007	I	--	--	--
Phenanthrene	85-01-8	--	V	523,000	--	0.13	1	--	--	--	--	0.3	I	--	--	Anthracene
Phenol	108-95-2	--	--	--	--	0.1	1	--	--	--	--	0.3	I	0.2	C	--
Phosphorus, Total As P	7723-14-0	--	--	--	0.001	--	1	--	--	--	--	49	P	--	--	Monosodium phosphate
Pyrene	129-00-0	--	V	2,380,000	--	0.13	1	--	--	--	--	0.03	I	--	--	--
Selenium	7782-49-2	--	--	--	0.001	--	1	--	--	--	--	0.005	I	0.02	C	--
Silver	7440-22-4	--	--	--	0.0006	--	0.04	--	--	--	--	0.005	I	--	--	--
Styrene	100-42-5	--	V	9,350	--	--	1	--	--	--	--	0.2	I	1	I	--
2,3,7,8-TCDD TEQ	N/A	--	V	1,960,000	--	0.03	1	130,000	C	38	C	7E-10	I	0.00000004	C	2,3,7,8-TCDD
Thallium	7440-28-0	--	--	--	0.001	--	1	--	--	--	--	0.00001	X	--	--	--
Vanadium	7440-62-2	--	--	--	0.001	--	0.026	--	--	--	--	0.005	S	0.0001	A	--
Zinc	7440-66-6	--	--	--	0.0006	--	1	--	--	--	--	0.3	I	--	--	--

Notes:

[a] These values are from *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual* (Part E, Supplemental Guidance for Dermal Risk Assessment) Final (EPA, 2004b). Value for arsenic is from Roberts et al., 2007.

CASRN = Chemical Abstract System Registry Number

cm/hr = centimeters per hour, m3/kg = cubic meters per kilogram; mg/kg = milligrams per kilogram; µg/m3 = micrograms per cubic meter; mg/m3 = milligrams per cubic meter

GI = gastrointestinal

M = carcinogen identified by EPA as having a mutagenic mode of action

EPA (June 2015) regional screening levels, volatilization factors, and Kp values

Sources:

A - Agency for Toxic Substances and Disease Registry (ATSDR)
C - California Environmental Protection Agency (Cal-EPA)
E - Environmental Criteria and Assessment Office (ECAO)
H - Health Effects Assessment Summary Tables (HEAST)
I - Integrated Risk Information System (IRIS)
J - New Jersey
S - Regional screening levels user guide, Section 5
P - Provisional Peer-Reviewed Toxicity Values (PPRTV)
X - PPRTV Appendix

TABLE 9-4

Critical Toxic Effects Considered for Target Organ/System-Specific Hazard Index Estimates

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Hazard Index Contributor[a]	Target Organ/System Affected[b]									
	Nervous	Hematologic	Dermal	Cardiovascular	Thyroid	Gastrointestinal	Reproductive	Urinary	Hair Growth	Immune
Aluminum	■									
Antimony		■								
Arsenic			■	■						
Cobalt					■					
Copper						■				
Cyanide							■			
Iron						■				
Manganese	■									
Mercury								■		■
Selenium	■	■	■							
Thallium									■	
Vanadium			■							
Zinc		■								■

Notes:

[a] Listed are those chemicals identified as primary contributors to the hazard index (HI), for all exposure areas across the Site that have a HI exceeding 1 .

[b] Source from USEPA IRIS database (EPA, 2016), or other sources listed in Section 9.5.3.

Highlighted cells in the same column indicate chemicals considered collectively to assess noncancer HI for that target organ/system.

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
103	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Arsenic (HQ=0.6, 24%) Cobalt (HQ=0.5, 22%)	3E-06	--	0.2
104	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.8, 25%)	NR	--	0.9
106	5E-05	2	6	Arsenic (ELCR=5E-5, >99%)	Manganese (HQ=0.5, 25%) Cobalt (HQ=0.4, 22%)	Manganese (HQ=1, 24%)	2E-05	0.8	2
108	6E-05	2	5	Arsenic (ELCR=6E-5, >99%)	Arsenic (HQ=0.4, 24%)	Arsenic (HQ=1, 24%)	4E-05	0.6	2
109	9E-05	2	6	Arsenic (ELCR=9E-5, >99%)	Arsenic (HQ=0.5, 32%)	Arsenic (HQ=2, 32%)	7E-05	0.8	3
110	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 27%) Iron (HQ=0.5, 26%)	NR	--	NR
112	1E-05	0.8	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.7, 28%) Iron (HQ=0.7, 26%)	NR	--	0.003
113	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 26%) Cobalt (HQ=0.6, 25%)	NR	--	NR
114	5E-05	0.9	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 35%)	3E-05	--	0.7
115	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=1, 34%)	NR	--	0.8
116	2E-04	2	8	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 50%)	Arsenic (HQ=4, 50%)	2E-04	2	5
117	7E-05	1	3	Arsenic (ELCR=7E-5, >99%)	None Identified	Arsenic (HQ=1, 38%)	4E-05	--	0.9
119	3E-05	0.8	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.6, 23%) Arsenic (HQ=0.5, 19%)	4E-06	--	0.1
120	1E-05	2	8	Arsenic (ELCR=1E-5, >99%)	Antimony (HQ=2, 66%)	Antimony (HQ=5, 67%)	NR	2	5
121	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 26%) Cobalt (HQ=0.7, 25%)	5E-06	--	0.1
122	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 23%) Iron (HQ=0.5, 22%)	NR	--	0.1
126	5E-05	2	7	Arsenic (ELCR=5E-5, >99%)	Iron (HQ=0.5, 23%) Cobalt (HQ=0.4, 20%)	Iron (HQ=2, 23%)	2E-05	0.8	3
127	6E-05	1	4	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 28%)	3E-05	--	0.8
129	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Manganese (HQ=0.6, 28%) Cobalt (HQ=0.6, 27%)	NR	--	0.1
130	1E-05	1	4	Arsenic (ELCR=1E-5, >99%)	None Identified	Manganese (HQ=2, 50%)	NR	--	1
131	1E-05	2	6	Arsenic (ELCR=1E-5, >99%)	Thallium (HQ=1, 54%)	Thallium (HQ=3, 55%)	NR	0.6	2
133	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Thallium (HQ=0.7, 26%) Manganese (HQ=0.5, 20%)	NR	--	0.03
134	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Thallium (HQ=1, 45%)	NR	--	NR
135	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Manganese (HQ=0.6, 26%) Cobalt (HQ=0.6, 25%)	NR	--	0.1
136	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Manganese (HQ=1, 33%)	NR	--	0.7
137	9E-06	0.8	3	Arsenic (ELCR=9E-6, >99%)	None Identified	Thallium (HQ=1, 46%)	NR	--	NR
139	9E-06	0.8	3	Arsenic (ELCR=9E-6, >99%)	None Identified	Manganese (HQ=0.9, 34%)	NR	--	0.4
140	1E-05	1	4	Arsenic (ELCR=1E-5, >99%)	None Identified	Thallium (HQ=1, 31%)	NR	--	0.3
141	3E-05	0.8	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.6, 26%)	1E-05	--	0.4
142	4E-05	0.6	2	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.7, 33%)	1E-05	--	0.4
143	4E-05	0.7	2	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 36%)	2E-05	--	0.4
144	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Manganese (HQ=0.7, 28%)	NR	--	0.1
145	3E-05	2	5	Arsenic (ELCR=3E-5, >99%)	Manganese (HQ=0.5, 32%)	Manganese (HQ=2, 31%)	9E-06	0.4	1
146	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Thallium (HQ=1, 25%)	NR	--	0.5
147	6E-05	1	3	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 36%)	3E-05	--	0.8
149	1E-05	0.8	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Copper (HQ=0.6, 25%)	NR	--	0.7
150	9E-06	0.6	2	Arsenic (ELCR=9E-6, >99%)	None Identified	Cobalt (HQ=0.6, 32%)	NR	--	NR
151	3E-05	0.6	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.5, 27%)	5E-06	--	0.1
152	7E-06	0.5	2	Arsenic (ELCR=7E-6, >99%)	None Identified	Cobalt (HQ=0.5, 30%)	NR	--	NR
153	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.5, 25%)	NR	--	0.2
154	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.6, 25%)	4E-06	--	0.08
155	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.6, 25%)	9E-07	--	0.2
156	6E-05	1	4	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 31%)	3E-05	--	0.8
157	3E-04	2	7	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 77%)	Arsenic (HQ=5, 77%)	3E-04	2	5
158	1E-05	0.8	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.7, 29%)	NR	--	0.006
159	3E-05	1	5	Arsenic (ELCR=3E-5, >99%)	None Identified	Thallium (HQ=2, 41%)	1E-05	--	0.3

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
160	3E-05	3	8	Arsenic (ELCR=3E-5, >99%)	Thallium (HQ=0.9, 36%)	Thallium (HQ=3, 37%) Manganese (HQ=2, 26%) Iron (HQ=2, 18%)	6E-06	1	4
161	9E-06	1	4	Arsenic (ELCR=9E-6, >99%)	None Identified	Thallium (HQ=2, 52%)	NR	--	0.4
162	5E-05	2	5	Arsenic (ELCR=5E-5, >99%)	Thallium (HQ=0.8, 48%)	Thallium (HQ=3, 48%)	3E-05	0.5	2
163	1E-05	1	4	Arsenic (ELCR=1E-5, >99%)	None Identified	Thallium (HQ=2, 49%)	NR	--	0.5
164	5E-05	0.9	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=0.9, 30%)	3E-05	--	1
166	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.5, 26%) Iron (HQ=0.5, 25%)	NR	--	NR
168	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.4, 29%)	NR	--	NR
169	1E-05	2	5	Arsenic (ELCR=1E-5, >99%)	Thallium (HQ=1, 66%)	Thallium (HQ=3, 66%)	NR	0.5	2
172	6E-06	0.6	2	Arsenic (ELCR=6E-6, >99%)	None Identified	Cobalt (HQ=0.5, 30%)	NR	--	NR
173	1E-05	0.8	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.7, 27%)	NR	--	0.1
174	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Manganese (HQ=0.9, 30%)	NR	--	0.5
175	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.6, 27%)	NR	--	NR
176	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.6, 29%)	9E-06	--	0.3
177	9E-06	1	4	Arsenic (ELCR=9E-6, >99%)	None Identified	Thallium (HQ=3, 71%)	NR	--	1
178	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.5, 24%) Cobalt (HQ=0.5, 24%)	2E-06	--	0.03
179	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 25%) Iron (HQ=0.5, 24%)	NR	--	NR
180	8E-05	0.9	3	Arsenic (ELCR=8E-5, >99%)	None Identified	Arsenic (HQ=1, 52%)	5E-05	--	1
181	6E-05	0.9	3	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 39%)	4E-05	--	0.8
182	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 24%) Cobalt (HQ=0.6, 22%)	2E-06	--	0.3
183	2E-05	2	8	Arsenic (ELCR=2E-5, >99%)	Thallium (HQ=1, 43%)	Thallium (HQ=3, 44%)	2E-06	0.9	3
184	6E-06	1	5	Arsenic (ELCR=6E-6, >99%)	None Identified	Thallium (HQ=3, 69%)	NR	--	2
185	3E-05	0.8	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.8, 32%)	1E-05	--	0.3
186	7E-06	0.5	2	Arsenic (ELCR=7E-6, >99%)	None Identified	Cobalt (HQ=0.5, 29%)	NR	--	NR
187	1E-05	1	4	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=1, 35%)	NR	--	0.9
188	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Arsenic (HQ=0.5, 25%) Cobalt (HQ=0.5, 24%)	2E-06	--	0.1
189	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 26%)	NR	--	0.05
190	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.6, 27%)	4E-06	--	0.07
192	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 26%) Manganese (HQ=0.6, 26%)	NR	--	0.06
193	9E-06	0.8	3	Arsenic (ELCR=9E-6, >99%)	None Identified	Manganese (HQ=0.8, 30%)	NR	--	0.3
194	1E-05	0.8	3	Arsenic (ELCR=9E-6, >99%)	None Identified	Cobalt (HQ=0.8, 32%)	NR	--	0.06
195	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=0.9, 27%)	3E-05	--	0.6
196	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.5, 21%)	NR	--	NR
197	9E-06	0.7	2	Arsenic (ELCR=9E-6, >99%)	None Identified	Cobalt (HQ=0.6, 29%)	NR	--	NR
198	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.4, 26%) Iron (HQ=0.4, 25%)	NR	--	0.02
199	3E-05	2	6	Arsenic (ELCR=3E-5, >99%)	Thallium (HQ=0.5, 32%)	Thallium (HQ=2, 33%)	1E-05	0.2	0.8
201	3E-05	2	7	Arsenic (ELCR=3E-5, >99%)	Manganese (HQ=0.5, 25%)	Manganese (HQ=2, 24%) Cobalt (HQ=2, 24%)	5E-06	0.9	3
202	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 31%)	NR	--	NR
204	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Manganese (HQ=0.8, 27%)	NR	--	0.3
205	1E-05	0.9	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Manganese (HQ=0.8, 28%)	NR	--	0.3
206	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Manganese (HQ=0.5, 30%)	NR	--	NR
207	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 27%)	NR	--	NR
209	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 21%) Iron (HQ=0.4, 20%) Thallium (HQ=0.4, 19%)	NR	--	NR
210	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.4, 22%)	NR	--	NR
211	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 26%)	NR	--	NR
212	7E-06	0.6	2	Arsenic (ELCR=7E-6, >99%)	None Identified	Thallium (HQ=0.5, 24%)	NR	--	NR
213	3E-05	0.8	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Manganese (HQ=0.6, 22%)	3E-06	--	0.1

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
216	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 22%)	NR	--	NR
217	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 23%)	NR	--	NR
218	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.4, 22%)	NR	--	NR
219	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.4, 23%)	NR	--	NR
220	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Thallium (HQ=0.4, 21%) Cobalt (HQ=0.4, 20%)	NR	--	NR
221	5E-05	1	4	Arsenic (ELCR=5E-5, >99%)	None Identified	Cobalt (HQ=1, 24%)	2E-05	--	1
222	4E-05	0.8	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 31%)	2E-05	--	0.5
223	8E-05	1	3	Arsenic (ELCR=8E-5, >99%)	None Identified	Arsenic (HQ=2, 46%)	6E-05	--	1
224	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.5, 22%) Arsenic (HQ=0.5, 21%) Cobalt (HQ=0.5, 21%)	4E-06	--	0.07
226	1E-04	2	7	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.9, 42%)	Arsenic (HQ=3, 42%) Thallium (HQ=2, 29%)	1E-04	0.8	3
230	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 27%)	NR	--	NR
231	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 28%)	NR	--	NR
232	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 23%)	NR	--	0.2
233	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.6, 24%) Arsenic (HQ=0.6, 24%)	8E-06	--	0.2
235	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None identified	Manganese (HQ=1, 38%)	NR	--	1
237	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None identified	Manganese (HQ=1, 22%) Thallium (HQ=1, 22%)	5E-06	--	0.8
238	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.5, 28%)	NR	--	NR
239	1E-05	0.9	3	Arsenic (ELCR=1E-5, >99%)	None identified	Manganese (HQ=0.8, 26%)	NR	--	0.3
240	1E-05	0.8	2	Arsenic (ELCR=1E-5, >99%)	None identified	Manganese (HQ=0.8, 33%)	NR	--	0.3
241	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.5, 28%)	NR	--	NR
242	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None identified	Cobalt (HQ=0.9, 23%)	9E-06	--	0.5
243	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.8, 32%)	NR	--	NR
245	7E-06	0.7	2	Arsenic (ELCR=7E-6, >99%)	None identified	Cobalt (HQ=0.9, 38%)	NR	--	0.09
247	2E-04	2	7	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 61%)	Arsenic (HQ=4, 60%)	2E-04	2	5
248	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None identified	Manganese (HQ=0.9, 30%)	NR	--	0.4
249	7E-06	0.6	2	Arsenic (ELCR=7E-6, >99%)	None identified	Cobalt (HQ=0.6, 31%)	NR	--	NR
251	5E-05	1	4	Arsenic (ELCR=5E-5, >99%)	None identified	Manganese (HQ=1, 35%) Arsenic (HQ=1, 24%)	3E-05	--	2
252	1E-04	2	5	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.7, 49%)	Arsenic (HQ=2, 48%)	1E-04	0.6	2
253	4E-05	2	5	Arsenic (ELCR=4E-5, >99%)	Manganese (HQ=0.5, 30%)	Manganese (HQ=1, 29%)	1E-05	0.5	2
254	3E-05	1	3	Arsenic (ELCR=3E-5, >99%)	None identified	Iron (HQ=0.7, 22%) Cobalt (HQ=0.7, 21%)	8E-06	--	0.2
255	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None identified	Cobalt (HQ=0.7, 23%) Iron (HQ=0.6, 22%)	3E-06	--	0.05
256	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None identified	Manganese (HQ=1, 25%)	NR	--	0.8
257	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.5, 28%)	NR	--	NR
261	4E-05	1	5	Arsenic (ELCR=4E-5, >99%)	None identified	Cobalt (HQ=1, 21%)	1E-05	--	0.9
262	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.5, 22%)	NR	--	0.1
263	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.7, 29%)	NR	--	NR
265	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.8, 22%) Manganese (HQ=0.8, 22%)	8E-08	--	0.4
267	4E-05	0.8	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.9, 33%)	2E-05	--	0.4
268	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Cobalt (HQ=1, 24%)	1E-05	--	1
303	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Manganese (HQ=0.8, 25%) Iron (HQ=0.8, 25%)	NR	--	0.4
307	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.8, 31%)	2E-08	--	0.003
308	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.6, 28%)	7E-06	--	0.1
309	7E-05	2	5	Arsenic (ELCR=7E-5, >99%)	Manganese (HQ=0.5, 31%)	Manganese (HQ=2, 30%)	5E-05	0.8	3
310	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.5, 26%)	NR	--	NR
311	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.5, 29%)	NR	--	NR
1102	4E-05	1	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.9, 26%)	2E-05	--	0.6
1106	4E-05	0.9	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.7, 25%)	2E-05	--	0.4

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
1107	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.8, 28%)	7E-06	--	0.2
1108	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.7, 24%)	6E-06	--	0.2
1902	5E-05	2	5	Arsenic (ELCR=5E-5, >99%)	Iron (HQ=0.4, 25%)	Iron (HQ=1, 26%)	3E-05	0.6	2
1903	1E-04	2	7	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.7, 30%)	Arsenic (HQ=2, 30%) Cobalt (HQ=2, 23%)	9E-05	1	4
1906	7E-05	2	6	Arsenic (ELCR=6E-5, >99%)	Iron (HQ=0.4, 24%) Arsenic (HQ=0.4, 23%)	Iron (HQ=1, 24%) Arsenic (HQ=1, 23%) Cobalt (HQ=1, 21%)	4E-05	0.8	3
1907	4E-05	3	10	Arsenic (ELCR=4E-5, >99%)	Manganese (HQ=2, 51%)	Manganese (HQ=5, 49%) Iron (HQ=2, 23%) Cobalt (HQ=2, 15%)	2E-05	2	7
1908	5E-05	2	6	Arsenic (ELCR=5E-5, >99%)	Cobalt (HQ=0.6, 30%)	Cobalt (HQ=2, 31%)	3E-05	1	3
1909	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Cobalt (HQ=1, 29%)	2E-05	--	1
1910	3E-05	4	12	Arsenic (ELCR=3E-5, >99%)	Manganese (HQ=2, 50%)	Manganese (HQ=6, 49%) Iron (HQ=3, 28%)	1E-05	3	9
1911	6E-05	3	9	Arsenic (ELCR=6E-5, >99%)	Manganese (HQ=1, 43%)	Manganese (HQ=4, 42%) Iron (HQ=3, 32%)	3E-05	2	7
1912	7E-05	2	6	Arsenic (ELCR=7E-5, >99%)	Iron (HQ=0.4, 25%)	Iron (HQ=1, 25%)	4E-05	0.8	3
1913	5E-05	2	5	Arsenic (ELCR=5E-5, >99%)	Cobalt (HQ=0.4, 23%)	Cobalt (HQ=1, 24%)	3E-05	0.8	3
1914	5E-05	2	5	Arsenic (ELCR=5E-5, >99%)	Iron (HQ=0.4, 22%) Manganese (HQ=0.4, 22%) Cobalt (HQ=0.4, 22%)	Iron (HQ=1, 23%)	3E-05	0.7	2
1915	4E-05	2	5	Arsenic (ELCR=4E-5, >99%)	Manganese (HQ=0.6, 33%)	Manganese (HQ=2, 32%)	1E-05	0.8	2
1917	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Iron (HQ=1, 28%)	1E-05	--	1
2102	4E-05	1	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 25%)	2E-05	--	0.5
2105	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 31%)	3E-05	--	0.6
2108	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.7, 29%) Cobalt (HQ=0.6, 25%)	NR	--	0.04
2109	6E-05	0.9	3	Arsenic (ELCR=6E-5, 100%)	None Identified	Arsenic (HQ=1, 37%)	4E-05	--	0.7
2110	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.9, 33%)	6E-06	--	0.3
2112	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.7, 27%) Iron (HQ=0.6, 25%)	NR	--	0.05
2114	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.7, 35%)	NR	--	NR
2115	4E-05	0.9	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.7, 24%) Iron (HQ=0.7, 24%)	1E-05	--	0.3
2116	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.7, 26%)	1E-05	--	0.2
2117	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 27%)	6E-06	--	0.2
2118	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 26%) Cobalt (HQ=0.6, 26%)	NR	--	NR
2201	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 27%)	3E-06	--	0.07
2202	1E-05	0.9	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.9, 29%)	NR	--	0.2
2203	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.9, 36%)	NR	--	0.1
2204	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 27%)	NR	--	0.03
2205	4E-05	0.9	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Iron (HQ=0.7, 26%) Arsenic (HQ=0.7, 25%)	1E-05	--	0.3
2209	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 27%) Cobalt (HQ=0.6, 25%)	NR	--	0.02
2211	5E-05	0.9	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=0.9, 30%)	2E-05	--	0.5
2214	8E-05	1	4	Arsenic (ELCR=8E-5, >99%)	None Identified	Arsenic (HQ=2, 40%)	6E-05	--	1
2215	2E-04	2	7	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 67%)	Arsenic (HQ=4, 67%)	2E-04	1	4
2216	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 32%)	3E-05	--	0.6
2304	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.7, 36%)	NR	--	NR
2305	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 28%)	NR	--	NR
2307	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 30%)	NR	--	NR
2308	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=1, 37%)	NR	--	0.9
2310	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.7, 32%)	NR	--	0.01
2311	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 28%)	NR	--	NR
2312	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.8, 31%)	NR	--	0.1

