Appendix A
Superfund Risk Assessments and Public Health Assessments of 2009 Current Sites

Relatively few Superfund risk assessments or public health assessments were found for currently operating sites. Those that were found are listed here, in **Table A-1**.

Table A-1. Superfund Risk Assessments and Public Health Assessments of 2009 Current Sites

Row	Mine Site	State	Document Titles	Document Date
1	Argenta Mine and Mill	Nevada	Notice of Final Decision, Reclamation Permit 0252	May 2008
2	ASARCO LLC Hayden Plant Site	Arizona	Screening-Level Ecological Risk Assessment	Aug 2008
3	Elkem Eramet	Ohio	Health Consultation: Marietta Area Air Investigation	July 2009
4	Fort Knox Mine	Alaska	Arctic Grayling and Burbot Studies in the Fort Knox Water Supply Reservoir and Developed Wetlands, 2001	Feb 2002
			Arctic Grayling and Burbot Studies in the Fort Knox Water Supply Reservoir and Developed Wetlands, 2000	Jan 2002
			Arctic Grayling and Burbot Studies in the Fort Knox Water Supply Reservoir, Stilling Basin, and Developed Wetlands, 2002	Dec 2002
5	Greens Creek Mine	Alaska	Aquatic Biomonitoring at Greens Creek Mine	June 2004
			Aquatic Biomonitoring at Greens Creek Mine	May 2005
			Aquatic Biomonitoring at Greens Creek Mine	July 2010
			Aquatic Biomonitoring at Greens Creek Mine	May 2011
6	Herculaneum Lead Smelter Site	Missouri	ATSDR Health Consultation-Exposure Investigation	June 2005
7	Lincoln Park Superfund Site	Colorado	EPA Superfund Record of Decision	Jan 2002
8	Phelps Dodge Tyrone	New Mexico	Wildlife Monitoring Plan for Post Closure	Dec 2005
9	Red Dog	Alaska	Aquatic Biomonitoring at Red Dog Mine, 2010.	Spring 2010
10	Smokey Canyon Mine	Idaho	Smoky Canyon Mine CERCLA Investigations and Response	Aug 2001
			FINAL Site Investigation Report Smoky Canyon Mine	July 2005
			Public Health Assessment for Southeast Idaho Phosphate Mining Resource Area Bannock, Bear Lake, Bingham, and Caribou Counties, Idaho.	Feb 2006
			Baseline Human Health Risk Assessment	July 2005
			Public Health Assessment: Asarco Hayden Smelter Site (A/K/A Asarco Incorporated Hayden Plant)	Sept 2002

Appendix B
Defining the Universes of 108(b) Historical CERCLA and 2009 Current Sites

This appendix describes the data sources and methodologies that EPA used to define the universes of 108(b) CERCLA Historical sites and 2009 Current sites. **Section B.1** describes the data sources and methodology used to create the initial universe of 108(b) CERCLA Historical sites. Section B.1 also describes the randomized sampling that generated the 24 Case Study Historical sites for in-depth data gathering and evaluation. **Section B.2** details the later expansion of the 108(b) CERCLA Historical Sites universe, as well as the supplemental site sellection and data collection. Section B.3 describes the data sources and selection criteria used to create the universe of 2009 Current sites are described, along with the methods for locating these sites. Section B.4 documents those sites found in both the 108(b) CERCLA Historical Sites universe and the 2009 Current Sites universe.

B.1 Initial List of 108(b) Historical CERCLA Sites

EPA constructed a dataset of known mining and primary mineral processing sites that have been cleaned up using Superfund (CERCLA) authority. These sites include CERCLA removal sites, National Priority List (NPL) sites, and sites cleaned up under CERCLA (sometimes in addition to other federal laws') authority. The list includes sites of which EPA is aware that mining, and/or primary mineral processing occurred, although it also includes some sites at which other types of activities may have occurred at different times (e.g., secondary mineral processing) or that are part of the overall Superfund site (e.g., manufactured gas plant or chemical manufacturing).

B.1.1 Abandoned Mine Lands List as of 2002

EPA's National Mining Team developed a list of 561 mining and mineral processing sites that have been addressed using Superfund (CERCLA) cleanup authority or that are on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) inventory of sites that might at a future date be cleaned up under CERCLA cleanup authority. Some of the sites have not yet been assessed for cleanup needs. The National Mining Team defines the term "abandoned mine lands" for its purposes as "…those lands, waters, and surrounding watersheds contaminated or scarred by the extraction, beneficiation or processing of ores and minerals (excluding coal). Abandoned mine lands include areas where mining or processing activity is determined to be temporarily inactive" (U.S. EPA, 2004).

The scope of the National Mining Team's efforts differs slightly from the scope and applicability of the proposed CERCLA 108(b) rule, which focusses on mines and processors of metal and non-fuel, non-metallic mineral resources identified in the July 2009 FR notice (74 FR 37213-37219). The CERCLA 108(b) rule also does not cover commodities excluded from the definition of "hardrock mining facilities" for the purposes of identifying the classes of facilities for which financial responsibility requirements would be first developed. The list of excluded commodities is based on an analysis of several factors published in the Priority Classes notice for the CERCLA 108(b) requirements (published July 28, 2009, in the Federal Register, 74 FR

37213-37219). EPA staff analyzed the following factors in determining what mining sectors and commodities to exclude:

- Annual amounts of hazardous substances released to the environment
- The number of facilities in active operation and production
- The physical size of the operation
- The extent of environmental contamination
- The number of sites on the CERCLA site inventory (including both National Priority List (NPL) sites and non-NPL sites)
- Government expenditures
- Projected clean-up expenditures; and
- Corporate structure and bankruptcy potential.

A memorandum to the record ("Mining Classes Not Included in Identified Hardrock Mining Classes of Facilities" from Stephen Hoffman and Shahid Mahmud, June 29, 2009, document number EPA-HQ-SFUND-2009-0265-0003, U.S. EPA (2009a)) lists 59 MSHA commodities to be excluded.

To conduct this evaluation, therefore, EPA identified those mining and mineral processing sites on the Abandoned Mines List associated with metal and non-metallic, non-fuel mineral commodities identified in the July 2009 FR notice [74 FR 37213-37219], excluding those listed in U.S. EPA (2009a).

B.1.2 Filtering for 108(b) Historical CERCLA Sites

Based on the list of abandoned mine lands sites, EPA used the following criteria to identify relevant 108(b) Historical CERCLA sites:

- Mining or mineral processing occurred at the site (either alone, together, or in combination with other activities).
- For mineral processing, EPA documents describing site activities mention processing of *primary* (i.e., earthen) mineral resources rather than only secondary mineral resources (i.e., already circulating within the economy and returned for recovery).
- The site is or had been addressed by the EPA under CERCLA as an NPL site, a removal site, a site cleaned up as part of a CERCLA enforcement action, or some combination of these.
- Site contamination resulted at least in part from mining or mineral processing activities that occurred *at the site*, rather than solely from mining or mineral processing wastes transported to the site from a different location or from other non-mining, non-mineral processing activities.
- The commodity or commodities mined or processed at the sites fell within the scope of the July 2009 FR notice (74 FR 37213-37219).
- The site was not a member of a mining class excluded from the rule per EPA (2009a).

EPA identified 251 sites that have been cleaned up using Superfund (CERCLA) cleanup authority: as removal sites, NPL sites, or in some cases as part of a CERCLA enforcement action. **Attachment B1** presents the Historical CERCLA site names, identification numbers, locations, and commodities mined/processed.

B.1.3 Stratification into pre- and post-1980 sites

A few of the Historical CERCLA Sites were included because of contamination from mining operations conducted as far back in time as the 1700s and early to mid 1800s. In order to focus the analysis on the historical sites that use mining and mineral processing practices similar to those used at current or future mining and mineral processing sites, EPA divided the list of 251 sites into two groups: one in which site operations ended before 1980 and one in which the operations occurred after 1980.

B.1.4 Random Selection of Case Study Historical Sites

A randomized selection process was used to sample a subset of the post-1980 historical sites. A set of priority rules was implemented for the selection process that included (1) sites with readily available data, and (2) no legal negotiation was ongoing at a site.

The selection process resulted in a set of 30 (24 NPL and 6 removal) sites that are more likely to be similar to modern mining and milling practices and mineral processing methods used at currently active sites. The subset of sites randomly selected from the post-1980 subset of 108(b) CERCLA sites is presented in **Table B-1**.

Table B-1. Randomly Selected Case Study Historical Sites

Row	Site Name	EPA ID	Site Type	Last Operational Year
1	Anaconda Co. Smelter	MTD093291656	NPL	1980
2	Bueno Mill & Mine Site	CON000802129	Removal	2008*
3	Bunker Hill Mining & Metallurgical Complex	IDD048340921	NPL	1991
4	Captain Jack Mill	COD981551427	NPL	1981
5	Cimarron Mining Corp.	NMD980749378	NPL	1982
6	Cyprus Tohono Mine	AZD094524097	Removal	1997
7	Eagle Mine	COD081961518	NPL	1984
8	East Helena Site	MTD006230346	NPL	2001
9	Eastern Michaud Flats Contamination	IDD984666610	NPL	Current
10	Evening Star Mine	CON000802651	Removal	2003*
11	Foote Mineral Co.	PAD077087989	NPL	1991
12	Gilt Edge Mine	SDD987673985	NPL	1998
13	Homestake Mining Co.	NMD007860935	NPL	1990
14	Li Tungsten Corp.	NYD986882660	NPL	1985
15	Macalloy Corporation	SCD003360476	NPL	1998
16	Midnite Mine	WAD980978753	NPL	1981
17	Mine Site 2028	INN000510234	Removal	1996*
18	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	NPL	Current
19	National Southwire Aluminum Co.	KYD049062375	NPL	Current
20	Omaha Lead	NESFN0703481	NPL	1996
21	Ophir Mills and Smelter	UT0010221516	Removal	2003*

Row	Site Name	EPA ID	Site Type	Last Operational Year
22	Ormet Corp.	OHD004379970	NPL	Current
23	Palmerton Zinc Pile	PAD002395887	NPL	1980
24	Reynolds Metals Company	ORD009412677	NPL	2000
25	Silver Mountain Mine	WAD980722789	NPL	1983
26	Silverton Mercury (HG) Concentrators	WAN001002702	Removal	1983*
27	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	NPL	1981
28	Summitville Mine	COD983778432	NPL	1992
29	Teledyne Wah Chang	ORD050955848	NPL	Current
30	Tex-Tin Corp.	TXD062113329	NPL	1991

* When a Removal site's last operational year is unknown, the Last Non-NPL Status date was used

Note: A "current" listing in the *Last Operational Year* field indicates the site still had mining or mineral processing activities ongoing as of calendar year 2009. At the Bunker Hill site EPA has limited evidence that mining was occurring, but the mine became non-producing in 2009 and potentially should be classified as current. This limited evidence is the operating status information in the MSHA database at http://www.msha.gov/drs/drshome.htm, for the mine numbered as MSHA ID # 1000083.

B.1.5 Documents from Superfund Data Management System

EPA extracted data on exposure to CERCLA hazardous substances associated with the historical NPL sites, from the following source documents:

- Superfund human health risk assessments (HHRA) and ecological risk assessments (ERA)
- NPL site summary information previously developed by EPA that included synopses for the record of decision (ROD), contaminants of concern, site characteristics, and NPL mining/mineral processing methods
- Remedial Investigation/Feasibility Study (RI/FS) documents
- RODs
- Other CERCLA site documents such as comprehensive 5-year review and risk assessments from CERCLIS and Regional Superfund web pages.

Data for the removal sites were extracted from the following CERCLA site documents:

- Action memos
- Supplemental action memos
- Pollution reports
- Other removal-related documentation.

In the above lists of document sources, preference was generally given for data extraction in the order shown. Preference was based on accessibility of exposure and CERCLA hazardous substance information already summarized and then additional documents were referenced, as needed, that were expected to contain the required data elements. Information that emerges over a period of time, such as with more comprehensive site field sampling, can sometimes change the picture of site conditions, and thus information from many different site documents needed to be evaluated to infer which documents contained the most complete data for the purposes of this report. Ultimately, RODs, RI/FS documents, and Superfund risk assessments were found to most frequently contain the information that was of interest.

Narrative case studies were developed for the Case Study Historical sites. These case studies are included in **Attachment B2**. However, insufficient data were available for any of the Removal sites; as a result, only the NPL sites were used in the analysis. The documents reviewed for each of the NPL Case Study Historical sites is provided in **Attachment B3**.

B.2 Expanded List of 108(b) Historical CERCLA Sites and Supplemental Sampling

Ongoing QA/QC efforts identified issues which, in aggregate, suggested that EPA should continue developing the 108(b) Historical CERCLA Sites universe. For example, additional analysis of CERCLIS identified numerous additional sites that qualified to be on the list. Also, data collection efforts for the Cased Study Historical sites found that some sites on the list were not mines or mineral processors and should not have been on the list at all. EPA therefore decided to update the 108(b) Historical CERCLA Sites universe.

Also, EPA found that the Case Study Historical sites included a limited range of the commodities mined and/or processed when compared to the overall 108(b) Historical CERCLA Sites universe. EPA therefore conducted a supplemental selection of additional historical sites for in-depth data collection and study.

B.2.1 Using CERCLIS Data to Update the 108(b) Historical CERCLA Sites Universe

While collecting data for the initial Case Study Historical sites, EPA found that insufficient data were available for Removal and other non-NPL sites. EPA therefore decided to concentrate the updating on NPL sites.

To further clarify and update the list, EPA compared the initial 108(b) Historical CERCLA Sites universe to the following two reports generated by the CERCLIS Public Access Database:

- List 9 (Active CERCLIS Sites, available at http://www.epa.gov/superfund/list-9-active-cerclis-sites): Displays the sequence of activities undertaken at active CERCLIS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted: and
- SCAP 12 (NPL Sites, available at http://www.epa.gov/superfund/scap-12-foia-nplnon-npl-site-summary-version-2401): Displays the sequence of activities undertaken at all NPL sites in CERCLIS. NPL sites include sites proposed to the NPL, sites currently on the final NPL and sites deleted from the final NPL.

Similar to efforts described in Section B.1 above regarding filtering the AML list, EPA identified those mining and mineral processing sites on the List 9 and SCAP 12 reports associated with metal and non-metallic, non-fuel mineral commodities identified in the July 2009 FR notice [74 FR 37213-37219], excluding those listed in U.S. EPA (2009a). Based on the 108(b) Historical CERCLA Sites universe, as well as the List 9 and SCAP 12 reports, EPA developed a list of 448 sites that have been cleaned up using Superfund (CERCLA) authority: as NPL sites or, from the initial 108(b) Historical CERCLA Sites universe, as removal sites or as part of a CERCLA enforcement action. **Attachment B4** presents the list of 448 sites comprising the updated 108(b) Historical CERCLA Sites universe, including site names, identification numbers, locations, and commodities mined/processed.

B.2.2 Supplemental Selection of Historical Sites

In August 2012, while updating the 108(b) Historical CERCLA Sites universe, EPA took another sample to supplement the original, random sample of Case Study Historical sites for in-depth data collection and study. The supplemental sampling differed from the original, random sampling in several respects:

- The list from which to sample excluded sites already on the original, randomly selected sites list;
- The list from which to sample excluded sites associated with commodities already represented in the original, randomly selected sites list; and
- The supplemental sampling was not restricted to post-1980 operating sites.

The list of sites selected during the supplemental sampling is presented in **Table B-2** below.

Table B-2. Historical Sites in Supplemental Sample

Row	Site Name	EPA ID	Site Type	Last Operational Year
1	ALCOA/Lavaca Bay	TXD008123168	NPL	1979
2	Blackbird Mine	IDD980725832	NPL	1982
3	Chemet Co.	TND987768546	NPL	1987
4	Cleveland Mill	NMD981155930	NPL	1950
5	E.I. du Pont de Nemours & Co., Inc. (Newport Pigment Plant Landfill)	DED980555122	NPL	Unknown
6	Fremont National Forest/White King and Lucky Lass Uranium Mines (USDA)	OR7122307658	NPL	1964
7	Libby Asbestos Site	MT0009083840	NPL	1990
8	Riverbank Army Ammunition Plant	CA7210020759	NPL	Unknown
9	Rockwool Industries Inc.	TXD066379645	NPL	1987
10	Saltville Waste Disposal Ponds	VAD003127578	NPL	1972
11	U.S. Radium Corp.	NJD980654172	NPL	1926
12	Washington County Lead District - Old Mines	MON000705027	NPL	c. 1980

B.2.3 Documents from Superfund Data Management System

EPA extracted exposure and CERCLA hazardous substance data associated with the supplemental sample of historical sites from the same types of source documents as those used for the original, random sample (see Section B.1.5).

As with the original data collection effort, preference of data source documents was based on accessibility of information already summarized and then additional documents were referenced as needed. Ultimately, RODs, RI/FS documents, baseline risk assessments (BRA), human health risk assessments (HHRA) and ecological risk assessments (ERA) were found to most frequently contain the information that was of interest.

Please note that, while data were collected for the suplementally selected sites, and for completeness of documentation they are included in this report, the data were not available in time to be included in the analyses, and any conclusions drawn by this report are not based on these data. These data are available, however, for any future analyses.

B.3 Currently Active Sites as of 2009 (2009 Current Sites)

The list of 2009 Current sites was based on the mineral or metal commodity mined or processed. The development of EPA’s list of applicable commodities is described in **Section B.3.1** below. **Section B.3.2** describes how EPA identified mines and mineral processors using the list of commodities, and information from sources such as the Mine Safety and Health Administration (MSHA) and the U.S. Geological Survey (USGS), along with the mine status. **Section B.3.3** describes the list of 2009 Current sites and the processes used to locate each site.

B.3.1 Commodities Included in the Report

Two federal agencies survey and/or regulate the mining/mineral processing industry: the USGS, under the Department of the Interior, and the MSHA, under the Department of Labor. These two agencies use different categorization schemes and operate under different federal statutes. EPA is using data from both agencies to identify members of the hard rock mining industry that extract, beneficiate, or process metals and non-metallic, non-fuel minerals in the United States.

EPA began its efforts to identify members of the hard rock mining industry by setting a January 2010 target timeframe for operations to occur at the sites. The EPA identified a database maintained by MSHA, the Mine Data Retrieval System,[1] and a set of reports published annually by USGS (Minerals Yearbooks).[2]

The Minerals Yearbooks (as well as Commodity Summaries for the few commodities without yearbooks) are published for approximately 86 groups of commodities. EPA excluded helium, nitrogen, and sulfur from further consideration because they are extracted from natural gas and/or petroleum (fuels). The EPA also excluded peat on the basis of its occasional use as a

[1] Weekly updates are available at http://www.msha.gov/drs/drshome.htm. EPA used a version that MSHA staff indicated represents MSHA's best-quality data for calendar year 2009, provided to Phuc Phan of EPA by Chad Hancher of MSHA in July 2010. EPA also periodically extracted data from the weekly updates.

[2] Available at http://minerals.usgs.gov/minerals/pubs/commodity/ .

fuel, leaving approximately 82 groups of commodities. EPA also excluded manufactured abrasives, reasoning that although minerals are used as feedstocks, the manufacturing process for abrasives is more akin to manufacturing than mineral processing.

Next, EPA arrayed the commodities listed by MSHA in its Mine Data Retrieval System database and removed the energy commodities (coal (anthracite); coal (bituminous); coal (lignite); oil mining; oil sand; oil shale) from that list, leaving approximately 98 groups of commodities.

There is significant overlap between the approximately 82 USGS commodities and approximately 98 MSHA commodities, and in many instances the commodity names are identical. Several that are tracked by USGS and not MSHA are likely to be ores/minerals that are imported from outside the United States and beneficiated/processed within the U.S.

EPA then merged the two lists of commodities to create a list of metal and non-metallic, non-fuel minerals that could be extracted, beneficiated, or processed in the United States. This list is not all-inclusive, because it represents ores and minerals mined and processed in the 2006 to 2009 timeframe; changes in market conditions and commodity prices over time could mean that additional ores/minerals not present on this list could begin to be mined or processed in the United States, while mining or processing of ores/minerals currently present on this list might be discontinued at some future point.

The preliminary merged list of commodities included 154 metals and non-metallic, non-fuel minerals (see **Table B-3**). Some listed commodities could be subsumed within other listed commodities, depending on definitions used. However, to the extent that there were slight differences between commodity names used by USGS and MSHA, EPA chose to keep those commodity groups separate. Table B-3 generally lists the commodities alphabeticallyr, although minerals in the clays, gemstones, crushed/broken and dimension stone/rock, and sand families are grouped together.

