Appendix G
Analytical Data

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Contents

Appendix G contains the Iron King Mine – Humboldt Smelter Superfund Site (Site) analytical database and tables that annotate the database fields. Data from the following investigations are included in the Site database. The investigations are described in Sections 3 and 4 of the *Remedial Investigation* (RI) *Report, Iron King Mine – Humboldt Smelter Superfund Site, Dewey-Humboldt, Yavapai County, Arizona*.

- 2002 Preliminary Assessment/Site Investigation (PA/SI) of the Former Iron King Mine Property (Arizona Department of Environmental Quality [ADEQ], 2002)
- 2004 PA/SI of the Former Humboldt Smelter Property (ADEQ, 2004)
- 2005 U.S. Environmental Protection Agency (EPA) Removal Assessment (Ecology and Environment, Inc. [E & E], 2005)
- 2006 Expanded Site Investigation (ESI) (ADEQ, 2006)
- 2008 Ironite Products Company/North American Industries Sampling (Brown and Caldwell, 2009)
- 2008 to 2009 Initial RI (EA Engineering, Science, and Technology, Inc. [EA], 2010)
- 2010 and 2012 Supplemental RI (EA, 2011)
- 2012 to 2013 Background and Surface Soil Sampling (EPA, 2012)
- 2013 to 2015 Data Gap RI (Lockheed Martin Scientific, Engineering, Response, and Analytical [SERAS], 2015)

The analytical database is provided in a Microsoft Access 2013 database file (IronKingMine_HumboldtSmelter_RI_Data.accdb). The analytical data are separated by media within the database in the following tables:

- tblSoilData: Analytical data with a sample matrix of “Soil”.
- tblSedimentData: Analytical data with a sample matrix of “SD” for sediment. Samples identified as sediment include samples collected from intermittent surface water features, sporadically ponded areas, onsite retention ponds, and ancillary drainage pathways on or near the former Iron King Mine and former Humboldt Smelter properties. Many of these samples were therefore located in areas more indicative of terrestrial habitat, rather than aquatic or benthic organism habitat.
- tblSurfaceWaterData: Analytical data with a sample matrix of “SW” for surface water. Samples classified as surface water were collected from the three surface water features that transect the Site: the Agua Fria River, Chaparral Gulch, and Galena Gulch. The Agua Fria River is the primary surface water feature in the valley and provides the only true aquatic habitat that occurs within the boundaries of the Site. Other samples identified as surface water samples (whether transitory or permanent) include samples collected from intermittent surface water features, sporadically ponded areas, onsite retention ponds, and ancillary drainage pathways on or near the Humboldt Smelter and Iron King Mine sites.
- tblGroundwaterData: Analytical data with a sample matrix of “GW” for groundwater.
- tblAirData: Analytical data with a sample matrix of “Air” for ambient air.
- tblOtherMatrixData: Analytical data with other sample matrixes. The majority of the records have a matrix of “QCWATER”. A small number of data records have matrixes of “DRUM”, “PLANT”, “ROCK”, and “STORAGE TANK”. These samples were not generally incorporated into the RI analyses.

Appendix G includes the following tables to annotate the database fields:

- Table G-1 – Column Descriptions: Contains a description of each of the column headings within the Microsoft Access data tables.
- Table G-2 – Exposure Area Descriptions: Provides a description of the exposure areas used to group soil data for the nature and extent evaluation, fate and transport evaluation, and human health risk assessment.
- Table G-3 – Ecological Risk Assessment Exposure Area Descriptions: Provides a description of the exposure areas used to group soil, sediment, and surface water data for the ecological risk assessment.
- Table G-4 – Result Flag Definition: Provides a definition for each of the data quality flags.
- Table G-5 – Best Result Code Definitions: Provides a definition of codes used to designate why a sample result was selected as the "Best Result" for the nature and extent evaluation or risk assessment.

Section 6.1 of the RI provides a description of the data management activities associated with compiling data from multiple investigations, correlation of portable XRF spectroscopy data with laboratory analyses, and the data reduction procedures. The database tables contain fields "Best Result Used for Risk Assessment" and "Best Result Used for Nature and Extent" to indicate which of the data records were used for the RI risk assessment and nature and extent evaluation, respectively. It should be noted that pre-removal action concentrations were included in the nature and extent dataset to allow a comprehensive evaluation of current and historical nature, extent, and contaminant transport pathways. Pre-removal samples were not included in the risk assessments. Further details regarding the process for selecting the Best Result is presented in Section 6.1.3 of the RI.

Works Cited

Arizona Department of Environmental Quality (ADEQ). 2002. *Preliminary Assessment/Site Inspection Report, Iron King Mine and Tailings. Prepared for EPA Region 9.* October 7.

Arizona Department of Environmental Quality (ADEQ). 2004. *Preliminary Assessment/Site Inspection Report, Humboldt Smelter.* Prepared for EPA. April 29.

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Brown and Caldwell. 2009. *Sampling Report, Former Ironite Products Company Facility*. Prepared for North American Industries, Humboldt, Arizona. May 14.