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
2313	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.8, 31%)	NR	--	NR
2314	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Manganese (HQ=2, 40%)	1E-05	--	1
2315	1E-05	0.8	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.9, 33%)	NR	--	0.09
2316	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.8, 37%)	NR	--	0.03
2317	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 34%)	NR	--	NR
2318	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.5, 28%)	NR	--	NR
2322	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=1, 34%)	NR	--	0.4
2323	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 26%)	NR	--	0.1
2324	7E-05	0.9	3	Arsenic (ELCR=7E-5, >99%)	None Identified	Arsenic (HQ=1, 47%)	5E-05	--	1
2325	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=1, 35%)	NR	--	0.4
2326	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.5, 28%)	NR	--	NR
2327	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.5, 27%)	NR	--	NR
2328	2E-04	1	4	Arsenic (ELCR=2E-4, 100%)	None Identified	Arsenic (HQ=3, 76%)	1E-04	--	3
2329	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Arsenic (HQ=0.6, 28%)	1E-05	--	0.2
2330	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 30%)	1E-06	--	0.02
2393	3E-04	2	8	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 68%)	Arsenic (HQ=5, 68%)	2E-04	2	5
2394	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None identified	Iron (HQ=0.8, 25%) Cobalt (HQ=0.7, 24%) Arsenic (HQ=0.7, 23%)	1E-05	--	0.2
2396	2E-05	0.5	1.488	Arsenic (ELCR=2E-5, 100%)	None identified	Iron (HQ=0.7, 48%)	NR	--	--
2401	4E-05	0.8	2	Arsenic (ELCR=4E-5, >99%)	None identified	Arsenic (HQ=0.7, 28%)	1E-05	--	0.3
2402	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 30%)	NR	--	NR
2403	3E-05	0.4	1	Arsenic (ELCR=3E-5, 100%)	None identified	Iron (HQ=0.6, 40%) Arsenic (HQ=0.5, 38%)	6E-06	--	--
2404	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.5, 27%) Cobalt (HQ=0.5, 25%)	NR	--	0.01
2406	1E-04	2	6	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.8, 48%)	Arsenic (HQ=3, 48%)	1E-04	0.9	3
2407	4E-05	0.8	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 28%)	2E-05	--	0.3
2408	6E-05	1	4	Arsenic (ELCR=6E-5, >99%)	None identified	Arsenic (HQ=1, 29%)	4E-05	--	1
2409	7E-05	1	4	Arsenic (ELCR=7E-5, >99%)	None identified	Arsenic (HQ=1, 36%)	5E-05	--	1
2410	1E-04	1	4	Arsenic (ELCR=1E-4, >99%)	None identified	Arsenic (HQ=2, 50%)	8E-05	--	2
2415	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None identified	Arsenic (HQ=0.6, 25%)	8E-06	--	0.2
2416	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 25%) Cobalt (HQ=0.6, 25%)	NR	--	NR
2417	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 25%) Cobalt (HQ=0.6, 23%)	8E-07	--	0.09
2420	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 29%)	NR	--	0.004
2422	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 28%)	NR	--	0.04
2425	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 28%) Cobalt (HQ=0.6, 27%)	NR	--	NR
2426	2E-04	2	8	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 41%)	Arsenic (HQ=3, 41%) Manganese (HQ=3, 34%)	1E-04	2	5
2427	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.4, 27%)	NR	--	NR
2428	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 26%)	1E-06	--	0.03
2429	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.5, 27%)	NR	--	NR
2430	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None identified	Cobalt (HQ=0.8, 30%)	NR	--	0.08
2433	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 28%)	NR	--	NR
2434	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.5, 25%)	1E-06	--	0.03
2435	5E-05	0.9	3	Arsenic (ELCR=5E-5, >99%)	None identified	Arsenic (HQ=1, 33%)	3E-05	--	0.5
2444	2E-04	2	6	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 58%)	Arsenic (HQ=3, 58%)	1E-04	0.9	3
2449	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 26%) Cobalt (HQ=0.5, 23%)	NR	--	NR
2456	1E-05	0.4	1	Arsenic (ELCR=1E-5, 100%)	None identified	None identified	NR	--	--
2457	9E-06	0.9	3	Arsenic (ELCR=9E-6, >99%)	None identified	Thallium (HQ=1, 40%)	NR	--	NR
2458	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.5, 27%) Iron (HQ=0.5, 27%)	NR	--	NR
2462	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 28%) Cobalt (HQ=0.6, 25%)	NR	--	NR

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
2490	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 27%) Cobalt (HQ=0.7, 25%)	NR	--	0.03
2502	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 25%) Cobalt (HQ=0.5, 24%)	NR	--	0.03
2504	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 31%)	NR	--	0.0003
2505	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 29%)	NR	--	NR
2507	2E-05	0.4	1	Arsenic (ELCR=2E-5, 100%)	None identified	None identified	NR	--	--
2508	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 27%)	NR	--	0.1
2509	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.5, 26%) Cobalt (HQ=0.5, 25%)	NR	--	0.02
2511	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.6, 28%)	NR	--	0.04
2512	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.6, 27%) Iron (HQ=0.5, 25%)	NR	--	0.02
2514	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.5, 29%)	NR	--	NR
2515	2E-05	0.4	1	Arsenic (ELCR=2E-5, 100%)	None identified	None identified	NR	--	--
2516	2E-05	0.6	2	Arsenic (ELCR=2E-5, 100%)	None identified	Iron (HQ=0.6, 32%)	NR	--	0.1
2517	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 27%)	NR	--	0.04
2518	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.6, 26%)	NR	--	0.02
2520	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 25%) Cobalt (HQ=0.5, 24%)	NR	--	NR
2521	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 31%)	NR	--	NR
2522	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.5, 27%)	NR	--	NR
2523	4E-05	0.7	2	Arsenic (ELCR=4E-5, >99%)	None identified	Arsenic (HQ=0.7, 31%)	2E-05	--	0.3
2524	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 25%) Cobalt (HQ=0.6, 24%)	NR	--	NR
2525	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 30%)	NR	--	0.09
2526	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 30%)	NR	--	NR
2527	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None identified	Arsenic (HQ=0.9, 27%)	2E-05	--	0.7
2529	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None identified	Iron (HQ=0.5, 25%) Arsenic (HQ=0.5, 24%)	5E-06	--	0.1
2530	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None identified	Arsenic (HQ=0.7, 28%)	1E-05	--	0.2
2532	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 24%)	1E-06	--	0.1
2535	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Iron (HQ=0.6, 30%)	NR	--	NR
2536	2E-05	0.4	1	Arsenic (ELCR=2E-5, 100%)	None identified	None identified	NR	--	--
2537	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 28%)	2E-06	--	0.04
2538	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 27%)	3E-07	--	0.005
2539	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.9, 27%) Cobalt (HQ=0.8, 24%)	NR	--	0.3
2540	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.7, 25%)	NR	--	0.3
2541	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None identified	Manganese (HQ=1, 30%)	NR	--	0.7
2542	2E-05	0.6	2	Arsenic (ELCR=2E-5, 100%)	None identified	Iron (HQ=0.8, 43%)	NR	--	0.3
2545	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None identified	Manganese (HQ=0.8, 26%)	NR	--	0.4
2549	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Cobalt (HQ=0.6, 26%) Iron (HQ=0.6, 25%)	NR	--	NR
2550	2E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None identified	Iron (HQ=0.6, 26%)	9E-07	--	0.02
2602	2E-04	2	6	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=1, 72%)	Arsenic (HQ=4, 72%)	2E-04	1	4
2603	4E-05	0.9	3	Arsenic (ELCR=4E-5, >99%)	None identified	Arsenic (HQ=0.7, 26%)	2E-05	--	0.3
2606	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 26%)	2E-06	--	0.04
2610	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.4, 26%) Iron (HQ=0.4, 26%)	NR	--	NR
2612	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 31%)	NR	--	NR
2615	4E-04	4	14	Arsenic (ELCR=4E-4, >99%)	Arsenic (HQ=2, 56%)	Arsenic (HQ=8, 56%) Manganese (HQ=2, 14%) Iron (HQ=2, 13%) Cobalt (HQ=2, 12%)	4E-04	3	11
2691	4E-05	0.8	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 31%)	2E-05	--	0.4

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
2693	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Manganese (HQ=0.9, 24%) Iron (HQ=0.9, 24%) Cobalt (HQ=0.8, 22%)	8E-06	--	0.8
2701	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 26%) Iron (HQ=0.5, 26%)	NR	--	NR
2702	1E-05	0.8	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.7, 26%) Cobalt (HQ=0.6, 25%)	NR	--	0.07
2704	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 27%) Iron (HQ=0.6, 27%)	NR	--	NR
2707	2E-05	0.5	2	Arsenic (ELCR=2E-5, 100%)	None Identified	Iron (HQ=0.6, 36%)	NR	--	NR
2708	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.8, 26%) Iron (HQ=0.7, 23%)	5E-07	--	0.07
2709	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.6, 24%) Iron (HQ=0.6, 22%)	NR	--	0.04
2710	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 26%)	NR	--	0.1
2715	1E-05	0.5	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.4, 24%)	NR	--	NR
2718	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Manganese (HQ=1, 27%)	1E-05	--	0.9
2719	2E-04	3	9	Arsenic (ELCR=2E-4, >99%)	Arsenic (HQ=0.9, 34%)	Arsenic (HQ=3, 34%)	1E-04	2	6
2720	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Manganese (HQ=0.9, 22%) Cobalt (HQ=0.9, 22%)	2E-05	--	1
2723	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 26%)	NR	--	0.2
2724	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.8, 34%)	NR	--	0.1
2725	4E-05	1	4	Arsenic (ELCR=4E-5, >99%)	None Identified	Manganese (HQ=1, 24%)	2E-05	--	1
2726	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Manganese (HQ=1, 28%)	4E-06	--	0.9
2736	3E-05	1	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 25%)	7E-06	--	0.5
2740	3E-05	0.8	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.6, 22%) Manganese (HQ=0.6, 22%)	5E-06	--	0.2
2741	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 26%)	NR	--	0.01
2748	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=1, 27%)	9E-06	--	0.7
2749	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 27%)	NR	--	NR
2752	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 27%)	NR	--	NR
2753	2E-05	0.5	2	Arsenic (ELCR=2E-5, 100%)	None Identified	Iron (HQ=0.6, 38%) Manganese (HQ=0.6, 38%)	NR	--	0.08
2755	6E-05	1	4	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 30%)	3E-05	--	0.9
2756	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 25%)	2E-06	--	0.06
2801	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=1, 26%)	1E-05	--	1
2804	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=1, 32%)	NR	--	1
2805	4E-05	1	5	Arsenic (ELCR=4E-5, >99%)	None Identified	Cobalt (HQ=1, 29%)	1E-05	--	2
2806	5E-05	1	5	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 22%)	3E-05	--	2
2807	3E-05	2	6	Arsenic (ELCR=3E-5, >99%)	Manganese (HQ=0.5, 29%)	Manganese (HQ=2, 28%)	1E-05	0.7	2
2808	6E-05	2	6	Arsenic (ELCR=6E-5, >99%)	Arsenic (HQ=0.5, 27%)	Manganese (HQ=1, 23%) Arsenic (HQ=1, 22%) Iron (HQ=1, 21%)	4E-05	0.7	2
2810	3E-05	1	4	Arsenic (ELCR=3E-5, 100%)	None Identified	Manganese (HQ=2, 49%)	1E-05	--	2
2901	6E-05	2	6	Arsenic (ELCR=6E-5, >99%)	Iron (HQ=0.4, 23%)	Iron (HQ=1, 24%)	4E-05	1	3
2903	6E-05	3	9	Arsenic (ELCR=6E-5, >99%)	Manganese (HQ=0.8, 29%)	Manganese (HQ=3, 28%) Cobalt (HQ=3, 27%) Iron (HQ=2, 18%)	4E-05	2	6
3001	4E-05	1	5	Arsenic (ELCR=4E-5, >99%)	None Identified	Cobalt (HQ=1, 30%)	1E-05	--	2
3004	9E-05	2	7	Arsenic (ELCR=9E-5, >99%)	Cobalt (HQ=0.6, 27%) Arsenic (HQ=0.6, 25%)	Cobalt (HQ=2, 27%) Arsenic (HQ=2, 25%)	7E-05	1	4
3005	8E-05	2	6	Arsenic (ELCR=8E-5, >99%)	Cobalt (HQ=0.6, 32%) Arsenic (HQ=0.5, 25%)	Cobalt (HQ=2, 33%) Arsenic (HQ=2, 25%)	6E-05	1	3
3008	8E-05	2	7	Arsenic (ELCR=8E-5, >99%)	Arsenic (HQ=0.6, 27%)	Cobalt (HQ=2, 27%) Arsenic (HQ=2, 22%)	6E-05	1	4
3009	7E-05	2	7	Arsenic (ELCR=7E-5, >99%)	Cobalt (HQ=0.7, 31%)	Cobalt (HQ=2, 31%)	5E-05	1	4

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
3010	8E-05	2	7	Arsenic (ELCR=8E-5, >99%)	Cobalt (HQ=0.7, 29%)	Cobalt (HQ=2, 30%) Arsenic (HQ=2, 21%) Iron (HQ=2, 21%)	6E-05	1	5
3011	6E-05	2	5	Arsenic (ELCR=6E-5, >99%)	Cobalt (HQ=0.4, 25%)	Cobalt (HQ=1, 25%) Iron (HQ=1, 24%)	4E-05	0.7	2
3012	7E-05	2	5	Arsenic (ELCR=7E-5, >99%)	Arsenic (HQ=0.5, 27%)	Arsenic (HQ=1, 27%)	5E-05	0.7	2
3015	9E-05	2	7	Arsenic (ELCR=9E-5, >99%)	Arsenic (HQ=0.6, 25%)	Arsenic (HQ=2, 25%)	7E-05	1	4
45065	2E-05	2	6	Arsenic (ELCR=2E-5, >99%)	Thallium (HQ=0.8, 46%)	Thallium (HQ=3, 46%)	4E-07	0.4	1
45066	4E-05	3	8	Arsenic (ELCR=4E-5, >99%)	Thallium (HQ=1, 51%)	Thallium (HQ=4, 52%)	1E-05	1	4
105A	3E-05	1	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 24%) Manganese (HQ=0.7, 22%)	4E-06	--	0.4
105B	4E-05	2	7	Arsenic (ELCR=4E-5, >99%)	Copper (HQ=0.5, 21%)	Copper (HQ=2, 21%)	2E-05	1	5
107A	5E-05	1	5	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 22%)	3E-05	--	2
107B	7E-05	2	5	Arsenic (ELCR=7E-5, >99%)	Arsenic (HQ=0.3, 25%)	Arsenic (HQ=1, 25%)	4E-05	0.6	2
1101A	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.8, 29%)	1E-05	--	0.3
1101B	6E-05	0.8	3	Arsenic (ELCR=6E-5, 100%)	None Identified	Arsenic (HQ=1, 50%)	4E-05	--	0.9
1104A	4E-05	0.8	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Iron (HQ=0.7, 26%) Arsenic (HQ=0.7, 25%)	1E-05	--	0.3
1104B	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 33%)	3E-05	--	0.6
138A	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.5, 25%)	NR	--	NR
138B	4E-05	0.9	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.8, 28%)	2E-05	--	0.4
138C	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.7, 29%)	NR	--	0.02
165 and 60J	2E-05	1	4	Arsenic (ELCR=2E-5, >99%)	None Identified	Mercury (HQ=2, 46%)	NR	--	2
167A	8E-05	2	6	Arsenic (ELCR=8E-5, >99%)	Arsenic (HQ=0.5, 27%)	Arsenic (HQ=2, 27%)	6E-05	0.9	3
167B	3E-05	2	6	Arsenic (ELCR=3E-5, >99%)	Manganese (HQ=0.5, 26%) Iron (HQ=0.5, 24%)	Manganese (HQ=2, 25%) Iron (HQ=2, 25%)	1E-05	1	3
167C	5E-05	2	6	Arsenic (ELCR=5E-5, >99%)	Cobalt (HQ=0.5, 27%)	Cobalt (HQ=2, 27%)	3E-05	0.9	3
170A	2E-05	0.8	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=7, 29%)	NR	--	NR
170B	1E-05	2	6	Arsenic (ELCR=1E-5, >99%)	Thallium (HQ=1, 57%)	Thallium (HQ=3, 57%)	NR	0.5	2
191A	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.8, 23%) Iron (HQ=0.8, 22%)	1E-05	--	0.6
191B	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.7, 25%)	2E-06	--	0.07
203A	6E-05	1	5	Arsenic (ELCR=6E-5, >99%)	Arsenic (HQ=0.4, 27%)	Arsenic (HQ=1, 27%)	4E-05	--	1
203B	6E-05	2	5	Arsenic (ELCR=6E-5, >99%)	Arsenic (HQ=0.4, 25%)	Arsenic (HQ=1, 25%)	4E-05	0.5	2
2103A	4E-05	1	3	Arsenic (ELCR=4E-5, >99%)	None Identified	Arsenic (HQ=0.9, 28%)	2E-05	--	0.5
2103B	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.7, 25%)	1E-05	--	0.2
2111A	2E-05	0.8	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 29%)	NR	--	0.05
2111B	1E-05	0.8	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.8, 29%)	NR	--	0.08
2119A	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 25%)	2E-06	--	0.03
2119B	3E-05	1	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=1, 31%)	1E-05	--	0.4
214A	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.6, 26%) Iron (HQ=0.5, 24%)	NR	--	NR
214B	3E-05	0.8	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.6, 23%)	4E-06	--	0.2
215A	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 25%)	NR	--	NR
215B	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=0.8, 27%)	8E-06	--	0.2
215C	2E-04	2	6	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=1, 55%)	Arsenic (HQ=3, 55%)	1E-04	1	3
225A	5E-05	1	3	Arsenic (ELCR=5E-5, >99%)	None Identified	Arsenic (HQ=1, 32%)	3E-05	--	0.6
225C	8E-05	1	4	Arsenic (ELCR=8E-5, >99%)	None Identified	Arsenic (HQ=2, 40%)	6E-05	--	1
227 and 70J	7E-05	1	4	Arsenic (ELCR=7E-5, >99%)	None Identified	Arsenic (HQ=2, 32%)	5E-05	--	1
228 and 55J	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.5, 25%)	NR	--	0.02
229 and 36W	1E-04	2	5	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.7, 45%)	Arsenic (HQ=2, 45%)	9E-05	0.8	3
2319A	3E-05	1	4	Arsenic (ELCR=3E-5, >99%)	None Identified	Cobalt (HQ=1, 36%)	1E-05	--	1
234 and 45J	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.6, 28%)	NR	--	NR
236 and 85J	2E-05	0.9	3	Arsenic (ELCR=2E-5, >99%)	None identified	Cobalt (HQ=0.8, 27%)	NR	--	0.4
2437A	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None identified	Cobalt (HQ=0.5, 26%) Iron (HQ=0.5, 25%)	NR	--	NR
2439A	2E-05	0.6	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.5, 26%)	NR	--	NR
2459A	1E-05	0.4	1	Arsenic (ELCR=1E-5, 100%)	None identified	None identified	NR	--	--

TABLE 9-5

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Yard-Specific Risk (RYSR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk (ELCR)	Noncancer Hazard Index					Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only		Child/Adult	Child Only		Child/Adult	Child Only
2459B	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None identified	Iron (HQ=0.6, 27%) Cobalt (HQ=0.5, 25%)	NR	--	NR
246 and 30W	1E-04	2	5	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.7, 46%)	Arsenic (HQ=2, 46%)	1E-04	0.9	3
258 and 00W	3E-05	1	3	Arsenic (ELCR=3E-5, >99%)	None identified	Manganese (HQ=0.6, 21%) Cobalt (HQ=0.6, 20%)	5E-06	--	0.4
2713B	2E-05	0.5	2	Arsenic (ELCR=2E-5, 100%)	None Identified	Manganese (HQ=0.8, 46%)	NR	--	0.3
2743A	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 26%) Cobalt (HQ=0.5, 25%)	NR	--	NR
2743BC	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.6, 27%) Cobalt (HQ=0.6, 27%)	NR	--	NR
2743D	8E-05	1	3	Arsenic (ELCR=8E-5, >99%)	None Identified	Arsenic (HQ=2, 46%)	6E-05	--	1
2743E	1E-05	0.7	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.7, 32%)	NR	--	NR
3006A	7E-05	2	6	Arsenic (ELCR=7E-5, >99%)	Cobalt (HQ=0.4, 25%) Arsenic (HQ=0.4, 23%)	Cobalt (HQ=1, 25%)	4E-05	0.8	3
3006B	3E-05	2	6	Arsenic (ELCR=3E-5, >99%)	Cobalt (HQ=0.5, 30%)	Cobalt (HQ=2, 30%)	9E-06	0.8	3
3013A	8E-05	2	7	Arsenic (ELCR=8E-5, >99%)	Cobalt (HQ=0.7, 30%)	Cobalt (HQ=2, 30%) Arsenic (HQ=2, 22%)	6E-05	1	4
3013B	5E-05	2	6	Arsenic (ELCR=5E-5, >99%)	Cobalt (HQ=0.6, 32%)	Cobalt (HQ=2, 32%)	2E-05	0.8	3
40W	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.6, 26%)	1E-06	--	0.02
80J	2E-05	1	3	Arsenic (ELCR=2E-5, >99%)	None Identified	Cobalt (HQ=0.9, 26%) Manganese (HQ=0.9, 26%)	1E-07	--	0.6
O08	7E-05	0.4	1	Arsenic (ELCR=7E-5, 100%)	None Identified	None Identified	5E-05	--	--
O09	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.5, 25%)	2E-06	--	0.04
O10	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 28%)	3E-06	--	0.06
O11	1E-05	1	3	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=2, 45%)	NR	--	0.8
O12	3E-05	0.7	2	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.7, 33%)	5E-06	--	0.09
O13	2E-05	0.1	0.4	Arsenic (ELCR=2E-5, 100%)	None Identified	None identified	NR	--	--
O14	2E-05	0.1	0.4	Arsenic (ELCR=2E-5, 100%)	None Identified	None identified	NR	--	--
O15	3E-05	0.2	0.6	Arsenic (ELCR=3E-5, 100%)	None Identified	None identified	4E-06	--	--
O16	2E-05	0.5	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.5, 29%)	3E-06	--	0.06
O17	6E-05	0.8	3	Arsenic (ELCR=6E-5, >99%)	None Identified	Arsenic (HQ=1, 48%)	4E-05	--	0.8

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-6

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Residential Screening Area Risk (RSAR) Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard						Incremental Risk and Hazard[b]		
	Excess Lifetime	Noncancer Hazard Index		Primary Contributors	Primary Contributors to Hazard Index[a]		Excess Lifetime	Noncancer Hazard Index	
Exposure Area	Cancer Risk	Child/Adult	Child Only	to Cancer Risk[a]	Child/Adult	Child Only	Cancer Risk	Child/Adult	Child Only
Parcel Group A	3E-05	0.9	3	Arsenic (ELCR=3E-5, >99%)	None Identified	Iron (HQ=0.7, 25%)	6E-06	--	0.2
Parcel Group B	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.7, 27%) Cobalt (HQ=0.6, 25%)	NR	--	NR
Parcel Group C	2E-05	0.7	2	Arsenic (ELCR=2E-5, >99%)	None Identified	Iron (HQ=0.6, 27%) Cobalt (HQ=0.5, 24%)	NR	--	NR
Parcel Group D Hotspot	3E-04	3	10	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 49%)	Arsenic (HQ=5, 49%)	2E-04	2	7
Parcel Group D (Hotspot Excluded)	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 28%) Iron (HQ=0.5, 27%)	NR	--	NR
Parcel Group E	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.6, 28%) Iron (HQ=0.5, 26%)	NR	--	NR
Parcel Group F	1E-05	2	8	Arsenic (ELCR=1E-5, >99%)	Manganese (HQ=2, 73%)	Manganese (HQ=6, 72%)	NR	2	5
Parcel Group G	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Iron (HQ=0.5, 27%) Cobalt (HQ=0.5, 23%)	NR	--	0.03
Parcel Group H	5E-05	1	4	Arsenic (ELCR=5E-5, >99%)	None Identified	Cobalt (HQ=1, 31%)	3E-05	--	1

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-7

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Non-Residential, Possible Future Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard						Incremental Risk and Hazard[b]		
	Excess Lifetime	Noncancer Hazard Index		Primary Contributors	Primary Contributors to Hazard Index[a]		Excess Lifetime	Noncancer Hazard Index	
Exposure Area	Cancer Risk	Child/Adult	Child Only	to Cancer Risk[a]	Child/Adult	Child Only	Cancer Risk	Child/Adult	Child Only
NR3 Upper Chaparral Gulch	9E-05	1	4	Arsenic (ELCR=9E-5, >99%)	None Identified	Arsenic (HQ=2, 42%)	6E-05	--	1
NR13 Smelter East of River	6E-05	1	5	Arsenic (ELCR=6E-5, >99%)	None Identified	Cobalt (HQ=1, 32%)	4E-05	--	2
NR19 North of Main Tailings Pile	1E-04	2	7	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=0.8, 39%)	Arsenic (HQ=3, 39%) Thallium (HQ=2, 23%)	1E-04	0.8	3
NR20 North of Chaparral Gulch	7E-05	2	5	Arsenic (ELCR=7E-5, >99%)	Arsenic (HQ=0.4, 28%)	Arsenic (HQ=1, 28%) Thallium (HQ=1, 25%)	5E-05	0.3	1