Table B-3. Merged list of USGS and MSHA Commodity Groups

Commodity	Source Agency	Commodity	Source Agency
Agate	MSHA	Turquoise	MSHA
Alumina	USGS and MSHA	Germanium	USGS
Aluminum	USGS	Gilsonite	MSHA
Aluminum Ore-Bauxite	MSHA (USGS just Bauxite)	Gold	USGS (MSHA Gold Ore)
Amethyst	MSHA	Graphite	USGS and MSHA
Antimony	USGS (MSHA Antimony Ore)	Gravel, Construction	USGS
Aplite	MSHA	Gravel, Industrial	USGS
Arsenic	USGS	Gypsum	USGS and MSHA
Asbestos	USGS	Hafnium	USGS
Barite	USGS (MSHA Barite Barium Ore)	Indium	USGS
Beryllium	USGS (MSHA Beryl-Beryllium Ore)	Iodine	USGS
Bismuth	USGS	Iron	USGS
Boron	USGS (MSHA Boron Minerals)	Iron, scrap	USGS

Commodity	Source Agency	Commodity	Source Agency
Bromine	USGS	Iron, slag	USGS
Brucite	MSHA	Iron Ore	USGS and MSHA
Cadmium	USGS	Iron Oxide Pigments	USGS
Cement	USGS and MSHA	Kyanite	USGS and MSHA
Cesium	USGS	Kyanite-Related Materials	USGS
Chem. and Fertil. Mnls. NEC	MSHA	Lead	USGS
Chromium	USGS (MSHA Chromite Chromium Ore)	Lead-Zinc Ore	MSHA
Clays		Leonardite	MSHA
Bentonite	MSHA (USGS Clays)	Lime	USGS and MSHA
Clay, Ceramic, Refractory Mnls.	MSHA (USGS Clays)	Lithium	USGS
Common Clays NEC	MSHA (USGS Clays)	Magnesium	USGS
Fire Clay	MSHA (USGS Clays)	Magnesium Compounds	USGS
Fullers Earth	MSHA (USGS Clays)	Magnesite	MSHA
Kaolin and Ball Clay	MSHA (USGS Clays)	Magnetite	MSHA
Cobalt	USGS	Manganese	USGS (MSHA Manganese Ore)
Copper	USGS (MSHA Copper Ore NEC)	Mercury	USGS
Cristobalite, Ground	MSHA	Mica	USGS and MSHA
Diatomaceous Earth (Diatomite)	MSHA (USGS Diatomite)	Molybdenum	USGS (MSHA Molybdenum Ore)
Explosives	USGS	Nephaline Syenite	USGS
Feldspar	USGS and MSHA	Nickel	USGS
Ferroalloys	USGS	Niobium (Columbium)	USGS
Fluorspar	USGS and MSHA	Olivine	MSHA
Gallium	USGS	Perlite	USGS and MSHA
Gemstones	USGS and MSHA	Phosphate Rock	USGS and MSHA
Diamond, Industrial	USGS	Pigment Minerals	MSHA
Emerald	MSHA	Platinum-Group Metals	USGS (MSHA Platinum Group Ore)
Garnet	MSHA (USGS Garnet, Industrial)	Potash	USGS and MSHA
Potash, Soda, Borate Mnls. NEC	MSHA	Crushed, Broken Slate	MSHA
Potassium Compounds	MSHA	Crushed, Broken Stone NEC	MSHA
Pumice	USGS	Crushed, Broken Traprock	MSHA
Pumicite	USGS and MSHA	Stone, Dimension	USGS
Pyrophyllite	USGS	Dimension Basalt	MSHA
Quartz Crystal	USGS and MSHA	Dimension Granite	MSHA
Quartz, Ground	MSHA	Dimension Limestone	MSHA
Rare Earths	USGS (MSHA Rare Earths Ore)	Dimension Marble	MSHA
Rhenium	USGS	Dimension Mica	MSHA
Rubidium	USGS	Dimension Quartzite	MSHA
Salt	USGS and MSHA	Dimension Sandstone	MSHA
Salt, Brine Evaporated	MSHA	Dimension Slate	MSHA
Sand		Dimension Stone NEC	MSHA
Construction Sand and Gravel	USGS and MSHA	Dimension Traprock	MSHA
Sand, Industrial NEC	MSHA (USGS Industrial Sand and Gravel, under Silica)	Steel	USGS

Commodity	Source Agency	Commodity	Source Agency
Sand, Common	MSHA	Steel Scrap	USGS
Selenium	USGS	Steel Slag	USGS
Shale	USGS (MSHA Common Shale)	Strontium	USGS
Shell	MSHA	Talc	USGS and MSHA
Silica	USGS	Tantalum	USGS
Silica, Ground	MSHA	Tellurium	USGS
Silica, Special	USGS	Thallium	USGS
Silicon	USGS	Thorium	USGS
Silver	USGS (MSHA Silver Ore)	Tin	USGS
Soda Ash	USGS	Titanium	USGS
Sodium Sulfate	USGS	Titanium Ore	MSHA
Sodium Compounds	MSHA	Tripoli	USGS and MSHA
Silica, Special	USGS	Trona	MSHA
Silicon	USGS	Tungsten	USGS
Silver	USGS (MSHA Silver Ore)	Uranium Ore	MSHA
Soda Ash	USGS	Uranium-Vanadium Ore	MSHA
Sodium Sulfate	USGS	Vanadium	USGS
Sodium Compounds	MSHA	Vanadium Ore	MSHA
Stone, Crushed	USGS	Vermiculite	USGS and MSHA
Crushed, Broken Basalt	MSHA	Wollastonite	USGS and MSHA
Crushed, Broken Granite	MSHA	Zeolites	USGS and MSHA
Crushed, Broken Limestone NEC	MSHA	Zinc	USGS and MSHA
Crushed, Broken Marble	MSHA	Zirconium	USGS
Crushed, Broken Mica	MSHA	Misc. Metal Ore NEC	MSHA
Crushed, Broken Quartzite	MSHA	Misc. Nonmetallic Mnls. NEC	MSHA
Crushed, Broken Sandstone	MSHA		

EPA then removed from the list the commodities listed in EPA (2009a), as well as similarly named USGS commodities that were not specifically identified in EPA (2009a).[3] EPA also removed the USGS commodity group "explosives," because it did not fit within the description of the July 29, 2009 Federal Register notice, and the two USGS commodity groups "iron scrap" and "steel scrap," because they generally describe secondary materials. In addition, EPA removed non-specific commodity categories such as “pigment minerals,” “chemical and fertilizer minerals NEC,” “Miscellaneous nonmetallic minerals NEC,” etc. due to the analytical difficulties presented by lack of specificity of the exact commodity.

The end result is a list of 74 metals and non-metallic, non-fuel minerals, which are listed in **Table B-4**. This is the final commodities list upon which the 2009 Current Sites universe was based.

[3] Construction gravel, industrial gravel, crushed stone, and pumicite.

Table B-4. MSHA and USGS Commodities Potentially Subject to CERCLA 108(b) Hard Rock Mining Rule

Commodity	Source Agency	Commodity	Source Agency
Alumina	USGS and MSHA	Manganese	USGS (MSHA Manganese Ore)
Aluminum Ore-Bauxite	MSHA (USGS just Bauxite)	Mercury	USGS
Aluminum	USGS	Molybdenum	USGS (MSHA Molybdenum Ore)
Antimony	USGS (MSHA Antimony Ore)	Nephaline Syenite	USGS
Arsenic	USGS	Nickel	USGS
Asbestos	USGS	Niobium (Columbium)	USGS
Barite	USGS (MSHA Barite Barium Ore)	Phosphate Rock	USGS and MSHA
Beryllium	USGS (MSHA Beryl-Beryllium Ore)	Platinum-Group Metals	USGS (MSHA Platinum Group Ore)
Bismuth	USGS	Potash	USGS and MSHA
Boron	USGS (MSHA Boron Minerals)	Potassium Compounds	MSHA
Bromine	USGS	Pyrophyllite	USGS
Brucite	MSHA	Rare Earths	USGS (MSHA Rare Earths Ore)
Cadmium	USGS	Rhenium	USGS
Cesium	USGS	Rubidium	USGS
Chromium	USGS (MSHA Chromite Chromium Ore)	Selenium	USGS
Cobalt	USGS	Silica	USGS
Copper	USGS (MSHA Copper Ore NEC)	Silicon	USGS
Ferroalloys	USGS	Silver	USGS (MSHA Silver Ore)
Fluorspar	USGS and MSHA	Steel	USGS
Gallium	USGS	Strontium	USGS
Germanium	USGS	Talc	USGS and MSHA
Gold	USGS (MSHA Gold Ore)	Tantalum	USGS
Hafnium	USGS	Tellurium	USGS
Indium	USGS	Thallium	USGS
Iodine	USGS	Thorium	USGS
Iron	USGS	Tin	USGS
Iron, slag	USGS	Titanium	USGS
Iron Ore	USGS and MSHA	Titanium Ore	MSHA
Iron Oxide Pigments	USGS	Tungsten	USGS
Kyanite and related materials	USGS	Uranium Ore	MSHA
Lead	USGS	Uranium-Vanadium Ore	MSHA
Lead-Zinc Ore	MSHA	Vanadium	USGS
Lithium	USGS	Vanadium Ore	MSHA
Magnesium	USGS	Vermiculite	USGS and MSHA
Magnesium Compounds	USGS	Wollastonite	USGS and MSHA
Magnesite	MSHA	Zinc	USGS and MSHA
Magnetite	MSHA	Zirconium	USGS

B.3.2 MSHA and USGS Data Sources for 2009 Current Sites

For the purposes of this, EPA needed to define a list of mines and mineral processors that would potentially be subject to the rule. However, the population of mines and mineral processors that are operating at any given point in time can fluctuate significantly. This is because mines and mineral processors sometimes operate intermittently, due to fluctuating commodity prices, other business-related factors, mining and processing technical operations issues, and weather conditions. EPA chose to reflect the set of mines and mineral processors operating during calendar year 2009, the year in which the "priority classes" notice was published in the *Federal Register*.

EPA used two data sources to identify the mines and processors that handle the 108(b) mineral commodities:

- MSHA's Mine Data Retrieval System[4] (MDRS)
- Minerals Yearbook reports published annually by the USGS.[5]

In early 2010, when EPA began developing the list of mines and mineral processors, many of the Minerals Yearbooks for 2009 were not yet available. It is therefore possible that some mines and mineral processors on EPA's list were operational in 2007 and 2008 but not in 2009. Similarly, EPA did not obtain a quality-assured version of MSHA's mines database (MDRS) that reflected mines operating in 2009 until mid-2010; this was MSHA's 2009 annual close-out database and was used as the master source for comparison of all other mine and processor datasets as part of quality control and assurance protocols.

MSHA mines and processors site lists were compared to the USGS mine and processors site lists, to create the final list of 108(b) sites (i.e., mines or mineral processors of the metals and non-metallic, non-fuel minerals listed listed in Table B-4). The MSHA 2009 end-of-year dataset contains a total of 12,558 records for mines and mining facilities representing all commodity type groups (e.g., metals, industrial minerals, aggregates, dimension stone).

B.3.3 Compilation of the 2009 Current Site List and Site Locations

The primary criteria used to identify 108(b) mines and processors from the original data sources are commodity produced (see **Table B-4** above for the list of commodities) and mine status. Spepcifically, EPA retained entries in MSHA's database with a current status of "active," "intermittent," "nonproducing," or "new," but excluded entries with a current status of "abandoned." MSHA's data dictionary for its mines database[6] does not provide definitions for these "current status" categories, so their meaning was inferred from general industry usage. The MSHA database included surface and underground mine types only. MSHA also identified mine "facilities" that were included, for the purposes of this work, as synonymous with mineral processing operations.

Next, records were removed when the detail in all data fields were identical to corresponding data fields of another data record(s) and determined to be a true duplicate.

---

[4] Weekly updates are available at http://www.msha.gov/drs/drshome.htm; EPA used a version that MSHA staff had indicated represent MSHA's best-quality data for calendar year 2009, provided to EPA by MSHA in July 2010. These data were compared to other MSHA datasets downloaded on May 12, 2010, in ASCII file format from the Open Government Initiative dataset link found on the MSHA website (http://www.msha.gov/Open GovernmentData /OGIMSHA.asp). EPA also periodically queried data from the weekly updates.

[5] Available at http://minerals.usgs.gov/minerals/pubs/commodity/.

[6] Reference: MSHA 2010. MSHA Data Warehouse Data Dictionary. U.S. Department of Labor, Mine Safety and Health Administration, Arlington, VA, 2010.

However, any record with a minor difference compared with another was retained unless other information indicated that the record was a duplicate. All deletions were carefully documented in case additional site information was discovered at a later date. The resulting dataset included records on 564 currently active sites, including 293 mines and 271 processors.

As described in detail in **Appendix E**, the physical location of 2009 Current sites were identified using various techniques: address geocoding was used when an address or partial address was available; internet searches for location or other information on mines and processors; and consulting additional data sources to obtain information that could lead to the mine or processor location. ArcMap® aerial image software was used to evaluate the site locations found for each mine or processor. Mines were evaluated based on the ground-surface expression observed from the imagery as compared with information from the accompanying data either obtained with the MSHA data record attributes (e.g., aboveground mine, underground mine, processor type) or discovered from other information sources. If necessary, the coordinate location for a site was adjusted based on the information available as of the time the site location record was created. The address and latitude/longitude locations provided in the various sources were not always accurate or precise enough for the purpose of this study; the location provided for some records was the managing office for a site located in a nearby town or even a different state.

A numerical qualifier of 0, 1, or 2 was assigned to the point location for each mine and processor record to indicate EPA's general confidence in the geographic coordinates determined for the site. The confidence level depended on the availability and inferred quality of the information sources used to develop the coordinate location; therefore, these codes principally represent professional judgment and may not accurately describe the actual mine/processor locations. The site location confidence values are defined as follows:

- Level "0" confidence indicates that
  - no location could be found, or
  - the location is likely to be inaccurate and no source could be found to substantiate or improve it.
- Level "1" confidence indicates that the location may or may not be accurate based on the quality of available information.
- Level "2" confidence indicates that the location seems to be accurate relative to results of a visual comparison with known site attributes available in the data record and corroborating evidence from other sources (e.g., EPA reports).

In many cases, source data were available that allowed EPA to locate the mine with a high level of confidence; however, without contacting mine operators or accessing and reviewing land records data there is still the possibility of location errors. Thus all coordinate (i.e., latitude/longitude) data, regardless of the assigned confidence, should be considered unverified. The primary limitations in using the geolocated list of mines and processors include the uncertainty in the accuracy of some locations and in the limitations of representing very large mines with a single point. See **Appendix E** for a detailed description of the geocoding and location verification effort.

Primarily based on proximity, site name, and owner or operator name, EPA determined that a number of the sites could be combined into single sites. Combining sites in this way would eliminate duplicate entries that were for regulatory purposes a single “site.” Therefore, mines and processors that were within 5 kilometers (approximately 3 miles) of each other and also shared a similar site name, owner name, or operator name were combined and represented by a single site record. When mines or processors were combined in this manner, EPA chose a new point location for the new site composed of the combined mine/processor sites, generally between the original locations or otherwise near the middle of the disturbed area evident in aerial imagery. The resulting dataset included individual mine sites, individual processor sites, and combinations of multiple mine sites, multiple processor sites, or mixtures of both mine and processor sites.

The combining exercise reduced the 2009 Current Sites universe to 491 sites. This dataset, listed in **Attachment B5**, retains the identity of the source dataset in case that information is needed later to evaluate a currently active site record, and uses a data variable called the Site ID to identify each combined site with a unique number. If an individual site (i.e., identified by a Mine ID or Processor ID) is part of a combined site, then a Site ID assigned to the group will be associated with that site and all other sites included in the grouping; sites that are not part of a combined site will have a unique Site ID.

Of the 491 sites in the 2009 Current Sites universe, 74 sites had a location confidence of “0,” and therefore could not be mapped, leaving 417 sites that were mapped. **Figure B-2** maps the locations of 2009 Current mines and combined mines/processors where a location could be estimated. **Figure B-3** maps the locations of 2009 Current processors and combined mines/processors where a location could be estimated.

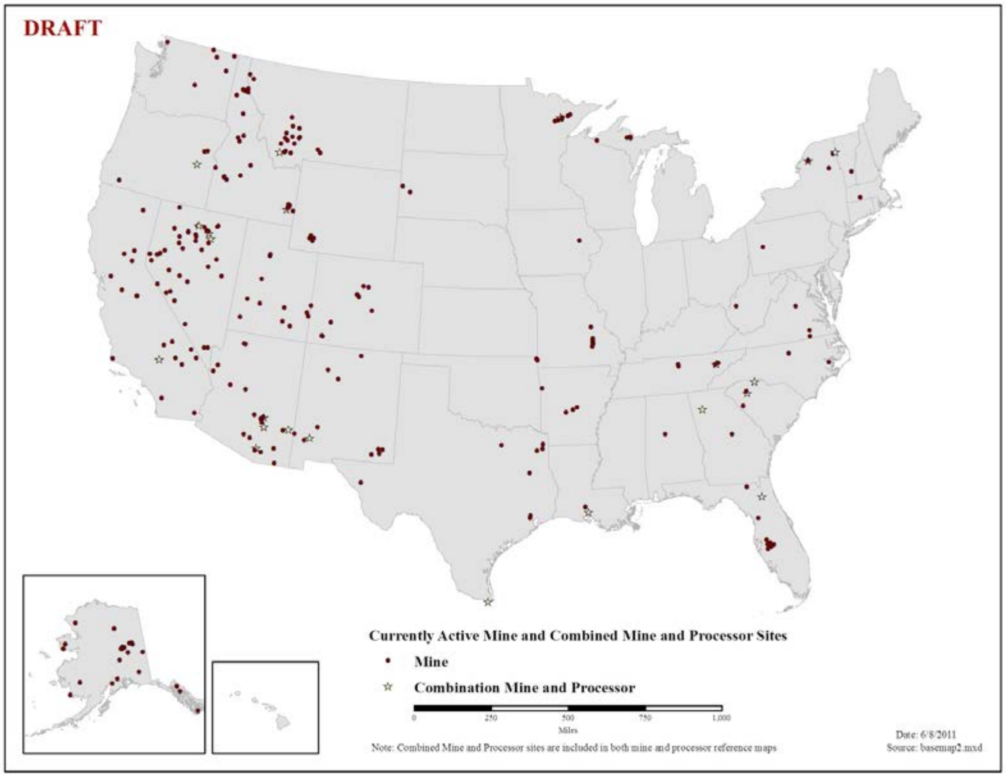


Figure B-2. 2009 Current mines and combined mines/processors.

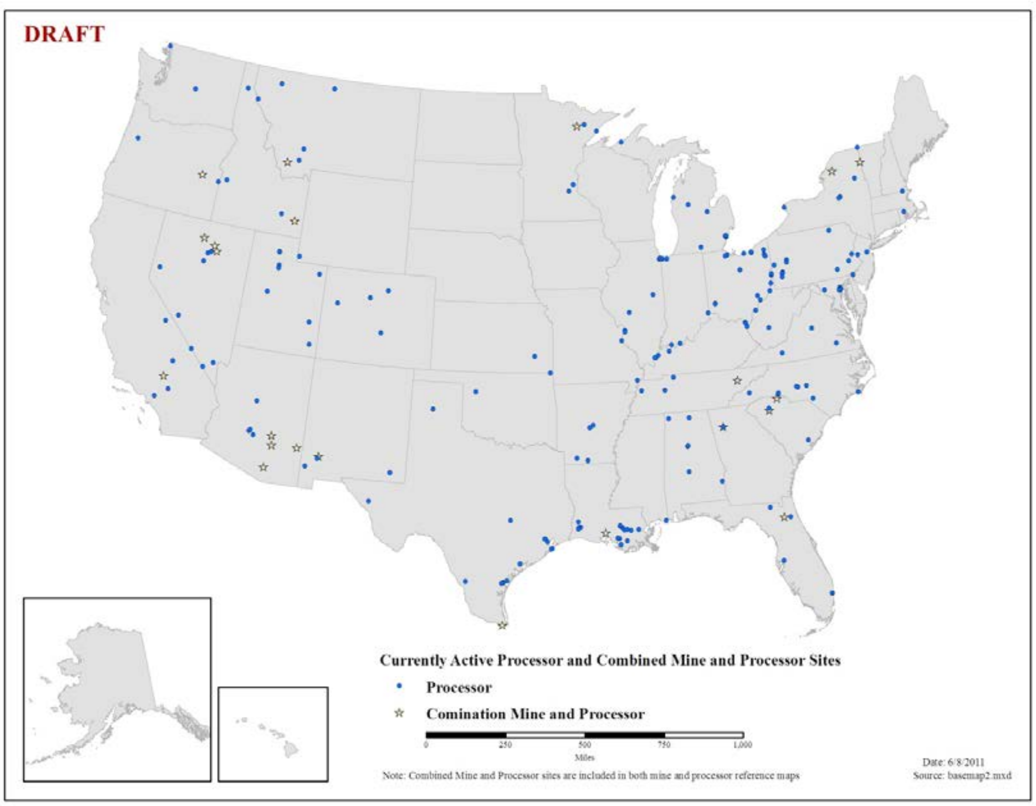


Figure B-3. 2009 Current processors and combined mines/processors.

B.4 Overlap between 108(b) Historical CERCLA and 2009 Current Sites

There was some overlap between the 108(b) Historical CERCLA Sites universe and the 2009 Current Sites universe; 17 sites appeared on both lists, including six Case Study Historical sites selected for in-depth review in this report. **Table B-5** lists those overlapping sites; those that are also Case Study Historical sites are bolded.