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

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U.S. Environmental Protection Agency (EPA). 2012. *Field Report and Preliminary Results, X-Ray Fluorescence (XRF) Soil Sampling, April 17-19, 2012, Iron King Mine – Humboldt Smelter Superfund Site, Humboldt, Arizona,* by Jeff Dhont, EPA Remedial Project Manager. April 25.

TABLE G-1

Column Descriptions

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

Column Name	Column Description
Location Name	Monitoring well, soil boring, or other location where the sample was taken.
Exposure Area (Primary)	The primary grouping used for risk assessment analysis. See Table G-2 for exposure area descriptions.
Exposure Area (Secondary)	The secondary grouping used for risk assessment analysis. A secondary grouping is assigned in cases where two exposure areas overlap (for example RYSR and NR3). See the Table G-2 for exposure area descriptions.
EcoRisk Assessment Group (Soil)	The geographic area that was used in grouping soil data for the Ecological Risk Assessment. This column is only included in "tblSoilData". See the Table G-3 for Ecological Risk Assessment exposure area definitions.
EcoRisk Assessment Group (Sed and SW)	The geographic area that was used in grouping sediment and surface water data for the Ecological Risk Assessment. This column is only included in "tblSedimentData" and "tblSurfaceWaterData". See Table G-3 for Ecological Risk Assessment exposure area definitions.
Northing	Projection: NAD_1983_StatePlane_Arizona_Central_FIPS_0202_Feet_Intl
Easting	Projection: NAD_1983_StatePlane_Arizona_Central_FIPS_0202_Feet_Intl
Sample Name	Sample name from the chain of custody
Sample Matrix	Matrix of sample
Sample Date	Date of sample
Sample Type	Field sample (i.e., normal sample) or duplicate sample
Sample Beginning Depth (ft)	The depth below ground at the top of the sampling interval
Sample Ending Depth (ft)	The depth below ground at the bottom of the sampling interval
Analysis Type	X-ray Fluorescence (XRF) or laboratory (Lab)
Analysis Extraction Type	Analysis extraction type. Most commonly total, in vitro bioaccessibility (IVBA), synthetic precipitation leaching procedure (SPLP), or toxicity characteristic leaching procedure (TCLP) in "tblSoilData" and "tblSedimentData". In "tblAirData", samples collected using BGI PQ100 samplers are classified as "Total" and samples collected using continuous particulate monitors which characterize high-wind events are classified as "TEOM" (Thermo Electron TEOM Series 1400a).
Analysis Fraction Type	Analysis fraction type. Most commonly "Total" or "Dissolved" in "tblSurfaceWaterData" and "tblGroundwaterData" tables.
Analyte Name	Analyte names are standardized and uniform
Analyte Group	Analyte group (e.g., Metals, VOCs, General)
Result Value	Concentration value
Units	Units for the Result Value, Method Detection Limit, and Reporting Limit
Result Flag	Identifies data quality. See the Table G-4 for result flag descriptions.
Best Result Code	Populated if the Result Value was selected as a Best Result. The six codes used in this field are Y1, Y2, Y3, Y4, Y5, and Y6 and are described in Table G-5.
Best Result Non-Detect Basis	For Best Results that are non-detect, this column indicates whether the Result Value is based on the Method Detection Limit (MDL), Reporting Limit (RL), or the original reported result (FR).
Best Result Used for Risk Assessment	Y or N. Y indicates that the Result Value was used for Risk Assessment analysis. N indicates it was not.
Best Result Used for Nature and Extent	Y or N. Y indicates that the Result Value was used for Nature and Extent analysis. N indicates it was not. All Result Values used for Risk Assessment analysis were also used for Nature and Extent analysis. In addition, some results that were not used for Risk Assessment were used for Nature and Extent. See Section 6.1 of the Remedial Investigation Report for more information.
Method Detection Limit	Reported method detection limit
Reporting Limit	Reported reporting limit

TABLE G-2

Exposure Area Descriptions

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

Exposure Area Name	Exposure Area Description
NR2 School	Humboldt Elementary School
NR2 Town Hall	Dewey-Humboldt Town Hall
NR3	Upper Chaparral Gulch
NR4	JT Septic Facility
NR5	Main Tailings Pile 1964 Blow Out Path
NR6	Middle Chaparral Gulch
NR7	Smelter Tailings Swale
NR8	Tailings Floodplain
NR9	Lower Chaparral Gulch
NR10	Agua Fria Tailings Pile
NR11	Former Pyrometallurgical Operations Area
NR12	Smelter Plateau
NR13	Former Humboldt Smelter Property East of the Agua Fria River
NR14	South of Former Iron King Mine Property
NR15	Auto Yard
NR16	Former Mineworks Area
NR17	Main Tailings Pile
NR18	North American Industries Operations Area
NR19	Former Glory Hole and North of Main Tailings Pile
NR20	North of Chaparral Gulch
BERM	Tailings Berm
RSAR-A	Residential Screening Area Risk (RSAR), Area A
RSAR-B	Residential Screening Area Risk (RSAR), Area B
RSAR-C	Residential Screening Area Risk (RSAR), Area C
RSAR-D	Residential Screening Area Risk (RSAR), Area D
RSAR-E	Residential Screening Area Risk (RSAR), Area E
RSAR-F	Residential Screening Area Risk (RSAR), Area F
RSAR-G	Residential Screening Area Risk (RSAR), Area G
RSAR-H	Residential Screening Area Risk (RSAR), Area H
RYSR (####)	Residential Yard-Specific Risk (RYSR) property
BKG	Located outside of the background boundary
None	Sample location could not be confirmed and therefore was not associated with an exposure area
NonYard	Within the Residential Yard-Specific Risk (RYSR) area but outside of an assessed residential property
UNDEV	Located within the background boundary but outside of any defined exposure area