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-8

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Non-Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Risk and Hazard			Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]		Incremental Risk and Hazard[b]		
	Excess Lifetime Cancer Risk	Noncancer Hazard Index			Child/Adult	Child Only	Excess Lifetime Cancer Risk	Noncancer Hazard Index	
		Child/Adult	Child Only					Child/Adult	Child Only
NR2 Dewey-Humboldt Town Hall	7E-06	0.5	2	Arsenic (ELCR=7E-6, >99%)	None Identified	Cobalt (HQ=0.6, 32%)	NR	--	NR
NR2 Humboldt Elementary School	1E-05	0.6	2	Arsenic (ELCR=1E-5, >99%)	None Identified	Cobalt (HQ=0.5, 26%) Iron (HQ=0.4, 24%)	NR	--	0.006
NR4 JT Septic Facility	6E-04	5	16	Arsenic (ELCR=6E-4, >99%)	Arsenic (HQ=4, 73%)	Arsenic (HQ=12, 72%)	6E-04	4	12
NR5 Main Tailings Pile 1964 Blow Out Path	3E-04	3	8	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 66%)	Arsenic (HQ=5, 66%)	3E-04	2	5
NR6 Middle Chaparral Gulch	2E-04	4	13	Arsenic (ELCR=2E-4, >99%)	Manganese (HQ=2, 50%)	Manganese (HQ=7, 49%) Arsenic (HQ=4, 30%)	2E-04	3	10
NR7 Smelter Tailings Swale	1E-04	3	10	Arsenic (ELCR=1E-4, >99%)	Thallium (HQ=1, 33%)	Thallium (HQ=3, 33%) Arsenic (HQ=3, 25%)	1E-04	2	6
NR8 Tailings Floodplain	3E-04	5	17	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 32%) Manganese (HQ=2, 30%)	Arsenic (HQ=6, 32%) Manganese (HQ=5, 29%) Thallium (HQ=4, 21%)	3E-04	4	13
NR9 Lower Chaparral Gulch	7E-04	8	25	Arsenic (ELCR=7E-4, >99%)	Arsenic (HQ=4, 59%)	Arsenic (HQ=14, 58%) Thallium (HQ=3, 14%) Cobalt (HQ=2, 9%)	7E-04	6	20
NR10 Agua Fria Tailings Pile	2E-03	12	40	Arsenic (ELCR=2E-3, >99%)	Arsenic (HQ=10, 81%)	Arsenic (HQ=32, 81%) Thallium (HQ=4, 9%) Cobalt (HQ=2, 4%)	2E-03	11	35
NR11 Former Pyrometallurgical Operations Area	6E-04	11	37	Arsenic (ELCR=3E-4, 48%) 2,3,7,8-TCDD TEQ (ELCR=2E-4, 41%) Benzo[a]pyrene (ELCR=4E-5, 6%) Dibenzo[a,h]anthracene (ELCR=7E-6, 1%) Chromium, Hexavalent (ELCR=6E-6, 1%) Benzo[b]fluoranthene (ELCR=5E-6, <1%) Benzo[a]anthracene (ELCR=5E-6, <1%) Aroclor-1248 (ELCR=4E-6, <1%) Indeno[1,2,3-cd]pyrene (ELCR=3E-6, <1%)	2,3,7,8-TCDD TEQ (HQ=7, 61%) Arsenic (HQ=2, 15%)	2,3,7,8-TCDD TEQ (HQ=23, 61%) Arsenic (HQ=6, 15%) Copper (HQ=2, 6%) Aluminum (HQ=2, 4%)	6E-04	10	33
NR12 Smelter Plateau	8E-04	9	29	Arsenic (ELCR=7E-4, 86%) Chromium, Hexavalent (ELCR=6E-5, 8%) 2,3,7,8-TCDD TEQ (ELCR=5E-5, 6%)	Arsenic (HQ=4, 45%)	Arsenic (HQ=13, 45%) 2,3,7,8-TCDD TEQ (HQ=4, 15%) Manganese (HQ=4, 12%) Thallium (HQ=2, 7%)	7E-04	7	24
NR14 South of Former Iron King Mine Pr	3E-04	6	18	Arsenic (ELCR=3E-4, >99%)	Thallium (HQ=2, 45%) Arsenic (HQ=2, 29%)	Thallium (HQ=8, 45%) Arsenic (HQ=5, 29%)	2E-04	4	13
NR15 Auto Yard	2E-05	2	7	Arsenic (ELCR=2E-5, >99%)	Thallium (HQ=1, 55%)	Thallium (HQ=4, 55%)	NR	0.6	2
NR16 Former Mineworks Area	6E-04	6	21	Arsenic (ELCR=6E-4, >99%) Benzo[a]pyrene (ELCR=5E-6, <1%)	Arsenic (HQ=4, 56%)	Arsenic (HQ=12, 56%) Thallium (HQ=3, 12%) Antimony (HQ=2, 11%)	6E-04	5	16
NR17 Main Tailings Pile	2E-03	17	54	Arsenic (ELCR=2E-3, >99%) Chromium, Hexavalent (ELCR=5E-6, <1%)	Arsenic (HQ=13, 79%)	Arsenic (HQ=43, 79%) Thallium (HQ=5, 8%) Iron (HQ=2, 4%) Antimony (HQ=2, 3%)	2E-03	15	50
NR18 North American Industries Operations Area	3E-04	4	13	Arsenic (ELCR=3E-4, >99%)	Arsenic (HQ=2, 42%)	Arsenic (HQ=6, 42%) Thallium (HQ=4, 28%)	3E-04	3	8

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-9

Target Organ/System-Specific Hazard Index Estimates For the Residential Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Noncancer Hazard Index	Incremental Noncancer Hazard Index[a]	Hazard Index by Target Organ/System[b]										Incremental Excess Lifetime Cancer Risk[a]	Mean Lead Conc. (mg/kg)	Lead UCL (mg/kg)
			Nervous (Al, Mn,Se)	Hematologic (Sb, Se, Zn)	Dermal (As, Se, V)	Cardiovascular (As)	Thyroid (Co)	Gastrointestinal (Cu, Fe)	Reproductive (CN)	Urinary (Hg)	Hair growth (Tl)	Immune (Hg, Zn)			
Residential Yard-Specific Risk (RYSR) Exposure Areas															
116	2	2	0.1	0.4	1	1	NR	NR	NR	NR	NR	NR	2E-04	52.8	135
120	2	2	0.009	2	NR	NR	NR	NR	0.02	NR	NR	NR	NR	1,360	13,331
157	2	2	NR	0.03	2	2	NR	0.02	NR	NR	NR	NR	3E-04	47.4	138
247	2	2	NR	0.3	1	1	NR	NR	NR	0.04	NR	0.04	2E-04	173	544
1907	3	2	1	NR	0.1	0.1	0.2	0.5	NR	NR	NR	NR	2E-05	32.7	39.2
1910	4	3	2	NR	0.07	0.07	0.2	0.8	NR	NR	NR	NR	1E-05	34.1	39.8
1911	3	2	1	NR	0.2	0.2	0.08	0.7	NR	NR	NR	NR	3E-05	39.9	39.9
2393	2	2	NR	0.05	1	1	NR	0.02	NR	0.03	NR	0.03	2E-04	1,180	4,714
2426	2	2	0.7	NR	0.8	0.8	NR	0.09	NR	NR	NR	NR	1E-04	60.8	123
2615	4	3	0.5	NR	2	2	0.3	0.3	NR	NR	NR	NR	4E-04	39.3	57.4
2719	3	2	0.1	0.4	0.9	0.8	0.009	0.2	NR	0.04	NR	0.04	1E-04	1,119	8,527
2903	3	2	0.7	NR	0.4	0.2	0.5	0.3	NR	NR	NR	NR	4E-05	22.0	21.2
Residential Screening Area Risk (RSAR) Exposure Areas															
Parcel Group D Hotspot	3	2	0.09	0.04	0.5	0.5	0.1	0.1	NR	0.02	0.04	0.04	2E-04	1,579	3,048
Parcel Group F	2	2	0.8	NR	0.05	0.03	0.09	0.09	NR	NR	NR	NR	NR	26.9	30.5
Non-Residential Exposure Areas															
NR4 JT Septic Facility	5	4	NR	0.2	3	3	NR	0.07	NR	NR	NR	NR	6E-04	1,183	1,887
NR5 Main Tailings Pile 1964 Blow Out Path	3	2	NR	0.08	2	2	NR	NR	NR	NR	NR	0.01	3E-04	1,186	1,681
NR6 Middle Chaparral Gulch	4	3	2	0.05	1	1	0.02	0.02	NR	NR	NR	0.008	2E-04	526	633
NR7 Smelter Tailings Swale	3	2	0.06	0.08	0.7	0.7	0.07	0.2	NR	NR	0.5	0.01	1E-04	210	263
NR8 Tailings Floodplain	5	4	1	0.05	2	2	0.02	0.1	NR	0.1	0.6	0.2	3E-04	676	1,338
NR9 Lower Chaparral Gulch	8	6	0.3	0.4	4	4	0.4	0.2	NR	NR	0.5	0.02	7E-04	649	1,869
NR10 Agua Fria Tailings Pile	12	11	0.1	0.05	10	10	0.3	0.0006	NR	NR	0.5	0.05	2E-03	3,883	5,579
NR11 Former Pyrometallurgical Operations Area	11	10	0.4	0.2	2	2	0.02	0.7	NR	0.02	NR	0.05	6E-04	953	2,093
NR12 Smelter Plateau	9	7	1	0.2	4	4	0.07	0.5	NR	0.03	0.07	0.06	7E-04	797	1,029
NR14 South of Former Iron King Mine Property	6	4	0.08	0.3	2	1	0.1	0.1	NR	NR	2	0.01	2E-04	632	1,748
NR16 Former Mineworks Area	6	5	0.08	0.7	3	3	0.04	0.09	0.008	0.3	0.2	0.3	6E-04	3,255	8,726
NR17 Main Tailings Pile	17	15	0.02	0.6	13	13	NR	0.4	0.006	0.3	0.8	0.4	2E-03	1,773	3,150
NR18 North American Industries Operations Area	4	3	0.02	0.1	2	2	0.1	0.05	NR	0.1	0.6	0.1	3E-04	785	5,333

Notes:

[a] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Results are provided for the combined child/adult scenario

[b] Only exposure areas with a incremental hazard index (HI) > 1 were evaluated for target organ/system HI segregation.

NR = no incremental risk and/or hazard identified for this exposure area

= HI >1 for target organ/system

= Incremental excess lifetime cancer risk >1x10^{-4} and/or lead concentration >400 mg/kg

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
Soil			
103	Residential Yard-Specific Risk (RYSR)	75.6	116
104	Residential Yard-Specific Risk (RYSR)	43.8	54.3
106	Residential Yard-Specific Risk (RYSR)	34.8	40.8
108	Residential Yard-Specific Risk (RYSR)	*249*	*419*
109	Residential Yard-Specific Risk (RYSR)	*311*	*393*
110	Residential Yard-Specific Risk (RYSR)	51.2	76.2
112 [b]	Residential Yard-Specific Risk (RYSR)	23.0	23.0
113 [b]	Residential Yard-Specific Risk (RYSR)	30.8	30.8
114	Residential Yard-Specific Risk (RYSR)	51.4	72.5
115	Residential Yard-Specific Risk (RYSR)	40.0	69.1
116	Residential Yard-Specific Risk (RYSR)	52.8	135
117	Residential Yard-Specific Risk (RYSR)	57.3	114
119	Residential Yard-Specific Risk (RYSR)	117	*265*
120	Residential Yard-Specific Risk (RYSR)	*1,360*	*13,331*
121	Residential Yard-Specific Risk (RYSR)	44.2	56.2
122	Residential Yard-Specific Risk (RYSR)	55.9	123
126	Residential Yard-Specific Risk (RYSR)	36.1	41.0
127	Residential Yard-Specific Risk (RYSR)	75.6	*144*
129	Residential Yard-Specific Risk (RYSR)	42.8	57.5
130	Residential Yard-Specific Risk (RYSR)	39.4	47.9
131	Residential Yard-Specific Risk (RYSR)	38.0	49.8
133	Residential Yard-Specific Risk (RYSR)	24.8	62.9
134	Residential Yard-Specific Risk (RYSR)	38.2	47.1
135	Residential Yard-Specific Risk (RYSR)	69.1	*148*
136	Residential Yard-Specific Risk (RYSR)	46.6	57.7
137	Residential Yard-Specific Risk (RYSR)	47.7	65.0
139 [b]	Residential Yard-Specific Risk (RYSR)	36.2	36.2
140	Residential Yard-Specific Risk (RYSR)	97.8	119
141	Residential Yard-Specific Risk (RYSR)	*345*	*414*
142	Residential Yard-Specific Risk (RYSR)	127	*204*
143	Residential Yard-Specific Risk (RYSR)	*239*	*372*
144	Residential Yard-Specific Risk (RYSR)	66.6	82.0
145	Residential Yard-Specific Risk (RYSR)	59.0	71.4
146	Residential Yard-Specific Risk (RYSR)	47.1	70.8
147	Residential Yard-Specific Risk (RYSR)	41.5	59.7
149	Residential Yard-Specific Risk (RYSR)	130	*315*
150 [b]	Residential Yard-Specific Risk (RYSR)	17.7	17.7
151	Residential Yard-Specific Risk (RYSR)	111	138
152 [b]	Residential Yard-Specific Risk (RYSR)	37.6	37.6

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
153	Residential Yard-Specific Risk (RYSR)	*233*	*594*
154	Residential Yard-Specific Risk (RYSR)	41.2	75.6
155	Residential Yard-Specific Risk (RYSR)	40.6	44.8
156 [b]	Residential Yard-Specific Risk (RYSR)	32.0	32.0
157	Residential Yard-Specific Risk (RYSR)	47.4	138
158 [b]	Residential Yard-Specific Risk (RYSR)	34.9	34.9
159	Residential Yard-Specific Risk (RYSR)	22.9	51.3
160	Residential Yard-Specific Risk (RYSR)	39.4	48.3
161	Residential Yard-Specific Risk (RYSR)	25.2	32.6
162	Residential Yard-Specific Risk (RYSR)	*171*	*1,350*
163	Residential Yard-Specific Risk (RYSR)	75.8	*160*
164	Residential Yard-Specific Risk (RYSR)	*274*	*547*
166 [b]	Residential Yard-Specific Risk (RYSR)	36.3	36.3
168	Residential Yard-Specific Risk (RYSR)	85.7	*159*
169	Residential Yard-Specific Risk (RYSR)	38.8	74.3
172 [b]	Residential Yard-Specific Risk (RYSR)	11.8	11.8
173	Residential Yard-Specific Risk (RYSR)	33.7	55.7
174	Residential Yard-Specific Risk (RYSR)	51.3	63.8
175	Residential Yard-Specific Risk (RYSR)	18.8	30.3
176	Residential Yard-Specific Risk (RYSR)	*366*	*503*
177	Residential Yard-Specific Risk (RYSR)	77.3	128
178	Residential Yard-Specific Risk (RYSR)	*161*	*196*
179	Residential Yard-Specific Risk (RYSR)	68.7	89.4
180	Residential Yard-Specific Risk (RYSR)	113	*232*
181	Residential Yard-Specific Risk (RYSR)	*238*	*367*
182	Residential Yard-Specific Risk (RYSR)	*316*	*660*
183	Residential Yard-Specific Risk (RYSR)	34.2	36.8
184	Residential Yard-Specific Risk (RYSR)	22.0	29.8
185	Residential Yard-Specific Risk (RYSR)	20.5	47.3
186	Residential Yard-Specific Risk (RYSR)	33.9	46.0
187	Residential Yard-Specific Risk (RYSR)	28.4	39.1
188	Residential Yard-Specific Risk (RYSR)	*193*	*266*
189	Residential Yard-Specific Risk (RYSR)	49.8	64.6
190	Residential Yard-Specific Risk (RYSR)	89.8	*184*
192	Residential Yard-Specific Risk (RYSR)	47.0	76.9
193	Residential Yard-Specific Risk (RYSR)	31.5	38.4
194	Residential Yard-Specific Risk (RYSR)	23.0	31.1
195	Residential Yard-Specific Risk (RYSR)	112	*173*
196	Residential Yard-Specific Risk (RYSR)	124	*168*
197 [b]	Residential Yard-Specific Risk (RYSR)	15.2	15.2

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
198	Residential Yard-Specific Risk (RYSR)	50.3	67.7
199	Residential Yard-Specific Risk (RYSR)	71.1	90.0
201	Residential Yard-Specific Risk (RYSR)	27.0	43.3
202	Residential Yard-Specific Risk (RYSR)	40.8	80.9
204	Residential Yard-Specific Risk (RYSR)	43.1	50.5
205	Residential Yard-Specific Risk (RYSR)	38.7	55.1
206	Residential Yard-Specific Risk (RYSR)	42.5	49.7
207	Residential Yard-Specific Risk (RYSR)	23.1	30.2
209 [b]	Residential Yard-Specific Risk (RYSR)	24.9	24.9
210	Residential Yard-Specific Risk (RYSR)	23.2	28.6
211	Residential Yard-Specific Risk (RYSR)	62.7	*165*
212 [b]	Residential Yard-Specific Risk (RYSR)	28.2	28.2
213	Residential Yard-Specific Risk (RYSR)	*148*	*199*
216 [b]	Residential Yard-Specific Risk (RYSR)	39.0	39.0
217 [b]	Residential Yard-Specific Risk (RYSR)	35.3	35.3
218	Residential Yard-Specific Risk (RYSR)	55.1	87.6
219 [b]	Residential Yard-Specific Risk (RYSR)	28.5	28.5
220	Residential Yard-Specific Risk (RYSR)	31.0	36.0
221	Residential Yard-Specific Risk (RYSR)	104	118
222	Residential Yard-Specific Risk (RYSR)	*615*	*2,849*
223	Residential Yard-Specific Risk (RYSR)	*184*	*253*
224	Residential Yard-Specific Risk (RYSR)	71.3	89.2
226	Residential Yard-Specific Risk (RYSR)	*308*	*408*
230	Residential Yard-Specific Risk (RYSR)	58.4	67.4
231	Residential Yard-Specific Risk (RYSR)	74.6	95.7
232	Residential Yard-Specific Risk (RYSR)	*574*	*2,833*
233	Residential Yard-Specific Risk (RYSR)	*305*	*385*
235	Residential Yard-Specific Risk (RYSR)	44.5	54.6
237	Residential Yard-Specific Risk (RYSR)	52.1	64.3
238	Residential Yard-Specific Risk (RYSR)	43.1	50.7
239	Residential Yard-Specific Risk (RYSR)	42.2	55.2
240	Residential Yard-Specific Risk (RYSR)	47.1	67.9
241 [b]	Residential Yard-Specific Risk (RYSR)	37.6	37.6
242	Residential Yard-Specific Risk (RYSR)	25.7	30.2
243	Residential Yard-Specific Risk (RYSR)	40.7	64.6
245 [b]	Residential Yard-Specific Risk (RYSR)	10.9	10.9
247	Residential Yard-Specific Risk (RYSR)	*173*	*544*
248	Residential Yard-Specific Risk (RYSR)	60.0	107
249 [b]	Residential Yard-Specific Risk (RYSR)	19.3	19.3

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
251 [b]	Residential Yard-Specific Risk (RYSR)	15.3	15.3
252	Residential Yard-Specific Risk (RYSR)	*188*	*255*
253	Residential Yard-Specific Risk (RYSR)	54.1	61.0
254	Residential Yard-Specific Risk (RYSR)	44.9	60.5
255	Residential Yard-Specific Risk (RYSR)	28.5	37.9
256	Residential Yard-Specific Risk (RYSR)	31.8	38.7
257	Residential Yard-Specific Risk (RYSR)	48.0	59.0
261	Residential Yard-Specific Risk (RYSR)	31.2	40.6
262	Residential Yard-Specific Risk (RYSR)	89.5	*204*
263	Residential Yard-Specific Risk (RYSR)	28.0	38.8
265	Residential Yard-Specific Risk (RYSR)	78.9	113
267	Residential Yard-Specific Risk (RYSR)	140	*193*
268	Residential Yard-Specific Risk (RYSR)	77.1	101
303	Residential Yard-Specific Risk (RYSR)	29.4	34.8
307	Residential Yard-Specific Risk (RYSR)	50.2	114
308	Residential Yard-Specific Risk (RYSR)	140	*198*
309 [b]	Residential Yard-Specific Risk (RYSR)	19.3	19.3
310	Residential Yard-Specific Risk (RYSR)	74.9	104
311	Residential Yard-Specific Risk (RYSR)	31.4	38.8
1102 [b]	Residential Yard-Specific Risk (RYSR)	21.4	21.4
1106	Residential Yard-Specific Risk (RYSR)	46.1	62.4
1107	Residential Yard-Specific Risk (RYSR)	33.1	39.4
1108	Residential Yard-Specific Risk (RYSR)	35.3	43.2
1902 [b]	Residential Yard-Specific Risk (RYSR)	25.1	25.1
1903 [b]	Residential Yard-Specific Risk (RYSR)	34.3	34.3
1906 [b]	Residential Yard-Specific Risk (RYSR)	39.1	39.1
1907	Residential Yard-Specific Risk (RYSR)	32.7	39.2
1908 [b]	Residential Yard-Specific Risk (RYSR)	35.1	35.1
1909 [b]	Residential Yard-Specific Risk (RYSR)	39.1	39.1
1910	Residential Yard-Specific Risk (RYSR)	34.1	39.8
1911 [b]	Residential Yard-Specific Risk (RYSR)	39.9	39.9
1912 [b]	Residential Yard-Specific Risk (RYSR)	33.5	33.5
1913	Residential Yard-Specific Risk (RYSR)	21.3	24.3
1914	Residential Yard-Specific Risk (RYSR)	26.3	26.6
1915	Residential Yard-Specific Risk (RYSR)	20.4	22.9
1917	Residential Yard-Specific Risk (RYSR)	33.5	55.0
2102	Residential Yard-Specific Risk (RYSR)	32.1	42.6
2105	Residential Yard-Specific Risk (RYSR)	47.7	54.0
2108 [b]	Residential Yard-Specific Risk (RYSR)	39.9	39.9