Table B-5. Sites in Both the 108(b) Historical CERCLA Site and 2009 Current Site Universes

Row	Site Name	City	State	EPA ID
1	Asarco Hayden Plant	Hayden	AZ	AZD008397127
2	**Bunker Hill Mining & Metallurgical Complex**	**Smelterville**	**ID**	**IDD048340921**
3	Cyprus Tohono Mine	Casa Grande	AZ	AZD094524097
4	**Eastern Michaud Flats Contamination**	**Pocatello**	**ID**	**IDD984666610**
5	Idaho Lakeview Mine/Mill	Athol	ID	IDN001002537
6	Iron King Mine - Humboldt Smelter	Dewey-Humboldt	AZ	AZ0000309013
7	Kennecott (North Zone) (Sa)	Magna	UT	UTD070926811
8	Kennecott (South Zone) (Sa)	Copperton	UT	UTD000826404
9	Lincoln Park	Canon City	CO	COD042167858
10	Molycorp, Inc.	Questa	NM	NMD002899094
11	**Monsanto Chemical Co. (Soda Springs Plant)**	**Soda Springs**	**ID**	**IDD081830994**
12	**National Southwire Aluminum Co.**	**Hawesville**	**KY**	**KYD049062375**
13	**Ormet Corp.**	**Hannibal**	**OH**	**OHD004379970**
14	Rock Creek Mine	Nome	AK	AKN001002823
15	**Teledyne Wah Chang**	**Albany**	**OR**	**ORD050955848**
16	Unimin Mine Fire	Spruce Pine	NC	NCD097358766
17	U.S. Magnesium	Tooele County	UT	UTN000802704

Attachment B1. Initial 108(b) Historical CERCLA Sites Universe

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
1	Abbott/Turkey Run Mine	CAN000908401		CA	
2	Alcoa (Vancouver Smelter)	WAD009045279	NPL	WA	Aluminum
3	Alder Mill	WAD980722847	Removal	WA	Arsenic, lead, metals
4	Allis Chalmers Dupont Landfill	WID982071839	Removal	WI	
5	Altoona Mine	CAN000908402	Removal	CA	Mercury
6	American Fork Canyon/Uinta National	UTD988074951	Removal	UT	
7	American Lead And Zinc Mill	CON000802649	Removal	CO	
8	American Smelting Co – El Paso Smelting Wk	TXD990757668		TX	
9	Anaconda Co. Smelter	MTD093291656	NPL	MT	Copper
10	Anaconda Copper Company	NVD083917252	Removal	NV	
11	Anderson-Calhoun Mine/Mill	WAN001002309	Removal	WA	
12	Annapolis Lead Mine	MO0000958611	NPL	MO	Lead
13	Asarco Hayden Plant	AZD008397127	Removal	AZ	
14	Asarco Sodium - East Helena	MTN000802439	Removal	MT	
15	Asarco Taylor Springs	ILN000508170	NPL	IL	
16	Asarco, Inc. (Globe Plant)	COD007063530	NPL	CO	
17	Atlas Asbestos Mine	CAD980496863	NPL	CA	Asbestos
18	Atlas Iron And Metal Co.	CAN000908308	Removal	CA	
19	Barite Hill/Nevada Goldfields	SCN000407714	NPL	SC	Gold, silver
20	Barker Hughesville Mining District	MT6122307485	NPL	MT	Lead, silver
21	Barry Bronze Bearing Co.	NJC200400018	Removal	NJ	
22	Basin Mining Area	MTD982572562	NPL	MT	Copper, silver, zinc, lead, iron, arsenic, sulfur, boron, silicon dioxide
23	Belden Cribbings	CON000802450	Removal	CO	
24	Big River Hills Lead Tailings	MON000705784	NPL	MO	
25	Big River Mine Tailings/St. Joe Minerals Corp.	MOD981126899	NPL	MO	Lead
26	Bingham Magna Ditch	UTN000802691	Removal	UT	Arsenic (inorganic compounds)
27	Black Butte Mine	OR0000515759	NPL	OR	Mercury
28	Blackbird Mine	IDD980725832	NPL	ID	
29	Blue Ledge Mine	CAN000906063	Removal	CA	
30	Bluewater Uranium Mine	NND983469891	Removal	NM	

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
31	Bonne Terre Mine Tailings	MOD985818236	Removal	MO	
32	Brewer Gold Mine	SCD987577913	NPL	SC	Gold
33	Bueno Mill & Mine Site	CON000802129	Removal	CO	
34	Bunker Hill Mining & Metallurgical Complex	IDD048340921	NPL	ID	Lead, zinc
35	Butterfield Mine (St Joe's Tunnel)	UTD981548993	Removal	UT	
36	California Gulch	COD980717938	NPL	CO	Lead, silver, zinc, copper, gold
37	Callahan Mining Corp	MED980524128	NPL	ME	Zinc, copper, sphalerite, chalcopyrite, pyrite, pyrrhotite
38	Cane Valley Navajo Radioactive Structures	NNN000908623	Removal	AZ	
39	Captain Jack Mill	COD981551427	NPL	CO	Gold, silver
40	Carpenter Snow Creek Mining District	MT0001096353	NPL	MT	Silver, zinc, galena, lead, gold
41	Carson River Mercury Site	NVD980813646	NPL	NV	Gold, silver
42	Carthage City And Eastern Jasper County Lead	MON000705445	Removal	MO	
43	Celtor Chemical Works	CAD980638860	NPL	CA	Copper, zinc
44	Central City, Clear Creek	COD980717557	NPL	CO	Gold
45	Central Eureka Mine	CA0000726539	Removal	CA	
46	Central Farmers Activity	IDD980722292	Removal	ID	
47	Central Mining District Lead – Camden Co.	MON000705679	Removal	MO	
48	Central Mining District Lead – Cole Co.	MON000705444	Removal	MO	
49	Central Mining District Lead – Miller Co.	MON000705678	Removal	MO	
50	Central Mining District Lead – Moniteau Co.	MON000705681	Removal	MO	
51	Central Mining District Lead – Morgan Co.	MON000705680	Removal	MO	
52	Chemet Co.	TND987768546	NPL	TN	
53	Cherokee County	KSD980741862	NPL	KS	Lead, zinc
54	Cima Road Mine Waste Site	CAN000905903	Removal	CA	
55	Cimarron Mining Corp.	NMD980749378	NPL	NM	Gold, iron
56	Cinnabar Mine	IDD980665160	Removal	ID	
57	Circle Smelting Corp.	ILD050231976	NPL	IL	
58	Claim Jumper/Shock Hill	CON000802644	Removal	CO	
59	Clayton Silver Mine & Assoc Properties	ID0000135798	Removal	ID	
60	Cleveland Mill	NMD981155930	NPL	NM	Lead, zinc, copper
61	Cleveland Mine And Mill	WAN001002247	Removal	WA	
62	Coalinga Asbestos Mine	CAD980817217	NPL	CA	Asbestos
63	Commencement Bay, Near Shore/Tide Flats	WAD980726368	NPL	WA	
64	Conjecture Mine	IDN001002661	Removal	ID	

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
65	Continental Mine And Mill	IDN001002317	Removal	ID	Lead
66	Copper Basin Mining District	TN0001890839	Removal	TN	
67	Cyprus Tohono Mine	AZD094524097	Removal	AZ	
68	Davenport And Flagstaff Smelters	UTD988075719	NPL	UT	Lead, silver
69	Denver Radium Site	COD980716955	NPL	CO	Radium
70	Depue/New Jersey Zinc/Mobil Chemical Corp.	ILD062340641	NPL	IL	
71	Dona Ana Metal Survey	NM0000605387		NM	
72	Douglas Mine	ID0000010108	Removal	ID	
73	Eagle 1 Mill Site	NV0001995604	Removal	NV	
74	Eagle Mine	COD081961518	NPL	CO	Zinc, silver
75	Eagle Zinc Co Div T L Diamond	ILD980606941	NPL	IL	
76	East Helena Site	MTD006230346	NPL	MT	Lead, zinc
77	Eastern Michaud Flats Contamination	IDD984666610	NPL	ID	Phosphate
78	Elizabeth Mine	VTD988366621	NPL	VT	Iron, pyrrhotite, copper
79	Elvins Mine Tailings	MOD985818244	Removal	MO	
80	Ely Copper Mine	VTD988366571	NPL	VT	Copper
81	Empire Canyon	UT0002005981	Removal	UT	
82	Eureka Mills	UT0002240158	NPL	UT	Silver, lead
83	Evening Star Mine	CON000802651	Removal	CO	
84	Everett Smelter	WAN001002564	Removal	WA	
85	Fallow Road Lead	MON000705453	Removal	MO	
86	Federal Mine Tailings	MOD985808070	Removal	MO	
87	Flat Creek Imm	MT0012694970	NPL	MT	Silver, gold, lead, copper, zinc
88	Foote Mineral Co.	PAD077087989	NPL	PA	Lepidolite, lithium, monazite
89	Formosa Mine	ORN001002616	NPL	OR	Copper, zinc, thorium
90	Franklin County Lead	MON000705442	Removal	MO	
91	Franklin Slag Pile (Mdc)	PASFN0305549	NPL	PA	Copper
92	Fremont National Forest/White King And Lucky Lass Uranium Mines (Usda)	OR7122307658	NPL	OR	Uranium
93	French Gulch	CO0001093392	Removal	CO	
94	Gambonini Mercury Mine	CA0002322469	Removal	CA	
95	Gem Park Complex	CON000801985	Removal	CO	Asbestos
96	Georgetown Railroad	MTD986068930	Removal	MT	
97	Gilt Edge Mine	SDD987673985	NPL	SD	Gold, mercury, zinc
98	Glen Ridge Radium Site	NJD980785646	NPL	NJ	Radium

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
99	Goldome Mill	CAN000908600	Removal	CA	Mercury
100	Grandview Mine	WASFN1002165	Removal	WA	
101	Grey Eagle Mine	CAD000629923	Removal	CA	
102	Grouse Creek Mine	IDSFN1002152	Removal	ID	
103	Harmony Mine & Mill Site	IDSFN1002104	Removal	ID	Copper
104	Hegeler Zinc	ILN000508134	NPL	IL	
105	Herculaneum Lead Smelter Site	MOD006266373	Removal	MO	
106	Highway 00 Lead	MON000705438	Removal	MO	
107	Homestake Mining Co.	NMD007860935	NPL	NM	Uranium
108	Hutchinson Mine Pcb Site	PAD982364275	Removal	PA	
109	Idaho Lakeview Mine	IDN001002537	Removal	ID	
110	Industrial Minerals	CO0001407543	Removal	CO	Bromine, cyanide
111	International Minerals (E. Plant)	INT190010876	NPL	IN	
112	International Smelting And Refining	UTD093120921	NPL	UT	Copper, lead, zinc
113	Interstate Lead Co. (Ilco)	ALD041906173	NPL	AL	
114	Iron King Mine - Humboldt Smelter	AZ0000309013	NPL	AZ	Gold, silver, lead, zinc, copper
115	Iron Mountain Mine	CAD980498612	NPL	CA	Gold, silver, iron, pyrite, zinc, copper
116	Iron Springs Mining District	CO0001916360	Removal	CO	
117	Jacks Creek/Sitkin Smelting & Refining, Inc.	PAD980829493	NPL	PA	
118	Jacobs Smelter	UT0002391472	NPL	UT	Silver
119	Jordan View Lot	UTD988073466	Removal	UT	
120	Kaaba Texas Mine	WASFN1002145	Removal	WA	
121	Kaiser Aluminum (Mead Works)	WAD000065508	NPL	WA	Aluminum
122	Kennecott (North Zone) (Sa)	UTD070926811	Removal	UT	Inorganics, metals
123	Kennecott (South Zone) (Sa)	UTD000826404	Removal	UT	Aluminum (metal), arsenic, barium, bicarbonate, cadmium, calcium, chloride, chromium, copper, fluoride, iron, lead, magnesium, manganese, nickel, nitrate, potassium, selenium, silver, sodium, sulfate, TDS, zinc
124	Kennecott Ne Stockton Property	UTN000802693	Removal	UT	
125	Kentucky/West Virginia Coal Slurry Spill	WVN000305636	Removal	WV	
126	Kern River/Bingham Creek Pipeline	UTD988073458	Removal	UT	
127	King Creek	MTD986069920	Removal	MT	
128	Kingsbury Creek Mine Lab	CA0002373736	Removal	CA	
129	Klau/Buena Vista Mine	CA1141190578	NPL	CA	Mercury
130	Lark Waste Rock And Tailings (Kennecott)	UTD980959258	Removal	UT	

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
131	Lava Cap Mine	CAD983618893	NPL	CA	Gold, silver
132	Le Roi Co Smelter	WAD988507323	Removal	WA	
133	Leadwood Mine Tailings	MOD985818210	Removal	MO	
134	Leviathan Mine	CAD980673685	NPL	CA	Sulfur, copper sulfate
135	Li Tungsten Corp.	NYD986882660	NPL	NY	Tungsten
136	Libby Asbestos Site	MT0009083840	NPL	MT	Vermiculite
137	Lincoln Park	COD042167858	NPL	CO	Uranium
138	Loflin Gold Mine	NCN000407301	Removal	NC	
139	Macalloy Corporation	SCD003360476	NPL	SC	Ferrochromium
140	Madison County Mines	MOD098633415	NPL	MO	Lead
141	Marsh Creek Rd Abandoned Dump Site	CAD980736060	Removal	CA	
142	Martin-Marietta Aluminum Co.	ORD052221025	NPL	OR	Aluminum
143	Matthiessen And Hegeler Zinc Company	IL0000064782	NPL	IL	Zinc
144	Mccleur Tailings	AZ0000309096	Removal	AZ	
145	Mclaren Mill Tailings	MTD981550841	Removal	MT	
146	Metals Refining Company	INN000509964		MI	
147	Midnite Mine	WAD980978753	NPL	WA	Uranium
148	Midvale Slag	UTD081834277	NPL	UT	Copper, gold, lead, silver
149	Milltown Reservoir Sediments	MTD980717565	NPL	MT	Copper
150	Mine Site 2028	INN000510234	Removal	IN	
151	Minnie Moore Mine	IDN001002295	Removal	ID	
152	Molycorp, Inc.	NMD002899094	NPL	NM	
153	Monarch Mill	IDN001002609	Removal	ID	
154	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	NPL	ID	Elemental phosphorus
155	Montclair/West Orange Radium Site	NJD980785653	NPL	NJ	Radium
156	Monticello Mill Tailings (Usdoe)	UT3890090035	NPL	UT	Uranium, vanadium
157	Monticello Radioactively Contaminated Properties	UTD980667208	NPL	UT	Uranium, vanadium
158	Morning Star Mine	CA0000466748	Removal	CA	
159	Mouat Industries	MTD021997689	NPL	MT	Chromium, sodium dichromate
160	Mta Vermiculite Rail Spur	CAN000905933	Removal	CA	
161	Murray Smelter	UTD980951420	NPL	UT	
162	National Mine Tailings	MOD985818228	Removal	MO	
163	National Southwire Aluminum Co.	KYD049062375	NPL	KY	Aluminum
164	National Zinc Co.	KSD980406698	Removal	KS	
165	National Zinc Corp.	OKD000829440	NPL	OK	

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
166	Nelson Tunnel/Commodore Waste Rock	CON000802630	NPL	CO	Silver, lead, zinc
167	Newton County Mine Tailings	MOD981507585	NPL	MO	Lead, cadmium, zinc
168	Nl Ind, Mine, Mill	COD980634604	Removal	CO	Arsenic, cadmium, lead, metals, silver, zinc
169	North Cave Hills Mining Sites	SD0012261936	Removal	SD	
170	Northeast Churchrock Mine Site	NNN000906132	Removal	NM	
171	Old Cobalt Tailings Pond	UTD980717987	Removal	UT	
172	Omaha Lead	NESFN0703481	NPL	NE	Lead
173	Ophir Mills And Smelter	UT0010221516	Removal	UT	
174	Ore Knob Mine	NCN000409895	NPL	NC	Copper, iron, silver, gold
175	Ormet Corp.	OHD004379970	NPL	OH	Aluminum
176	Oronogo-Duenweg Mining Belt	MOD980686281	NPL	MO	Lead, zinc, cadmium
177	Palmerton Zinc Pile	PAD002395887	NPL	PA	Zinc
178	Pend Oreille Village	WAN001002719	Removal	WA	
179	Pike Hill Copper Mine	VTD988366720	NPL	VT	Copper
180	Pioneer Foundry	MAN000105854	Removal	MA	Asbestos, lead, oil & grease, PAHs, phosphoric acid
181	Pioneer Pir And Gardner's Point Placer Mines	CAN000905978	Removal	CA	
182	Polar Star Mine	CASFN0905494	Removal	CA	
183	Powhatan Mining Company	MDN000306665	Removal	MD	
184	Puckett Smelter	ALN980824000	Removal	AL	
185	Reynolds Metals Company	ORD009412677	NPL	OR	Aluminum
186	Richardson Flat Tailings	UTD980952840	NPL	UT	
187	Rico - Argentine	COD980952519	Removal	CO	
188	Rinconada Mine	CA0141190579	Removal	CA	
189	Rock Creek Mine	AKN001002823	Removal	AK	
190	Rsr Corporation	TXD079348397	NPL	TX	
191	Rumsey Tailings	MT0001992585	Removal	MT	Arsenic, lead, mercury
192	Saco Steel	MEN000104208	Removal	ME	Metals, polychlorinated biphenyls
193	Salmon River Uranium Development	IDN001002662	Removal	ID	
194	San Vincente Creek Tailings	NMD980879415	Removal	NM	
195	Shaharald Mine	CAN000908300	Removal	CA	
196	Sharon Steel Corp. (Farrell Works)	PAD001933175	NPL	PA	Iron
197	Sharon Steel Corp. (Midvale Tailings)	UTD980951388	NPL	UT	Lead, copper, zinc
198	Shieldalloy Corp.	NJD002365930	NPL	NJ	Niobium, steel, chromium, aluminum
199	Shieldalloy Metallurgical Corporation	OHD042319244	Removal	OH	
200	Silver Bow Creek/Butte Area	MTD980502777	NPL	MT	Gold, silver, copper

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
201	Silver Mountain Mine	WAD980722789	NPL	WA	Silver, gold
202	Silverton Mercury (Hg) Concentrators	WAN001002702	Removal	WA	
203	Smeltertown Site	COD983769738	NPL	CO	
204	Smuggler Mountain	COD980806277	NPL	CO	Silver, lead
205	Southeast Idaho Selenium Project	IDN001002245	Removal	ID	
206	Southwest Assay Site	UTD988066239	Removal	UT	
207	Southwest Jefferson County Mining	MON000705443	NPL	MO	Lead, zinc, barium
208	St. Joe Mineral Corp – Viburnum	MOD000823252	Removal	MO	
209	Standard Mine	CO0002378230	NPL	CO	Gold, silver, lead, zinc
210	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	NPL	FL	Elemental phosphorus
211	Stephenson – Bennett Mine	NMD986684231	Removal	NM	
212	Stibnite/Yellow Pine Mining Area	IDD980665459	NPL	ID	
213	Sulphur Bank Mercury Mine	CAD980893275	NPL	CA	Sulfur, mercury
214	Summitville Mine	COD983778432	NPL	CO	Gold
215	Talache Mine	ID0002007250	Removal	ID	
216	Tar Creek (Ottawa County)	OKD980629844	NPL	OK	Iron, zinc
217	Tedder Road Lead	MON000705452	Removal	MO	
218	Teledyne Wah Chang	ORD050955848	NPL	OR	Zirconium
219	Tex-Tin Corp.	TXD062113329	NPL	TX	
220	Tiger Metal Services Incorporated	OHD004294625	Removal	OH	
221	Tooele Valley Railroad	UT0011980278	Removal	UT	
222	Torch Lake	MID980901946	NPL	MI	Copper
223	Tulsa Fuel And Manufacturing	OKD987096195	NPL	OK	Zinc
224	Two Brothers Mine	CO0012044960	Removal	CO	
225	U.S. Magnesium	UTN000802704	NPL	UT	Magnesium
226	U.S. Radium Corp.	NJD980654172	NPL	NJ	Radium
227	U.S. Smelter And Lead Refinery, Inc.	IND047030226	NPL	IN	
228	U.S. Titanium	VAD980705404	NPL	VA	Titanium
229	Unimin Mine Fire	NCD097358766	Removal	NC	
230	Union Pacific Vermiculite Rail Spur	CAN000905932	Removal	CA	
231	United Nuclear Corp.	NMD030443303	NPL	NM	Uranium
322	Upper Tenmile Creek Mining Area	MTSFN7578012	NPL	MT	Gold, lead, zinc, copper
233	Uravan Uranium Project (Union Carbide Corp.)	COD007063274	NPL	CO	Radium, vanadium, uranium
234	Usda Fs Boise Nf: Monarch Mine Stamp Mill	ID0001413723	Removal	ID	
235	V & V Mining Pcb Site	VAN000305626	Removal	VA	

Row	Site Name	EPA ID	Site Type	State	Commodities mined/processed
236	Vasquez Boulevard and I-70 (VBI70)	CO0002259588	NPL	CO	
237	Vermiculite Wrg4	PAN000305592	Removal	PA	
238	Vermont Asbestos Group Mine	VTN000105222	Removal	VT	
239	Veta Grande Mining Co	NVD038275020	Removal	NV	
240	Viburnum Trend Lead Haul Roads	MON000704445	Removal	MO	
241	W.R. Grace & Co., Inc./Wayne Interim Storage Site (USDOE)	NJ1891837980	NPL	NJ	Monazite
242	Washington County Lead – Furnace Creek	MON000705842	Removal	MO	
243	Washington County Lead District - Old Mines	MON000705027	NPL	MO	Lead, barite
244	Washington County Lead District - Potosi	MON000705023	NPL	MO	Lead, barite
245	Washington County Lead District - Richwoods	MON000705032	NPL	MO	Lead, barite
246	Weiss Road Drum Site	NVN000905819	Removal	NV	
247	Western Mineral Products	MNN000508056	Removal	MN	
248	Western Minerals Denver Plant	CO0010165136	Removal	CO	
249	Whitewood Creek	SDD980717136	NPL	SD	Gold
250	WR Grace Hamilton Twp	NJD067387472	Removal	NJ	
251	Zeibright Mine	CAN000905925	Removal	CA	

Known errata on the list of 250 include

- one site included erroneously (International Minerals, Terre Haute, Indiana, INT190 010876, which produced an insecticide; site contamination is apparently unrelated to any mining or primary mineral processing operations);
- one site misclassified as an NPL site that is a removal site (Big River Hills Lead Tailings, Missouri, MON000705784); and
- several sites that were present on the list of 561 but were omitted when the list of 251 was created:
    - one site inadvertently omitted that mined magnetite (Ringwood Mines/Landfill, New Jersey, NJD980529739);
    - three sites that received waste from rare earth ore processing (Kerr McGee Residential Areas, ILD980824015, Kerr McGee (Kress Creek/West Branch of Dupage River), ILD980823991 and Kerr McGee (Reed-Keppler Park, ILD980824007);
    - one iron works site with contamination from a secondary manufacturing process (Tar Lake, MID980794655);
    - one mine tailings site (Silver Creek Tailings, UTD980951404);
    - one gold dredge tailings site (Aerojet General, CAD980358832);
    - one silver, lead and zinc ore processing waste site (Triumph Mine Site, IDD984666024); and
    - one copper/zinc/silver/gold mine (USDA FS Wenatchee NF Holden Mine, WA91223007672).

Attachment B2. Case Studies of Historical Sites

Anaconda Co. Smelter NPL Site Summary

EPA ID: MTD093291656
Location: Anaconda, MT
EPA Region: 8
Status: NPL - Final

Number of Operable Units: 10
Date of NPL Listing: 1983
Last Operational Year: 1980
Documents Used: RI/FS & RODs (Various by OU)

Introduction:

The Anaconda Smelter Site is located in the Deer Lodge County, Montana, in and around the city of Anaconda and approximately 25 miles northwest of Butte, Montana. Operations at the Anaconda smelter began in 1884 and ceased in 1980. Milling and smelting activities conducted at the Old Works and Washoe Reduction Works smelters have resulted in the contamination of various environmental media in the surrounding area through airborne emissions and disposal practices. Smelter emissions dispersed contaminants elevated in arsenic and metals over more than 300 square miles. Large amounts of slag and tailings were also produced. Ore processing to anode copper produced wastes that have spread over more than 6,000 acres and contain elevated concentrations of arsenic, cadmium, copper, lead, and zinc. The wastes were estimated to include about 230 million cubic yards (mcy) of tailings, 30 mcy of slag, and 0.5 mcy of flue dust. Approximately 20,000 acres of soil were severely impacted by airborne emissions and millions of gallons of ground water were polluted. The milling and smelting contaminants pose well-documented risks to human health and the environment. The site is divided into operable units (OU) that focus the remedial actions on 10 OUs. The final ten OUs are as follows:

- OU1 – site-wide;
- OU3 – contaminated soils (under a realignment response, actions at this OU were incorporated into the OU4);
- OU4 – Anaconda Regional Water and Waste and Soils (ARWW&S) that impacted surface water and ground water;
- OU7 – Old Works/East Anaconda Development Area (OW/EADA) (provides the final response action at the Mill Creek OU15);
- OU9 – Beryllium Removal (removal and disposal of beryllium wastes);
- OU11 – Flue Dust (addresses flue dust at the site);
- OU12 – Arbiter Removal (removal and disposal of arbiter wastes);
- OU14 – Smelter Hill (the response action was incorporated into OU4);
- OU15 – Mill Creek (permanent protection of residential health); and
- OU16 – Community Soils (addresses all remaining residential and commercial/industrial soils within the site). Site remedial actions have been documented in Records of Decision (RODs) for OUs 4, 7, 11, 15, and 16.