TABLE G-3

Ecological Risk Assessment Exposure Area Descriptions

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

Exposure Area Name	Exposure Area Description
N/A	Not assessed for ecological risk assessment
3001	3001
AF-01	Agua Fria River (AF)-01
AF-02	Agua Fria River (AF)-02
AF-03	Agua Fria River (AF)-03
NE-02	Northeast (NE)-02
NE-03	Northeast (NE)-04
NE-04	Northeast (NE)-06
NE-05	Northeast (NE)-07
NE-06	Northeast (NE)-08
NE-07	Northeast (NE)-09
NE-08	Northeast (NE)-11
NR10	Agua Fria Tailings Pile
NR11	Former Pyrometallurgical Operations Area
NR12	Smelter Plateau
NR13	Former Humboldt Smelter Property East of the Agua Fria River
NR14	South of Former Iron King Mine Property
NR15	Auto Yard
NR16	Former Mineworks Area
NR17	Main Tailings Pile
NR18	North American Industries Operations Area
NR19	Former Glory Hole and North of Main Tailings Pile
NR20	North of Chaparral Gulch
NR3	Upper Chaparral Gulch
NR4 and NR5	NR4 JT Septic Facility and NR5 Main Tailings Pile 1964 Blow Out Path
NR6	Middle Chaparral Gulch
NR7	Smelter Tailings Swale
NR8	Tailings Floodplain
NR9	Lower Chaparral Gulch
NW-01	Northwest (NW)-01
NW-02	Northwest (NW)-03
RSAR-A	Residential Screening Area Risk (RSAR)-A
RSAR-B	Residential Screening Area Risk (RSAR)-B
RSAR-D	Residential Screening Area Risk (RSAR)-D
RSAR-H	Residential Screening Area Risk (RSAR)-H
SE-01	Southeast (SE)-01
SE-02	Southeast (SE)-02

TABLE G-4

Result Flag Definition

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

Result Flag	Flag Definition
B	The analyte was found in the associated blank as well as the sample. Indicates possible blank contamination.
D	The analyte has been run at a dilution to bring the concentration of that compound within the linear range of the instrument.
E	The analyte concentration is considered estimated; the analyte may be above or below the linear range of the instrument. The sample should be reanalyzed at an appropriate dilution.
EMPC	Estimated Maximum Possible Concentration
J	The identification of the analyte is acceptable; however the reported value is an estimate.
JB	The analyte was found in the associated blank as well as the sample. Indicates possible blank contamination.
LJ	The analyte concentration is biased low; the result may actually be higher.
NJ	Spiked sample recovery not within control limits
R	The analyte concentration is rejected due to serious deficiencies in the ability to analyze the analyte and meet quality control criteria. The presence or absence of the analyte cannot be verified.
U	The analyte was not detected at or above the reported value
UJ	The analyte was not detected at or above the reported value, and the reporting limit is estimated
J-	Laboratory reported that the value is estimated low
J+	Laboratory reported that the value is estimated high. In addition to laboratory assigned J+ flags, a J+ qualifier was added to 2013/2014 chromium and copper XRF results. All XRF results were adjusted using correlation factors developed from laboratory/XRF co-sampling. However, the correlation factor for 2013/2014 chromium and copper samples was determined to be poor. See Section 6.1 of the RI Report for more information.
=	Indicates that the value was detected
ND	Analyte was not detected and the reporting and method detection limits are unknown
NR	Analyte was tested, but no result or indication of detect or non-detect was reported
na	Used for liquid limit samples when no result is reported
NP	Used for plasticity index and plastic limit samples when no result is reported
*	Used for 1-D consolidation, direct shear, moisture-retention, and strength parameter results with no value
DNR	Analyte was detected but no result was provided

TABLE G-5

Best Result Code Definitions

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

Best Result Code	Best Result Code Definition
Y1	Best result is the maximum detected laboratory value.
Y2	Best result is the minimum detection limit reported for laboratory results.
Y3	No laboratory data were collected. Best result in the maximum detected XRF value.
Y4	No laboratory data were available. Best result in the minimum detection limit reported for the XRF results.
Y5	All results were rejected. Best result is a rejected value.
Y6	No results were reported. No best result is provided and the best result qualifier is set to "NR" (no result).