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
2109	Residential Yard-Specific Risk (RYSR)	36.9	79.3
2110	Residential Yard-Specific Risk (RYSR)	23.0	43.8
2112	Residential Yard-Specific Risk (RYSR)	24.2	29.0
2114 [b]	Residential Yard-Specific Risk (RYSR)	13.8	13.8
2115	Residential Yard-Specific Risk (RYSR)	53.4	72.4
2116	Residential Yard-Specific Risk (RYSR)	37.1	43.0
2117	Residential Yard-Specific Risk (RYSR)	36.1	42.1
2118	Residential Yard-Specific Risk (RYSR)	28.7	32.6
2201	Residential Yard-Specific Risk (RYSR)	25.7	38.1
2202 [b]	Residential Yard-Specific Risk (RYSR)	21.4	21.4
2203 [b]	Residential Yard-Specific Risk (RYSR)	20.0	20.0
2204 [b]	Residential Yard-Specific Risk (RYSR)	16.8	16.8
2205	Residential Yard-Specific Risk (RYSR)	36.4	47.3
2209 [b]	Residential Yard-Specific Risk (RYSR)	32.7	32.7
2211	Residential Yard-Specific Risk (RYSR)	30.2	54.8
2214	Residential Yard-Specific Risk (RYSR)	94.2	139
2215	Residential Yard-Specific Risk (RYSR)	43.1	55.7
2216	Residential Yard-Specific Risk (RYSR)	90.7	*241*
2304	Residential Yard-Specific Risk (RYSR)	15.5	21.4
2305	Residential Yard-Specific Risk (RYSR)	22.9	31.0
2307 [b]	Residential Yard-Specific Risk (RYSR)	10.6	10.6
2308 [b]	Residential Yard-Specific Risk (RYSR)	25.1	25.1
2310 [b]	Residential Yard-Specific Risk (RYSR)	14.5	14.5
2311 [b]	Residential Yard-Specific Risk (RYSR)	37.5	37.5
2312 [b]	Residential Yard-Specific Risk (RYSR)	25.8	25.8
2313	Residential Yard-Specific Risk (RYSR)	22.7	30.7
2314 [b]	Residential Yard-Specific Risk (RYSR)	36.7	36.7
2315 [b]	Residential Yard-Specific Risk (RYSR)	28.9	28.9
2316 [b]	Residential Yard-Specific Risk (RYSR)	26.6	26.6
2317 [b]	Residential Yard-Specific Risk (RYSR)	16.0	16.0
2318	Residential Yard-Specific Risk (RYSR)	26.1	32.1
2322	Residential Yard-Specific Risk (RYSR)	27.6	40.5
2323	Residential Yard-Specific Risk (RYSR)	22.7	28.2
2324	Residential Yard-Specific Risk (RYSR)	37.1	107
2325 [b]	Residential Yard-Specific Risk (RYSR)	32.7	32.7
2326	Residential Yard-Specific Risk (RYSR)	33.9	38.1
2327 [b]	Residential Yard-Specific Risk (RYSR)	30.4	30.4
2328	Residential Yard-Specific Risk (RYSR)	60.1	*215*

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
2329	Residential Yard-Specific Risk (RYSR)	35.5	52.3
2330 [b]	Residential Yard-Specific Risk (RYSR)	35.1	35.1
2393	Residential Yard-Specific Risk (RYSR)	*1,180*	*4,714*
2394	Residential Yard-Specific Risk (RYSR)	28.9	40.0
2396 [b]	Residential Yard-Specific Risk (RYSR)	25.1	25.1
2401	Residential Yard-Specific Risk (RYSR)	121	*333*
2402	Residential Yard-Specific Risk (RYSR)	48.7	63.1
2403	Residential Yard-Specific Risk (RYSR)	98.8	132
2404	Residential Yard-Specific Risk (RYSR)	64.4	*147*
2406	Residential Yard-Specific Risk (RYSR)	*901*	*7,126*
2407	Residential Yard-Specific Risk (RYSR)	112	*228.6*
2408	Residential Yard-Specific Risk (RYSR)	*508*	*953*
2409	Residential Yard-Specific Risk (RYSR)	*382*	*725*
2410	Residential Yard-Specific Risk (RYSR)	*1,055*	*1,543*
2415	Residential Yard-Specific Risk (RYSR)	*155*	*209*
2416	Residential Yard-Specific Risk (RYSR)	102	139
2417	Residential Yard-Specific Risk (RYSR)	112	*169*
2420	Residential Yard-Specific Risk (RYSR)	30.7	42.4
2422	Residential Yard-Specific Risk (RYSR)	48.8	67.6
2425 [b]	Residential Yard-Specific Risk (RYSR)	39.9	39.9
2426	Residential Yard-Specific Risk (RYSR)	60.8	123
2427	Residential Yard-Specific Risk (RYSR)	43.2	55.3
2428	Residential Yard-Specific Risk (RYSR)	79.6	97.7
2429	Residential Yard-Specific Risk (RYSR)	82.3	*163*
2430	Residential Yard-Specific Risk (RYSR)	131	*223*
2433	Residential Yard-Specific Risk (RYSR)	45.1	62.1
2434	Residential Yard-Specific Risk (RYSR)	54.4	87.5
2435	Residential Yard-Specific Risk (RYSR)	69.7	95.5
2444	Residential Yard-Specific Risk (RYSR)	*324*	*980*
2449 [b]	Residential Yard-Specific Risk (RYSR)	33.6	33.6
2456 [b]	Residential Yard-Specific Risk (RYSR)	13.8	13.8
2457 [b]	Residential Yard-Specific Risk (RYSR)	26.6	26.6
2458 [b]	Residential Yard-Specific Risk (RYSR)	19.3	19.3
2462 [b]	Residential Yard-Specific Risk (RYSR)	9.60	9.60
2490	Residential Yard-Specific Risk (RYSR)	91.9	139
2502	Residential Yard-Specific Risk (RYSR)	117	*144*
2504	Residential Yard-Specific Risk (RYSR)	29.1	37.0
2505	Residential Yard-Specific Risk (RYSR)	27.9	49.2
2507	Residential Yard-Specific Risk (RYSR)	36.4	44.3

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
2508 [b]	Residential Yard-Specific Risk (RYSR)	24.4	24.4
2509 [b]	Residential Yard-Specific Risk (RYSR)	30.4	30.4
2511	Residential Yard-Specific Risk (RYSR)	24.9	35.1
2512 [b]	Residential Yard-Specific Risk (RYSR)	37.5	37.5
2514	Residential Yard-Specific Risk (RYSR)	44.3	52.3
2515	Residential Yard-Specific Risk (RYSR)	33.6	44.6
2516	Residential Yard-Specific Risk (RYSR)	58.8	110
2517	Residential Yard-Specific Risk (RYSR)	91.6	*158*
2518	Residential Yard-Specific Risk (RYSR)	49.2	59.7
2520	Residential Yard-Specific Risk (RYSR)	61.4	76.3
2521	Residential Yard-Specific Risk (RYSR)	48.9	60.0
2522	Residential Yard-Specific Risk (RYSR)	62.8	76.2
2523	Residential Yard-Specific Risk (RYSR)	62.4	89.2
2524	Residential Yard-Specific Risk (RYSR)	60.5	76.2
2525	Residential Yard-Specific Risk (RYSR)	29.7	36.1
2526 [b]	Residential Yard-Specific Risk (RYSR)	30.4	30.4
2527	Residential Yard-Specific Risk (RYSR)	115	*171*
2529	Residential Yard-Specific Risk (RYSR)	*358*	*676*
2530	Residential Yard-Specific Risk (RYSR)	*724*	*2,816*
2532	Residential Yard-Specific Risk (RYSR)	51.1	78.7
2535	Residential Yard-Specific Risk (RYSR)	13.2	25.8
2536	Residential Yard-Specific Risk (RYSR)	107	*148*
2537	Residential Yard-Specific Risk (RYSR)	58.4	93.3
2538	Residential Yard-Specific Risk (RYSR)	88.6	*149*
2539	Residential Yard-Specific Risk (RYSR)	57.3	80.2
2540	Residential Yard-Specific Risk (RYSR)	28.9	34.5
2541	Residential Yard-Specific Risk (RYSR)	27.8	39.2
2542	Residential Yard-Specific Risk (RYSR)	42.5	48.9
2545	Residential Yard-Specific Risk (RYSR)	73.2	92.4
2549	Residential Yard-Specific Risk (RYSR)	48.5	58.3
2550	Residential Yard-Specific Risk (RYSR)	*207*	*288*
2602	Residential Yard-Specific Risk (RYSR)	*2,920*	*18,699*
2603	Residential Yard-Specific Risk (RYSR)	113	*148*
2606	Residential Yard-Specific Risk (RYSR)	48.0	63.0
2610	Residential Yard-Specific Risk (RYSR)	49.1	73.0
2612	Residential Yard-Specific Risk (RYSR)	18.4	21.4
2615	Residential Yard-Specific Risk (RYSR)	39.3	57.4
2691	Residential Yard-Specific Risk (RYSR)	*211*	*284*
2693	Residential Yard-Specific Risk (RYSR)	82.3	94.3
2701	Residential Yard-Specific Risk (RYSR)	45.1	48.6

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
2702 [b]	Residential Yard-Specific Risk (RYSR)	35.1	35.1
2704 [b]	Residential Yard-Specific Risk (RYSR)	38.3	38.3
2707	Residential Yard-Specific Risk (RYSR)	36.5	44.5
2708	Residential Yard-Specific Risk (RYSR)	102	*156*
2709	Residential Yard-Specific Risk (RYSR)	112	*223*
2710	Residential Yard-Specific Risk (RYSR)	66.5	123
2715	Residential Yard-Specific Risk (RYSR)	45.9	58.3
2718	Residential Yard-Specific Risk (RYSR)	*231*	*293*
2719	Residential Yard-Specific Risk (RYSR)	*1,119*	*8,527*
2720	Residential Yard-Specific Risk (RYSR)	89.8	108
2723	Residential Yard-Specific Risk (RYSR)	23.1	30.4
2724	Residential Yard-Specific Risk (RYSR)	24.1	39.3
2725	Residential Yard-Specific Risk (RYSR)	112	*161*
2726	Residential Yard-Specific Risk (RYSR)	62.3	75.3
2736 [b]	Residential Yard-Specific Risk (RYSR)	25.8	25.8
2740	Residential Yard-Specific Risk (RYSR)	43.4	51.9
2741	Residential Yard-Specific Risk (RYSR)	78.9	*161*
2748	Residential Yard-Specific Risk (RYSR)	40.0	106
2749 [b]	Residential Yard-Specific Risk (RYSR)	32.7	32.7
2752	Residential Yard-Specific Risk (RYSR)	28.9	33.8
2753	Residential Yard-Specific Risk (RYSR)	42.8	49.9
2755	Residential Yard-Specific Risk (RYSR)	52.8	65.3
2756	Residential Yard-Specific Risk (RYSR)	61.2	76.3
2801	Residential Yard-Specific Risk (RYSR)	30.6	71.1
2804	Residential Yard-Specific Risk (RYSR)	40.1	47.9
2805	Residential Yard-Specific Risk (RYSR)	26.4	31.2
2806 [b]	Residential Yard-Specific Risk (RYSR)	36.7	36.7
2807	Residential Yard-Specific Risk (RYSR)	29.8	33.9
2808 [b]	Residential Yard-Specific Risk (RYSR)	36.7	36.7
2810	Residential Yard-Specific Risk (RYSR)	39.3	43.7
2901	Residential Yard-Specific Risk (RYSR)	31.1	42.9
2903	Residential Yard-Specific Risk (RYSR)	22.0	21.2
3001	Residential Yard-Specific Risk (RYSR)	58.3	98.6
3004	Residential Yard-Specific Risk (RYSR)	*143*	*619*
3005	Residential Yard-Specific Risk (RYSR)	*141*	*187*
3008	Residential Yard-Specific Risk (RYSR)	95.7	113
3009	Residential Yard-Specific Risk (RYSR)	100	121
3010	Residential Yard-Specific Risk (RYSR)	80.8	106
3011	Residential Yard-Specific Risk (RYSR)	50.5	65.5

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
3012	Residential Yard-Specific Risk (RYSR)	69.4	90.5
3015	Residential Yard-Specific Risk (RYSR)	72.6	97.8
45065 [b]	Residential Yard-Specific Risk (RYSR)	27.8	27.8
45066	Residential Yard-Specific Risk (RYSR)	19.9	23.5
105A	Residential Yard-Specific Risk (RYSR)	43.5	51.2
105B	Residential Yard-Specific Risk (RYSR)	*226*	*698*
107A	Residential Yard-Specific Risk (RYSR)	*182*	*240*
107B	Residential Yard-Specific Risk (RYSR)	*275*	*335*
1101A [b]	Residential Yard-Specific Risk (RYSR)	38.7	38.7
1101B	Residential Yard-Specific Risk (RYSR)	37.0	44.9
1104A	Residential Yard-Specific Risk (RYSR)	38.9	53.6
1104B	Residential Yard-Specific Risk (RYSR)	36.7	53.7
138A	Residential Yard-Specific Risk (RYSR)	128	*187*
138B	Residential Yard-Specific Risk (RYSR)	*264*	*408*
138C	Residential Yard-Specific Risk (RYSR)	49.8	82.9
165 and 60J	Residential Yard-Specific Risk (RYSR)	82.9	93.8
167A	Residential Yard-Specific Risk (RYSR)	66.5	*168*
167B	Residential Yard-Specific Risk (RYSR)	25.3	29.6
167C	Residential Yard-Specific Risk (RYSR)	41.8	52.2
170A [b]	Residential Yard-Specific Risk (RYSR)	25.1	25.1
170B	Residential Yard-Specific Risk (RYSR)	21.6	24.9
191A [b]	Residential Yard-Specific Risk (RYSR)	28.9	28.9
191B	Residential Yard-Specific Risk (RYSR)	26.6	32.0
203A	Residential Yard-Specific Risk (RYSR)	*182*	*249*
203B	Residential Yard-Specific Risk (RYSR)	*244*	*323*
2103A	Residential Yard-Specific Risk (RYSR)	37.6	47.9
2103B	Residential Yard-Specific Risk (RYSR)	28.6	34.7
2111A [b]	Residential Yard-Specific Risk (RYSR)	12.2	12.2
2111B [b]	Residential Yard-Specific Risk (RYSR)	22.9	22.9
2119A	Residential Yard-Specific Risk (RYSR)	31.3	38.5
2119B	Residential Yard-Specific Risk (RYSR)	33.6	39.4
214A	Residential Yard-Specific Risk (RYSR)	79.8	125
214B	Residential Yard-Specific Risk (RYSR)	114	*152*
215A	Residential Yard-Specific Risk (RYSR)	51.7	64.5
215B	Residential Yard-Specific Risk (RYSR)	*150*	*204*
215C	Residential Yard-Specific Risk (RYSR)	*402*	*670*
225A	Residential Yard-Specific Risk (RYSR)	101	134
225C	Residential Yard-Specific Risk (RYSR)	*167*	*218*
227 and 70J	Residential Yard-Specific Risk (RYSR)	*159*	*300*

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
228 and 55J	Residential Yard-Specific Risk (RYSR)	84.2	114
229 and 36W	Residential Yard-Specific Risk (RYSR)	*605*	*915*
2319A	Residential Yard-Specific Risk (RYSR)	22.3	27.5
234 and 45J	Residential Yard-Specific Risk (RYSR)	70.2	80.5
236 and 85J	Residential Yard-Specific Risk (RYSR)	81.7	87.4
2437A	Residential Yard-Specific Risk (RYSR)	25.5	31.3
2439A	Residential Yard-Specific Risk (RYSR)	35.3	44.1
2459A [b]	Residential Yard-Specific Risk (RYSR)	8.17	8.17
2459B [b]	Residential Yard-Specific Risk (RYSR)	7.70	7.70
246 and 30W	Residential Yard-Specific Risk (RYSR)	*308*	*426*
258 and 00W	Residential Yard-Specific Risk (RYSR)	107	*192*
2713B	Residential Yard-Specific Risk (RYSR)	51.3	51.3
2743A [b]	Residential Yard-Specific Risk (RYSR)	18.6	18.6
2743BC [b]	Residential Yard-Specific Risk (RYSR)	22.2	22.2
2743D	Residential Yard-Specific Risk (RYSR)	22.0	40.1
2743E [b]	Residential Yard-Specific Risk (RYSR)	12.9	12.9
3006A	Residential Yard-Specific Risk (RYSR)	70.7	105
3006B	Residential Yard-Specific Risk (RYSR)	46.4	57.6
3013A	Residential Yard-Specific Risk (RYSR)	66.0	83.7
3013B	Residential Yard-Specific Risk (RYSR)	59.1	81.0
40W	Residential Yard-Specific Risk (RYSR)	49.3	50.4
80J	Residential Yard-Specific Risk (RYSR)	69.5	92.1
O08	Residential Yard-Specific Risk (RYSR)	42.6	*159*
O09	Residential Yard-Specific Risk (RYSR)	27.9	34.5
O10	Residential Yard-Specific Risk (RYSR)	50.1	65.3
O11	Residential Yard-Specific Risk (RYSR)	20.1	25.5
O12	Residential Yard-Specific Risk (RYSR)	64.0	95.7
O13	Residential Yard-Specific Risk (RYSR)	65.2	84.9
O14	Residential Yard-Specific Risk (RYSR)	40.5	62.9
O15	Residential Yard-Specific Risk (RYSR)	114	*144*
O16	Residential Yard-Specific Risk (RYSR)	*156*	*395*
O17	Residential Yard-Specific Risk (RYSR)	103	*146*
Parcel Group A	Residential Screening Area Risk (RSAR)	41.8	46.4
Parcel Group B	Residential Screening Area Risk (RSAR)	35.9	42.9
Parcel Group C	Residential Screening Area Risk (RSAR)	30.6	34.8
Parcel Group D Hot Spot	Residential Screening Area Risk (RSAR)	**1,579**	*3,048*
Parcel Group D (Hot Spot Excluded)	Residential Screening Area Risk (RSAR)	35.3	54.1
Parcel Group E	Residential Screening Area Risk (RSAR)	20.0	22.2
Parcel Group F	Residential Screening Area Risk (RSAR)	27	30.5

TABLE 9-10

Exposure Point Concentrations for Lead in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Lead Exposure Point Concentration (mg/kg)	
		Mean	UCL[a]
Parcel Group G [b]	Residential Screening Area Risk (RSAR)	34.3	34.3
Parcel Group H [b]	Residential Screening Area Risk (RSAR)	38.3	38.3
NR3 Upper Chaparral Gulch	Non-Residential, Possible Future Residential	*216*	*253*
NR13 Smelter East of River	Non-Residential, Possible Future Residential	*203*	*260*
NR19 North of Main Tailings Pile	Non-Residential, Possible Future Residential	*252*	*458*
NR20 North of Chaparral Gulch	Non-Residential, Possible Future Residential	55.1	61.6
NR2 Dewey-Humboldt Town Hall [b]	Non-Residential	18.4	18.4
NR2 Humboldt Elementary School	Non-Residential	32.2	41.8
NR4 JT Septic Facility	Non-Residential	***1,183***	***1,887***
NR5 Main Tailings Pile 1964 Blow Out Path	Non-Residential	***1,186***	***1,681***
NR6 Middle Chaparral Gulch	Non-Residential	*526*	*633*
NR7 Smelter Tailings Swale	Non-Residential	*210*	*263*
NR8 Tailings Floodplain	Non-Residential	*676*	***1,338***
NR9 Lower Chaparral Gulch	Non-Residential	*649*	***1,869***
NR10 Agua Fria Tailings Pile	Non-Residential	***3,883***	***5,579***
NR11 Former Pyrometallurgical Operations Area	Non-Residential	***953***	***2,093***
NR12 Smelter Plateau	Non-Residential	*797*	***1,029***
NR14 South of Former Iron King Mine Property	Non-Residential	*632*	***1,748***
NR15 Auto Yard	Non-Residential	29.3	44.7
NR16 Former Mineworks Area	Non-Residential	***3,255***	***8,726***
NR17 Main Tailings Pile	Non-Residential	***1,773***	***3,150***
NR18 North American Industries Operations Area	Non-Residential	*785*	***5,333***
Sediment			
AF-01	Agua Fria River - Upstream	10.4	14.1
AF-02	Aqua Fria River - Adjacent to Smelter	66.3	*337*
AF-03	Aqua Fria River - Downstream	44.4	171

Notes:

[a] The lower of the calculated UCL or the maximum detection is listed.

[b] The concentrations listed for this exposure area is the maximum detect.

Highlighted cells indicate that the exposure point concentration (EPC) exceeds EPA residential screening level of 400 mg/kg

Italicized values indicate EPC exceeds provisional screening level of 140 mg/kg.

Bolded values indicate non-residential properties with EPC exceeding the EPA industrial screening level of 800 mg/kg

EPC = exposure point concentration

mg/kg = milligram per kilogram

UCL = upper confidence limit on the mean concentration, calculated as described in Section 9.4.2

TABLE 9-11

Summary of Risk and Hazard Estimates for the Residential Exposure Scenario – Inhalation of Ambient Dusts

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Monitoring Station	Excess Lifetime Cancer Risk	Noncancer Hazard Index	Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]
Site Downwind Stations				
AES-01	3E-06	0.2	Arsenic (ELCR=4E-6, 91%)	None Identified
AHS-02	2E-05	1	Beryllium (ELCR=1E-5, 79%) Arsenic (ELCR=3E-6, 15%)	None Identified
AHS-03	2E-06	0.5	None Identified	None Identified
AIK-01	4E-05	2	Arsenic (ELCR=4E-5, 93%) Nickel (ELCR=3E-6, 7%)	Arsenic (HQ=2, 72%)
AIK-01A	5E-05	2	Arsenic (ELCR=5E-5, 97%)	Arsenic (HQ=2, 89%)
AIK-02	1E-05	0.7	Arsenic (ELCR=7E-6, 74%) Nickel (ELCR=2E-6, 23%)	None Identified
AIK-03	4E-06	0.9	Cadmium (ELCR=2E-6, 48%)	None Identified
Background Stations				
ABG-01	2E-05	0.8	Arsenic (ELCR=2E-5, 94%)	None Identified
AHS-01	3E-06	3	Beryllium (ELCR=2E-6, 55%)	Aluminum (HQ=3, 90%)

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

TABLE 9-12

Summary of Risk and Hazard Estimates for the Occupational Exposure Scenario – Non-Residential, Possible Future Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard				Incremental Risk and Hazard[b]	
Exposure Area	**Excess Lifetime Cancer Risk**	**Noncancer Hazard Index**	**Primary Contributors to Cancer Risk[a]**	**Primary Contributors to Hazard Index[a]**	**Excess Lifetime Cancer Risk**	**Noncancer Hazard Index**
NR3 Upper Chaparral Gulch	2E-05	0.3	Arsenic (ELCR=2E-5, >99%)	None Identified	1E-05	--
NR13 Smelter East of River	1E-05	0.3	Arsenic (ELCR=1E-5, >99%)	None Identified	8E-06	--
NR19 North of Main Tailings Pile	3E-05	0.5	Arsenic (ELCR=3E-5, >99%)	None Identified	3E-05	--
NR20 North of Chaparral Gulch	2E-05	0.3	Arsenic (ELCR=2E-5, >99%)	None Identified	1E-05	--

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-13

Summary of Risk and Hazard Estimates for the Occupational Exposure Scenario – Non-Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard				Incremental Risk and Hazard[b]	
Exposure Area	Excess Lifetime Cancer Risk	Noncancer Hazard Index	Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]	Excess Lifetime Cancer Risk	Noncancer Hazard Index
NR2 Dewey-Humboldt Town Hall	2E-06	0.1	Arsenic (ELCR=2E-6, >99%)	None Identified	NR	--
NR2 Humboldt Elementary School	3E-06	0.1	Arsenic (ELCR=3E-6, >99%)	None Identified	NR	--
NR4 JT Septic Facility	1E-04	1	Arsenic (ELCR=1E-4, >99%)	None Identified	1E-04	--
NR5 Main Tailings Pile 1964 Blow Out Path	6E-05	0.6	Arsenic (ELCR=6E-5, >99%)	None Identified	6E-05	--
NR6 Middle Chaparral Gulch	4E-05	0.9	Arsenic (ELCR=4E-5, >99%)	None Identified	4E-05	--
NR7 Smelter Tailings Swale	3E-05	0.7	Arsenic (ELCR=3E-5, >99%)	None Identified	2E-05	--
NR8 Tailings Floodplain	6E-05	1	Arsenic (ELCR=6E-5, >99%)	None Identified	6E-05	--
NR9 Lower Chaparral Gulch	2E-04	2	Arsenic (ELCR=1E-4, >99%)	Arsenic (HQ=1, 59%)	2E-04	1
NR10 Agua Fria Tailings Pile	4E-04	3	Arsenic (ELCR=4E-4, >99%)	Arsenic (HQ=2, 81%)	4E-04	2
NR11 Former Pyrometallurgical Operations Area	1E-04	3	Arsenic (ELCR=6E-5, 51%) 2,3,7,8-TCDD TEQ (ELCR=5E-5, 45%) Benzo[a]pyrene (ELCR=2E-6, 2%)	2,3,7,8-TCDD TEQ (HQ=2, 61%)	1E-04	2
NR12 Smelter Plateau	2E-04	2	Arsenic (ELCR=1E-4, 92%) 2,3,7,8-TCDD TEQ (ELCR=1E-5, 7%) Chromium, Hexavalent (ELCR=3E-6, 2%)	Arsenic (HQ=0.9, 46%)	2E-04	2
NR14 South of Former Iron King Mine Property	6E-05	1	Arsenic (ELCR=6E-5, >99%)	None Identified	5E-05	--
NR15 Auto Yard	4E-06	0.5	Arsenic (ELCR=4E-6, >99%)	None Identified	NR	--
NR16 Former Mineworks Area	1E-04	1	Arsenic (ELCR=1E-4, >99%)	None Identified	1E-04	--
NR17 Main Tailings Pile	5E-04	4	Arsenic (ELCR=5E-4, >99%)	Arsenic (HQ=3, 79%)	5E-04	3
NR18 North American Industries Operations Area	6E-05	0.9	Arsenic (ELCR=6E-5, >99%)	None Identified	6E-05	--

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-14

Target Organ/System-Specific Hazard Index Estimates For Non-Residential Exposure Scenarios

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Noncancer Hazard Index	Incremental Noncancer Hazard Index[a]	Hazard Index by Target Organ/System[b]										Incremental Excess Lifetime Cancer Risk[a]	Mean Lead Conc. (mg/kg)	Lead UCL (mg/kg)
			Nervous (Al, Mn,Se)	Hematologic (Sb, Se, Zn)	Dermal (As, Se, V)	Cardiovascular (As)	Thyroid (Co)	Gastrointestinal (Cu, Fe)	Reproductive (CN)	Urinary (Hg)	Hair growth (Tl)	Immune (Hg, Zn)			
Non-Residential Exposure Areas – Occupational Exposure Scenario															
NR10 Agua Fria Tailings Pile	3	2	0.02	0.01	2	2	0.07	0.0001	NR	NR	0.1	0.01	4E-04	3,883	5,579
NR11 Former Pyrometallurgical Operations Area	3	2	0.09	0.04	0.4	0.4	0.004	0.1	NR	0.004	NR	0.01	1E-04	953	2,093
NR12 Smelter Plateau	2	2	0.3	0.05	0.9	0.9	0.01	0.1	NR	0.006	0.02	0.01	2E-04	797	1,029
NR17 Main Tailings Pile	4	3	0.004	0.1	3	3	NR	0.09	NR	0.06	0.2	0.08	5E-04	1,773	3,150
Non-Residential Exposure Areas – Recreational Exposure Scenario															
NR17 Main Tailings Pile	2	2	0.002	0.06	1	1	NR	0.01	0.0006	0.03	0.02	0.04	8E-05	1,773	3,150

Notes:

[a] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4.