Summary of Site-related Contamination:

Site-related contamination is the result of smelting operations; specifically, airborne emissions and disposal practices. Site operations have contaminated various media (soil, sediment, ground water, surface water, residential dust, and debris) with numerous contaminants. A Center for Disease Control and Prevention (CDC) study showed that pre-school children from the community of Mill Creek had greater arsenic exposure than children of any other community in the Anaconda area. High levels of arsenic, cadmium, copper, lead, and zinc are present in

OU4 soil, sediment, tailings, slag, and other waste material. OU4 ground water contains elevated levels of arsenic, cadmium, copper, and zinc. Soils, slag, waste materials, and plant tissue in OU7 contain high levels of arsenic, cadmium, copper, lead, and zinc. OU11 also contains high levels of these contaminants in flue dust, tailings, slag, and sludge. These same contaminants are present at elevated levels in OU15 soils in extremely high levels. OU15 flue dust, tailings, and slag also contain high levels of arsenic, cadmium, and lead. OU16 also has high concentrations of arsenic and lead in soil and residential dust.

Conclusion of Site-related Risk:

Human Health Risk: The primary threats contributing to human health, and the contaminants ultimately driving the site's remedial actions, are inorganic chemicals (arsenic, cadmium, copper, and lead). The two major media of concerns for human exposure to these contaminants are soil/dust and ground water. Residential, recreational, and occupational receptors exposed to these media potentially have unacceptable human health risks. The primary routes of human exposure to these media are ingestion (accidental or intentional) and inhalation.

Risks were not characterized for the ARWW&S OU (OU4), as data were relatively limited for some areas of the OU. Action levels were selected from Maximum Contaminant Levels (MCLs), non-zero Maximum Contaminant Level Goals (MCLGs), and State of Montana Numeric Water Quality Standards (Water Quality Bureau [WQB] standards) for comparison to site data to guide remedial activities. Consequently, risks for OU4 are not presented.

In OU7 (OW/EADA), the primary contributor to human health risk is arsenic [current cancer risks of 7E-03 and 4E-04 to occupational adult receptor from ingestion of contaminated ground water and soil, respectively, 3E-04 to recreational adult receptor from ingestion and inhalation of contaminated soil, and current non-cancer risk HQ of 30 to occupational adult from ingestion of contaminated ground water].

In OU 11 (Flue Dust), the primary contributors to human health risk are:

(1) arsenic [future cancer risks of 7E-02, 7E-02, and 5E-02 to residential adult receptors from ingestion of contaminated soil, inhalation of contaminated air and dust, and ingestion of contaminated ground water, respectively, and 4E-03 to recreational adult from ingestion of contaminated soil; current cancer risk of 9E-03 to recreational adult from ingestion of contaminated soil; future non-cancer risk HQ of 70 to residential adult receptors from ingestion of contaminated ground water; current non-cancer risk HQ of 10 to residential adult receptors from ingestion of contaminated soil];

(2) cadmium [future cancer risk of 5E-04 to residential adult receptors from inhalation of contaminated air and dust; future non-cancer risk HQ of 70 to residential adult receptors from ingestion of contaminated ground water; current non-cancer risk HQ of 2 to residential adult receptors from ingestion of contaminated soil];

(3) copper [future non-cancer risk HQs of 40 and 6 to residential child receptors from ingestion of contaminated soil and ground water, respectively, and 5 and 3 to residential adult receptors from ingestion of contaminated soil and ground water, respectively]; and

(4) lead [future on-site residential children's estimated average blood lead levels were calculated at 73µg/dL; for current off-site children, the estimated average blood lead level is 2.6 µg/dL].

In OU15 (Mill Creek), the primary contributors to human health risk are

(1) arsenic [current cancer risk of 2.8E-03 to residential receptor from ingestion of soil, drinking water, and the non-respirable fraction from the inhalation route];

(2) arsenic and cadmium [current cancer risk of 1.6E-03 to residential receptor from inhalation of contaminated air and dust]; and

(3) cadmium and lead [current non-cancer risk HQ of 1.96 to residential receptor from ingestion of cadmium and lead, and inhalation of lead, through cumulative pathways].

In OU 16 (Community Soils), all cancer risks were below the EPA threshold of 1E-04, and no non-cancer risk HQs exceeded 1.0.

Ecological risks have been identified for a number of avian and mammalian species, plants, and aquatic organisms in OUs 4, 7, and 11 from exposure to inorganic chemicals (arsenic, cadmium, copper, lead, and zinc).

In OU4, the primary contributors to ecological risk are

(1) arsenic [current HQs of 189 and 171 for the Deer Mouse and Red Fox, respectively];

(2) cadmium [current HQs of 83.4, 12.1, and 11.1 for the American Robin, White-tailed Deer, and American Kestrel, respectively];

(3) copper [current HQs of 68.3, 60.1, 38.7, and 28.7 for the American Robin, American Kestrel, Red Fox, and White-tailed Deer, respectively]; and

(4) lead [current HQs of 158, 127, and 40 for the Red Fox, American Kestrel, and American Robin, respectively].

In OU7 (OW/EADA) and OU11 (Flue Dust), ecological risks were not quantified. However, in OU7, arsenic, cadmium, copper, lead, and zinc were qualitatively identified as contributors to ecological risk for terrestrial vegetation and wildlife from direct contact, ingestion, and inhalation of soil, plants, and surface water.

In OU11, flue dust was found to poses potential risk to aquatic organisms, contaminated soil poses potential risk to plants, and plants pose potential risks to herbivores.

Human Health Risk Driver(s):

Operable Unit 7:

Ground Water, Cancer

– *Current Worker, Ingestion*

- Arsenic

Ground Water, Non-cancer

– *Current Worker, Ingestion*

- Arsenic

Operable Unit 11 (cont'd):

Ground Water, Non-cancer

– *Future Adult Resident, Ingestion*

- Cadmium

Operable Unit 15:

Soil, Drinking Water, and the Non-respirable Fraction from the Inhalation Route

Soil, Cancer

– *Current Worker, Ingestion*
- Arsenic

– *Adult Resident and Adult Recreational User, Ingestion & Inhalation*
- Arsenic

Operable Unit 11:

Soil, Cancer

– *Current & Future Adult Recreational User, Ingestion*
- Arsenic

– *Future Adult Resident, Ingestion*
- Arsenic

Soil, Non-cancer

– *Current Adult & Child Resident, Ingestion*
- Arsenic, Copper

Air/Dust, Cancer

– *Future Adult Resident, Inhalation*
- Arsenic, Cadmium

Ground Water, Cancer

– *Future Adult Resident, Ingestion*
- Arsenic

– *Current Resident, Ingestion*
- Arsenic

Air and Soil/Dust, Cancer

– *Current Residential Inhalation*
- Arsenic, Cadmium

Ecological Risk Driver(s):

Operable Unit 4:

– *Current Avian, Combined Media/All Routes*
- Cadmium, Copper, Lead

– *Current Mammalian, Combined Media/All Routes*
- Arsenic, Copper, Lead

Operable Unit 7:

– *Current Vegetation, Combined Media/All Routes*
- Arsenic, Cadmium, copper, lead, zinc

– *Current Wildlife, Combined Media/All Routes*
- Arsenic, Cadmium, Copper, Lead, Zinc

Operable Unit 11:

Risk drivers not quantified or qualified.

Final Remedy:

The selected remedial actions are as follows:

OU4 –

(1) reduce surficial arsenic concentrations to below the designated action levels of 250 parts per million (ppm), 500 ppm, and 1,000 ppm using soil cover or in situ treatment;

(2) reclamation of the soils and waste contamination via re-vegetation;

(3) partial removal of waste materials followed by soil cover and re-vegetation for areas adjacent to streams and place in designated waste management areas;

(4) for alluvial aquifers, clean up to applicable water quality standards by using soil covers, removing sources causing groundwater contamination and natural attenuation;

(5) for the bedrock aquifers and a portion of the alluvial aquifer, waive the applicable groundwater standard;

(6) for portions of the valley alluvial aquifers where ground water is underlying waste left in place, conduct point-of-compliance monitoring and institute treatment, where applicable;

(7) reclamation of contaminated soils and engineered storm water management;

(8) selective source removal and stream bank stabilization;

(9) institutional controls (ICs) and operations and maintenance to ensure monitoring, repair of implemented actions, and communication with local government and private citizens; and

(10) mitigation of impacts to wetlands from implementation of the remedy and communications with U.S. Fish and Wildlife Service will be coordinated.

OU7 (OW/EADA) –

(1) cap waste materials in recreational and potential commercial/industrial areas exceeding arsenic levels of 1,000 ppm;

(2) treat soils exceeding arsenic levels of 1,000 ppm in recreational and potential commercial/industrial areas using re-vegetation;

(3) cover or treat soils exceeding arsenic levels of 500 ppm in current commercial/industrial areas;

(4) provide for future soil remediation at the time of development;

(5) construct surface controls to manage surface water runoff;

(6) upgrade or repair levees adjacent to Warm Springs Creek to contain the 100-year peak flood event and prevent erosion;

(7) replace bridges or culverts, as necessary;

(8) implement ICs to protect engineering controls and manage future use;

(9) implement long-term monitoring; and

(10) preserve, to the extent practicable, historic features in the Old Works Historic District.

OU11 (Flue Dust) –

(1) removal and treatment via cement/silicate-based stabilization of approximately 316,500 cy of flue dust material;

(2) disposal of treatment residuals in an on-site repository; and

(3) implementation of ICs and monitoring of the disposal area.

OU15 (Mill Creek) –

(1) relocation of all residents;

(2) demolition of structures; and

(3) fencing the entire site.

OU16 (Community Soils) –

(1) clean up all current residential soils that exceed 250 ppm soil arsenic concentration, through removal, clean backfill, and protective barrier;

(2) where removal is not implementable, treatment or other measures will be taken to reduce arsenic concentrations to below the 250 ppm or to prevent exposure;

(3) clean up future residential soils at the time of development that exceed 250 ppm soil arsenic concentration;

(4) implement ICs to provide educational information to all residents;

(5) clean up all current commercial or industrial areas that exceed 500 ppm soil arsenic concentration using re-vegetative techniques and/or engineered covers;

(6) clean up all future commercial or industrial areas at the time of development that exceed the commercial/industrial action level of 500 ppm soil arsenic concentration;

(7) construct a cap over contaminated railroad bed material; and

(8) restrict access to the rail bed with a barrier and control surface runoff.

Bueno Mill and Mine Removal Site Summary

EPA ID: CON000802129
Location: Jamestown, CO
EPA Region: 8
Status: Removal – Time Critical

Number of Operable Units: 1
Date in CERCLIS: 2002
Last Operational Year: Unknown, not currently in operation
Documents Used: Action Memorandum, Site Assessment Report, Pollution Report

Introduction:

The site is located in the Jamestown Mining District, in Boulder County, Colorado. The Jamestown Mining District extends across portions of the Lefthand Creek and South St. Vrain Creek watersheds. The contamination at the site is a result of mining and milling activity, starting in 1879, that produced gold, silver, and copper. The primary sources of contamination are tailings piles, mine waste dumps, and adits. The Bueno Tailings are located on a ridge northwest of Jamestown and approximately 3,800 feet southeast of the Bueno Mine. The site is owned by the Town of Jamestown, the U.S. Forest Service (USFS), and a private property owner. The second portion of the site is another tailings deposit near the floodplain of the Little James River and a large collection pond. These tailings are commonly referred to as the Streamside Tailings and comprise a large deposit in the creek channel, with the majority being impounded along the stream bank. The Bueno and Streamside tailings deposits combined are estimated to contain at least 40,000 cubic yards. This portion of the site is owned by a private landowner. The Town of Jamestown diverts water from James Creek for municipal use, including drinking water, just above the confluence with Little James Creek and along the stretch adjacent to the Bueno Tailings. In addition, flooding of Little James Creek is a significant concern for the long-term stability; the Streamside Tailings impoundment and routine flow continues to erode the tailings deposited in the creek and undermine the base of the impoundment due to their proximity to the creek. As a result, metals (primarily lead and zinc) have been found in the soil and surface water sediments.

Summary of Site-related Contamination:

Site operations have contaminated various media (soil, surface water, and sediment) with numerous inorganic chemicals. A watershed survey conducted by U.S. Environmental Protection Agency (EPA) Region 8 and the USFS identified several sources of heavy metals loadings to the James Creek and Little James Creek surface water. In addition, the Jamestown water treatment plant has reported impacts to the water supply during run-off events transporting tailings from the Bueno Tailings Site. Consequently, the USFS identified the site as a priority within the Left-Hand Watershed for a potential removal action. A Removal Assessment was initiated in May 2005 and found high levels of lead, as well as other contaminants, in tailings deposits. These contaminants in the tailings are released from the tailings impoundments into the environment, including nearby residences and drinking water supply. The primary contaminants ultimately driving the site’s remedial action are arsenic, copper, lead, and zinc.

Conclusion of Site-related Risk:

The primary threats contributing to human health risks are inorganic chemicals (arsenic, copper, lead, and zinc). The onsite media of concern for human health risk are soil and surface water to current on-site trespasser receptors through unidentified pathways. In addition, current offsite residents may be at risk in the future due to migration of contaminants from the tailings through surface water into the drinking water supply. Current residents also may be at risk from hazardous substances becoming airborne or migrating offsite through other unspecified mechanisms. No human health risks were quantified for individual or combined exposure routes.

The primary contributors to ecological risk, for fish and fauna, are copper, lead, and zinc through direct contact with surface water and sediment or ingestion of food; no ecological risks were calculated for individual or combined exposure routes.

Final Remedy:

The selected remedy addressed surface water, soil, and tailings waste. The initial action implemented was the installation of erosion-control fencing to reduce discharge of tailings into the Little James Creek prior to the spring runoff period. In addition, to address tailings waste and contaminated soil the following two options may be implemented that includes: (1) two tailings deposits will be relocated to one of the two onsite locations, and the tailings will be capped with geo-synthetic and soil cover and protected from run-off; or (2) this is not the preferred option but will be implemented if option 1 is not feasible, and entails consolidating tailings deposits at the existing Bueno Tailings location where the pile will be graded with a positive slope extending out from the center with a lined perimeter ditch constructed at the top margins of the pile and capped with a soil cover then re-vegetated.

To address surface water, the Streamside Tailings area will be stabilized and the channel restored. The tailings removal will be performed to the extent that the main impoundment is left in place. The uncontained tailings below the impoundment will be removed, and the dispersed deposits on the banks and in the channel of Little James Creek downstream from the impoundment area may not be removed to avoid creating further impacts to the streambed.

Bunker Hill Mining & Metallurgical Complex NPL Site Summary

EPA ID: IDD048340921
Location: Smelterville, ID
EPA Region: 10
Status: NPL - Final

Number of Operable Units: 3
Date of NPL Listing: 1983
Last Operational Year: 1998
Documents Used: RI/FS & RODs (Various by OU)

Introduction:

The Bunker Hill Mining & Metallurgical Complex is a former lead and zinc smelting operation located in Smelterville, Idaho. The complex includes the Bunker Hill mine and mill, a lead and zinc smelter, and a phosphoric acid fertilizer plant. The facility includes mining-contaminated areas in the Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas, as well as the 21-square-mile Bunker Hill "Box," located in the area surrounding the smelting operations (the cities of Kellogg, Page, Pinehurst, Smelterville, and Wardner in Shoshone County). Mining within the Coeur d'Alene Basin has resulted in millions of tons of mill tailings, mine waste rock, and ore concentrates spread across the site. Mining contamination has affected more than 166 river miles of the Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas. Since 1968, tailings produced have generally been impounded or placed back in the mines. Inorganic chemical contamination is present in soil, sediment, surface water, and ground water from commercial mining, milling, and smelting operations, and associated modes of transportation. The site is divided into three operable units (OUs): the populated areas of the Box (OU1), the non-populated areas of the Box (OU2), and mining-related contamination in the broader Coeur d'Alene Basin (OU3).

Summary of Site-related Contamination:

Commercial mining, milling, and smelting operations, and associated modes of transportation, have led to site-wide contamination. An estimated 62 million tons of tailings were discharged to streams within the Coeur d'Alene Basin prior to 1968, containing an estimated 880,000 tons of lead and more than 720,000 tons of zinc. All three of the site's OUs are contaminated with inorganic chemicals (primarily antimony, arsenic, cadmium, copper, iron, lead, mercury, silver, and zinc) across multiple media (soils, surface water, ground water, sediment, waste piles, and dust). Land uses potentially affected by site contamination in all OUs include residential, occupational, and recreational.

Conclusion of Site-related Risk:

In past years, children within a 2-mile radius of the industrial complex have been found to have elevated levels of lead in their blood from exposure to contaminated community soils. The primary threats contributing to human health and ecological risks, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals.

The contaminants that pose a risk to human health include antimony, arsenic, cadmium, copper, iron, lead, mercury, and zinc. The media of concern for human exposure are soil/dust, particulates in the air, ground water, and food. The receptors with potentially unacceptable risk from these media are future occupational workers and current residential receptors (particularly child residents). The primary routes of exposure to these media are ingestion (accidental or intentional), inhalation, or combined exposure routes. The primary contributors to human health risk were determined by adding the risk associated with potentially high-risk activities to the baseline estimate. The baseline estimate comprises the following activities: (1) ingestion of residential yards soil, (2) ingestion of house dust, (3) inhalation of particulates, (4) consumption of produce, and (5) ingestion of public water supplies. In OU1, the primary contributors to human health risk are (1) arsenic (current baseline cancer risk of 1.1E-03 to residential receptor; additive risk includes [a] 6.7E-04 for ingestion of contaminated local ground water, [b] 2.2E-04 for ingestion of soil and dust [child with pica], and [c] 3.1E-05 for ingestion of residential soil at 95th percentile concentration); (2) cadmium (current baseline cancer risk of 5.8E-05 to residential receptor [no additive risk potential]); and (3) lead (50% of children within a 2-mile radius, and 30% within 2- to 3-mile radius, of the industrial complex had blood levels above 10 µg/dL). In OU2, the primary contributors to human health risk are (1) arsenic (future cancer risk of 8.6E-04 to residential receptor from ingestion of contaminated food [market purchases]); and (2) combined inorganic chemicals (cadmium, lead, and mercury) (non-cancer HQ of 35.8 to future occupational receptor from baseline risk plus groundwater ingestion). In OU3, the primary contributors to human health risk are (1) arsenic (current cancer risk of 3E-04 to current residential receptors [adult and child] from combined exposure to yard soil and tap water); (2) cadmium (future HQ of 17 for future residential children ingestion of contaminated ground water); and (3) lead (11% of children surveyed were found to have blood lead levels above 10 µg/dL).

An ecological risk assessment was not conducted for OU1 due to the lack of sufficient/critical habitat. Ecological receptors in OU2 and OU3 include terrestrial biota, plants, soil invertebrates, microbial soil community viability, small- and medium-sized mammals, waterfowl, birds, benthic organisms, fish, aquatic plant species, and amphibians. The OU2 ecological risk assessment found inorganic chemicals (antimony, arsenic, copper, lead, manganese, mercury, silver, and zinc) to have qualitative risks for (1) benthic invertebrates, fish, and aquatic plants from surface water exposure; (2) terrestrial plants, soil invertebrates, and small mammals from soil; and (3) terrestrial plants from ground water and surface water. Qualitative risks included potentially adverse or toxic effects, possibly sub-lethal. The primary contributors to ecological risk in OU3 (for which pathways were not identified) are (1) lead (current HQ of 387 to Spotted Sandpipers); (2) zinc (current HQ of 35 and 25.5 to Song Sparrows and Masked Shrews, respectively); (3) mercury (current HQ of 7.5 to birds); and (4) cadmium (current HQ of 6.12 to Song Sparrows).

Human Health Risk Driver(s):

<u>Operable Unit 1:</u>
Baseline Cancer
– *Current Resident, Combined Media and Exposure Routes*
- Arsenic, Cadmium

Percent Children with Blood Lead Levels >P10
- 50% (2-mile radius), 30% (2- to 3-mile radius

<u>Operable Unit 2:</u>
Food (Market Basket), Cancer
– *Future Resident, Ingestion*
- Arsenic, Cadmium

Baseline Non-cancer
– *Future Worker, Groundwater Ingestion*
- Cadmium, Lead, Mercury

<u>Operable Unit 3:</u>
Combined Soil & Tap Water, Cancer
– *Current Resident, All Pathways*
- Arsenic

Ground water, Non-cancer
– *Future Child Resident, Ingestion*
- Cadmium

Percent Children with Blood Lead Levels >P10
- 11%

Ecological Risks Driver(s):

<u>Operable Unit 2</u>:
All risks were qualitative

<u>Operable Unit 3:</u>
- Avian Risk: Cadmium, Copper, Lead, Mercury, Zinc
- Mammalian Risk: Arsenic, Copper, Zinc

Final Remedy:

The selected remedial actions address soil/source materials, ground water, surface water, and airborne dust. The selected remedial actions are as follows:

OU1 (Populated Areas) –

(1) Sampling of residential properties' soils; removal, replacement, and re-vegetation of contaminated yard soil and sod; placement of a visual marker if lead in soil concentrations exceed 1,000 parts per million (ppm) below the depth of excavation; onsite disposal of contaminated materials;

(2) dust suppression measures; and

(3) institutional controls and monitoring.

OU2 (Non-populated Areas) –

(1) stabilization of hillsides and associated drainages, including the re-establishment of riparian habitat and stream corridor vegetation;

(2) drainage improvements to minimize contact between surface water and tailings and mine waste rock, and to reduce contaminant transport (i.e., sediment runoff) to the South Fork of the Coeur d'Alene River;

(3) closure and cover of onsite solid waste landfills;

(4) cap waste impoundment areas to minimize releases and infiltration through tailings and sludges;

(5) closure of onsite wells;

(6) road repair;

(7) removal of contaminated soil and materials from gulches; and

(8) demolition of stacks and buildings.