[b] Only exposure areas with a incremental hazard index (HI) > 1 were evaluated for target organ/system HI segregation.

NR = no incremental risk and/or hazard identified for this exposure area

= HI >1 for target organ/system

= Incremental excess lifetime cancer risk >1x10^{-4} and/or lead concentration >800 mg/kg

TABLE 9-15

Summary of Risk and Hazard Estimates for the Recreational Exposure Scenario – Non-Residential, Possible Future Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard				Incremental Risk and Hazard[b]	
Exposure Area	**Excess Lifetime Cancer Risk**	**Noncancer Hazard Index**	**Primary Contributors to Cancer Risk[a]**	**Primary Contributors to Hazard Index[a]**	**Excess Lifetime Cancer Risk**	**Noncancer Hazard Index**
NR3 Upper Chaparral Gulch	3E-06	0.1	Arsenic (ELCR=3E-6, >99%)	None Identified	2E-06	--
NR13 Smelter East of River	2E-06	0.1	Arsenic (ELCR=2E-6, >99%)	None Identified	1E-06	--
NR19 North of Main Tailings Pile	5E-06	0.2	Arsenic (ELCR=5E-6, >99%)	None Identified	4E-06	--
NR20 North of Chaparral Gulch	3E-06	0.2	Arsenic (ELCR=3E-6, >99%)	None Identified	2E-06	--

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk.

ELCR = excess lifetime cancer risk

"--" = not calculated

TABLE 9-16

Summary of Risk and Hazard Estimates for the Recreational Exposure Scenario – Non-Residential Groups

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Site Risk and Hazard				Incremental Risk and Hazard[b]	
Exposure Area	Excess Lifetime Cancer Risk	Noncancer Hazard Index	Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]	Excess Lifetime Cancer Risk	Noncancer Hazard Index
NR2 Dewey-Humboldt Town Hall	3E-07	0.05	None Identified	None Identified	NR	--
NR2 Humboldt Elementary School	4E-07	0.06	None Identified	None Identified	NR	--
NR4 JT Septic Facility	2E-05	0.5	Arsenic (ELCR=2E-5, >99%)	None Identified	2E-05	--
NR5 Main Tailings Pile 1964 Blow Out Path	1E-05	0.3	Arsenic (ELCR=1E-5, >99%)	None Identified	1E-05	--
NR6 Middle Chaparral Gulch	8E-06	0.4	Arsenic (ELCR=8E-6, >99%)	None Identified	7E-06	--
NR7 Smelter Tailings Swale	5E-06	0.3	Arsenic (ELCR=5E-6, >99%)	None Identified	4E-06	--
NR8 Tailings Floodplain	1E-05	0.5	Arsenic (ELCR=1E-5, >99%)	None Identified	1E-05	--
NR9 Lower Chaparral Gulch	3E-05	0.8	Arsenic (ELCR=3E-5, >99%)	None Identified	3E-05	--
NR10 Agua Fria Tailings Pile	6E-05	1	Arsenic (ELCR=6E-5, >99%)	None Identified	6E-05	--
NR11 Former Pyrometallurgical Operations Area	2E-05	1	Arsenic (ELCR=1E-5, 49%) 2,3,7,8-TCDD TEQ (ELCR=9E-6, 42%)	None Identified	2E-05	--
NR12 Smelter Plateau	3E-05	0.9	Arsenic (ELCR=2E-5, 89%) 2,3,7,8-TCDD TEQ (ELCR=2E-6, 6%)	None Identified	3E-05	--
NR14 South of Former Iron King Mine Property	1E-05	0.6	Arsenic (ELCR=1E-5, >99%)	None Identified	9E-06	--
NR15 Auto Yard	8E-07	0.2	None Identified	None Identified	NR	--
NR16 Former Mineworks Area	2E-05	0.7	Arsenic (ELCR=2E-5, >99%)	None Identified	2E-05	--
NR17 Main Tailings Pile	8E-05	2	Arsenic (ELCR=8E-5, >99%)	Arsenic (HQ=1, 80%)	8E-05	2
NR18 North American Industries Operations Area	1E-05	0.4	Arsenic (ELCR=1E-5, >99%)	None Identified	1E-05	--

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

[b] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Only exposure areas with a Site HI > 1 were evaluated for incremental risk.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

NR = no incremental risk and/or hazard identified for this exposure area

"--" = not calculated

TABLE 9-17

Summary of Risk and Hazard Estimates for the Recreational Exposure to Agua Fria River Sediment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Excess Lifetime Cancer Risk	Noncancer Hazard Index	Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]
AF-01 (Upstream)	4E-07	0.07	None Identified	None Identified
AF-02 (Adjacent to Smelter)	2E-06	0.2	Arsenic (ELCR=2E-6, >99%)	None Identified
AF-03 (Downstream)	2E-06	0.1	Arsenic (ELCR=2E-6, >99%)	None Identified

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

TABLE 9-18

Summary of Risk and Hazard Estimates for Recreational Exposure to Agua Fria River Surface Water

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Excess Lifetime Cancer Risk	Noncancer Hazard Index	Primary Contributors to Cancer Risk[a]	Primary Contributors to Hazard Index[a]
AF-01 (Upstream)	1E-09	0.00003	None Identified	None Identified
AF-02 (Adjacent to Smelter)	5E-08	0.0008	None Identified	None Identified
AF-03 (Downstream)	7E-08	0.002	None Identified	None Identified

Notes:

[a] Primary contributors to the total risk are listed when chemical-specific risk > 10^{-6}. Primary contributors to the hazard index (HI) are listed when HI > 1.

ELCR = excess lifetime cancer risk

HQ = hazard quotient

TABLE 9-19

Exposure Areas Identified With Risk Estimates Exceeding EPA Thresholds For Potential Exposure to Soil: Residential Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Incremental Excess Lifetime Cancer Risk	Target Organ Incremental Hazard Index (Child/Adult)	Lead Exposure Point Concentration (mg/kg)	Incremental Excess Lifetime Cancer Risk > $1x10^{-4}$	Target Organ Incremental Hazard Index >1 (Child/Adult)	Lead EPC > 400 mg/kg	Primary Contributors[a]
108	Residential Yard-Specific Risk (RYSR)	4E-05	nc	*419*	--	--	✓	Pb
116	Residential Yard-Specific Risk (RYSR)	2E-04	1	135	✓	--	--	As
120	Residential Yard-Specific Risk (RYSR)	NR	2	*13,331*	--	✓[b]	✓	Pb, Sb[b]
141	Residential Yard-Specific Risk (RYSR)	1E-05	nc	*414*	--	--	✓	Pb
153	Residential Yard-Specific Risk (RYSR)	NR	nc	*594*	--	--	✓	Pb
157	Residential Yard-Specific Risk (RYSR)	3E-04	2	138	✓	✓	--	As
162	Residential Yard-Specific Risk (RYSR)	3E-05	nc	*1,350*	--	--	✓	Pb
164	Residential Yard-Specific Risk (RYSR)	3E-05	nc	*547*	--	--	✓	Pb
176	Residential Yard-Specific Risk (RYSR)	9E-06	nc	*503*	--	--	✓	Pb
182	Residential Yard-Specific Risk (RYSR)	2E-06	nc	*660*	--	--	✓	Pb
222	Residential Yard-Specific Risk (RYSR)	2E-05	nc	*2,849*	--	--	✓	Pb
226	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*408*	--	--	✓	Pb
232	Residential Yard-Specific Risk (RYSR)	NR	nc	*2,833*	--	--	✓	Pb
247	Residential Yard-Specific Risk (RYSR)	2E-04	1	*544*	✓	--	✓	As, Pb
1910	Residential Yard-Specific Risk (RYSR)	1E-05	2	39.8	--	✓[b]	--	Mn[b]
2215	Residential Yard-Specific Risk (RYSR)	2E-04	nc	55.7	✓	--	--	As
2328	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*215*	✓[c]	✓[c]	--	--
2393	Residential Yard-Specific Risk (RYSR)	2E-04	1	*4,714*	✓	--	✓	As, Pb
2406	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*7,126*	--	--	✓	Pb
2408	Residential Yard-Specific Risk (RYSR)	4E-05	nc	*953*	--	--	✓	Pb
2409	Residential Yard-Specific Risk (RYSR)	5E-05	nc	*725*	--	--	✓	Pb
2410	Residential Yard-Specific Risk (RYSR)	8E-05	nc	*1,543*	--	--	✓	Pb
2426	Residential Yard-Specific Risk (RYSR)	1E-04	0.8	123	✓[c]	✓[c]	--	--
2444	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*980*	--	--	✓	Pb
2529	Residential Yard-Specific Risk (RYSR)	5E-06	nc	*676*	--	--	✓	Pb
2530	Residential Yard-Specific Risk (RYSR)	1E-05	nc	*2,816*	--	--	✓	Pb
2602	Residential Yard-Specific Risk (RYSR)	2E-04	nc	*18,699*	✓	--	✓	As, Pb
2615	Residential Yard-Specific Risk (RYSR)	4E-04	2	57.4	✓	✓	--	As
2719	Residential Yard-Specific Risk (RYSR)	1E-04	0.9	*8,527*	--	--	✓	Pb
3004	Residential Yard-Specific Risk (RYSR)	7E-05	nc	*619*	--	--	✓	Pb
105B	Residential Yard-Specific Risk (RYSR)	2E-05	nc	*698*	--	--	✓	Pb
138B	Residential Yard-Specific Risk (RYSR)	2E-05	nc	*408*	--	--	✓	Pb
215C	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*670*	--	--	✓	Pb
229 and 36W	Residential Yard-Specific Risk (RYSR)	9E-05	nc	*915*	--	--	✓	Pb
246 and 30W	Residential Yard-Specific Risk (RYSR)	1E-04	nc	*426*	--	--	✓	Pb
Parcel Group D Hot Spot	Residential Screening Area Risk (RSAR)	2E-04	0.5	*3,048*	✓	--	✓	As, Pb
NR19 North of Main Tailings Pile	Non-Residential, Possible Future Residential	1E-04	nc	*458*	--	--	✓	Pb
NR10 Agua Fria Tailings Pile	Non-Residential	2E-03	10	*5,579*	✓	✓	✓	As, Pb
NR11 Former Pyrometallurgical Operations Area	Non-Residential	6E-04	7	*2,093*	✓	✓	✓	As, Pb, cPAH, TEQ
NR12 Smelter Plateau	Non-Residential	7E-04	4	*1,029*	✓	✓	✓	As, Pb, CrVI, TEQ
NR14 South of Former Iron King Mine Property	Non-Residential	2E-04	2	*1,748*	✓	✓	✓	As, Pb, Tl[b]
NR16 Former Mineworks Area	Non-Residential	6E-04	3	*8,726*	✓	✓	✓	As, Pb
NR17 Main Tailings Pile	Non-Residential	2E-03	13	*3,150*	✓	✓	✓	As, Pb
NR18 North American Industries Operations Area	Non-Residential	3E-04	2	*5,333*	✓	✓	✓	As, Pb
NR4 JT Septic Facility	Non-Residential	6E-04	3	*1,887*	✓	✓	✓	As, Pb
NR5 Main Tailings Pile 1964 Blow Out Path	Non-Residential	3E-04	2	*1,681*	✓	✓	✓	As, Pb

TABLE 9-19

Exposure Areas Identified With Risk Estimates Exceeding EPA Thresholds For Potential Exposure to Soil: Residential Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Incremental Excess Lifetime Cancer Risk	Target Organ Incremental Hazard Index (Child/Adult)	Lead Exposure Point Concentration (mg/kg)	Incremental Excess Lifetime Cancer Risk > $1x10^{-4}$	Target Organ Incremental Hazard Index >1 (Child/Adult)	Lead EPC > 400 mg/kg	Primary Contributors[a]
NR6 Middle Chaparral Gulch	Non-Residential	2E-04	2	*633*	✓	✓[b]	✓	As, Pb, Mn[b]
NR8 Tailings Floodplain	Non-Residential	3E-04	2	*1,338*	✓	✓	✓	As, Pb
NR9 Lower Chaparral Gulch	Non-Residential	7E-04	4	*1,869*	✓	✓	✓	As, Pb

Notes:

[a] Includes primary contributors to cancer risk, child/adult hazard index, or lead assessment, when at least one box in columns to the left is checked

[b] The hazard index at this location is contributed by elevated levels of metals that do not appear to be from mine- or smelter-related sources (see Sections 7 and 8.6)

[c] Additional weight of evidence was considered to select these exposure areas, because they have both a cancer risk at the high end of the EPA risk management range (10^{-6} to 10^{-4}) and a child-only hazard index exceeding 3 for a mine-related metal (arsenic).

Highlighted cells indicate value exceeds the EPA regulatory risk threshold (cancer risk>$1x10^{-4}$; hazard index >1; and/or lead EPC>400 mg/kg). For the child-only scenario, values with hazard index exceeding 3 are highlighted

Italicized values indicate lead EPC exceeds provisional screening level of 140 mg/kg.

EPA = U.S. Environmental Protection Agency

EPC = exposure point concentration

mg/kg = milligram per kilogram

nc = target organ/system-specific hazard index not calculated because the total hazard index did not exceed 1 for this exposure area

NR = no incremental risk and/or hazard identified for this exposure area

"--" = below the EPA regulatory risk threshold

TABLE 9-20

Exposure Areas Identified With Risk Estimates Exceeding EPA Thresholds For Potential Exposure to Soil: Occupational Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Incremental Excess Lifetime Cancer Risk	Target Organ Incremental Hazard Index	Lead Exposure Point Concentration (mg/kg)	Incremental Excess Lifetime Cancer Risk > $1x10^{-4}$	Target Organ Incremental Hazard Index >1	Lead EPC > 800 mg/kg	Primary Contributors[a]
NR10 Agua Fria Tailings Pile	Non-Residential	4E-04	2	5,579	✓	✓	✓	As, Pb
NR11 Former Pyrometallurgical Operations Area	Non-Residential	1E-04	0.4	2,093	--	--	✓	Pb
NR12 Smelter Plateau	Non-Residential	2E-04	0.9	1,029	✓	--	✓	As, Pb, TEQ
NR14 South of Former Iron King Mine Property	Non-Residential	5E-05	nc	1,748	--	--	✓	Pb
NR16 Former Mineworks Area	Non-Residential	1E-04	nc	8,726	--	--	✓	Pb
NR17 Main Tailings Pile	Non-Residential	5E-04	3	3,150	✓	✓	✓	As, Pb
NR18 North American Industries Operations Area	Non-Residential	6E-05	nc	5,333	--	--	✓	Pb
NR4 JT Septic Facility	Non-Residential	1E-04	nc	1,887	--	--	✓	Pb
NR5 Main Tailings Pile 1964 Blow Out Path	Non-Residential	6E-05	nc	1,681	--	--	✓	Pb
NR8 Tailings Floodplain	Non-Residential	6E-05	nc	1,338	--	--	✓	Pb
NR9 Lower Chaparral Gulch	Non-Residential	2E-04	nc	1,869	✓	--	✓	As, Pb

Notes:

[a] Includes primary contributors to cancer risk, hazard index, or lead assessment, when at least one box in columns to the left is checked.

Highlighted cells indicate value exceeds the EPA regulatory risk threshold (cancer risk>$1x10^{-4}$; hazard index >1; and/or lead EPC>800 mg/kg).

EPA = U.S. Environmental Protection Agency

EPC = exposure point concentration

mg/kg = milligram per kilogram

nc = target organ/system-specific hazard index not calculated because the total hazard index did not exceed 1 for this exposure area

"--" = below the EPA regulatory risk threshold

TABLE 9-21

Exposure Areas Identified With Risk Estimates Exceeding EPA Thresholds For Potential Exposure to Soil: Recreational User Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Property or Property Group Name	Current Property Type	Incremental Excess Lifetime Cancer Risk	Target Organ Incremental Hazard Index	Lead Exposure Point Concentration (mg/kg)	Incremental Excess Lifetime Cancer Risk > $1x10^{-4}$	Target Organ Incremental Hazard Index >1	Lead EPC > 400 mg/kg	Primary Contributors[a]
NR10 Agua Fria Tailings Pile	Non-Residential	6E-05	nc	*5,579*	--	--	✓	Pb
NR11 Former Pyrometallurgical Operations Area	Non-Residential	2E-05	nc	*2,093*	--	--	✓	Pb
NR12 Smelter Plateau	Non-Residential	3E-05	nc	*1,029*	--	--	✓	Pb
NR14 South of Former Iron King Mine Property	Non-Residential	9E-06	nc	*1,748*	--	--	✓	Pb
NR16 Former Mineworks Area	Non-Residential	2E-05	nc	*8,726*	--	--	✓	Pb
NR17 Main Tailings Pile	Non-Residential	8E-05	1	*3,150*	--	--	✓	Pb
NR18 North American Industries Operations Area	Non-Residential	1E-05	nc	*5,333*	--	--	✓	Pb
NR19 North of Main Tailings Pile	Non-Residential, Possible Future Residential	4E-06	nc	*458*	--	--	✓	Pb
NR4 JT Septic Facility	Non-Residential	2E-05	nc	*1,887*	--	--	✓	Pb
NR5 Main Tailings Pile 1964 Blow Out Path	Non-Residential	1E-05	nc	*1,681*	--	--	✓	Pb
NR6 Middle Chaparral Gulch	Non-Residential	7E-06	nc	*633*	--	--	✓	Pb
NR8 Tailings Floodplain	Non-Residential	1E-05	nc	*1,338*	--	--	✓	Pb
NR9 Lower Chaparral Gulch	Non-Residential	3E-05	nc	*1,869*	--	--	✓	Pb

Notes:

[a] Includes primary contributors to cancer risk, hazard index, or lead assessment, when at least one box in columns to the left is checked.

Highlighted cells indicate value exceeds the EPA regulatory risk threshold (cancer risk>$1x10^{-4}$; hazard index >1; and/or lead EPC>400 mg/kg).

Italicized values indicate lead EPC exceeds provisional screening level of 140 mg/kg.

EPA = U.S. Environmental Protection Agency

EPC = exposure point concentration

mg/kg = milligram per kilogram

nc = target organ/system-specific hazard index not calculated because the total hazard index did not exceed 1 for this exposure area

"--" = below the EPA regulatory risk threshold

TABLE 9-22

Target Organ/System-Specific Hazard Index Estimates For the Child-Only Residential Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Noncancer Hazard Index	Incremental Noncancer Hazard Index[a]	Hazard Index by Target Organ/System[b]										Incremental Excess Lifetime Cancer Risk[a]	Mean Lead Conc. (mg/kg)	Lead UCL (mg/kg)
			Nervous (Al, Mn,Se)	Hematologic (Sb, Se, Zn)	Dermal (As, Se, V)	Cardiovascular (As)	Thyroid (Co)	Gastrointestinal (Cu, Fe)	Reproductive (CN)	Urinary (Hg)	Hair growth (Tl)	Immune (Hg, Zn)			
Residential Yard-Specific Risk (RYSR) Exposure Areas															
106	6	2	1	0.04	0.6	0.5	0.5	0.3	NR	NR	NR	NR	2E-05	34.8	40.8
108	5	2	0.4	0.3	0.7	0.7	0.006	0.4	NR	NR	NR	0.03	4E-05	249	419
109	6	3	0.3	0.4	1	1	NR	0.5	NR	NR	NR	0.06	7E-05	311	393
116	8	5	0.4	1	4	4	NR	NR	NR	NR	NR	NR	2E-04	52.8	135
120	8	5	0.03	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	1,360	13,331
126	7	3	0.4	NR	0.8	0.5	0.6	0.9	NR	NR	NR	NR	2E-05	36.1	41.0
131	6	2	0.3	0.1	NR	NR	NR	0.04	NR	NR	1	NR	NR	38.0	49.8
157	7	5	NR	0.09	5	5	NR	0.07	NR	NR	NR	NR	3E-04	47.4	138
160	8	4	2	NR	0.1	0.1	NR	0.8	NR	NR	1	NR	6E-06	39.4	48.3
162	5	2	NR	NR	0.6	0.6	NR	0.1	NR	NR	0.8	NR	3E-05	171	1,350
169	5	2	NR	NR	NR	NR	NR	NR	NR	NR	2	NR	NR	38.8	74.3
183	8	3	0.9	NR	0.07	0.04	0.2	0.1	NR	NR	2	NR	2E-06	34.2	36.8
184	5	2	NR	NR	NR	NR	NR	0.06	NR	NR	1	NR	NR	22.0	29.8
201	7	3	1	NR	0.4	0.1	0.8	0.4	NR	NR	NR	NR	5E-06	27.0	43.3
226	7	3	NR	0.05	2	2	NR	0.07	NR	0.1	0.1	0.1	1E-04	308	408
247	7	5	NR	1	4	4	NR	NR	NR	0.1	NR	0.1	2E-04	173	544
251	4	2	1	NR	0.6	0.6	0.1	NR	NR	NR	NR	NR	3E-05	15.3	15.3
252	5	2	NR	0.06	2	2	NR	NR	NR	NR	NR	NR	1E-04	188	255
253	5	2	0.9	NR	0.3	0.3	0.1	0.1	NR	NR	NR	NR	1E-05	54.1	61.0
309	5	3	1	NR	1	0.9	0.5	NR	NR	NR	NR	NR	5E-05	19.3	19.3
1902	5	2	0.4	NR	0.7	0.5	0.4	0.5	NR	NR	NR	NR	3E-05	25.1	25.1
1903	7	4	0.4	NR	2	2	0.9	0.6	NR	NR	NR	NR	9E-05	34.3	34.3
1906	6	3	0.6	NR	1	0.8	0.4	0.6	NR	NR	NR	NR	4E-05	39.1	39.1
1907	10	7	4	NR	0.4	0.4	0.8	2	NR	NR	NR	NR	2E-05	32.7	39.2
1908	6	3	0.6	NR	0.9	0.6	1	0.6	NR	NR	NR	NR	3E-05	35.1	35.1
1910	12	9	5	NR	0.2	0.2	0.7	3	NR	NR	NR	NR	1E-05	34.1	39.8
1911	9	7	3	NR	0.7	0.7	0.3	2	NR	NR	NR	NR	3E-05	39.9	39.9
1912	6	3	0.6	NR	1	0.9	0.2	0.7	NR	NR	NR	NR	4E-05	33.5	33.5
1913	5	3	0.7	NR	0.8	0.6	0.5	0.5	NR	NR	NR	NR	3E-05	21.3	24.3
1914	5	2	0.7	NR	0.8	0.6	0.4	0.4	NR	NR	NR	NR	3E-05	26.3	26.6
1915	5	2	1	NR	0.4	0.3	0.4	0.4	NR	NR	NR	NR	1E-05	20.4	22.9
2215	7	4	NR	NR	4	4	NR	NR	NR	NR	NR	NR	2E-04	43.1	55.7
2328	4	3	NR	NR	3	3	NR	NR	NR	NR	NR	NR	1E-04	60.1	215
2393	8	5	NR	0.2	5	5	NR	0.06	NR	0.1	NR	0.1	2E-04	1,180	4,714
2406	6	3	NR	0.1	2	2	NR	0.5	NR	0.1	NR	0.1	1E-04	901	7,126
2410	4	2	NR	NR	2	2	NR	0.2	NR	NR	NR	NR	8E-05	1,055	1,543
2426	8	5	2	NR	3	3	NR	0.3	NR	NR	NR	NR	1E-04	60.8	123
2444	6	3	NR	NR	3	3	NR	NR	NR	NR	NR	NR	1E-04	324	980
2602	6	4	NR	NR	4	4	NR	0.07	NR	NR	NR	NR	2E-04	2,920	18,699
2615	14	11	1	NR	8	7	0.9	1	NR	NR	NR	NR	4E-04	39.3	57.4
2719	9	6	0.4	1	3	3	0.03	0.6	NR	0.1	NR	0.1	1E-04	1,119	8,527
2805	5	2	0.4	NR	0.5	0.3	0.6	0.3	NR	NR	NR	NR	1E-05	26.4	31.2
2806	5	2	0.5	NR	0.8	0.6	0.2	0.2	NR	NR	NR	NR	3E-05	36.7	36.7
2807	6	2	1	NR	0.3	0.2	0.3	0.5	NR	NR	NR	NR	1E-05	29.8	33.9
2808	6	2	1	NR	0.9	0.8	0.07	0.4	NR	NR	NR	NR	4E-05	36.7	36.7
2810	4	2	1	NR	0.2	0.2	NR	0.5	NR	NR	NR	NR	1E-05	39.3	43.7
2901	6	3	0.7	NR	1	0.8	0.5	0.7	NR	NR	NR	NR	4E-05	31.1	42.9
2903	9	6	2	NR	1	0.7	2	1	NR	NR	NR	NR	4E-05	22.0	21.2
3001	5	2	0.07	NR	0.4	0.3	0.6	0.5	NR	NR	NR	NR	1E-05	58.3	98.6
3004	7	4	0.7	NR	2	1	1	0.6	NR	NR	NR	NR	7E-05	143	619
3005	6	3	0.3	NR	1	1	1	0.4	NR	NR	NR	NR	6E-05	141	187
3008	7	4	0.5	NR	2	1	1	0.6	NR	NR	NR	NR	6E-05	95.7	113
3009	7	4	0.3	0.1	1	1	2	0.9	NR	0.1	NR	0.1	5E-05	100	121
3010	7	5	0.5	NR	2	1	1	0.8	NR	NR	NR	NR	6E-05	80.8	106

TABLE 9-22

Target Organ/System-Specific Hazard Index Estimates For the Child-Only Residential Exposure Scenario

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Area	Site Noncancer Hazard Index	Incremental Noncancer Hazard Index[a]	Hazard Index by Target Organ/System[b]										Incremental Excess Lifetime Cancer Risk[a]	Mean Lead Conc. (mg/kg)	Lead UCL (mg/kg)
			Nervous (Al, Mn,Se)	Hematologic (Sb, Se, Zn)	Dermal (As, Se, V)	Cardiovascular (As)	Thyroid (Co)	Gastrointestinal (Cu, Fe)	Reproductive (CN)	Urinary (Hg)	Hair growth (Tl)	Immune (Hg, Zn)			
3011	5	2	0.3	NR	1	0.7	0.6	0.5	NR	NR	NR	NR	4E-05	50.5	65.5
3012	5	2	0.3	NR	1	1	0.2	0.6	NR	NR	NR	NR	5E-05	69.4	90.5
3015	7	4	0.5	0.06	2	1	0.7	0.6	NR	NR	NR	NR	7E-05	72.6	97.8
45066	8	4	0.5	0.002	0.3	0.3	0.2	0.1	NR	NR	3	NR	1E-05	19.9	23.5
105B	7	5	1	1	0.3	0.3	NR	2	NR	NR	NR	0.1	2E-05	226	698
107A	5	2	0.4	NR	0.6	0.6	0.2	0.4	NR	NR	NR	NR	3E-05	182	240
107B	5	2	0.3	0.2	0.9	0.9	0.04	0.6	NR	NR	NR	NR	4E-05	275	335
165 and 60J	4	2	0.1	NR	NR	NR	NR	NR	NR	2	NR	2	NR	82.9	93.8
167A	6	3	0.5	NR	1	1	0.6	0.3	NR	NR	NR	NR	6E-05	66.5	168
167B	6	3	1	NR	0.7	0.2	0.7	0.8	NR	NR	NR	NR	1E-05	25.3	29.6
167C	6	3	0.6	NR	0.9	0.6	0.9	0.6	NR	NR	NR	NR	3E-05	41.8	52.2
170B	6	2	0.01	NR	NR	NR	NR	NR	NR	NR	2	NR	NR	21.6	24.9
203B	5	2	0.09	NR	0.8	0.8	0.1	0.5	NR	NR	NR	NR	4E-05	244	323
215C	6	3	NR	0.3	3	3	NR	NR	NR	0.08	NR	0.08	1E-04	402	670
229 and 36W	5	3	NR	0.5	2	2	NR	NR	NR	0.1	NR	0.2	9E-05	605	915
246 and 30W	5	3	NR	0.7	2	2	NR	NR	NR	0.08	NR	0.08	1E-04	308	426
3006A	6	3	0.4	NR	1	0.9	0.6	0.4	NR	NR	NR	NR	4E-05	70.7	105
3006B	6	3	0.6	NR	0.5	0.2	0.9	0.4	NR	NR	NR	NR	9E-06	46.4	57.6
3013A	7	4	0.5	NR	2	1	1	0.7	NR	NR	NR	NR	6E-05	66.0	83.7
3013B	6	3	0.3	NR	0.8	0.5	1	0.5	NR	NR	NR	NR	2E-05	59.1	81.0
Residential Screening Area Risk (RSAR) Exposure Areas															
Parcel Group D Hotspot	10	7	0.2	0.4	5	5	0.5	0.7	NR	0.2	NR	0.4	2E-04	1,579	3,048
Parcel Group F	8	5	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27	30
Non-Residential, Possible Future Residential Exposure Areas															
NR13 Smelter East of River	5	2	0.08	0.1	0.7	0.7	0.7	0.3	NR	NR	NR	NR	4E-05	203	260
NR19 North of Main Tailings Pile	7	3	0.02	0.1	2	2	NR	0.1	NR	0.1	NR	0.2	1E-04	252	458
Non-Residential Exposure Areas															
NR4 JT Septic Facility	16	12	NR	0.8	11	11	NR	0.2	NR	NR	NR	NR	6E-04	1,183	1,887
NR5 Main Tailings Pile 1964 Blow Out Path	8	5	NR	0.3	5	5	NR	NR	NR	NR	NR	0.03	3E-04	1,186	1,681
NR6 Middle Chaparral Gulch	13	10	6	0.2	4	4	0.07	0.07	NR	NR	NR	0.03	2E-04	526	633
NR7 Smelter Tailings Swale	10	6	0.2	0.3	2	2	0.2	0.8	NR	NR	2	0.03	1E-04	210	263
NR8 Tailings Floodplain	17	13	5	0.2	5	5	0.05	0.5	NR	0.4	2	0.5	3E-04	676	1,338
NR9 Lower Chaparral Gulch	25	20	0.8	1	14	14	1	0.7	NR	NR	2	0.06	7E-04	649	1,869
NR10 Agua Fria Tailings Pile	40	35	0.3	0.2	32	32	1	0.002	NR	NR	2	0.2	2E-03	3,883	5,579
NR11 Former Pyrometallurgical Operations Area	37	33	1	0.5	5	5	0.06	2	NR	0.06	NR	NR	6E-04	953	2,093
NR12 Smelter Plateau	29	24	4	0.8	13	13	0.2	2	NR	0.09	0.2	0.2	7E-04	797	1,029
NR14 South of Former Iron King Mine Property	18	13	0.3	0.9	5	5	0.4	0.4	NR	NR	6	0.03	2E-04	632	1,748
NR15 Auto Yard	7	2	0.06	NR	NR	NR	0.2	NR	NR	NR	2	NR	NR	29	45
NR16 Former Mineworks Area	21	16	0.2	2	11	11	0.1	0.3	NR	0.9	0.7	1	6E-04	3,255	8,726
NR17 Main Tailings Pile	54	50	0.06	2	42	42	NR	1	NR	1	3	1	2E-03	1,773	3,150
NR18 North American Industries Operations Area	13	8	0.07	0.4	5	5	0.4	0.2	NR	0.3	2	0.4	3E-04	785	5,333

Notes:

[a] Incremental risk/hazard is calculated as the Site risk/hazard, minus the background risk/hazard, as described in Section 9.6.4. Results are provided for the combined child-only scenario

[b] Only exposure areas with a incremental hazard index (HI) > 1 were evaluated for target organ/system HI segregation.

NR = no incremental risk and/or hazard identified for this exposure area

= HI >=3 for target organ/system

= Incremental excess lifetime cancer risk >$1x10^{-4}$ and/or lead concentration >400 mg/kg

TABLE 10-1

Field Observations of Ecological Receptors at Iron King Mine – Humboldt Smelter Superfund Site

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Common Name	Scientific Classification or Name	Habitat Type Observed
Plants		
Agave	*Agave sp.*	Semidesert Grassland
Alligator juniper	*Juniperus deppeana*	Chaparral
Arizona Walnut	*Juglans major*	Chaparral
Broom snakeweed	*Gutierrezia sarothrae*	Chaparral
Bull thistle	*Cirsium vulgare*	Disturbed
Cactus	*Opuntia phaecantha*	Semidesert Grassland
Canotia	*Canotia holocantha*	Chaparral
Catclaw acacia	*Acacia greggii*	Chaparral
Cholla	*Opuntia whippei*	Chaparral
Cliffrose	*Cowania mexicana*	Chaparral
Cocklebur	*Xanthium spp.*	Riparian
Common ragweed	*Ambrosia artemisiifolia*	Riparian
Common sowthistle	*Sonchus oleraceus*	Riparian
Common yarrow	*Achillea millefolium*	Chaparral
Curly dock	*Rumex crispus*	Riparian
Davis Mountain mock vervain	*Glandularia bipinnatifida*	Chaparral
Desert ceanothus	*Ceanothus greggii*	Chaparral
Flatspine bur ragweed	*Ambrosia acanthicarpa*	Riparian
Fluff grass	*Tridens pulchellus*	Disturbed
Fremont's Cottonwood	*Populus fremontii*	Riparian
Goldenflower century plant	*Agave chrysantha*	Chaparral
Goodding's Willow	*Salix gooddingii*	Riparian
Hairy fleabane	Conyza bonariensis	Chaparral
Hairy Grama Grass	*Bouteloua hirsuta*	Semidesert Grassland
Hollyleaf buckthorn	*Rhamnus crocea*	Chaparral
Horehound	*Marrubium vulgare*	Riparian
Mezzanite	*Arctostaphylos sp.*	Chaparral
Onseed juniper	*Juniperus monosperma*	Chaparral
Palmer's penstemon	*Penstemon palmeri*	Chaparral
Plains lovegrass	*Eragrostis intermdia*	Chaparral
Poplars	*Populus sp.*	Riparian
Prickly pear	*Opuntia spp.*	Chaparral
Prickly Poppy	*Argenone pleiacantha*	Semidesert Grassland
Purple nightshage	*Solanum xantii*	Chaparral
Red brome	*Bromus rubens*	Chaparral
Rubber rabbitbush	*Ericameria nauseosa*	Chaparral
Rushes	*Juncus sp.*	Riparian
Russian Thistle	*Salsola tragus*	Grassland, Disturbed
Sacred thorn-apple	*Datura wrigtii*	Chaparral
Sedges	*Carex sp.*	Riparian
Shrub Live Oak	*Quercus turbinella*	Chaparral
Siberian elm	*Ulmus pumila*	Riparian
Sideoats grama	*Bouteloua curtipendula*	Chaparral
Sunflower	*Helianthus annuus*	Disturbed
Tall tumblemustard	*Sisymbrium altissimum*	Riparian
Tamarisks	*Tamarix sp.*	Riparian
Tree of Heaven	*Ailanthus altissima*	Developed/Residential
Velvet ash	*Fraxinus velutina*	Riparian
Velvet mesquite	*Prosopis velutina*	Chaparral/Riparian
Water Cress	*Nasturtium officinale*	Riparian
White sagebrush	*Artemesia ludoviciana*	Chaparral
Willow	*Salix sp.*	Riparian
Yucca	*Yucca sp.*	Semidesert Grassland

TABLE 10-1

Field Observations of Ecological Receptors at Iron King Mine – Humboldt Smelter Superfund Site

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Common Name	Scientific Classification or Name	Habitat Type Observed
Freshwater Invertebrates in the Agua Fria		
Amphipods	Gammarus	Aquatic/Riparian
Black flies	Simuliidae	Aquatic/Riparian
Boatman and Striders	Hemiptera	Aquatic/Riparian
Caddisflies	Hydropsychidae	Aquatic/Riparian
Common snail	*Physa sp.*	Aquatic/Riparian
Crane fly	Tipulidae	Aquatic/Riparian
Crayfish	Cambarus	Aquatic/Riparian
Damselfly	Zygoptera	Aquatic/Riparian
Dragonfly	Anisoptera	Aquatic/Riparian
Mayflies	Baetidea	Aquatic/Riparian
Midges	Chironimidae	Aquatic/Riparian
Planarian flatworms	Planariidae	Aquatic/Riparian
Predatory Diving Beetle	Dytiscidae	Aquatic/Riparian
Spiny crawler mayflies	Ephemerellidae	Aquatic/Riparian
Fish		
Dace	*Rhinichthys sp.*	Aquatic/Riparian
Fish fry	--	Aquatic/Riparian
Amphibians		
Arizona toad	*Bufo microscaphus*	Aquatic/Riparian
Mud turtle	*Kinosternon arizonense*	Riparian
Reptiles		
Desert grassland whiptail	*Aspidoscelis uniparens*	Riparian
Birds		
American goldfinch	*Carduelis tristis*	Riparian
Calliope hummingbird	*Stellula callipe*	Chaparral/Riparian
Common raven	*Corvus corax*	Chaparral/Riparian
Costa's hummingbird	*Calypte costae*	Chaparral/Riparian
Duck	*Anas platyrhynchos*	Riparian
Gambel's quail	*Callipepla gambelii*	Developed/Residential
Harris' hawk	*Parrabuteo unicintus*	Riparian
Hummingbirds	Trochilidae	Riparian
Mourning dove	*Zenaida macrooura*	Developed/Residential
Roadrunner	*Geococcyx californianus*	Chaparral
Rock dove	*Columba livia*	Disturbed/Bare Soil
Mammals		
Cottontail	*Sylvilagus auduboni*	Semidesert Grassland
Javelina	*Pecari tajacu*	Riparian/Chaparral/Grassland
White tailed deer	*Odocoileus virginianus*	Riparian/Chaparral/Grassland

Notes:

This list includes limited species observed during the biological evaluation (EnviroSystems Mangement, Inc., 2009) and during field sampling occuring in February and May 2014 by Lockheed Martin SERAS (2015).

TABLE 10-2

Evaluation of Potential Presence of Special-Status Species

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Common Name	Scientific Name	Status[a]	Habitat	Suitable Habitat?	Notes
Plants					
Arizona cliff-rose	Purshia subintegra	FE	Sonoran desert scrub where winters are mild, summers are hot, and rainfall is evenly distributed between summer and winter rainfall periods. Occurs only on limestone formed from Tertiary lakebed deposits.	No	No suitable habitat within the study area.
Invertebrates					
Page springsnail	Pyrgulopsis morrisoni	FC	Slow or still freshwater near head springs or upper sections of outflows.	No	Study area does not occur near a head spring or upper outflow area.
Fish					
Gila chub	*Gila intermedia*	LE/SC	Pools, springs, streams.	Yes	Two downstream tributaries (Silver and Sycamore Creeks) to the Agua Fria had stable populations. Two unstable populations occur in Little Sycamore Creek and Indian Creek. Not likely to adversely affect species or its habitat.
Gila topminnow	*Poeciliopsis occidentalis*	FE/SC	Small streams, springs below 4,500 feet elevation with aquatic vegetation and debris for cover.	No	Suitable habitat does not occur within or adjacent to the study area. No documented occurrences within the study area.
Gila trout	*Oncorhyncus gilae*	FT	Clean mountain streams in arid regions, intermittent streams (no flowing in summer and fall); or clear runs in mountain streams that are narrow and shallow. May be confined to pools during drought.	No	Suitable habitat does not occur within or adjacent to the study area. No documented occurrences within the study area. No critical habitat designated for this species.
Headwater chub	*Gila nigra*	FC	Middle to upper reaches of moderately-sized streams. Adult microhabitat consists of near shore pools adjacent to swifter riffles and runs over sand and gravel substrate.	Yes	Suitable habitat within the Agua Fria River, but unlikely to occur. There are no documented occurrences of the headwater chub within the Agua Fria near the project site and no critical habitat has been designated for this species. Not likely to adversely affect species or its habitat.

TABLE 10-2

Evaluation of Potential Presence of Special-Status Species

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Common Name	Scientific Name	Status[a]	Habitat	Suitable Habitat?	Notes
Roundtail Chub	*Gila Robusta*	FC	Historically found in the Lower Colorado River Basin. Found in cool to warm waters of rivers and streams, often occupying the deepest pools and eddies of large streams.	Yes	Suitable habitat within the Agua Fria River, but unlikely to occur. There are no documented occurrences of the headwater chub within the Agua Fria near the project site and no critical habitat has been designated for this species. Not likely to adversely affect species or its habitat.
Spikedace	*Meda fulgida*	FE	Moderate to large perennial streams with gravel cobble substrates and moderate to swift velocities over sand and gravel substrates. Recurrent flooding regime important.	No	The Agua Fria is within the historic range, but is near the location where perennial flow initiates; therefore the Agua Fria within the study area is not a moderate to large perennial stream and does not provide suitable habitat.
Amphibians					
Arizona toad	*Bufo microscaphus*	FR/SC	Rocky streams and canyons in the pine-oak belt of Arizona and New Mexico. Also occurs in the lower deserts.	Yes	Suitable habitat was observed in the Agua Fria, and impacts from site may result in degraded habitat. However, there are no documented occurrences within the study area and species is not federally protected.
Chiricahua leopard frog	*Rana chiricahuensis*	FT/SC	Streams, rivers, backwaters, ponds free from introduced fish, crayfish, and bullfrogs.	Yes	The Agua Fria provides potential habitat. Not likely to adversely affect species or its habitat.
Reptiles					
Northern Mexican Gartersnake	*Thamnophis eques megalops*	FT/SC	May occur with other native garter snake species making them difficult to identify. Considered a riparian obligate and occurs chiefly in source-area wetlands, large river riparian woodlands and forests and streamside gallery forests (limited herbaceous ground cover or dense grass).	Yes	Critical habitat is designated along the Agua Fria, and impacts from site may result in degraded habitat.

TABLE 10-2

Evaluation of Potential Presence of Special-Status Species

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Common Name	Scientific Name	Status[a]	Habitat	Suitable Habitat?	Notes
Birds					
Bald eagle	*Haliaeetus leucocephalus*	F-Eagle	Large trees, cliffs and ledges near water with abundant prey.	No	Trees and cliff ledges are present, but the Agua Fria is a smaller river and may not provide sufficient habitat or prey.
Mexican spotted owl	*Strix occidentalis lucida*	FT/SC	Nests in high elevation mixed conifer and canyon lands and dense forests with multilayered foliage structure.	No	Suitable habitat does not occur within or adjacent to the study area. No documented occurrences within the study area.
Southwester willow flycatcher	*Empidonax traillii extimus*	FE/SC	Cottonwood/willow and tamarisk vegetation along rivers and streams.	No	Suitable habitat does not occur within or adjacent to the study area. No documented occurrences within the study area.
Yellow-billed cuckoo	*Coccyzus americanus*	FT/SC	Mature stands of cottonwood-willow riparian deciduous forest.	No	Suitable habitat does not occur within or adjacent to the study area. No documented occurrences within the study area.
Mammals					
Black-footed ferret	*Mustela nigripes*	F-Exp	Depend exclusively on prairie dog burrows for shelter. Historic habitat coincided with black-tailed prairie dog habitat spanning much of the western North American intermountain and prairie grasslands.	No	Experimental population, considered nonessential. No critical habitat has been designated for this species.