OU3 (Mining-related Contamination in the Broader Coeur d'Alene Basin) –

(1) No further actions beyond those taken under OUs 1 and 2 for the protection of human health in community and residential areas;

(2) for environmental protection in the Upper Basin and Lower Basin, an adaptive management strategy that consists of approximately 30 years of prioritized actions designed to achieve benchmarks for environmental protection;

(3) for Coeur d'Alene Lake, no remedial actions; state, tribal, federal, and local governments implemented a Lake Management Plan outside of the Superfund process using separate legal authorities; and

(4) for Spokane River, remedy includes all of the human health remedy upstream of Upriver Dam and all of the environmental remedy from the Idaho/Washington border to Upriver Dam; additional sampling to determine the need to address areas upstream of the state line for environmental protection and downstream of Upriver Dam for human health and environmental protection; and quantification of risks to persons, including Spokane tribal members and others who may practice a subsistence lifestyle in the Spokane River area and related appropriate future response actions, if any.

Captain Jack Mill NPL Site Summary

EPA ID: COD981551427
Location: Ward, CO
EPA Region: 8
Status: NPL – Final

Number of Operable Units: 1
Date of NPL Listing: 2003
Last Operational Year: 1992
Documents Used: RI/FS & RODs (Varies by OU)

Introduction:

The Captain Jack Mill site is a former mining operation located near Ward, Colorado, in Boulder County, within the Left Hand Creek Watershed. The site occupies a narrow valley called California Gulch and extends from the Big Five Adit toward the southeast to just above the intersection of Left Hand Canyon and Sawmill Roads. The site and resulting contamination is a result of mining and milling operations that produced gold and silver from low-grade ores. The site contains three distinct mining areas, as well as numerous smaller workings that operated over a period of more than 100 years and ceased operations in 1992. Waste on the site as a result of these operations includes waste piles, settling ponds, lagoons used for settling tailings, waste rock from mine tunnels, and a mine/mill dump. Approximately 85,000 cubic yards (cy) of contaminated waste rock, tailings, and soils were identified, which include approximately 9,000 cy of the highest contaminant concentration materials considered principal threat waste. The site was added to the NPL in 2003 because of the threat to human health and the environment posed by surface and subsurface contamination. The site is evaluated as one Operational Unit (OU00) that includes site-wide contamination.

Summary of Site-related Contamination:

Site-related contamination is the result of mining and milling operations; specifically, waste piles, settling ponds, lagoons for settling tailings, waste rock from mine tunnels, and a mine/mill dump. Site operations have contaminated various media (food [fish and garden produce), ground water, mine water, surface water, sediment, subsurface soil, and surface soil) with numerous contaminants. Captain Jack Mill is contaminated with inorganic chemicals (primarily antimony, arsenic, cadmium, chromium, copper, iron, manganese, mercury, thallium, and zinc) and organic chemicals (primarily aroclor-1016, aroclor-1221, aroclor-1232, aroclor-1242, aroclor-1248, aroclor-1254, aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene).

Conclusion of Site-related Risk:

The primary threats contributing to human health risks, and the contaminants driving the site's remedial action, are inorganic chemicals (primarily arsenic and chromium) and organic chemicals (primarily benzo[a]pyrene). The major media concerns for human exposure to site-related contaminants are surface soil, subsurface soil, surface water, ground water, mine water, sediment, and food (fish and garden produce). The receptors with potentially unacceptable risk from these media are current and future residential, recreational, and occupational receptors. The primary routes of exposure to these media are dermal contact and ingestion.

The primary contributors to human health risk for current and future residents are (1) arsenic (cancer risk of 8.1E-03 and non-cancer hazard quotient [HQ] of 150 from surface soil ingestion); (2) benzo(a)pyrene (cancer risk of 4.7E-03 from dermal contact with ground water);

and (3) chromium (cancer risk of 3.2E-03 for mine water ingestion, 3.1E-03 for ground water ingestion, and 2.7E-03 for surface soil ingestion). The primary contributors to human health risk for current and future occupational receptors are: (1) arsenic (cancer risk of 6E-03, and non-cancer HQ of 37 from surface soil ingestion; cancer risk of 5.4E-04 for dermal contact with surface soil); and (2) chromium (cancer risk of 2E-03 for surface soil ingestion and 3.8E-04 for subsurface soil ingestion). The primary contributors to human health risk for current and future recreationalists are: (1) arsenic (cancer risk of 1.2E-03, and non-cancer HQ of 22 from surface soil ingestion, and cancer risk of 1.1E-04 from dermal contact with surface soil); and (2) chromium (cancer risk of 4.1E-04 for surface soil ingestion, 2.4E-04 for ingestion of fish, and 1.5E-04 for sediment ingestion).

The ecological receptors with risk from exposure to site-related contamination are avian and mammalian receptors, terrestrial plants and invertebrates, and aquatic life. The primary routes of exposure are direct contact with surface and subsurface soil, seeps, springs, and surface water; ingestion of surface soils, surface water, seeps, and springs; and ingestion of subsurface soil and aquatic life; and direct contact with seeps, springs, surface water, and sediments. The primary contributors to current environmental risk are (1) zinc (HQ of 5540 to Mountain Chickadee through ingestion of terrestrial invertebrates, and HQ of 488 to Red-tailed Hawk through ingestion of terrestrial invertebrates, birds and mammals); (2) aroclor-1221 (HQ of 2550 to Mountain Chickadee, and HQ of 1990 to American Dipper from all ingestion of benthic invertebrates); (3) lead (HQ of 2010 to Mountain Chickadee from ingestion of terrestrial invertebrates, and HQ of 419 to plants from direct contact with surface soil); (4) cadmium (HQ of 1540 to Mountain Chickadee from ingestion of terrestrial invertebrates); (5) copper (HQ of 1320 to Mountain Chickadee from ingestion of terrestrial invertebrates); and (6) aroclor (1016, 1232, 1242, 1248, 1254, and 1260) (each chemical has a non-cancer HQ of 1260 to Mountain Chickadee from ingestion of benthic invertebrates).

Human Health Risk Driver(s):

Operable Unit 00 (site-wide):

Surface Soil, Cancer

– *Current & Future Resident, Ingestion*
- Arsenic, Chromium

– *Current & Future Worker, Ingestion/Dermal*
- Arsenic

– *Current & Future Recreational User, Ingestion/Dermal*
- Arsenic, Chromium

Surface Soil, Non-cancer

– *Current & Future Resident and Worker, Ingestion*
- Arsenic

– *Current & Future Recreational User, Ingestion*
- Arsenic

Subsurface Soil, Non-cancer

– *Current & Future Worker, Ingestion*
- Chromium

Mine Water, Cancer

– *Current and Future Resident, Ingestion*
- Chromium

Food, Cancer

– *Current and Future Recreational User, Ingestion (Fish)*
- Chromium

Ecological Risk Driver(s):

Operable Unit 00 (site wide):

Food (Terrestrial Invertebrates)

– *Current Mountain Chickadee, Ingestion*
- Lead

Food (Terrestrial Invertebrates)

– *Current Red-tailed Hawk, Ingestion*
- Zinc

Food (Benthic Invertebrates)

– *Current Avian (Mountain Chickadee, American Dipper), Ingestion*

Ground Water, Cancer
– Current and Future Resident, Ingestion
- Chromium

- Aroclor-1016, 1221, 1232, 1242, 1248, 1254, 1260

Surface Soil
– Current Plants, Direct Contact
- Lead

Final Remedy:

The following outlines the selected remedial actions address ground water, surface water, and soil site-wide.

Surface Contamination Sources –

(1) excavation and treatment of all contaminated materials and placement in constructed consolidation cells;

(2) amendment of waste material by mixing lime into top 6 inches, cap with 6 inches of topsoil on top of 12 inches of select fill on top of a geo-synthetic clay liner, construction of consolidation cells;

(3) diversion of surface water runoff; and

(4) implementation of access controls.

Subsurface Contamination Sources –

(1) installation of bulkhead in tunnel and monitor for underground leaks;

(2) use of injection wells to circulate NaOH or another pH-buffer into the mine pool;

(3) monitoring of surface water;

(4) if downstream RAOs are not being met, installation of a series of biochemical reactors outside the adit atop the waste dump; and

(5) use of microorganisms to biologically transfer hazardous contaminants into non-hazardous substances, and routing of treated waters to onsite wetlands or discharge them to a creek. Surface water diversion allows for the draining of 50 gallons per minute of metals-contaminated water. 33,972 cubic yards of waste rock, tailings, are being remediated.

Cimarron Mining Corporation NPL Site Summary

EPA ID: NMD980749378
Location: Carrizozo, NM
EPA Region: 6
NPL Status: NPL - Final

Number of Operable Units: 2
Date of CERCLA Regulation: 1989
Last Operational Year: 1982
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Cimarron Mining Corporation is located in Carrizozo, Lincoln County, New Mexico. The Site is divided into two operable units (OUs). OU1 is the Cimarron Mill Site, which is approximately 10.6 acres and is located on the north side of Highway 380. OU2 consists of the Sierra Blanca Mill Site, which is 7.5 acres in area and is located east of U.S. Highway 54. The mill sites operated from 1960 to July 1982, with some temporary shutdowns. OU1 is an inactive milling facility and was used to recover iron and precious metals from ores. In 1979, the site was sold to Southwest Mineral Corporation, and soon thereafter, cyanide was apparently used to extract precious metals from the ore. OU2 was used to recover a variety of metals from ore transported to the site, although cyanide was apparently not used at this location. The site utilized precious metal extraction processes, which resulted in the unpermitted discharge of contaminated liquids and the stockpiling of approximately 570 cubic yards of contaminated material piles and other waste sediment. In 1979, the Sierra Blanca Mill Site was leased to American Minerals Recovery Corporation. The milling operation at OU1 was relocated to OU2 in June 1982. Both sites are currently inactive. OU1 is currently used as an auto repair shop and salvage yard. OU2 is fenced and is currently owned by the Town of Carrizozo. OU2 is presently not being used for residential or commercial purposes.

Summary of Site-related Contamination:

Site operations, primarily ore recovery and extraction processes, have contaminated various media—mainly cyanide in OU1 and lead in OU2. OU1 is contaminated with approximately 30 inorganic chemicals, including arsenic, chromium VI, cyanide, and nitrate. In OU1, ground water is contaminated at levels up to 400 parts per billion (ppb), with cyanide due to poor well construction allowing waste from cyanide recovery to reach shallow ground water. OU2 is contaminated with inorganic chemicals, including arsenic, barium, beryllium, copper, lead, manganese, mercury, silver, sodium, and zinc. Within OU2, there are approximately 43 cubic yards of tank sediments, 182 cubic yards of material pile soils and rock, and 345 cubic yards of discharge pit sediment and site soils contaminated with lead levels above 500 ppm.

Conclusion of Site-related Risk:

The primary threats contributing to human health risk, and the contaminants driving the remedial action, are inorganic chemicals (primarily arsenic, barium, chromium VI, cyanide, lead, manganese, nitrate, and silver). The major media of concern for human exposure to inorganic chemicals are soil, sediment, ground water, dust, and material piles. Residents exposed to contaminated media via accidental or intentional ingestion, dermal contact, or inhalation may have elevated health risks.

In OU1, the pathways of concern are ingestion of soil, sediment, or ground water and dermal contact with sediment by future onsite residential receptors. The primary contributor to cancer risk is arsenic [cancer risk of 2.6E-05, 8.7E-06, and 1.7E-06 to residential children from the ingestion of sediment, ingestion of soil, and dermal contact with sediment, respectively]. Non-cancer risks from site-related contamination are the result of ingesting contaminated ground water. Non-cancer risks to residential children range from HQ 1.9 (chromium VI) to 9.5 (cyanide); non-cancer risks to residential adults range from HQ 3.5 (nitrate) to 4.1 (cyanide). In OU2, the pathways of concern include ingestion of surface soil, material piles, or tank sediment; dermal contact with surface soil or tank sediment; and inhalation of dust by future onsite residential receptors. Cancer risks for the operable unit were calculated for exposure to all contaminants assuming a 30-year exposure, beginning at childhood; however, arsenic and lead were identified as the primary contributors to risk. The cancer risks range from 4.70E-06 (dermal contact with material piles) to 9.30E-04 (ingestion of surface soil). Non-cancer risks range from 1.4 (ingestion of surface soil contaminated with barium) to 4.4 (ingestion of tank sediments contaminated with silver).

Current environmental threats are associated with exposure to cyanide via contaminated food and soil. In OU1, the primary threat to ecological risk is from cyanide. The receptor identified in the calculation of ecological HQs was rabbits, and the pathway identified includes combined ingestion of food and soil [HQ of 9 to rabbits through ingestion of contaminated food items and soil]. Ecological risk information was not quantified for OU2; however, localized lead deposit posed concern.

Human Health Risk Driver(s):

Operable Unit 1:

Soil, Cancer

– Future Child Resident, Ingestion

- Arsenic

Ground Water, Non-Cancer

– Future Child Resident, Ingestion

- Chromium (VI), Cyanide, Nitrate

Operable Unit 2:

Soil, Cancer

– Future Resident, Ingestion

- Arsenic, Lead

Operable Unit 2 (cont'd):

Soils (Surface Soil, Material Piles, Tank Sediments), Non-Cancer

– Future Resident, Ingestion

- Barium, Manganese, Silver

Ecological Risk Driver(s):

Operable Unit 1:

Soil, Food

– Current & Future Mammalian, Ingestion

- Cyanide

Final Remedy:

The selected remedial actions are summarized below.

OU1 –

(1) pump and discharge ground water to the Carrizozo Publically Owned Treatment Works (POTW);

(2) biological activity within the existing treatment lagoons, in addition to effluent chlorination and photodecomposition, will provide treatment to reduce the cyanide concentration to acceptable levels; and

(3) monitoring of the treatment plant effluent and sludge.

OU2 –

(1) solidification/stabilization of contaminated soils and waste piles exceeding 500 ppm lead and onsite disposal;

(2) site wide groundwater monitoring; removal to the process chemical drums, and decontamination of tanks and associated piping; filling in the discharge pit and cinder block trenches with onsite soils and waste pile materials and covering with clean fill; plugging of the onsite abandoned water supply well; and inspection and maintenance of the existing fence. Approximately 225 cubic yards of contaminated soil will be remediated using solidification/stabilization with onsite disposal.

Cyprus Tohono Mine Removal Site Summary

EPA ID: AZD094524097
Location: Casa Grande, AZ
EPA Region: 9
Status: Removal – Non-Time Critical
Number of Operable Units: 1
Date in CERCLIS: 2002
Last Operational Year: 1997
Documents Used: Fact Sheet, PA/SI

Introduction:

The Cyprus Tohono Corporation holds a mining lease of 4,180 acres with the Bureau of Indian Affairs and the Tohono O'odham Nation and a business lease that includes an additional 6,325.5 acres for a total of 10,505.5 acres located in Casa Grande, Arizona. The Cyprus Tohono Mine site is located on the southwest flank of the Slate Mountains on the Tohono O'odham Nation. The site is located in an undeveloped rural area, approximately 1 mile east of the village of Gu Komelik. Copper mining at the site began in the 1880s. Copper remained the mine's primary commodity as large-scale underground mining operated from 1970 to 1983. Copper leaching operations began in 1983 using a sulfuric acid solution (raffinate) pumped into over 500 injection wells. In-situ leaching operations were stopped in 1994 with the commencement of open pit mining, which continued until 1997. Through January 2005, extraction/electro-winning operations for processing heap solutions were conducted. Current contamination issues stem from mining operations, beginning with the large-scale mining in 1970. Major mine facilities remaining on site include a solvent extraction/electro-winning plant, offices, laboratories, and a lined heap-leach pad. Areas of mining-produced materials on site include (1) vat leach tailings (leached oxide ore material produced during vat leach operations from 1975 to 1983); (2) mill tailings (residual material from processing sulfide ore in a ball mill and flotation plant generated beginning in the mid-1970s; the mill tailings impoundment was also used for the placement of mine discharge waters, vat leach wash solutions, cementation copper bleed solution, roaster cooling solutions, direct precipitation rain water, and storm event run-on of rain waters from the plant area); (3) evaporation pond materials (from evaporation ponds constructed in 1973 of local alluvial material and lined with 3 to 8 feet of mill tailings; the ponds were used for placement of excess mill waters and in-situ leach solutions); (4) calcine leach residue ponds (calcine is a residue material generated as a result of roasting copper concentrate, and calcine leach residue is the solid residue material remaining after the calcine has been leached with raffinate solution to extract the copper values); and (5) overburden (unmineralized alluvium, fanglomerate, and other bedrocks of insignificant mineral value). Mining operations on site ceased in 1997.

Summary of Site-related Contamination:

The contamination originates from onsite operations, including vat leach operations, processing sulfide ore, roasting of copper, and other mining and milling operations. Ground water on site has been contaminated with inorganic chemicals (selenium, sulfate, and thallium) and radionuclides (uranium-234 and uranium-236). Onsite soil and source materials were found to have elevated levels of inorganic chemicals (aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, sulfate, thallium, and zinc) and radionuclides (radium-228, thorium-228, thorium-230, thorium-232, uranium-234, uranium-235, and uranium-238). In residences in the village of Gu Komelik, samples indicated elevated levels of sulfate and nitrate. Forty migratory shore birds (including 37 Avocets, 1 Mallard Duck, 1 Egret, and 1 Cormorant) have died after contact with Pit Lake, an artificial surface water body on the site.

Conclusion of Significant Site-related Risk:

The major media of concern for human exposure to inorganic chemicals and radionuclides are soil, dust, and ground water. The primary routes of exposure to these media are ingestion, inhalation, and combined routes. The receptors with potential risk from these media are current residential receptors. Levels of uranium and sulfate in ground water (tested from onsite wells) exceeded health based benchmarks. Two wells approximately 1 mile west of the site, which residents use for drinking water, were also found to have elevated levels of sulfate (1500 mg/L) and uranium concentrations (uranium-234, 51.8 pCi/L) that exceed the U.S. Environmental Protection Agency's Maximum Contaminant Limits (MCLs) for drinking water of 250 mg/L and 1.1 pCi/L, respectively. People who ingest this water may have an elevated health risk. Levels of sulfate and uranium in the ground water have been continually increasing over time. There have also been reports of dust blowing into residential areas from the mine site. Samples taken of residential soils indicate elevated levels of sulfate on one property. No quantitative health risks were calculated for individual or combined exposure routes.

The major media of concern for ecological receptors to contaminants is surface water and soil. Current ecological threats directly affect terrestrial organisms, migratory birds, and the biotic community. The primary contributors to ecological risk, to which no specific receptors were provided, include inorganic chemicals (selenium, sulfate, and thallium) and radionuclides (uranium-234 and uranium-236). Surface water from Pit Lake contains elevated levels of uranium (uranium 234 at 50.2 pCi/L, uranium 235 at 2.8 pCi/L, and uranium 238 at 46.6 pCi/L) and sulfate (3,880 mg/L) that exceed MCLs of 1.1 pCi/L and 250 mg/L, respectively. The artificial habitat at Pit Lake is used by migratory shore birds. The Cactus Ferrigunous Pygmy Owl has been observed near the site and may be affected by contaminated soils on site due to feeding habits. No quantitative ecological risks were calculated.

Final Remedy:

The selected remedy addresses ground water, soil, and surface water media. To reduce risk to residents from ground water,

(1) all residential wells were shut down,

(2) ground water monitoring was put in place, and

(3) residents were supplied with an alternative source of water.

To address risk in surface water,

(1) media were chemically treated and filtered,

(2) storm water sumps were excavated, and

(3) new contingency systems/ponds were installed to mitigate contaminant release.

In addition, to improve surface water flow and eliminate erosion, specific locations were re-vegetated and re-contoured. To help eliminate threats from contaminated airborne soil, a dust-control program was implemented.

Finally, to address overall site conditions,

(1) all historic processing facilities were dismantled and

(2) a habitat improvement plan was implemented, including a study and documentation of the Cactus Ferruginous Pygmy Owl, an endangered species.

The amount of each media remediated/removed was not documented.

Eagle Mine NPL Site Summary

EPA ID: COD081961518
Location: Minturn, CO
EPA Region: 8
Status: NPL - Final

Number of Operable Units: 3
Date of NPL Listing: 1985
Last Operational Year: 1984
Documents Used: RI/FS & RODs (Varies by OU)

Introduction:

The Eagle Mine and its tailings piles, previously owned by the New Jersey Zinc Co. and Gulf and Western Industries, cover 110 acres in Eagle County, Colorado, between the towns of Minturn and Redcliff. About 1,300 people live within 3 miles of the tailings. The company's predecessors began purchasing mines in the area in 1912 and immediately began production. Zinc mining and milling operations ceased on December 30, 1977. Silver mining continued intermittently thereafter. The mine is now shut down completely and owned by Miller Enterprises. Two major tailings piles exist on the site. The old tailings pond was abandoned in 1946, when it reached capacity. A new tailings pond was constructed approximately 0.5 mile south where Cross Creek and Eagle River meet. Approximately 7 million tons of tailings remain in the disposal areas and are owned by Battlemountain Corp. Several other smaller tailings piles are located on National Forest land nearby, and tailings have been dumped in areas in the Eagle River floodplain. The site is divided into three Operable Units (OUs):

OU1 (Mine Site) – addresses principal sources of mine waste pollution impacting the Eagle River and ground water resources;

OU2 (Town of Gilman) – addresses contaminated soils in the Minturn Middle School area and in an approximate 2 square mile area in the south end of Minturn, the surface soils and waste rock piles in the Town of Gilman area, and private drinking water wells possibly being used in the Minturn area; and

OU3 (North Property) – addresses contamination of the North Property.

Summary of Site-related Contamination:

Site-related contamination is the result of mining and milling operations; specifically, tailing ponds and disposal practices. Site operations have contaminated various media (ground water, surface water, solid waste, soil, liquid waste, debris, and sediment) with numerous contaminants. OU1 contains high levels of inorganic chemicals (arsenic, cadmium, chromium, lead, manganese) and PCBs (not specified). OU2 contains high levels of arsenic, cadmium, chromium, iron, lead, manganese, nickel and zinc. Finally, OU3 contains elevated levels of inorganic chemicals (arsenic cadmium, calcium, cobalt, iron, magnesium, nickel, sulfate, thallium and zinc). Elevated levels of zinc have been also found in fish tissue in the North Property (OU3).