Notes:

[a] Species listings as of September, 2015.
-Federal Endangered Species Act (ESA) listings from USFWS, 2015
-State listings from Arizona Game and Fish Department, 2015

FC = Federal Candidate for listing under ESA
FE = Federal listing as Endangered under ESA
F-Eagle = Protected under the Bald and Golden Eagle Protection Act
F-Exp = Federal experimental population
FT = Federal listing as Threatened under ESA
SC = Arizona Species of Concern (no regulated protection)

TABLE 10-3

Assessment Endpoints and Measures

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Functional Group	Assessment Endpoint	Representative Endpoint Species	Measure of Exposure	Measure of Effect
Terrestrial Exposures				
Terrestrial and Riparian Vegetation	Survival and health of plants within the Iron King Mine area, and potentially exposed to constituents in soil	Various Plants	Measured constituent levels in soil	Available plant benchmarks from literature sources
Soil invertebrates	Survival and health of terrestrial invertebrates in upland areas within the Iron King Mine area, and potentially exposed to constituents in soil	Soil invertebrates	Measured constituent levels in soil	Terrestrial invertebrate benchmarks from literature
Herbivorous Birds	Survival and health of herbivorous birds using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and forage items	Gambel's quail	Measured constituent levels in soil and surface water. Measured or estimated constituent levels in plant tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Insectivorous Birds	Survival and health of insectivorous birds using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and prey items	Western kingbird	Measured constituent levels in soil and surface water. Measured or estimated constituent levels in plant tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Omnivorous Birds	Survival and health of omnivorous birds using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and forage/prey items	Song sparrow	Measured constituent levels in soil and surface water. Measured or estimated constituent levels in plant/prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Carnivorous Birds	Survival and health of carnivorous birds using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and prey items	Red-tailed hawk	Measured constituent levels in soil and surface water. Measured or estimated constituent levels in prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Herbivorous Mammals	Survival and health of herbivorous mammals using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and forage items	Pocket gopher	Measured constituent levels in soil and surface water. Measured and/or estimated constituent levels in plant tissue	Literature-based chronic NOAEL and LOAEL TRVs for mammals
Insectivorous Mammals	Survival and health of insectivorous mammals using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and prey items	Desert shrew	Measured constituent levels in soil and surface water. Measured and/or estimated constituent levels in prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Omnivorous Mammals	Survival and health of omnivorous mammals using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and prey/forage items	Raccoon	Measured constituent levels in soil and surface water. Measured and/or estimated constituent levels in plant/prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for mammals
Carnivorous Mammals	Survival and health of carnivorous mammals using areas with suitable habitat, and potentially exposed to constituents in soil, surface water, and prey items	Coyote	Measured constituent levels in sediment and surface water. Estimated constituent levels in prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for mammals

TABLE 10-3

Assessment Endpoints and Measures

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Functional Group	Assessment Endpoint	Representative Endpoint Species	Measure of Exposure	Measure of Effect
Semi-aquatic and Aquatic Exposures				
Aquatic/Wetland Vegetation	Survival and health of aquatic/semi-aquatic plants along perennial drainages/rivers downgradient of Iron King Mine related discharges, and potentially exposed to constituents in surface water	Various Plants	Measured constituent levels in sediment	Available plant benchmarks from literature sources
Aquatic Organisms	Survival and health of freshwater aquatic organisms (water column invertebrates and fish) present in perennial drainages/rivers downgradient of Iron King Mine related discharges, and potentially exposed to constituents in surface water.	Freshwater aquatic invertebrates, amphibian larvae, fish	Measured constituent levels in surface water	Federal and state water quality criteria/standards or toxicity effect levels
Benthic Organisms	Survival and health of benthic organisms in perennial streams/rivers downgradient of Iron King Mine related discharges, and potentially exposed to constituents in sediment	Benthic macroinvertebrates	Estimated constituent levels in sediment.	Freshwater sediment benchmarks from literature. Tissue-residue effects levels from literature
Omnivorous Birds	Survival and health of herbivorous birds using perennial streams/rivers downgradient of Iron King Mine related discharges, and potentially exposed to constituents in sediment, surface water, and forage items	Mallard	Measured constituent levels in sediment and surface water. Measured and/or estimated constituent levels in plant tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Piscivorous Birds	Survival and health of piscivorous birds using perennial streams/rivers downgradient of Iron King Mine related discharges, and potentially exposed to constituents in sediment, surface water, and prey items	Great blue heron	Measured constituent levels in surface water and estimated constituent levels in prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for birds
Omnivorous Mammals	Survival and health of omnivorous mammals using intertidal areas with suitable habitat, and potentially exposed to constituents in sediment, surface water, and prey/forage items	Raccoon	Measured constituent levels in sediment and surface water. Measured and/or estimated constituent levels in plant/prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for mammals
Piscivorous Mammals	Survival and health of piscivorous mammals using intertidal areas with suitable habitat, and potentially exposed to constituents in sediment, surface water, and prey items	River otter	Measured constituent levels in sediment and surface water. Measured and/or estimated constituent levels in prey tissue	Literature-based chronic NOAEL and LOAEL TRVs for mammals

Notes:
NOAEL = no observed adverse effect level
LOAEL = lowest observed adverse effect level
TRV = toxicity reference value

TABLE 10-4

Ecological Risk Assessment Roadmap for Iron King Mine

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Exposure Areas			Data Available				Exposure Pathways		
Exposure Area ID	Exposure Area Name	Size (acres)	Soil	Sediment	Surface water	Plant tissue	Upland	Semi-aquatic	Aquatic
Upland									
3001	3001	10.2	●				●		
NE-02	NE-02	20.9	●				●		
NE-04	NE-04	16.0	●				●		
NE-06	NE-06	36.6	●				●		
NE-07	NE-07	27.4	●				●		
NE-08	NE-08	45.6	●				●		
NE-09	NE-09	41.2	●				●		
NE-11	NE-11	37.0	●				●		
NR3	NR3 Upper Chaparral Gulch	10.5	●				●		
NR4/NR5	NR4 JT Septic Facility and NR5 Main Tailings Pile 1964 Blow Out Path	3.7	●				●		
NR6	NR6 Middle Chaparral Gulch	9.0	●				●		
NR7	NR7 Smelter Tailings Swale	17.1	●				●		
NR8	NR8 Tailings Floodplain	14.8	●				●		
NR9	NR9 Lower Chaparral Gulch	5.7	●				●		
NR10	NR10 Agua Fria Tailings Pile	1.1	●				●		
NR11	NR11 Former Pyrometallurgical Operations Area	36.4	●				●		
NR12	NR12 Smelter Plateau	34.7	●				●		
NR13	NR13 Former Humboldt Smelter Property East of the Agua Fria River	8.4	●				●		
NR14	NR14 South of Former Iron King Mine Property	80.7	●				●		
NR15	NR15 Auto Yard	18.0	●				●		
NR16	NR16 Former Mineworks Area	31.1	●			●	●		
NR17	NR17 Main Tailings Pile	73.4	●			●	●		
NR18	NR18 North American Industries Operations Area	20.0	●				●		
NR19	NR19 Former Glory Hole and North of Main Tailings Pile	99.5	●			●	●		
NR20	NR20 North of Chaparral Gulch	99.3	●				●		
NW-01	NW-01	41.2	●				●		
NW-03	NW-03	32.0	●				●		
RSAR-A	RSAR-A	28.8	●				●		
RSAR-B	RSAR-B	14.8	●				●		
RSAR-D	RSAR-D	36.1	●				●		
RSAR-H	RSAR-H	20.8	●				●		
SE-01	SE-01	25.7	●				●		
SE-02	SE-02	10.0	●				●		
Aquatic									
AF-01	AF-01	5.3		●	●			●	●
AF-02	AF-02	13.6		●	●			●	●
AF-03	AF-03	17.2		●	●			●	●

Upland Receptors:	
Primary producer	Terrestrial plants
Primary consumer	Soil invertebrates
Herbivore	Gambel's quail
Insectivore	Western kingbird
Omnivore	Song sparrow
Carnivore	Red-tailed hawk
Herbivore	Pocket gopher
Insectivore	Desert shrew
Omnivore	Raccoon
Carnivore	Coyote

Aquatic/Semi-aquatic receptors:	
Primary producer	Aquatic plants
Primary consumer	Aquatic organisms (invertebrates and fish)
Primary consumer	Benthic macroinvertebrates
Omnivore	Mallard
Piscivore	Great blue heron
Omnivore	Raccoon
Piscivore	River otter

TABLE 10-5

Summary of Screening-Level Ecological Risk Assessment Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	Soil																													Sediment			Water		
Variable	**3001**	**NE-02**	**NE-04**	**NE-06**	**NE-07**	**NE-08**	**NE-09**	**NE-11**	**NR3**	**NR4/NR5**	**NR6**	**NR7**	**NR8**	**NR9**	**NR10**	**NR11**	**NR12**	**NR13**	**NR14**	**NR15**	**NR16**	**NR17**	**NR18**	**NR19**	**NR20**	**NW-01**	**NW-03**	**RSAR-A**	**RSAR-B**	**RSAR-D**	**RSAR-H**	**SE-01**	**SE-02**	**AF-01**	**AF-02**	**AF-03**	**AF-01**	**AF-02**	**AF-03**
Aluminum				●	●	●	●	●				●				●	●		●		●			●								●	●	●	●	●	●
Antimony				●	●	●		●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●							●	●		●	●			
Arsenic	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●				●	●	●	●	●			
Barium				●	●	●	●	●				●	●	●		●	●	●			●													●	●	●	●	●	●
Beryllium																●																		●	●	●		●	●
Cadmium	●	●		●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●		●	●		●	●			●
Chloride												●				●																							
Chromium					●			●				●				●	●																●	●	●	●	●			
Chromium, Hexavalent																●	●					●																	
Cobalt							●	●				●		●		●	●						●										●	●	●	●	●		●	●
Copper	●			●	●	●		●	●	●	●	●	●	●		●	●	●			●	●	●	●								●	●	●	●	●			●
Cyanide						●										●					●	●															●	●	●
Fluoride																																				●	●	●
Iron	●				●	●	●	●				●	●			●	●		●		●	●	●	●		●	●					●	●	●	●	●	●	●	●
Lead	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Manganese				●	●	●	●	●			●	●	●	●		●	●		●		●			●	●	●	●					●	●	●	●	●		●	●
Mercury	●	●		●	●	●	●	●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●		●		●	●	●	●	●		●	●
Nickel					●	●		●				●	●	●		●	●	●					●										●	●	●	●	●			
Nitrate as N								●	●		●	●				●	●		●	●	●	●	●	●										●	●	●	●	●	●
Nitrite as N																																				●			●
Selenium					●				●	●	●	●	●	●		●	●	●	●		●	●	●	●	●			●				●	●	●	●			●	●
Silver					●				●	●	●	●	●	●		●	●	●	●		●	●	●	●								●	●		●	●			
Sulfate				●				●	●		●	●	●			●	●		●	●	●	●	●	●									●	●	●			
Thallium				●		●						●	●			●	●		●	●	●	●	●	●										●					
Vanadium							●	●																									●	●	●	●	●		●	●
Zinc	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●
1,2,3,4,6,7,8-Hepta CDD																●	●																●					
1,2,3,4,6,7,8-Hepta CDF																●	●																					
1,2,3,4,7,8,9-Hepta CDF																●	●																					
1,2,3,4,7,8-Hexa CDD																●	●																					
1,2,3,4,7,8-Hexa CDF																●	●																					
1,2,3,6,7,8-Hexa CDD																●	●																					
1,2,3,6,7,8-Hexa CDF																●	●																					
1,2,3,7,8,9-Hexa CDD																●	●																					
1,2,3,7,8,9-Hexa CDF																●	●																					
1,2,3,7,8,9-Hexa CDF																●	●																					
1,2,3,7,8-Penta CDD																●	●																					
1,2,3,7,8-Penta CDF																●	●																					
2,3,4,6,7,8-Hexa CDF																●	●																					
2,3,4,7,8-Penta CDF																●	●																					
2,3,7,8-Tetra CDD																●																					
2,3,7,8-Tetra CDF																●	●																					
4-Chloroaniline																					●																	
Acetone																								●														
Acetophenone												●				●					●			●														
Alpha-Chlordane																					●			●														
Aroclor-1242																					●																	
Aroclor-1248																●																						
Aroclor-1254																●					●																	
Benzaldehyde																					●																	
Benzyl butyl phthalate																					●			●														
Beta-BHC																					●																	
bis(2-Ethylhexyl)phthalate								●				●				●					●			●														
Caprolactam																					●			●														
Carbazole																●																						
Carbon disulfide																								●														
Delta-BHC																●																						
Dibenzo[a,h]anthracene																																						
Dieldrin																●					●			●														
Di-n-butyl phthalate												●				●																						
Endosulfan I																●																						
Endrin Ketone																					●																	
Heptachlor																●																						
Heptachlor Epoxide																●																						
Methyl ethyl ketone																								●														
OCDD																●	●																			●	●		
OCDF																●	●																			●			
Perchlorate												●																											
TEQBird																●	●																						
TEQMammal																●	●																						

Notes:

- Analytes retained for further evaluation in Baseline Ecological Risk Assessment were determined using the following criteria:
  - -Soil - Maximum detected value exceeded background and at least one chronic screening benchmark (plant/invertebrate or bird/mammal) or a benchmark was not available.
  - -Sediment: Maximum detected value exceeded at least one chronic screening benchmarks (benthic macroinvertebrates, plants, or birds/mammals) or a benchmark was not available.
  - -Surface water: Maximum detected value exceeded chronic screening benchmark for aquatic organisms or a benchmark was not available.

TABLE 10-6

Weight-of-Evidence and Identification of Chemicals of Ecological Concern in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

			Site or Incremental Risk[a]																Weight of Evidence	
					Gambel's quail		Western kingbird		Song sparrow		Red-tailed hawk		Pocket gopher		Desert shrew		Raccoon		Coyote			
Exposure Area	Matrix	COPECs with at least one HQ>1	Plants	Soil Invertebrates	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	Retain as COEC	Rationale Code
3001	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B
3001	Soil	Copper	<1	<1	<1	<1	1E+01	<1	9E+00	<1	<1	<1	<1	<1	1E+01	<1	<1	<1	<1	<1	No	B
3001	Soil	Lead	<1	<1	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NE-02	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NE-07	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	3E+00	<1	3E+01	<1	<1	<1	<1	<1	No	B
NE-07	Soil	Cadmium	<1	<1	<1	<1	4E+00	<1	2E+00	<1	<1	<1	<1	<1	8E+00	<1	<1	<1	<1	<1	No	B
NE-07	Soil	Copper	2E+00	2E+00	3E+00	<1	3E+01	**2E+00**	2E+01	<1	<1	<1	2E+00	<1	2E+01	<1	<1	<1	<1	<1	**Yes**	A
NE-07	Soil	Lead	<1	<1	<1	<1	9E+00	**2E+00**	8E+00	**2E+00**	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	**Yes**	A
NE-08	Soil	Cyanide	<1	<1	<1	<1	3E+00	<1	4E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NE-09	Soil	Manganese	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NE-11	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
NR3	Soil	Arsenic	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NR3	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
NR3	Soil	Lead	<1	<1	<1	<1	7E+00	<1	8E+00	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
NR4/NR5	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	1E+01	<1	1E+02	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR4/NR5	Soil	Arsenic	5E+00	7E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	5E+00	<1	2E+01	**4E+00**	<1	<1	<1	<1	**Yes**	A
NR4/NR5	Soil	Cadmium	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	1E+01	<1	<1	<1	<1	<1	No	B
NR4/NR5	Soil	Lead	4E+00	<1	2E+00	<1	2E+01	**3E+00**	7E+01	**1E+01**	<1	<1	5E+00	<1	2E+01	<1	<1	<1	<1	<1	**Yes**	A
NR4/NR5	Soil	Selenium	7E+00	<1	<1	<1	<1	<1	5E+00	<1	<1	<1	2E+00	<1	1E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR6	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	3E+00	<1	2E+01	<1	<1	<1	<1	<1	No	B
NR6	Soil	Arsenic	3E+00	4E+00	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	1E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR6	Soil	Cadmium	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	6E+00	<1	<1	<1	<1	<1	No	B
NR6	Soil	Copper	<1	<1	<1	<1	3E+00	<1	4E+00	<1	<1	<1	<1	<1	5E+00	<1	<1	<1	<1	<1	No	B
NR6	Soil	Lead	<1	<1	2E+00	<1	2E+01	**3E+00**	2E+01	**4E+00**	<1	<1	<1	<1	7E+00	<1	<1	<1	<1	<1	**Yes**	A
NR6	Soil	Manganese	9E+00	2E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	3E+00	<1	7E+00	<1	<1	<1	<1	<1	No	C
NR6	Soil	Selenium	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	C
NR7	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	3E+00	<1	3E+01	<1	<1	<1	<1	<1	No	B
NR7	Soil	Arsenic	2E+00	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5E+00	<1	<1	<1	<1	<1	No	C
NR7	Soil	Cadmium	<1	<1	<1	<1	1E+01	**2E+00**	6E+00	<1	<1	<1	<1	<1	3E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR7	Soil	Copper	4E+00	4E+00	5E+00	<1	6E+01	**4E+00**	4E+01	**3E+00**	<1	<1	5E+00	<1	5E+01	<1	<1	<1	<1	<1	**Yes**	A
NR7	Soil	Lead	<1	<1	<1	<1	9E+00	**2E+00**	8E+00	**2E+00**	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	**Yes**	A
NR7	Soil	Selenium	4E+00	<1	<1	<1	4E+00	<1	3E+00	<1	<1	<1	<1	<1	9E+00	<1	<1	<1	<1	<1	No	C
NR8	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	<1	<1	7E+00	<1	<1	<1	<1	<1	No	B
NR8	Soil	Arsenic	5E+00	6E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	4E+00	<1	2E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR8	Soil	Cadmium	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	<1	<1	7E+00	<1	<1	<1	<1	<1	No	B
NR8	Soil	Copper	2E+00	2E+00	2E+00	<1	3E+01	**2E+00**	2E+01	**2E+00**	<1	<1	3E+00	<1	3E+01	<1	<1	<1	<1	<1	**Yes**	A
NR8	Soil	Lead	2E+00	<1	6E+00	<1	4E+01	**8E+00**	4E+01	**8E+00**	<1	<1	3E+00	<1	1E+01	<1	<1	<1	<1	<1	**Yes**	A
NR8	Soil	Manganese	7E+00	2E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	2E+00	<1	5E+00	<1	<1	<1	<1	<1	No	C
NR8	Soil	Mercury	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR8	Soil	Selenium	2E+00	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	C
NR8	Soil	Zinc	2E+00	2E+00	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	C
NR9	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	2E+01	<1	2E+02	**4E+00**	<1	<1	<1	<1	**Yes**	A
NR9	Soil	Arsenic	1E+01	2E+01	<1	<1	<1	<1	5E+00	<1	<1	<1	1E+01	**3E+00**	4E+01	**1E+01**	<1	<1	<1	<1	**Yes**	A
NR9	Soil	Cadmium	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	9E+00	<1	<1	<1	<1	<1	No	B
NR9	Soil	Copper	3E+00	3E+00	<1	<1	2E+01	<1	3E+01	**2E+00**	<1	<1	3E+00	<1	4E+01	<1	<1	<1	<1	<1	**Yes**	A
NR9	Soil	Lead	3E+00	<1	3E+00	<1	3E+01	**5E+00**	6E+01	**1E+01**	<1	<1	4E+00	<1	2E+01	<1	<1	<1	<1	<1	**Yes**	A
NR9	Soil	Nickel	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
NR9	Soil	Selenium	1E+01	<1	<1	<1	3E+00	<1	7E+00	**2E+00**	<1	<1	3E+00	<1	2E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR9	Soil	Silver	<1	--	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NR10	Soil	Arsenic	3E+01	4E+01	<1	<1	<1	<1	1E+01	**3E+00**	<1	<1	2E+01	**4E+00**	6E+01	**1E+01**	<1	<1	<1	<1	**Yes**	A
NR10	Soil	Lead	1E+01	<1	2E+00	<1	1E+01	**2E+00**	2E+02	**3E+01**	<1	<1	7E+00	<1	3E+01	<1	<1	<1	<1	<1	**Yes**	A
NR10	Soil	Zinc	5E+00	4E+00	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	C
NR11	Soil	Aluminum	2E+03	--	7E+00	<1	2E+01	**4E+00**	3E+01	**6E+00**	<1	<1	2E+02	**4E+01**	9E+02	**2E+02**	<1	**<1**	<1	<1	No	D (pH = 8.26)
NR11	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	7E+00	<1	5E+01	<1	<1	<1	<1	<1	No	B
NR11	Soil	Arsenic	5E+00	6E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	4E+00	<1	1E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR11	Soil	Cadmium	<1	<1	<1	<1	9E+00	<1	4E+00	<1	<1	<1	<1	<1	2E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR11	Soil	Chromium	<1	7E+00	<1	<1	8E+00	<1	8E+00	<1	<1	<1	2E+00	<1	1E+01	<1	<1	<1	<1	<1	No	C
NR11	Soil	Copper	1E+01	1E+01	2E+01	<1	2E+02	**2E+01**	1E+02	**1E+01**	<1	<1	2E+01	<1	2E+02	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR11	Soil	Cyanide	<1	<1	<1	<1	5E+00	<1	6E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NR11	Soil	Lead	4E+00	<1	1E+01	2E+00	6E+01	**1E+01**	7E+01	**1E+01**	<1	<1	5E+00	<1	2E+01	<1	<1	<1	<1	<1	**Yes**	A
NR11	Soil	Nickel	<1	<1	<1	<1	5E+00	<1	3E+00	<1	<1	<1	2E+00	<1	2E+01	<1	<1	<1	<1	<1	No	B
NR11	Soil	Selenium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B
NR11	Soil	Silver	<1	--	<1	<1	4E+00	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NR11	Soil	Zinc	3E+00	3E+00	<1	<1	3E+00	<1	3E+00	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	C
NR11	Soil	Aroclor-1248	<1	<1	<1	<1	4E+00	<1	2E+00	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NR11	Soil	Heptachlor Epoxide	<1	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B

TABLE 10-6

Weight-of-Evidence and Identification of Chemicals of Ecological Concern in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

			Site or Incremental Risk[a]																Weight of Evidence	
					Gambel's quail		Western kingbird		Song sparrow		Red-tailed hawk		Pocket gopher		Desert shrew		Raccoon		Coyote			
Exposure Area	Matrix	COPECs with at least one HQ>1	Plants	Soil Invertebrates	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	Retain as COEC	Rationale Code
NR11	Soil	1,2,3,4,6,7,8-Hepta CDD	2E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,4,6,7,8-Hepta CDF	6E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,4,7,8,9-Hepta CDF	3E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,4,7,8-Hexa CDD	3E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,4,7,8-Hexa CDF	4E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,6,7,8-Hexa CDD	2E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,6,7,8-Hexa CDF	4E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,7,8,9-Hexa CDD	1E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,7,8,9-Hexa CDF	7E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	1,2,3,7,8-Penta CDD	3E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**Yes**	A
NR11	Soil	1,2,3,7,8-Penta CDF	2E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	2,3,4,6,7,8-Hexa CDF	1E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	2,3,4,7,8-Penta CDF	6E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	2,3,7,8-Tetra CDD	2E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	2,3,7,8-Tetra CDF	1E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	OCDD	9E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	OCDF	9E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR11	Soil	TEQBird	--	--	2E+00	<1	3E+02	**3E+01**	1E+02	**1E+01**	<1	<1	--	--	--	--	--	--	--	--		
NR11	Soil	TEQMammal	--	--	--	--	--	--	--	--	--	--	1E+01	<1	3E+03	**3E+02**	2E+01	**2E+00**	<1	<1		
NR12	Soil	Aluminum	6E+02	--	2E+00	<1	6E+00	<1	1E+01	**2E+00**	<1	<1	7E+01	**1E+01**	3E+02	**6E+01**	<1	<1	<1	<1	No	D (pH = 7.74)
NR12	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	1E+01	<1	8E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR12	Soil	Arsenic	1E+01	2E+01	<1	<1	2E+00	<1	5E+00	<1	<1	<1	1E+01	**2E+00**	4E+01	**9E+00**	<1	<1	<1	<1	**Yes**	A
NR12	Soil	Cadmium	<1	<1	<1	<1	9E+00	<1	4E+00	<1	<1	<1	<1	<1	2E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR12	Soil	Chromium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NR12	Soil	Chromium, Hexavalent	<1	5E+00	--	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR12	Soil	Copper	8E+00	8E+00	1E+01	<1	1E+02	**9E+00**	8E+01	**6E+00**	<1	<1	1E+01	<1	1E+02	<1	<1	<1	<1	<1	**Yes**	A
NR12	Soil	Lead	2E+00	<1	6E+00	<1	3E+01	**6E+00**	3E+01	**6E+00**	<1	<1	2E+00	<1	1E+01	<1	<1	<1	<1	<1	**Yes**	A
NR12	Soil	Manganese	4E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	C
NR12	Soil	Nickel	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	9E+00	<1	<1	<1	<1	<1	No	B
NR12	Soil	Selenium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NR12	Soil	Zinc	3E+00	3E+00	<1	<1	3E+00	<1	3E+00	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	C
NR12	Soil	1,2,3,4,6,7,8-Hepta CDD	8E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,4,6,7,8-Hepta CDF	4E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,4,7,8,9-Hepta CDF	5E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,4,7,8-Hexa CDD	3E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,4,7,8-Hexa CDF	2E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,6,7,8-Hexa CDD	6E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,6,7,8-Hexa CDF	6E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,7,8,9-Hexa CDD	7E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,7,8,9-Hexa CDF	3E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	1,2,3,7,8-Penta CDD	2E+00	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**Yes**	A
NR12	Soil	1,2,3,7,8-Penta CDF	2E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	2,3,4,6,7,8-Hexa CDF	5E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	2,3,4,7,8-Penta CDF	4E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	2,3,7,8-Tetra CDF	4E+01	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	OCDD	4E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	OCDF	6E+02	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
NR12	Soil	TEQBird	--	--	<1	<1	6E+01	**6E+00**	2E+01	**2E+00**	<1	<1	--	--	--	--	--	--	--	--		
NR12	Soil	TEQMammal	--	--	--	--	--	--	--	--	--	--	3E+00	<1	4E+02	**4E+01**	3E+00	<1	<1	<1		
NR13	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	<1	<1	1E+01	<1	<1	<1	<1	<1	No	B
NR13	Soil	Cadmium	<1	<1	<1	<1	3E+00	<1	2E+00	<1	<1	<1	<1	<1	1E+01	<1	<1	<1	<1	<1	No	B
NR13	Soil	Copper	2E+00	<1	<1	<1	1E+01	<1	2E+01	<1	<1	<1	2E+00	<1	2E+01	<1	<1	<1	<1	<1	No	C
NR13	Soil	Lead	<1	<1	<1	<1	6E+00	<1	9E+00	**2E+00**	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	**Yes**	A
NR13	Soil	Nickel	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
NR14	Soil	Aluminum	8E+00	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	**<1**	<1	<1	No	C,D (pH = 7.2)
NR14	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	2E+01	<1	2E+02	**4E+00**	3E+00	<1	<1	<1	**Yes**	A
NR14	Soil	Arsenic	4E+00	6E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	4E+00	<1	1E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR14	Soil	Cadmium	<1	<1	<1	<1	4E+00	<1	2E+00	<1	<1	<1	<1	<1	9E+00	<1	<1	<1	<1	<1	No	B
NR14	Soil	Lead	3E+00	<1	1E+01	2E+00	5E+01	**1E+01**	6E+01	**1E+01**	<1	<1	4E+00	<1	2E+01	<1	<1	<1	<1	<1	**Yes**	A
NR14	Soil	Selenium	4E+00	<1	<1	<1	4E+00	<1	3E+00	<1	<1	<1	<1	<1	1E+01	<1	<1	<1	<1	<1	No	C
NR14	Soil	Thallium	7E+00	7E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C

TABLE 10-6

Weight-of-Evidence and Identification of Chemicals of Ecological Concern in Soil

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

			Site or Incremental Risk[a]																Weight of Evidence	
					Gambel's quail		Western kingbird		Song sparrow		Red-tailed hawk		Pocket gopher		Desert shrew		Raccoon		Coyote			
Exposure Area	Matrix	COPECs with at least one HQ>1	Plants	Soil Invertebrates	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	Retain as COEC	Rationale Code
NR16	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	4E+01	<1	3E+02	**6E+00**	2E+00	<1	<1	<1	**Yes**	A
NR16	Soil	Arsenic	1E+01	2E+01	<1	<1	2E+00	<1	4E+00	<1	<1	<1	1E+01	**2E+00**	3E+01	**8E+00**	<1	<1	<1	<1	**Yes**	A
NR16	Soil	Cadmium	<1	<1	<1	<1	8E+00	<1	4E+00	<1	<1	<1	<1	<1	2E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR16	Soil	Cyanide	2E+00	2E+00	3E+00	<1	1E+01	<1	1E+01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR16	Soil	Lead	2E+01	<1	6E+01	**1E+01**	2E+02	**4E+01**	3E+02	**5E+01**	<1	<1	2E+01	<1	7E+01	<1	<1	<1	<1	<1	**Yes**	A
NR16	Soil	Mercury	<1	3E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR16	Soil	Selenium	7E+00	<1	<1	<1	6E+00	**2E+00**	5E+00	<1	<1	<1	2E+00	<1	1E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR16	Soil	Silver	<1	--	<1	<1	3E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
NR16	Soil	Zinc	3E+00	3E+00	<1	<1	3E+00	<1	3E+00	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	C
NR17	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	3E+01	<1	2E+02	**5E+00**	4E+00	<1	<1	<1	**Yes**	A
NR17	Soil	Arsenic	4E+01	6E+01	4E+00	<1	8E+00	**2E+00**	2E+01	**4E+00**	<1	<1	4E+01	**9E+00**	1E+02	**3E+01**	3E+00	<1	<1	<1	**Yes**	A
NR17	Soil	Cadmium	<1	<1	<1	<1	1E+01	**2E+00**	6E+00	<1	<1	<1	<1	<1	3E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR17	Soil	Copper	<1	<1	<1	<1	5E+00	<1	3E+00	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B
NR17	Soil	Cyanide	2E+00	2E+00	2E+00	<1	8E+00	<1	1E+01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR17	Soil	Lead	5E+00	<1	2E+01	**4E+00**	9E+01	**2E+01**	1E+02	**2E+01**	<1	<1	7E+00	<1	3E+01	<1	<1	<1	<1	<1	**Yes**	A
NR17	Soil	Mercury	<1	3E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	C
NR17	Soil	Selenium	7E+00	<1	<1	<1	6E+00	**2E+00**	5E+00	**2E+00**	<1	<1	2E+00	**<1**	2E+01	**2E+00**	<1	<1	<1	<1	**Yes**	A
NR17	Soil	Zinc	8E+00	7E+00	<1	<1	5E+00	**2E+00**	7E+00	**2E+00**	<1	<1	2E+00	<1	6E+00	<1	<1	<1	<1	<1	**Yes**	A
NR18	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	4E+00	<1	3E+01	<1	<1	<1	<1	<1	No	B
NR18	Soil	Arsenic	5E+00	6E+00	<1	<1	<1	<1	2E+00	<1	<1	<1	4E+00	<1	2E+01	**3E+00**	<1	<1	<1	<1	**Yes**	A
NR18	Soil	Cadmium	<1	<1	<1	<1	6E+00	<1	3E+00	<1	<1	<1	<1	<1	1E+01	<1	<1	<1	<1	<1	No	B
NR18	Soil	Lead	5E+00	<1	2E+01	**3E+00**	8E+01	**1E+01**	9E+01	**2E+01**	<1	<1	6E+00	<1	3E+01	<1	<1	<1	<1	<1	**Yes**	A
NR18	Soil	Selenium	2E+00	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	4E+00	<1	<1	<1	<1	<1	No	C
NR18	Soil	Zinc	2E+00	2E+00	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	C
NR19	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B
NR19	Soil	Arsenic	2E+00	3E+00	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	6E+00	<1	<1	<1	<1	<1	No	C
NR19	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
NR19	Soil	Lead	<1	<1	3E+00	<1	2E+01	**3E+00**	2E+01	**3E+00**	<1	<1	<1	<1	6E+00	<1	<1	<1	<1	<1	**Yes**	A
NR19	Soil	Selenium	2E+00	<1	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	6E+00	<1	<1	<1	<1	<1	No	C
NR20	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
SE-01	Soil	Aluminum	8E+01	--	<1	<1	<1	**<1**	<1	**<1**	<1	<1	9E+00	**2E+00**	4E+01	**8E+00**	<1	<1	<1	<1	No	F
SE-01	Soil	Cadmium	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B
SE-01	Soil	Copper	<1	<1	2E+00	<1	2E+01	<1	1E+01	<1	<1	<1	<1	<1	2E+01	<1	<1	<1	<1	<1	No	B
SE-01	Soil	Lead	<1	<1	<1	<1	4E+00	<1	4E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
SE-02	Soil	Aluminum	2E+01	--	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	7E+00	<1	<1	<1	<1	<1	No	C,F
SE-02	Soil	Antimony	<1	<1	--	--	--	--	--	--	--	--	<1	<1	4E+00	<1	<1	<1	<1	<1	No	B
SE-02	Soil	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	B
SE-02	Soil	Copper	<1	<1	<1	<1	5E+00	<1	5E+00	<1	<1	<1	<1	<1	6E+00	<1	<1	<1	<1	<1	No	B
SE-02	Soil	Lead	<1	<1	<1	<1	2E+00	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
SE-02	Soil	Selenium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	B

Notes:

[a] Incremental risk reported for analytes with background threshold values available to compute incremental risks. Otherwise, site risk is reported.

Hazard quotients are rounded to 1 significant figure.

-- = not available

< = less than

COEC = chemical of ecological concern

COPEC = chemical of potential ecological concern

NOAEL = no observed adverse effect level

LOAEL = lowest observed adverse effect level (columns shaded and HQs>1 are bolded for easier viewing)

HQ = hazard quotient

Weight of evidence rationale

- A LOAEL-based HQs greater than 1 for one or more receptors (including at least one bird or mammal).
- B Plant HQ, soil invertebrate HQ, and all LOAEL-based HQs (birds and mammals) are less than 1 (rounded to 1 significant figure).
- C All LOAEL-based HQs less than 1 for birds and mammals. HQs greater than 1 for plants and/or invertebrates, but are less than 10 indicating a low potential for risk to these receptors. In addition, plants and invertebrates are not used as the sole determinant for retention due to uncertainties in toxicity values.
- D Aluminum is not considered a risk to ecological receptors when soil pH is greater than 5.5 (EPA, 2003c). The average pH for site soils (0 to 2 feet below ground surface) is greater than 5.5.
- E Aluminum is considered a risk to ecological receptors when soil pH less than 5.5 (EPA, 2003c). The average pH for site soils (0 to 2 feet below ground surface) is less than 5.5, so aluminum is retained as a COEC.
- F Aluminum is not retained as a COEC. Soil pH data are not available for this exposure area, but site wide average pH (6.2) is considered applicable for this exposure area because this exposure area does not border one with pH less than 5.5 and/or no other COECs were identified for the exposure area.

TABLE 10-7

Weight-of-Evidence and Identification of Chemicals of Ecological Concern in Sediment

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

			Site Risk[a]										Upstream Reference Segments Risk[b]		Weight of Evidence	
				Benthic Macroinvertebrates		Mallard		Great blue heron		Raccoon		River Otter		Benthic Macroinvertebrates			
Exposure Area	Matrix	COPECs with at least one HQ>1	Plants	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	NOAEL based	LOAEL based	Retain as COEC	Rationale Code
AF-01	Sediment	Aluminum	5E+02	<1	<1	<1	<1	<1	<1	2E+00	<1	<1	<1	<1	<1	No	D (pH=6)
AF-01	Sediment	Arsenic	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-01	Sediment	Barium	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-01	Sediment	Iron	--	2E+00	<1	--	--	--	--	--	--	--	--	<1	<1	No	B
AF-01	Sediment	1,2,3,4,6,7,8-Hepta CDD	3E+00	2E+01	<1	--	--	--	--	--	--	--	--	--	--	No	C
AF-01	Sediment	OCDD	4E+01	2E+02	**7E+00**	--	--	--	--	--	--	--	--	--	--	**Yes**	A
AF-01	Sediment	OCDF	<1	6E+00	<1	--	--	--	--	--	--	--	--	--	--	No	B
AF-02	Sediment	Aluminum	1E+03	2E+00	<1	<1	<1	<1	<1	9E+00	**2E+00**	<1	<1	<1	<1	No	D (pH=6.5)
AF-02	Sediment	Arsenic	<1	9E+00	**3E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Cadmium	<1	9E+00	**2E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Chromium	<1	9E+00	**4E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Copper	1E+01	2E+02	**4E+01**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Lead	<1	9E+00	**3E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Nickel	<1	1E+01	**7E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	Selenium	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-02	Sediment	Silver	<1	6E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	--	No	B
AF-02	Sediment	Thallium	2E+00	--	--	<1	<1	<1	<1	<1	<1	<1	<1	--	--	No	C
AF-02	Sediment	Zinc	2E+00	1E+01	**3E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-02	Sediment	OCDD	2E+00	1E+01	<1	--	--	--	--	--	--	--	--	--	--	No	C
AF-03	Sediment	Aluminum	2E+02	<1	<1	<1	<1	<1	<1	3E+00	<1	<1	<1	<1	<1	No	D (pH = 7)
AF-03	Sediment	Arsenic	<1	1E+01	**3E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-03	Sediment	Cadmium	<1	3E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-03	Sediment	Copper	<1	8E+00	**2E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A
AF-03	Sediment	Lead	<1	5E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-03	Sediment	Manganese	<1	3E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	No	B
AF-03	Sediment	Mercury	<1	2E+00	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	--	No	B
AF-03	Sediment	Zinc	<1	6E+00	**2E+00**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**Yes**	A

Notes:

[a] Site risks are presented. Background threshold values for sediments were not available to compute incremental risks.

[b] Upstream reference segments include REF-AF, REF-West, and REF-East.

Hazard quotients are rounded to 1 significant figure.

-- = not available

< = less than

COEC = chemical of ecological concern

COPEC = chemical of potential ecological concern

NOAEL = no observed adverse effect level

LOAEL = lowest observed adverse effect level (columns shaded and HQs greater than 1 are bolded for easier viewing)

HQ = hazard quotient

Weight of evidence rationale

A LOAEL-based HQs greater than 1 for one or more receptors.

B Plant HQ and all LOAEL-based HQs (macroinvertebrates, birds, and mammals) are less than 1 (rounded to 1 significant figure).

C LOAEL-based HQs less than 1 for macroinvertebrates, birds, and mammals. Potential risk to plants is not used as the sole determinant for retention due to uncertainties in toxicity values for these receptors.

D Aluminum is not considered a risk to ecological receptors when soil/sediment pH greater than 5.5 (EPA, 2003c). The average pH for the exposure area is listed.

TABLE 10-8

Weight-of-Evidence and Identification of Chemicals of Ecological Concern in Surface Water

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Name	Media	Type	COPECs with at least one HQ>1	Fraction	Site Risk[a] Aquatic Organisms	Upstream Reference Segments Risk[b] Aquatic Organisms	Weight of Evidence: Retain as COEC	Weight of Evidence: Rationale Code
AF-01	Surface water		Aluminum	Total	**2E+01**	**6E+00**	**Yes**	A
AF-01	Surface water		Barium	Total	**3E+01**	**3E+01**	No	C
AF-01	Surface water		Iron	Total	**2E+00**	<1	**Yes**	A
AF-02	Surface water		Aluminum	Total	**9E+02**	**6E+00**	**Yes**	A
AF-02	Surface water		Barium	Total	**2E+02**	**3E+01**	**Yes**	A,B
AF-02	Surface water		Beryllium	Total	**3E+00**	ND	**Yes**	A,B
AF-02	Surface water		Iron	Total	**4E+01**	<1	**Yes**	A
AF-02	Surface water		Manganese	Total	**6E+01**	<1	**Yes**	A,B
AF-02	Surface water		Vanadium	Total	**7E+00**	<1	**Yes**	A,B
AF-03	Surface water		Aluminum	Total	**8E+02**	**6E+00**	**Yes**	A
AF-03	Surface water		Barium	Total	**3E+02**	**3E+01**	**Yes**	A,B
AF-03	Surface water		Beryllium	Total	**4E+00**	ND	**Yes**	A,B
AF-03	Surface water		Cadmium	Dissolved	**4E+00**	ND	**Yes**	A
AF-03	Surface water		Cobalt	Total	**3E+00**	<1	**Yes**	A,B
AF-03	Surface water		Cyanide	Total	**2E+00**	<1	**Yes**	A
AF-03	Surface water		Iron	Total	**4E+01**	<1	**Yes**	A
AF-03	Surface water		Manganese	Total	**2E+02**	<1	**Yes**	A,B
AF-03	Surface water		Mercury	Dissolved	**3E+00**	<1	**Yes**	A
AF-03	Surface water		Vanadium	Total	**2E+01**	<1	**Yes**	A,B
AF-03	Surface water		Zinc	Dissolved	**2E+00**	<1	**Yes**	A

Notes:

[a] Site risks are presented. Background threshold values for surface water were not available to compute incremental risks.

[b] Upstream reference segments include REF-AF, REF-West, and REF-East.

Hazard quotients are rounded to 1 significant figure.

COEC = chemical of ecological concern

COPEC = chemical of potential ecological concern

HQ = hazard quotient

ND = not detected

Weight of evidence rationale

A Site HQ greater than 1 and also exceeds the HQs for upstream reference segments.

B Site HQ exceeds reference locations HQs. However, benchmark is a Tier II value. There is a higher level of uncertainty and conservatism associated with the Tier II Values, since the Tier II values were established with fewer data than are required for state or federal criteria, and are often more conservative.

C Site HQ is equal to or less than the maximum upstream reference segment HQs.

TABLE 10-9

Summary of Baseline Ecological Risk Assessment Results

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

	COEC																		
Exposure Area/ Media	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Cyanide**	**Iron**	**Lead**	**Manganese**	**Mercury**	**Nickel**	**Selenium**	**Vanadium**	**Zinc**	**Dioxins and Furans**
Terrestrial - Soil																			
3,001																			
NE-02																			
NE-04																			
NE-06																			
NE-07									●			●							
NE-08																			
NE-09																			
NE-11																			
NR3																			
NR4/NR5		●	●									●				●			
NR6			●									●							
NR7						●			●			●							
NR8			●						●			●							
NR9		●	●						●			●				●			
NR10			●									●							
NR11			●			●			●			●							●
NR12		●	●			●			●			●							●
NR13												●							
NR14		●	●									●							
NR15																			
NR16		●	●			●						●				●			
NR17		●	●			●						●				●		●	
NR18			●									●							
NR19												●							
NR20																			
NW-01																			
NW-03																			
RSAR-A																			
RSAR-B																			
RSAR-D																			
RSAR-H																			
SE-01																			
SE-02																			
Aquatic - Sediment																			
AF-01																			●
AF-02			●			●	●		●			●			●			●	
AF-03			●						●									●	
Aquatic - Surface Water																			
AF-01	●										●								
AF-02	●			●	●						●		●				●		
AF-03	●			●	●	●		●		●	●		●	●			●	●	

Notes:

● Analytes retained as COECs:

COEC = chemical of ecological concern

Weight of Evidence included:

Soil - LOAEL-based HQs greater than 1 for one or more receptors (including at least one bird or mammal). Risk to plants and invertebrates was not used as the sole determinant as a COEC. Aluminum was excluded when soil pH greater than 5.5.

Sediment - COPEC-based HQs greater than 1 and exceed upstream reference segment HQs.

Surface water - Chronic criteria based HQs greater than 1 and exceed upstream reference segment HQs.

TABLE 10-10

Uncertainty Analysis

Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
Problem Formulation			
Fate and Transport	It is assumed that chemical concentrations will not change over time, and that concentrations are constant during the exposure duration. Natural attenuation and/or other degradation processes may be significant in some areas resulting in an over-estimation of exposure.	Moderate	Over-estimation of exposure/risk
Data Collection/Analysis	Variability in analyses, laboratories, representativeness of samples, sampling errors, and homogeneity of the sample matrix can influence quality and quantity of data used in the risk assessment. Data were validated, but historical sampling programs may not have had the same standards as more recent ones.	Unknown	Over- or under-estimation of exposure/risk
Data Collection/Analysis	Detection Limits. Historical data may have overly high detection limits, especially in regard to metals. Recent sampling was designed to have detection limits meeting ecological needs. However, as data are combined into the EPCs, high detection limits may influence the resulting mean and 95UCLs.	Moderate	Over-estimation of exposure/risk
Representative Species	Representative species were selected to reduce uncertainty; however, differences among species including physiology, reproductive biology, and/or foraging habits can result in different exposures and sensitivities for different receptors.	Low	Over- or under-estimation of exposure/risk
Exposure Pathway Analysis	Several exposure routes were considered minor and were not included in the exposure analysis. Although exposure via these routes still contributes to the total risk to each receptor, potential risks may be underestimated because these routes were not quantified.	Low	Under-estimation of exposure/risk
Analysis			
Wildlife Exposure Factors	Life history data for birds and mammals specific to the Site were not always available. Exposure parameters were either modeled using allometric relationships (e.g., food ingestion rates) or data from the same species in other portions of its range.	Moderate	Over- or under-estimation of exposure/risk
Bioaccumulation Factors	Site-specific data on COPEC concentrations in plant tissues were available from a small number of co-located soil/plant tissue sampling locations. Site-specific BAFs were calculated where sufficient data were available. For those exposure areas and/or chemicals for which site-specific data were not available, literature-based BAFs and regression models were used to estimate bioaccumulation. Comparison of modeled versus measured data for the same exposure area indicated that the modeled values were higher and lower than measured value depending on the chemical.	Moderate	Over- or under-estimation of exposure/risk
Bioavailability	Bioavailability of COPECs other than lead was assumed to be 100%. This likely overestimates risk to receptors at the site.	Low	Over-estimation of exposure/risk
Area Use Factors	AUFs were applied to exposure/risk estimates for birds and mammals in the BERA assessment to account for the foraging range of the receptor. Use of the site may be greater or less than that predicted by the AUF.	Low	Over- or under-estimation of exposure/risk
Exposure Point Concentrations	Exposure point concentrations were estimated using ProUCL 5.0. ProUCL does not offer a calculated UCL (with the new approaches for handling nondetects) when there are too few unique detected results (one or sometimes more than one). In these cases the UCL was defaulted to the maximum detected concentration. In datasets with fewer than 5 samples, the EPC defaulted to the maximum detected concentration.	Moderate	Over-estimation of exposure/risk

TABLE 10-10
Uncertainty Analysis
Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona

Assessment Element	Uncertainty	Magnitude of Impact	Direction of Impact
Toxicity Benchmarks and Toxicity Reference Values	Toxicity data were not available for all COPECs or media. COPECs for which toxicity data were unavailable were not evaluated, or surrogate toxicity data were used. Risks may be overestimated or underestimated.	Moderate	Over- or under-estimation of exposure/risk
Toxicity Benchmarks and Toxicity Reference Values	There is low confidence in some of the benchmarks and TRVs used in this ecological risk assessment because of the limited amount of toxicity data upon which they are based.	Moderate	Over- or under-estimation of risks
Toxicity Reference Values	Uncertainty factors were used to estimate chronic NOAEL-equivalent TRVs or chronic ESVs from other endpoints. In some cases an uncertainty factor was also used to estimate an LOAEL-equivalent TRV from an NOAEL-equivalent TRV.	Moderate	Over- or under-estimation of risks
Toxicity Reference Values	Sources of TRVs occasionally apply different uncertainty factors than those used in this report to adjust a study to a "Chronic NOAEL." When details of the study were available, the standardized uncertainty factors from this report were used. If sufficient details of the study were not presented or were not sufficiently complete to make a determination, then the interpretations made by the source document were used.	Low	Over- or under-estimation of risks
Risk Characterization			
Risk Estimation	Potential ecological risks were quantified using the HQ approach. The magnitude of the HQ indicates potential for ecological risk, but is not an exact estimation of risk. For example, the actual risk from a chemical with an HQ of 70 could be less than that for a chemical with an HQ of 20 because of uncertainties involved in estimating exposure, selection of effects criteria (TRVs), or field conditions affecting exposure.	Moderate	Over- or under-estimation of risks
Risk Estimation	Data necessary to estimate potential risks from all pathways for all chemicals in the food-chain uptake model were not always available. For these chemicals and/or areas, the food-chain uptake model was completed using the available data.	Moderate	Under-estimation of exposure/risk

Notes:
AUF = area use factor
COPEC = chemical of potential ecological concern
ERA = ecological risk assessment
HQ = hazard quotient
NOAEL = no observed adverse effect level
LOAEL = lowest observed adverse effect level
TRV = toxicity reference value
UCL = upper confidence level