Conclusion of Site-related Risk:

In past years, children in the town of Minturn have been found to have elevated levels of lead in their blood from exposure to contaminated soils and dust. Specifically, the primary threats contributing to human health, and the contaminants ultimately driving the site’s remedial action, are inorganic chemicals (arsenic, cadmium, calcium, cobalt, iron, lead, manganese, magnesium, nickel, sulfate, thallium, and zinc). The two major media of concern for human exposure to inorganic contaminants are soil/dust and ground water. The receptors with potentially unacceptable risk from these media are residential, recreational, and occupational workers. The primary routes of exposure to these media are ingestion (accidental or intentional), inhalation, and dermal contact.

In OUs 1 and 2, the primary contributor to human health risks are (1) arsenic (current cancer risks of 1.4E-04 and 1.1E-04 for residential adolescent and adult receptors, respectively, from ingestion of contaminated soil/dust; current non-cancer HQ of 4.5 for residential adolescents from ingestion of contaminated soil/dust); (2) combine exposure from arsenic and cadmium (current cancer risk of 7.32E-04 for residential adolescents from the ingestion and inhalation of contaminated air, soil, and dust); and (3) lead (16.5% of children in the town of Minturn were found to have blood lead levels exceeding P10 [10µg/dL] from the ingestion and inhalation of contaminated air, soil, and dust). OU2, additionally, had a primary contributor to human health risk not found in OU1: (1) combined exposure to arsenic, cadmium, chromium, iron, lead, and manganese (current cancer risk of 3E-04 for residential children from the ingestion of contaminated soil).

In OU3, the primary contributors to human health risk are (1) arsenic (future cancer risk for residential age averaged receptor from the ingestion of soil [2.54E-03], ingestion of ground water [1.76E-03], ingestion of boulder-chips [1.93E-04], and dermal contact with soil [1.67E-04]; and current and future risks to recreational hiker [2.52E-04; age averaged] and occupational adult [1.04E-04] receptors for ingestion of contaminated soil. Future non-cancer HQs ranging from 10.0, 12.7, and 23.4 for residential receptors [adult, age averaged, and child, respectively] for ingestion of contaminated ground water), and (2) inorganic chemicals (including future HQs ranging from 201 to 469 for iron, 54.8 to 128 for thallium, 49.3 to 115 for zinc, 38.8 to 90.6 for manganese, and 21.4 to 49.9 for cadmium, for residential receptors [adult and child, respectively] for ingestion of contaminated ground water).

Metals loading in the Eagle River pose ecological concerns; however, specific risk was not quantified. Specific ecological receptors and exposure routes have not been identified.

Human Health Risk Driver(s):

Operable Units 1& 2:

Soil/Dust, Cancer

– Current Adult and Adolescent Resident, Ingestion

- Arsenic

Soil/Dust, Non-cancer

– Current Adolescent Resident, Ingestion

- Arsenic

Air and Soil/Dust, Cancer

– Current Adolescent Resident, Ingestion and Inhalation

- Arsenic and Cadmium

Air and Soil/Dust, Non-cancer

– Current Adolescent Resident, Ingestion and Inhalation (Blood lead level)

- Lead

Operable Unit 3 (cont'd):

Soil, Cancer

– Future Age-Averaged Resident, Ingestion

- Arsenic

Soil, Cancer

– Current & Future Age-Averaged Recreational Hiker, Ingestion

- Arsenic

– Current & Future Worker, Ingestion

- Arsenic

– Future Age-Averaged Resident, Dermal Contact

- Arsenic

Boulder-chips, Cancer

– Future Age-Averaged Resident, Ingestion

- Arsenic

Ground Water, Non-cancer

Operable Unit 2 (Only):
Soil, Cancer
– *Current Child Resident, Ingestion*
- Arsenic, Cadmium, Chromium, Iron, Lead, Manganese

Operable Unit 3:
Ground Water, Cancer
– *Future Age-Averaged Resident, Ingestion*
- Arsenic

– *Future Adult and Child Resident, Ingestion*
- Arsenic, Iron, Manganese, Thallium, Zinc

– *Future Age-Averaged Resident, Ingestion*
- Arsenic, Iron, Manganese, Thallium, Zinc

Ecological Risk Driver(s):
Specific ecological risks (and receptors and exposure routes) have not been identified.

Final Remedy:

The selected remedial actions for the Mine Site (***OU1***) address major environmental threats to the Eagle River and human health threats from surface water, sediment, soil, ground water, and additional waste. To mitigate risk from soils and sediment, remedial actions include

(1) the excavation of contaminated soils and sediments from the Maloit Park Wetlands;

(2) control of seepage from the tailings; and

(3) rapid addition of topsoil and re-vegetation.

The remedial actions chosen to address surface water contamination include

(1) regular monitoring of surface water and biota, and

(2) draining and capping the historic pond and diversion of Rock Creek upgradient of contaminated mine seepage.

For ground water, the selected remedies include:

(1) ground water monitoring,

(2) leachability tests on waste rock,

(3) implementation of use restrictions for ground water at the Rex Flats and Old Tailings pile,

(4) accelerated re-vegetation at Rex Flats,

(5) ground water treatment,

(6) use restrictions,

(7) the construction of an up-gradient ground water diversion structure, and

(8) the relocation of the Town of Minturn drinking water wells.

Additional site waste remedial actions include:

(1) diverting and collecting contaminated mine seepage,

(2) capping the Consolidated Tailings Pile,

(3) continued treatment of mine seepage at the Water Treatment Plant, and

(4) re-vegetation in area of Roaster Pile 1.

For the Town of Gilman (***OU2***), current and potential human health risks posed by contaminated soil and waste rock will be remedied through the implementation of institutional controls to limit site access and provide long-term, local presence.

Remedial actions to address contamination in the North Property (***OU3***) have not been selected and are pending further evaluation.

East Helena NPL Site Summary

EPA ID: MTD006230346
Location: East Helena, MT
EPA Region: 8
Status: NPL - Final

Number of Operable Units: 2
Date of NPL Listing: 1984
Last Operational Year: 2001
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The East Helena Site is a former primary lead and zinc smelting operation located in Lewis and Clark County, Montana, near, and including parts of, East Helena, Montana. The site and resulting contamination is the result of smelting operations at the site. The site consists of the smelter facility; all of the City of East Helena; nearby residential subdivisions; numerous rural developments such as farms and homes on small acreage plots; and surrounding undeveloped lands. The smelter adjacent to East Helena operated from 1888 until April 2001. ASARCO bought the property in 1895 from Helena and Livingston Lead Smelting and continued operations until the smelter was closed in 2001. During its operation, the smelter produced lead bullion, but also recovered copper, gold, silver, and platinum for refining at other ASARCO facilities. Over more than 100 years of operation contamination to air, soils, surface water, and ground water resulted from smelter stack emissions; fugitive emissions from plant processes, such as the blast furnace, dross plant, and sinter plant; ore storage area, particularly prior to 1990; slag pile (a minor source); process ponds and process fluids circuitry; and direct discharges to Prickly Pear Creek and East Helena water treatment facilities. The site was added to the NPL in 1984 due to findings of contaminated soils in East Helena residential areas, elevated blood-lead levels in area children, elevated metal levels in the air, and contaminated process ponds over shallow ground water near the plant. The site is divided into two Operable Units (OUs): OU1 (Process Ponds and Fluids) addresses contamination of soil, sediment, and underlying ground water in the process ponds, and OU2 (East Helena Residential Soils and Undeveloped Lands) consists of non-smelter property surface soils of residential areas, rural developments, and surrounding agricultural land.

Summary of Site-related Contamination:

Site-related contamination is the result of smelter stack emissions; fugitive emissions from plant processes such as the blast furnace, dross plant, and sinter plant; the ore storage area, particularly prior to 1990; the slag pile (a minor source); process ponds and process fluids circuitry; and direct discharges to Prickly Pear Creek and East Helena water treatment facilities. Site operations have contaminated various media (surface soil, subsurface soil, sediment, ground water, surface water, fish tissue, residential dust, and air). Inorganic chemicals (arsenic, lead, cadmium, copper and zinc) from former processes can be found site-wide in all the media listed above. OU1 (Process Ponds) has been identified as a source of contamination to ground water and surface water in Prickly Pear Creek. Surface soil, sediment, surface water, and ground water in residential and undeveloped lands (OU2) are contaminated with the inorganic chemicals listed above, as well as antimony, chromium, manganese, mercury, selenium, silver, and thallium, which may pose an elevated health risk to residential receptors.

Conclusion of Site-related Risk:

Human health risks have been identified for residential receptors from exposure to inorganic chemicals (arsenic and cadmium). The major pathways of concern are soil and food ingestion and inhalation of air. OU1 narratively states that although a human health on-site exposure pathway exists, it is incomplete since workers are protected from process pond contaminants under Occupational Safety and Health Administration (OSHA) regulations, and therefore, no specific worker risks were reported. The primary contributors to human health risks in OU2 to residential receptors are (1) arsenic (cancer risks ranging from 3E-04 from air inhalation to 4E-06 from food/vegetable ingestion); and (2) cadmium (cancer risk of 8E-05 from air inhalation to residential receptors).

Site-wide elevated soil lead poses a risk to insectivorous birds or small mammals. Site-wide ecological risks have been identified for a number of avian and mammalian receptors from exposure to inorganic chemicals (antimony, arsenic, cadmium, copper, lead, manganese, mercury, selenium, thallium, and zinc). The major pathways of concern are ingestion of sediment and various different food sources. The primary contributors to site-wide ecological risk are (1) lead (Hazard Quotient [HQ] of 130 to Cliff Swallow from ingestion of sediment, HQ of 37 through ingestion of aquatic invertebrates, and HQ of 29 to Mallard from ingestion of sediment); (2) cadmium and selenium (each with an HQ of 28 to Cliff Swallow through ingestion of sediment); and (3) copper (HQ of 19 and 17 to the Cliff Swallow for ingestion of aquatic invertebrates and sediment, respectively).

Human Health Site-Related Risks:

<u>Operable Unit 1:</u>
Only occupational receptors, regulated under OSHA.

<u>Operable Unit 2:</u>
Air, Cancer
- *– Current Resident, Inhalation*
  - Arsenic, Cadmium

Food (vegetable), Cancer
- *– Current Adult Resident, Ingestion*
  - Arsenic

Soil, Cancer
- *– Current Adult Resident, Ingestion*
  - Arsenic

Ecological Site-Related Risks:

<u>Operable Unit 00 (site-wide):</u>
Sediment
- *– Current Avian and Mammalian Ingestion*
  - Cadmium, Copper, and Selenium

Food (through aquatic invertebrates)
- *– Current Avian Ingestion*
  - Lead and Copper

Final Remedy:

The following outlines the elected remedial actions to address human health and ecological risk from process water, soil, and sediments.

OU1 –

(1) (Lower Lake) Replace Lower Lake with storage tanks, construct a lined pond for storm water runoff, in-place co-precipitation of Lower Lake process waters; remove sediments

by dredge, dragline, or industrial vacuum; and dry sediments on drying pad; smelt sediments in the smelter process;

(2) (Speiss granulating pond and pit) replace existing pond with tank and secondary containment facility, replaceme existing pit with a new lined facility, excavate contaminated soils, and smelt soils in the smelting process;

(3) (Acid Plant Treatment facility) remove settling pond, dumpster system, and sediment drying area, and replace enclosed aboveground mechanical separation system; and

(4) (Thornock Lake) excavate bottom sediments, stockpiling, and smelting.

Remedial actions for ***OU2*** are

(1) (residential areas) conduct selected soil removal (1,000/500 ppm lead) and community education and institutional controls; and

(2) (undeveloped areas) establish in-place treatment involving removal, capping, and treatment of undeveloped lands, and application of institutional controls and monitoring.

Eastern Michaud Flats NPL Site Summary

EPA ID: IDD984666610
Location: Pocatello, ID
EPA Region: 10
Status: NPL - Final

Number of Operable Units: 2
Date of NPL Listing: 1990
Last Operational Year: 2001 (FMC Plant)
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Eastern Michaud Flats Contamination Site is located on 2,475 acres in Power County, Idaho, near Pocatello. Within the eastern part of the flats are two adjacent phosphate processing facilities. The FMC Corp. Elemental Phosphorus Plant produced elemental phosphorus from phosphate shale ore on ~1,450 acres from 1949 to its shutdown in 2001. The J.R. Simplot Co. Don Plant has produced a variety of fertilizer products from phosphate ore on ~1,025 acres since 1944. The site has been divided into two Operable Units (OUs): OU1 addresses the FMC Plant and related offsite areas, and OU2 addresses the Simplot Plant and related offsite areas.

Summary of Site-related Contamination:

Site-related contamination is the result of phosphate ore processing operations and waste handling practices; specifically, releases of ore constituents to the air, water, and soil. Site operations have contaminated various media, including soil, air, ground water, and food – milk, meat, and vegetables. The site is contaminated primarily with inorganic chemicals (antimony, arsenic, beryllium, boron, cadmium, chromium [VI], fluoride, manganese, mercury, vanadium, and zinc); volatile organic compounds (VOCs) (tetrachloroethene, trichloroethene); and radionuclides (lead 210, polonium 210, potassium 40, radium 226, radon 222, thorium 230, uranium 234, uranium 238). OU1 is also contaminated with polycyclic aromatic hydrocarbons (PAHs) and other fuel-related VOCs (benzene, toluene, ethylbenzene, and xylenes).

Conclusion of Site-related Risk:

Receptors potentially affected by site contamination include residential and occupational workers. The major media of concern for human exposure to contaminants are soil, ground water, food, air, and external radiation. The primary routes of exposure to these media are ingestion (accidental or intentional), dermal contact, external radiation, and inhalation.

The primary contributors to human health risks site-wide are (1) lead-210 (cancer risk of 1.06E-02 for ingestion of ground water to future residential receptors); (2) radium-226 (cancer risk of 4.35E-03 from external gamma radiation from soil to current residential receptors); (3) arsenic (cancer risk of 1.17E-03 from groundwater ingestion to future residential receptors); (4); cadmium (hazard quotient [HQ] values ranging from 40.41 to 41.66 for ingestion of vegetables and all exposure routes of soil to current residential receptors, respectively); and (5) fluoride (HQ values ranging from 24.71 [future] to 33.72 [current] for ingestion of meat and all exposure routes of soil to residential receptors, respectively). In OU1, the primary contributors to human health risks are (1) radon-222 (cancer risk of 5.71E-03 for inhalation of air to future occupational receptors); (2) combined radionuclides (cancer risks of 1.05E-03 and 1.41E-03 for external gamma exposure to current and future occupational receptors, respectively); and (3) arsenic (cancer risk of 6.83E-04 for ingestion of ground water by future occupational receptors). In OU2, the primary contributors to human health risk are (1) radon-222 (cancer risk of 4.63E-03 for air inhalation by future occupational receptors); (2) arsenic (cancer risk of 1.68E-03 for ingestion of ground water by future occupational receptors); and (3) fluoride (HQ of 14.51 from ground water ingestion by future occupational receptors).

Potential ecological receptors include avian, mammalian, and plant species. Ecological receptors were found to be at risk due to exposure to fluoride through dietary ingestion (Red-Tailed Hawk, Horned Lark, and coyote) or incidental ingestion of soil (Horned Lark and Sage Grouse). Two state species of concern (Yellow-Billed Cuckoo and Wolverine) may be located on the site and have potential for risk; however, their presence on the site is unlikely. HQ values for fluoride range from 1.3 for the Horned Lark to 4.09 for the Sage Grouse.

Human Health Risk Driver(s):

Operable Unit 00 (site-wide):

Ground Water, Cancer
- *– Future Resident, Ingestion*
  - Lead-210, Arsenic

Soil, Cancer
- *– Current Resident, External Gamma Radiation*
  - Radium-226

Ground Water, Non-cancer
- *– Future Resident, Ingestion*
  - Arsenic

Food, Non-cancer
- *– Current Resident, Ingestion*

Soil, Non-cancer
– Current Resident, Ingestion
  - Cadmium, Fluoride

Operable Unit 1:

Air, Cancer
- *– Future Worker, Inhalation*
  - Radon-222

External Radiation, Cancer
- *– Current & Future Worker, External Gamma Exposure*
  - Radionuclides

Operable Unit 1 (cont'd):

Ground Water, Cancer
- *– Future Worker, Ingestion*
  - Arsenic

Ground Water, Non-cancer
- *– Future Worker, Ingestion*
  - Arsenic

Operable Unit 2:

Air, Cancer
- *– Future Worker, Inhalation*
  - Radon-222

Ground Water, Cancer
- *– Future Worker, Ingestion*
  - Arsenic, Fluoride

Ground Water, Non-cancer
- *– Future Worker, Ingestion*
  - Arsenic

Ecological Risk Driver(s):

Operable Unit 00 (site-wide):

Combined Pathways/Multiple Routes
- *– Current Avian and Mammalian*
  - Fluoride

Final Remedy:

The following outlines selected remedial actions to address soil, ground water, air and solids. ***OU1 (FMC Plant) –***

(1) cap waste ponds and solids storage area;

(2) line Railroad Swale to reduce or eliminate infiltration of rainwater and prevent incidental exposure to contaminants;

(3) monitor ground water and implement controls to prevent use of contaminated ground water for drinking purposes under current and future ownership, prevent potential future residential use, and control potential worker exposures under future ownership;

(4) implement contingent groundwater extraction treatment system if contaminated ground water migrates beyond company owned property and into adjoining springs or the Portneuf River;

(5) contain contamination by hydrodynamic controls;

(6) treat and recycle extracted ground water within the plant to replace unaffected ground water that would have been extracted and used in plant operations; and

(7) conduct operation and maintenance on capped areas and ground water extraction system, if implemented.

OU2 –

(1) implement a groundwater extraction system to contain contaminants associated with the phosphogypsum stack and control potential worker exposures under current and future ownership;

(2) excavate contaminated soils from the dewatering pit and east overflow pond;

(3) monitor ground water and implement controls to prevent use of contaminated ground water for drinking purposes under current and future ownership;

(4) continue groundwater monitoring and controls until site contaminants of concern in ground water decline below MCLs or RBCs; and

(5) operate and maintain the groundwater extraction system.

OUs 1 and 2 (Off-Plant Areas, Actions Common to Both OUs) –

(1) implement land-use controls and monitoring in the off-plant area to restrict property use due to potential exposure to radionuclides in soils;

(2) inform future property owners of the potential human health risks associated with consumption of homegrown fruits and vegetables; and

(3) monitor fluoride levels around the site to determine the levels present and to evaluate the potential risk to ecological receptors; if measured levels indicate risk, conduct further evaluation followed by source control or other action, if necessary; and

(4) conduct groundwater monitoring in the off-plant area.

Evening Star Mine Removal Site Summary

EPA ID: CON000802651
Location: Jamestown, CO
EPA Region: 8
Status: Removal, Time Critical

Number of Operable Units: 1
Date in CERCLIS: 2006
Last Operational Year: Unknown
Documents Used: Action Memorandum

Introduction:

In 2005, the U.S. Environmental Protection Agency (EPA) commissioned a feasibility study to assess numerous mines in the James Creek Basin (*Little James Creek Mine Site Draft Feasibility Assessment Report, April 2005*). The study estimated that approximately 2,000 cubic yards of waste rock material was present at the Evening Star Mine. In February 2007, the EPA On-Scene Coordinator (OSC) visited the site to evaluate current conditions. It was observed that, although the spring melt had not yet begun, water was flowing from the mine's collapsed adit. The flow meandered across the top of the waste rock pile, ultimately flowing down the western edge of the pile. The OSC observed drainage patterns in the waste rock pile, indicating the routine presence of flows up to four times the volumetric flow rate present at the date of the OSC's site visit. These higher flows have obviously caused the adit drainage to flow across the top and down over the face of the pile in the past. On February 9, and again on March 19, under direction from the OSC, the Superfund Technical Assistance and Response Team (START) contractor mobilized to the site, collected soil and water samples, and conducted field measurements of water quality and flow rates. The first day that START was at the site, the flow from the adit was less than half what it had been on the day of the OSC's visit. It was measured to be 2 gallons per minute (GPM). On March 19, the OSC observed that the flow had decreased to approximately 0.5 GPM, that it entered the waste rock pile at a sinkhole, and that it flowed via subsurface to the confluence with Little James Creek. The formation of a sinkhole can be an indication that the pile is becoming unstable. Also, waste rock material was observed in the ephemeral drainage below the site, indicating that material has migrated offsite in the past. Site inspection results indicated elevated levels of inorganic chemicals in waste rock, soil, and surface water on site as a result of site operations.

Summary of Site-related Contamination:

Mining operations have led to site-wide contamination, primarily with inorganic chemicals (arsenic, copper, lead, aluminum, and zinc), via waste rock material and adit drainage. Current environmental threats from inorganic chemical exposure from contaminated soil and surface water threaten terrestrial mammals, plants, and aquatic organisms.

Conclusion of Site-related Risk:

The primary current threats to human health and the environment, and the contaminants driving the removal action, are heavy metals (primarily arsenic, copper, lead, aluminum, and zinc). Arsenic was identified as having unacceptable human health cancer risks, greater than 1E-04 for soil and waste rock combined inhalation, ingestion, and dermal exposure to onsite recreational receptors. Lead concentrations in the main pile exceed the level at which EPA toxicologists would expect a 5% probability of elevated blood levels in female recreational users at childbearing age from combined inhalation, ingestion, and dermal exposure to soil and waste rock on site. Copper, lead, aluminum, and zinc in surface water downgradient of the adit exceed

Ambient Water Quality Criteria and may pose a risk to aquatic communities. Arsenic, copper, and aluminum in soil and waste rock on the site also exceed Eco-Soil Screening Levels for both terrestrial mammals and plants, in many cases by 100 or 1,000 times. Potential heavy metal loading of the Little James Creek is also of concern.

Final Remedy:

The selected remedy addresses contaminated soil and the migration of contaminants to water. The overall approach for the removal action involves

(1) excavation/scraping of waste rock present upslope from the mine adit, if possible (if not possible due to extreme slope angles, these areas will be covered and re-vegetated to the extent practicable);

(2) consolidation of excavated waste rock with the existing main pile;

(3) grading/shaping the waste rock pile to promote slope stability and proper runoff;

(4) implementation of drainage controls to protect against runon and to armor the ephemeral drainage side of the re-graded waste rock pile against erosion from spring runoff/flash flooding;

(5) placement of 12 inches of alkaline clean cover material and 6 to 12 inches of soil amended with growth media over the re-graded waste rock pile; and

(6) re-vegetation of the covered waste rock pile and any areas disturbed during the course of the removal.

The study estimated that approximately 2,000 cubic yards of waste rock material was present at the site.

Foote Mineral Co. NPL Site Summary

EPA ID: PAD077087989	**Number of Operable Units:** 2
Location: East Whiteland Township, PA	**Date of NPL Listing:** 1992
EPA Region: 3	**Last Operational Year:** 1991
Status: NPL - Final	**Documents Used:** RI/FS & RODs (Varies by OU)

Introduction:

The Foote Mineral Co. site is located on a 79-acre property primarily in East Whiteland Township, Pennsylvania. Starting in 1941, the Foote Company built and operated a variety of process buildings on the property for the manufacture of lithium metal and lithium chemicals and inorganic fluxes for the metal industry. Ores and minerals were also crushed and sized as part of site operations. When the plant closed in 1991, the site included two quarries, a pit used to burn solvents, a lined basin, and more than 50 buildings and process areas. There were also three unlined lagoons that had been leveled and backfilled, and an area where a small amount of neutralized lithium arsenite was buried and later removed. Because the various areas of the site differed in physical characteristics, the site was split into two Operable Units (OUs): OU1, Plant Area and North Quarry, and OU2, South Quarry and Contaminated ground water plume.

Summary of Site-related Contamination:

Site-related contamination is the result of ore processing; specifically, a waste pit, lined basin, and unlined lagoons. Site operations have contaminated various media (soil, sediment, surface water, and ground water) with numerous contaminants. Contaminants were reported on a site-wide (OU00) basis, rather than by OU. Site-wide contamination is primarily due to inorganic chemicals, (aluminum, antimony, arsenic, copper, hafnium, iron, lithium¸ manganese¸ mercury, thallium, vanadium); semi-volatile organic compounds SVOCs (benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, aroclor 1260); and volatile organic compounds (VOCs; e.g., bromoform, carbon tetrachloride, 1,2-dichloroethane, benzene, tetrachloroethene, trichloroethene).

Conclusion of Site-related Risk:

The primary threats contributing to human health, and the contaminants ultimately driving the site's remedial action are inorganic chemicals, (antimony, arsenic, barium, boron, chromium, copper, hafnium, iron, lithium¸ manganese¸ mercury, thallium, vanadium); PCBs (aroclor-1260); SVOCs (benzo(b)fluoranthene, benzo(a)pyrene, and dibenzo(a,h)anthracene); and VOCs (1,2-dichloroethane benzene, bromoform, carbon tetrachloride, tetrachloroethene, and trichloroethene). The major media of concern for human exposure to inorganic and organic contaminants are soil, sediment, and ground water. The receptors with potentially unacceptable risk from these media are future trespassers, residential (child and adult), and occupational workers. The primary routes of exposure to these contaminated media are ingestion (accidental or intentional), inhalation, and dermal contact.

High risks from exposure to ground water, soil, and sediment are reported as resulting from multiple contaminants per media via several combined exposure routes (ingestion, inhalation, and dermal contact). Contaminants associated with sediment exposure risks include cancer risks for arsenic, chromium, and benzo(a)pyrene; and non-cancer risks for antimony, arsenic, barium, chromium, copper, iron, lithium, manganese, thallium, vanadium, and benzo(a)pyrene. Contaminants associated with soil exposure pose both cancer risks (arsenic, aroclor-1260, benzo[a]pyrene, benzo[b]fluoranthene, and dibenzo[a,h]anthracene) and non-cancer risks (antimony, arsenic, hafnium, iron, lithium, manganese, mercury, thallium, and vanadium). Contaminants associated with groundwater exposure include cancer risks for arsenic, chromium, 1,2-dichloroethane, benzene, bromoform, carbon tetrachloride, tetrachloroethene, and trichloroethene; and non-cancer risks for boron, chromium, and lithium. The primary risk drivers for ground water are cancer risk of 2.4E-04 for future residential (adult and child) receptor; and non-cancer HQ values ranging from 660 for future residential adult to 1600 for a future residential child. The primary risk drivers from exposure to contaminated soil—with a range of cancer risk from 4.8E-05 to 3.8E-04 and non-cancer HQ values ranging from 2.9 to 50—are for future trespassers and residential children, respectively. The primary risk drivers from exposure to contaminated sediment include cancer risks that range from 2E-06 to 3.1E-05 and non-cancer HQ values ranging from 3.2 to 61 for future trespasser and residential children, respectively.

The ecological risk assessment determined that the two media most responsible for potential contamination and associated ecological risk were surface water and sediment. Additionally, the two ecological receptors most susceptible to surface water and sediment are the mink and Great Blue Heron. No ecological hazard quotients were found above 1 for either receptor (total HQ of 0.03 and 0.01 for the Great Blue Heron and mink, respectively). However, the sediments in the North Quarry were qualitatively stated to be a potential future risk to ecological receptors due to inorganic contaminants (cadmium, chromium, copper, lead, manganese, silver) and organic contaminants (benzo[b]fluoranthene, and indeno[l,2,3-c,d]pyrene). Additionally, boron and lithium in surface water may also pose future risks to ecological receptors.

Human Health Risk Driver(s):

Operable Unit 00 (site-wide):

Ground Water, Cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganic Chemicals and VOCs

Ground Water, Non-cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganic Chemicals and VOCs

Soil, Cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganic Chemicals and SVOCs

Soil, Non-cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganic Chemicals and SVOCs

Sediment, Cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganics and SVOCs

Sediment, Non-cancer
  – Future Resident, Worker, and Trespasser, Ingestion, Inhalation, and Dermal Contact
  - Inorganic Chemicals and SVOCs

Ecological Risk Driver(s):

Operable Unit 00 – Site-wide:

No quantitative HQs above 1. Future qualitative risk may exist in the North Quarry from sediment and surface water exposure.

Final Remedy:

The selected remedial actions address soil, ground water, and wastes site-wide rather than by OU and are as following:

(1) excavation and offsite disposal of 904 cubic yards of radiation-contaminated soils at an appropriately permitted facility;

(2) in-situ soil stabilization of process tailing wastes located in the South Quarry;

(3) excavation and consolidation of contaminated soils, waste materials, and debris into the North and South quarries to prevent direct contact threats;

(4) capping of the North and South quarries with engineered, multilayered geo-synthetic caps;

(5) long-term ground water monitoring;

(6) removal of Light Non-Aqueous Phase Liquids (LNAPL) from ground water;

(7) use of institutional controls to prevent residential use of ground water and the capped areas; and

(8) implementation of a Ground water Management Zone in plume area.

Gilt Edge Mine NPL Site Summary

EPA ID: SDD987673985
Location: Lead, SD
EPA Region: 8
Status: NPL – Final

Number of Operable Units: 4
Date of NPL Listing: 2000
Last Operational Year: 1998
Documents Used: RI/FS & RODs (Varies by OU)

Introduction:

The Gilt Edge Superfund Site is located in the mining district in the Black Hills of South Dakota. The site is located approximately 6 miles south-southeast of the towns of Lead and Deadwood and lies immediately adjacent to the upper reaches of Strawberry Creek. Mining operations for gold, copper, and tungsten were conducted in this small mining district starting in 1876. About a century ago, a series of small mines began dumping metals-laden mill tailing into Strawberry Creek and Bear Butte Creek. By 1986, when BMC began conducting larger-scale open-pit mining, off-site waters were already contaminated. Site operations ceased in 1998.The site is comprised of four operable units (OUs).

OU1 (Primary Mine Disturbance Area) – addresses existing contaminant sources within the primary mine disturbance area, such as waste rock, spent ore, exposed mineralized bedrock, and sludge;

OU2 (Water Treatment, Groundwater, and Lower Strawberry Creek) – addresses

(1) acid rock drainage (ARD) at the site;

(2) ground water contamination; and

(3) contaminant sources, surface water, and sediments in the Lower Strawberry Creek area; and

OU3 (Ruby Gulch Waste Rock Dump) – addresses contaminant sources located within the Ruby Gulch waste rock dump.

OU4 (Cyprus Phelps/Dodge) – has been added recently. The site has been extensively disturbed by mining and mineral processing operations.

Six specific types of site features have a significant impact on the site:

(1) open pits,
(2) underground mine workings,
(3) heap leach pad (HLP),
(4) waste rock dumps,
(5) surface water management systems, and
(6) Lower Strawberry Creek.

Summary of Site-related Contamination:

Mining operations have led to site-wide contamination via waste rock, spent ore, exposed mineralized bedrock, sludge, metals-laden mill tailings in on-site waters, and ARD. Site operations have produced contaminated various media (soils, sediment, surface water, ground water, and fish tissues) within Gilt Edge Mine's OUs, with numerous inorganic chemicals that include aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, nitrate, nitrite, phosphorous, potassium, selenium, silver, sodium, strontium, thallium, vanadium, and zinc. The site has elevated exposure risks for residential (adult and child), occupational, and recreational receptors (current and future), as well as avian, mammalian, aquatic, and benthic ecological receptors.

Conclusion of Site-related Risk:

The major pathway concerns for human exposure to inorganic chemicals are soil, ground water, surface water, sediment, and food (fish). The receptors with potentially unacceptable risk from these media are offsite current residents, onsite future residents, offsite and onsite Current and Future recreationalists, and onsite future workers. The primary routes of exposure to these media are ingestion (accidental or intentional) and inhalation.

Risks for the site were quantified site-wide. The primary contaminants driving risk from soil include arsenic, manganese, and thallium; those driving risk from ground water include aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, thallium, and zinc. The contributors to risk for future onsite residents are (1) total metals (cancer risk of 2E-02, and non-cancer risk Hazard Index [HI] of 800 from ingestion of ground water); and (2) dissolved metals (cancer risk of 1E-02 ,and HI of 700 from ingestion of ground water, cancer risk of 1E-03 and HI of 50 from soil ingestion). The contributors to Current and Future offsite adult residents are (1) total metals (cancer risk of 6E-03, and HI of 80 from ingestion of ground water); and (2) dissolved metals (cancer risk of 8E-04, and HI of 70 from ingestion of ground water). The contributors to Current and Future risk to offsite child residents are from combined contaminants through ingestion of sediment (cancer risk of 2E-05) and surface water (cancer risk of 2E-06). The contributors to future onsite workers are (1) total metals (cancer risk of 4E-03, and HI of 200 from ingestion of ground water); (2) dissolved metals (cancer risk of 3E-03, and HI of 200 from ingestion of ground water, cancer risk of 1E-04 and HI of 6 from soil ingestion); and (3) combined contaminants (primarily arsenic, manganese, and thallium) (cancer risk of 5E-05, and HI of 50 from ingestion/inhalation of soil). The contributors to Current and Future risk to on-site recreational receptors are from combined contaminants from ingestion of surface water (cancer risk of 9E-04) and combined ingestion and inhalation of soil (cancer risk of 2E-04).

The primary contributors to current ecological risk include inorganic chemicals (aluminum, antimony, arsenic, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, thallium, vanadium, and zinc). Aquatic organisms (from direct contact with surface water), benthic invertebrates (from direct contact with sediment), and plant and soil invertebrates (from direct contact with soil) all have HQ values listed as greater than 1 (qualitatively documented), with the most severe effects from cadmium, copper, lead, manganese, silver, and zinc. Within riparian areas, the greatest risks related to inorganic chemicals include ingestion of surface water, sediment/soil, and food (varies by receptor) as follows: (1) aluminum (HI of 10,000 for the Masked Shrew, and HI of 300 for the

Deer Mouse); (2) lead (HI of 400 for the Masked Shrew, and HI of 60 for the American Robin); and (3) cadmium (HI of 200 for the Masked Shrew).

Human Health Risk Driver(s):
Operable Unit 00 (site-wide):
Soil, Cancer
- *Future Resident, Ingestion*
  - Dissolved metals (primarily Arsenic, Thallium)
- *Future Worker, Ingestion*
  - Dissolved metals (primarily Thallium)
- *Current & Future Worker, Ingestion and Inhalation*
  - Combined contaminants (primarily Arsenic, Manganese, Thallium)
- *Current and Future Recreational User, Ingestion and Inhalation*
  - Combined contaminants (primarily Arsenic, Manganese, Thallium)

Soil, Non-cancer
- *Future Resident, Ingestion*
  - Dissolved metals (primarily Arsenic, Thallium)
- *Future Worker, Ingestion*
  - Dissolved metals (primarily Thallium)
- *Future Worker, Ingestion and Inhalation*
  - Combined contaminants (primarily Arsenic, Thallium)

Ground Water, Cancer
- *Future Resident, Ingestion*
  - Total metals and Dissolved metals (Aluminum, Antimony, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Thallium, Zinc)
- *Current & Future Resident and Future Worker, Ingestion*
  - Total metals and Dissolved metals (Aluminum, Antimony, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Thallium, Zinc)

Ground Water, Non-cancer
- *Current & Future Resident and Future Worker, Ingestion*
  - Total metals and Dissolved metals (Aluminum, Antimony, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Thallium, Zinc)

Surface Water, Cancer
- *Current & Future Recreational User, Ingestion/Dermal Contact*
  - Combined Contaminants (Not specified)
- *Current & Future Child Resident, Ingestion*
  - Combined Contaminants (Not specified)

Sediment
- *Current & Future Resident, Ingestion/Dermal Contact*
  - Arsenic

Ground Water, Non-cancer
- *Current & Future Resident and Future Worker, Ingestion*
  - Total metals and Dissolved metals (Aluminum, Antimony, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Thallium, Zinc)

Ecological Risk Driver(s):
Operable Unit 00 (site-wide):
Surface Water, Sediment, and Food (Varies)
- *Current Masked Shrew, Ingestion*
  - Aluminum, Cadmium, Lead
- *Current Deer Mouse, Ingestion*
  - Aluminum, Antimony, Thallium
- *Current American Robin, Ingestion*
  - Lead

Surface Water
- *Current Aquatic Organisms, Direct Contact*
  - Aluminum, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Selenium, Sodium, Thallium, Zinc

Sediment
- *Current Benthic Organisms, Direct Contact*
  - Aluminum, Cadmium, Cobalt, Copper, Lead, Manganese, Silver, Zinc

Soil
- *Current Plants & Soil Invertebrates, Direct Contact*
  - Cobalt, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, Zinc

Interim Remedy:

Risk was quantified site-wide, and remedial actions by OU were based on this risk. OU3 required an interim remedy to address contamination associated with the largest ARD source on the site. The interim actions taken include

(1) re-grading of waste rock, including placement in the upper Ruby Gulch drainage;

(2) construction of a composite cap using a geo-membrane liner;

(3) installation of lateral drainage structures to limit erosion and convey runoff;

(4) construction of a protective layer for the liner and surface water controls using materials consisting of the Highway 385 project rock and growth materials from on-site sources; and

(5) construction of surface water run-on diversion channels.

Final Remedy:

The selected remedy addresses ground water, surface water, waste rock, acid-generating bedrock, wastewater, and sludge. The selected remedy helps achieve greater water quality and reduces the toxicity and volume of acid water and ARD. The overall remedial actions taken include those outlined in the following sentences.

OU1 –

(1) ARD collection,

(2) upgrades to the water treatment plant (WTP),

(3) removal, consolidation, and containment of acid-generating waste rock and fills,

(4) sludge removal and disposal as a part of OU2, and

(5) land-use controls to protect human receptors.

OU2 –

(1) maintain site control and operations infrastructures,

(2) collect metal-laden toxic waters and ARD for treatment in the WTP,

(3) upgrades to the WTP, and

(4) implement optimized on-site sludge management using on-site storage basins or sludge filtering. The amount of media remediated and/or removed was not specified.

OU4 is still being investigated.

Homestake Mining Co. NPL Site Summary

EPA ID: NMD007860935
Location: Milan, NM
EPA Region: 6
Status: NPL - Final

Number of Operable Units: 3
Date of NPL Listing: 1983
Last Operational Year: 1990
Documents Used: RI/FS & RODs (Various by OU)

Introduction:

The Homestake Mining Co. (HMC) Site is a former uranium milling operation located in Cibola County, New Mexico, about 5.5 miles north of the town of Milan. The site and resulting contamination is the result of uranium milling operations that took place between 1958 and 1990. Uranium milling operations involved an alkaline leach-caustic precipitation process to extract and concentrate uranium oxide from uranium ores. Waste byproducts from the milling operations were either disposed above ground in the two tailings impoundments or recycled back into the milling process. The tailings are composed of a uranium-depleted sand fraction and a fine fraction (slimes). The sand fraction was used for building the sides and internal dikes of the impoundment, while the slimes were allowed to collect in the center of the impoundment. Seepage from two large tailings ponds on the site has contaminated a shallow aquifer that provides water to residents in several down-gradient subdivisions. The contamination of soil resulted from windblown tailings that were carried from the tailings impoundments and deposited mostly in the northeast of the tailings impoundments, the prominent downwind direction, on the surface soil surrounding the mill site. The water is unsafe for drinking and cooking. In addition, possible radon releases into residential subdivisions were investigated. The site is divided into three Operable Units (OUs):

OU1– addresses tailing seepage contamination of groundwater aquifers;

OU2– addresses long-term tailings stabilization, surface reclamation, and site closure; and

OU3– addresses radon concentrations in neighboring residential areas.

Summary of Site-related Contamination:

Site-related contamination is the result of uranium milling operations, specifically slag piles and dust/particulates emitted from smelting stacks. Site operations have contaminated various media (soil, air, and ground water). The contaminants present from site-related activities in (1) ground water include inorganic chemicals (chloride, chromium, molybdenum, nitrate, selenium, sulfate, and vanadium) and radionuclides (radium-226 and radium-228, thorium-230, and uranium); (2) soil (from windblown tailings) include radionuclides (radium-226 and thorium-230); and (3) indoor air includes one radionuclide (radon-222).

Conclusion of Significant Site-related Risk:

The primary threats contributing to human health risks, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals and radionuclide contaminants in ground water (particularly selenium) and radon-222 in air. The two major pathway concerns for human exposure to inorganic chemicals and radionuclides are ground water and air. The receptors with potentially unacceptable risk from these media are current residents in nearby subdivisions. The primary routes of exposure to these media are ingestion and inhalation.

OU1 states that human health risks exist from selenium to current residents ingesting ground water due to contamination of the shallow aquifer in OU1; however, no quantitative risks were provided. OU2 is under the direction of the Nuclear Regulatory Commission (NRC), and neither quantitative nor qualitative risks were provided in accessible documents. In OU3, the primary contributor to human health risk is radon-222 (current cancer risk of 5.9E-04 to residential receptors from inhalation of contaminated air).

An ecological risk assessment was not conducted for the site.

Human Health Risk Driver(s):
Operable Unit 00 (site-wide):
Air, Cancer
– Current Resident, Inhalation
- Radon-222

Ecological Risk Driver(s):
An ecological risk assessment was not conducted for this site.

Final Remedy:

The following outlines the selected remedial actions to address soil, ground water, and surface water.

OU1 (Contamination of Ground Water from Tailings Seepage) –

(1) previous actions taken by HMC in agreement with the state and the U.S. Environmental Protection Agency (EPA) include providing an alternative water source for affected residents and funding of the alternate water costs for 10 years as well as injection of clean water; and

(2) collection, cleaning, and reinjection of contaminated ground water from the aquifer.

Nearly 4.5 billion gallons of ground water was removed, and 540 million gallons of treated water was injected through the OU1 remedy. NRC reasserted regulatory authority over uranium milling operations in New Mexico in 1986 and regulated ground water remedial activities.

OU2 (Stabilization of the Tailings) – 21 million tons of soil were remediated in the large tailing impoundment and 1.2 million tons in the small tailing impoundment. After milling operations ceased in 1990, the activities for mill decommissioning, surface reclamation and remediation, stabilization of the tailings impoundments, and site closure have been performed under the direction of the NRC. For addressing air in

OU3 (Radon Concentrations in Neighboring Subdivisions), EPA determined that it does not have the authority to address radon concentrations in the subdivisions; however, house-specific radon reduction methods were given as recommendations to homeowners, and a Memorandum of Understanding was signed by EPA and the NRC designating the NRC as the lead federal agency addressing the radon issue. EPA will continue to review outdoor radon monitoring and particulates data collected at the facility boundary pursuant to NRC license requirements.

Li Tungsten Corp. NPL Site Summary

EPA ID: NYD986882660
Location: Glen Cove, NY
EPA Region: 2
Status: NPL - Final

Number of Operable Units: 4
Date of NPL Listing: 1992
Last Operational Year: 1985
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Li Tungsten Corp. Site is a former primary smelting facility in an industrial area along the north bank of Glen Cove Creek in Glen Cove, Nassau County, New York. From the 1940s to the early 1980s, tungsten ores imported from around the world were smelted at the facility to produce tungsten carbide powder, tungsten wire, and welding rods. The site consists of two tracts of land: the 26-acre property comprising the former Li Tungsten facility, and portions of the 23-acre former Captain's Cove condominium development property. From the late 1950s to the late 1970s, the Captain's Cove area was used as a dump site for the disposal of incinerator ash, sewage sludge, rubbish, household debris, dredged sediments from Glen Cove Creek, and industrial wastes. Typical operations in the extraction process included physical, chemical, and mechanical processes, such as sizing and crushing, gravity separation, magnetic and electrostatic separation, roasting, leaching, flotation, and fusion. These operations resulted in contaminated slag and radioactive ore residuals. The site is divided into four Operable Units (OUs):

OU1– addresses soils and ground water at the former facility;

OU2– addresses soils and ground water at the Captain's Cove property);

OU3– addresses radiological survey of Dice Complex (this OU was discontinued); and

OU4– addresses radioactive slag in Glen Cove Creek.

Summary of Site-related Contamination:

Site-related contamination is the result of smelting operations; specifically, disposal practices, slag, and radioactive ore residual. Site operations have contaminated various media (surface soil, sediment, dust/air, and ground water) with numerous contaminants. Li Tungsten operable units are contaminated with inorganic chemicals, radionuclides, pesticides, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs).

Conclusion of Site-related Risk:

The primary threats contributing to human health and ecological risks, and the contaminants driving the remedial action, are inorganic chemicals, pesticides, PAHs, PCBs, VOCs, and radionuclides. The major media of concern include soil, dust, ground water, sediment, and surface water. Expose individuals potentially experiencing unacceptable health risk from these media are residential, occupational, recreational, and trespassing receptors. The primary routes of exposure to these media are ingestion (accidental or intentional), inhalation, dermal contact, and external radiation.

In OU1, the primary contributors to human health risk are (1) arsenic (future cancer risk ranges from 1E-06 to occupational receptor from dermal exposure to contaminated ground water to 1E-02 to residential child receptor from ingestion of contaminated soil, and future non-cancer risk hazard quotient [HQ] of 300 to residential child receptor from ingestion of contaminated soil); (2) cadmium (future cancer risk of 9E-03 to residential adult receptor from ingestion of contaminated ground water); (3) thorium-228 (cancer risk ranges from 1E-06 to current trespasser adolescent receptor from external radiation from contaminated sediment to 5E-03 and 8E-03 to future residential and occupational receptors from external radiation from contaminated soil); (4) radium-226 (cancer risk ranges from 1E-06, each, for current trespasser adolescent receptor and future occupational receptor from external radiation from sediment and soil, respectively, to 2E-03 and 3E-03 for future residential and occupational external radiation from soil); (5) radium-228 (future cancer risk of 1E-06, each, for residential child and occupational receptors from external radiation from ground water and soil, respectively, to 3E-03 and 4E-03 for residential adult and occupational receptors, respectively, from external radiation from soil); (6) vinyl chloride (future cancer risk of 2E-06 to occupational receptor from dermal contact with ground water to 3E-03 to residential adult receptor from ingestion of ground water); and (7) 1,1-dichloroethene (future cancer risk of 1E-06 to occupational receptor from dermal contact with ground water to 7E-04 to residential adult receptor from ingestion of ground water). In OU2, the primary contributors to human health risk are (1) arsenic (cancer risk ranges from 1E-06 for current trespasser adolescent receptor from ingestion of sediment to 6E-02, 2E-01, and 9E-02 for future occupational, residential adult, and residential child, respectively, from ingestion of ground water, and with non-cancer risk HQs of 400, 1000, and 2000, respectively); (2) thorium-228 (cancer risk ranges from 2E-06 for current trespasser adolescent receptor from external radiation from soil to 7E-03 for future residential adult receptor from external radiation from soil); (3) radium-226 (cancer risk ranges from 5E-06 for current trespasser adolescent receptor from external radiation from soil to 3E-02 for future residential adult from external radiation from soil); (4) radium-228 (future cancer risk ranges from 2E-06 for residential child receptor from external radiation from ground water to 3E-03 residential adult receptor from external radiation from soil); (5) uranium-238 (future cancer risk ranges from 3E-06 to 1E-03 for occupational and residential adult receptor, respectively, from external radiation from soil); (6) vinyl chloride (future cancer risk ranges from 1E-06 to 4E-04 and 6E-04 for residential adult, occupational, and residential child receptors, respectively, from ingestion of ground water). In OU4, the primary contributors to human health risk are (1) radium-226 (future cancer risk ranges from 8.3E-04 to 3.3E-03 for occupational and residential child receptors, respectively, from external radiation from soil; additionally, occupational and residential adult receptors' ingestion of ground water yields future cancer risks of 1.2E-04 and 3.3E-04, respectively); (2) radium-228 (future cancer risk ranges from: 1.7E-02 and 8.5E-03 for occupational and residential child receptors, respectively, from external radiation from soil; 1.3E-03 and 1.7E-02 for residential adult receptor from ingestion of soil and ground water, respectively; and 2.1E-03 for residential child receptor from ingestion of ground water); and (3) thorium-228 (current and future cancer risk of 1E-03 for recreational adolescent receptor from external radiation from sediment; cancer risk ranges from 1.4E-02 to 5.8E-02 for residential child and adult receptors, respectively, from external radiation from surface soil).

Terrestrial and aquatic birds and small mammals may also experience elevated exposure risks as a result of contact with contaminated soil, sediment, surface water, and food items. Ecological risks have been identified for a number of avian and mammalian species, as well as terrestrial plants and invertebrates, and aquatic biota from exposure to inorganic chemicals, PAHs, pesticides, PCBs, VOCs, and radionuclides in OU1 and OU2. The pathways analyzed include ingestion of food items, soil, sediment, and surface water; direct uptake from soil; and combined exposure pathways. The primary contributors to risk to aquatic organisms from surface water are (1) pesticides (HQ 9100 from 4,4'-DDD; HQ 4600 from 4,4'-DDT); (2) PCBs (HQ of 1000 from all PCBs); and (3) metals (HQ of 2880 from cobalt; HQ of 905 from silver; HQ of 533 from iron). The primary contributors to ecological risk to avian receptors from ingestion of soil, sediment, surface water and food items include (1) zinc (HQ of 2380 to the American Robin and 1280 to the Mallard); (2) selenium (HQ of 2350 to the Mallard and 1510 to the American Robin); and (3) lead (HQ of 1600 to the American Robin and 422 to the Mallard). The primary contributors to ecological risk to mammalian receptors include (1) selenium (HQ of 39800 to the Raccoon, 9380 to the Red Fox, and 4740 to the Deer Mouse); (2) antimony (HQ of 14400 to the Red Fox, 7640 to the Deer Mouse, and 582 to the Raccoon); (3) arsenic (HQ of 12000 to the Red Fox, 11900 to the Raccoon, and 7660 to the Deer Mouse); and (4) aluminum (HQ of 7970 to the Red Fox, 6960 to the Raccoon, and 4270 to the Deer Mouse). The primary contributor to ecological risk to soil invertebrates from direct contact with soil and ingestion of food items and soil is (1) chromium (HQ of 4050). The primary contributors of risk to terrestrial plants from direct uptake from soil are (1) chromium (HQ of 1620); (2) aluminum (HQ of 1130); and (3) antimony (HQ of 1120).

Human Health Risk Driver(s):

Operable Unit 1:

Soil, Cancer
- *Future Worker, Ingestion, Dermal Contact, and External Radiation*
  - Arsenic, Radium-226, Radium-228, Thorium-228
- *Future Child and Adult Resident, Ingestion, Dermal Contact, and External Radiation*
  - Arsenic, Lead-210, Radium-226, Radium-228, Thorium-228
- *Current Trespasser, Ingestion, Dermal Contact, and External Radiation*
  - Arsenic, Thorium-228

Soil, Non-Cancer
- *Future Worker, Ingestion and Dermal Contact*
  - Antimony, Arsenic
- *Future Child and Adult Resident, Ingestion and Dermal Contact*
  - Antimony, Arsenic, Manganese, Nickel
- *Future Trespasser, Ingestion*
  - Arsenic

Ground Water, Cancer
- *Future Worker, Ingestion and Dermal Contact*
  - 1,1-Dichloroethane, Arsenic, Tetrachloroethene, Vinyl Chloride
- *Future Child and Adult Resident, Ingestion and Inhalation*
  - 1,1-Dichloroethane, Arsenic, Cadmium, Tetrachloroethene, Trichloroethene, Vinyl Chloride

Ground Water, Non-cancer
- *Future Child and Adult Resident, Ingestion and Dermal Contact*
  - 1,2-Dichloroethane, Antimony, Arsenic, Trichloroethene
- *Future Worker, Ingestion and Dermal Contact*
  - 1,2-Dichloroethane, Antimony, Arsenic

Sediment , Cancer
- *Future Worker, Ingestion, Inhalation, and Dermal Contact*
  - Arsenic
- *Current Trespasser, Ingestion, Dermal Contact, and External Radiation*
  - Arsenic, Radium-226, Thorium-228

Surface Water, Cancer
- *Current Trespasser, Dermal Contact*
  - Arsenic

Dust/Air, Cancer
- *Current Resident, Inhalation*
  - Arsenic, Cobalt, Manganese
- *Future Worker, Inhalation*
  - Cobalt, Manganese, Silver

Dust/Air, Non-Cancer
- *Future Adult Resident and Worker, Inhalation*
  - Cobalt, Manganese

Operable Unit 2:

Ground Water, Cancer
- *Future Resident, Ingestion and Dermal Contact*
  - Arsenic, Vinyl Chloride
- *Future Worker, Ingestion*
  - Arsenic, Vinyl Chloride

Ground Water, Non-cancer
- *Future Worker, Ingestion and Inhalation*
  - Arsenic
- *Future Adult and Child Resident, Ingestion and Inhalation*
  - Arsenic, Chloroform

Soil, Cancer
- *Future Worker, External Radiation*
  - Radium-226
- *Future Adult and Child Resident, Ingestion, Dermal Contact, and External Radiation*
  - Arsenic, Lead-210, Radium-226, Radium-228, Thorium-228, Uranium-238

Soil, Non-cancer
- *Future Adult and Child Resident, Ingestion, Dermal Contact, and Inhalation*
  - Antimony, Arsenic, Chloroform, Manganese

Human Health Risk Driver(s) (cont'd):
Operable Unit 4:
Ground Water, Cancer
- *– Future Worker, Ingestion*
  - Radium-226
- *– Future Adult and Child Resident, Ingestion*
  - Radium-226, Radium-228

Sediment, Cancer
- *– Current & Future Worker, External Radiation*
  - Radium-228
- *– Current & Future Adult and Child Resident, Ingestion and External Radiation*
  - Radium-228, Thorium-228

Soil , Cancer
- *– Future Worker, Ingestion and External Radiation*
  - Radium-226 Radium-228, Thorium-228, Thorium-232
- *– Future Adult and Child Resident, Ingestion and External Radiation*
  - Radium-226, Radium-228, Thorium-228, Thorium-232

Ecological Risk Driver(s):
Operable Units 1 and 2:
Food, Soil, Sediment, Surface Water
- *– Avian, Ingestion*
  - Lead, Selenium, Zinc
- *– Mammalian, Ingestion*
  - Aluminum, Antimony, Arsenic, Zinc

Food and Soil
- *– Soil Invertebrates, Ingestion and Direct Contact*
  - Chromium

Direct Uptake from Soil
- *– Terrestrial Plants*
  - Aluminum, Antimony, Chromium

Not specified, Aquatic Biota
- Inorganic Chemicals, Pesticides, PCBs

Final Remedy:

The following outlines the selected remedial actions to address soil, ground water and sediment. ***OU1 and OU2 soils –***

(1) excavation of soils and sediments contaminated above cleanup levels;

(2) separation of radionuclide-contaminated soil from non-radionuclide soil contaminated with heavy metals;

(3) offsite disposal of both radionuclide and metals contaminated soil at appropriately licensed facilities;

(4) offsite disposal of radioactive waste at an appropriately licensed facility;

(5) building demolition at the facility;

(6) storm sewer and sump cleanouts at the Li Tungsten facility;

(7) institutional controls governing the future use of the site; decommissioning of Industrial Well N1917 on Parcel A; and

(8) collection and offsite disposal of contaminated surface water from Parcels B and C.

OU 1 and OU2 ground water –

(1) no action; and

(2) long-term groundwater monitoring program to assess the recovery of the Upper Glacial Aquifer after the soil remedy is implemented.

OU4 –

(1) construction of a dewatering facility on the Li Tungsten property;

(2) two phases of Creek dredging to remove radioactive slag materials;

(3) dewatering of the dredged sediment followed by segregation of slag from the dewatered sediment; and

(4) off-site transportation and disposal of the radioactive slag at an appropriately licensed facility.

MacAlloy Corporation NPL Site Summary

EPA ID: SCD003360476
Location: North Charleston, SC
EPA Region: 4
Status: NPL - Final
Number of Operable Units: 1
Date of NPL Listing: 2000
Last Operational Year: 1998
Documents Used: RI/FS & ROD

Introduction:

The Macalloy Corporation site is a former ferrochromium alloy manufacturing plant located in North Charleston, Charleston County, South Carolina. The site is approximately 140 acres fronting Shipyard Creek in an industrial and commercial section of the Charleston Peninsula, which is formed by the confluence of the Ashley and Cooper rivers. The site was used to manufacture ferrochromium alloy from 1941 to 1998 by several companies and, at various times, the U.S. Department of Defense, by smelting chromium ore in as many as 12 submerged electric arc furnaces. The site and resulting contamination is the result of site smelting operations and storage of ferrochromium alloy, chrome ore, and slag. Waste materials generated during furnace operations included slag; airborne waste gases; fine particulate matter, ashes and dust (PMAD); gas conditioning tower (GCT) sludge and associated wastewater; electrostatic precipitator (ESP) dust; and bag house dust, which were stored in unlined and lined impoundments throughout the site. An estimated 80,000 tons of air pollution control material, consisting of ESP dust and GCT sludge, is contained in an unlined surface impoundment on site. A 20-acre groundwater plume of hexavalent chromium exists below the impoundment. Historically, the facility discharged surface water offsite to the Shipyard Creek (a tributary of the Cooper River) and adjacent wetland areas via a National Pollutant Discharge Elimination System (NPDES) permit. The site was added to the NPL in 2000 because of the threat to human health and the environment posed by the soil and groundwater contamination on the Macalloy property. The site was treated as a single operational unit for the purposes of risk assessment. In 2005, the site was purchased by a third party, which has redeveloped ~20 acres at the southern portion of the site as an industrial park, and an inter-modal shipping facility with Shipyard Creek access is planned for the northern portion of the site.

Summary of Site-related Contamination:

Site-related contamination is primarily due to alloy manufacturing and smelting; specifically, waste storage and disposal practices, including slag, waste gases, fine particulate matter emission, sludge, wastewater, and unlined impoundments. Site operations have contaminated various media (surface and subsurface soil, shallow ground water, sediment, onsite surface water/storm water, and food [shellfish]) with inorganic chemicals (arsenic, chromium VI, iron, lead, manganese, nickel, and zinc), organic chemicals (benzo[a]pyrene and chloromethane), and radionuclides (radium-226, thorium-232, potassium-40, and uranium-235). Several documented quantities of contamination include (1) approximately 60,000 cubic yards (cy) of soil contaminated with hexavalent chromium; (2) a 20-acre ground water plume of hexavalent chromium; (3) approximately 110 cy of soil and debris with elevated gamma radiation levels; (4) surface water samples associated with storm water that show elevated levels of hexavalent chromium and other inorganic chemicals; and (5) approximately 1,000 cy of sediment contaminated with inorganic chemicals.

Conclusion of Site-related Risk:

The site is currently unused; however, future industrial use is planned.

Site-wide human health risks have been identified from exposure to inorganic chemicals (antimony, arsenic, chromium VI, iron, and manganese) and organic chemicals (benzo[a]pyrene equivalents). The pathways of concern for human health risks are ingestion of ground water, soil, and food (shrimp). Receptors with potentially unacceptable risk from these media are residential, occupational, and recreational receptors. Elevated risks were identified under future land-use scenarios. The primary contributors of risk to residential receptors are (1) arsenic (lifetime weighted average cancer risks of 2E-04 and 2E-05 from groundwater ingestion and surface soil ingestion, respectively); (2) benzo(a)pyrene equivalent (lifetime weighted average cancer risks of 1E-05 and 5E-06 for soil ingestion and dermal contact, respectively); and, (3) hexavalent chromium (future non-cancer risk HQs of 203 [child] and 86.8 [adult] for residential groundwater ingestion). The primary contributor of risk to onsite occupational receptors is hexavalent chromium (non-cancer risk HQ of 31 from groundwater ingestion). The primary contributor of risk to onsite recreational fisher receptors is arsenic (cancer risk of 2.4E-04, and non-cancer HQ of 3.11 from ingestion of food [shrimp]).

The primary contributors to ecological risk are inorganic chemicals (chromium [total], lead, nickel, and zinc); however, risks were qualitatively stated as being acceptable to benthic organisms through ingestion and direct contact with contaminated sediment.

Human Health Risk Driver(s):

Operable Unit 00 (site-wide):

Soil, Cancer

– *Future Adult and Child Resident, Ingestion and Dermal Contact*
  - Arsenic, Benzo(a)pyrene Equivalent

Ground Water, Cancer

– *Future Adult and Child Resident, and Worker, Ingestion*
  - Arsenic

Ground Water, Non-cancer

– *Future Adult and Child Resident, and Worker, Ingestion*
  - Chromium (VI)

Food (Shrimp), Cancer

– *Future Recreational User, Ingestion*
  - Arsenic

Food (Shrimp), Non-Cancer

– *Future Recreational User, Ingestion*
  - Arsenic

Ecological Risk Driver(s):

Operable Unit 00 (site-wide):

Sediment

– *Current Benthic Organisms, Multiple Routes*
  - No Risk Drivers
  - Shrimp contamination will be monitored

Final Remedy:

The selected remedial actions address sediment, ground water, soil, and surface water/storm water are

(1) to prevent exposure to radiation levels greater than twice the measured background concentration, excavation of ~ 110 cy of radiological soil and debris, with off-site disposal;

(2) to eliminate exposure to benthic organisms from unacceptable concentrations of chromium, nickel, and zinc, dredging of contaminated sediment in area 001 Tidal Creek, with upland disposal, capping, and restoration;

(3) to monitor Zone C Shipyard Creek sediment until the preparation of the Five-Year Review Report;

(4) to prevent exposure to chromium (VI) concentrations in shallow ground water above the maximum contaminant level (MCL) specified by the Safe Drinking Water Act for total chromium (100 µg/L) and to minimize the migration of chromium (VI) from ground water to Shipyard Creek, enhanced *in situ* chemical reduction of contaminated ground water;

(5) to prevent the leaching of chromium (VI) from site soil to ground water at concentrations exceeding the groundwater cleanup level, on-site chemical reduction of ~ 115,000 cy of soil contaminated with chromium (VI), with stabilization/solidification, i.e., *ex situ* treatment with mechanical mixing;

(6) to mitigate discharge of contaminants into Shipyard Creek and address the substantive requirements of the Clean Water Act, a comprehensive storm water and sediment control management system; and

(7) to establish institutional controls and restrictive covenants to limit land use to commercial/industrial purposes and prohibit the use of ground water underlying the property.

Midnite Mine NPL Site Summary

EPA ID: WAD980978753
Location: Wellpinit, WA
EPA Region: 10
Status: NPL – Final

Number of Operable Units: 2
Date of NPL Listing: 1983
Last Operational Year: 1981
Documents Used: OU1- ROD, RI/FS

Introduction:

The Midnite Mine Superfund Site is located on the Spokane Indian Reservation in eastern Washington State, approximately 45 miles northwest of Spokane. The site is located on federal government lands held in trust for the Spokane Tribe of Indians. Mining operations began in 1955 and continued until 1981, excluding a 4-year period in the late 1960s. The site includes an inactive open pit uranium mine as well as the areas impacted by mine-related contamination. About 2.4 million tons of ore and proto-ore were stockpiled on site. Waste rock was used to backfill a series of previously mined pits, construct roads, and grade the site, or was dumped in piles. Pit 3 and Pit 4 were not backfilled and remain open. The site is divided into two Operable Units (OUs): OU1 (Mined Area and Mining Affected Area) consists of the mined area, the gravel haul roads at and near the mine and areas of ground water, surface water, sediments, and soil affected by the environmental transport of mine-related contaminants; and OU2 (Midnite Mine Haul Route) consists of areas along the paved road where ore or waste spilled in transit to the mill or was dumped, leading to levels of gamma radiation that posed a risk to human health. Prior to the final remedy, a removal action was performed to excavate ore debris in OU2 and stage the debris in OU1.

Summary of Site-related Contamination:

The site is contaminated primarily with inorganic chemicals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, thallium, vanadium, and zinc) as well as radionuclides (including lead-210, radium-226, radon-222, thorium-228, uranium-234, and uranium-238). These contaminants result from acid mine drainage, radioactive decay, and particulate migration.

Conclusion of Significant Site-related Risk:

The contaminants ultimately driving the site's remedial action are inorganic chemicals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc) and radionuclides (lead-210, radium-226, radon-222, thorium-228, uranium-234, and uranium-238). The major media of concern include soil, surface water, sediment, ground water, air, and contaminated food. All receptors for human health are from the local Indian tribes. The receptors with potentially unacceptable risk are future residents, and current and future non-residential and recreational receptors. The primary routes of exposure to these media include inhalation, ingestion, and external radiation.

Due to the removal action in OU2 and incorporation with OU1, specific risks are reported only for OU1. The primary contributors to human health cancer risk in OU1 include (1) uranium isotopes (risk to future residents from inhalation of ground water of 7E-01 [uranium-234] and 6E-01 [uranium-238]; and inhalation of surface water of 4E-01 [both uranium-234 and uranium-

238]); (2) lead-210 (risk to future residents from plant ingestion of 4E-01 and meat ingestion of 1E-01 and risk to current/future non-residential receptors from meat ingestion of 2E-01); and (3) airborne radon (risk to future residents from inhalation of 2E-01). The primary contributors to non-cancer risk include (1) all contaminants (HQ of 141,653 and 77,347 to future child and adult residents, respectively, from ingestion of plants; HQ of 15,309 from inhalation of ground water by future adult residents; and HQ of 9,767 from inhalation of surface water by future adult residents); and (2) uranium (HQ of 141,070 and 77,029 to future child and adult residents, respectively, from ingestion of plants).

Current ecological risks were identified for many receptors, including periphyton, benthic macroinvertebrates, fish, terrestrial soil community, terrestrial plants, amphibians, wetland plants, wetland invertebrates, mammals (with various feeding strategies), and birds (with various feeding strategies) from exposure to inorganic chemicals and radionuclides. The primary contributors to ecological risk in OU1 are (1) zinc (HQ of 1370 for direct contact with surface water by amphibians; HQ of 381 for terrestrial plants exposed to contaminated surface soil through unspecified routes), (2) uranium (HQ of 728 for wetland plant exposed to contaminated sediment through unspecified routes; HQ of 214.1 for wetland invertebrates exposed to contaminated sediment through unspecified routes), (3) copper (HQ of 116.7 for amphibians exposed to contaminated surface water through direct contact), and (4) chromium (HQ of 165 for the terrestrial soil community exposed to contaminated soil through unspecified routes).

Human Health Risk Driver(s):

Operable Unit 1:

Ground Water, Cancer

– Future Resident, Inhalation

- Uranium-234, Uranium-238

Ground Water, Non-cancer

– Future Adult Resident, Inhalation

- All Contaminants (Inorganic chemicals, Radionuclides)

Surface Water, Cancer

– Future Resident, Inhalation

- Uranium-234, Uranium-238

Surface Water, Non-cancer

– Future Adult Resident, Inhalation

- All Contaminants (Inorganic chemicals, Radionuclides)

Food (plants), Cancer

– Future Resident, Ingestion

- Lead-210

Food (plants), Non-cancer

– Future Child and Adult Resident, Ingestion

- All Contaminants (Inorganic chemicals, Radionuclides)

Food (meat), Cancer

– Current & Future Non-Resident, Ingestion

- Lead-210

Indoor Air, Cancer

–Future Resident, Inhalation

- Radon

Ecological Risk Driver(s):

Operable Unit 1:

Surface Water

– Current Amphibian, Direct Contact

- Copper, Zinc

Surface Soil

– Current Terrestrial Plant Community, Unspecified Route

- Chromium, Zinc

Sediment

– Current Wetland Plant Community, Unspecified Route

- Uranium

– Current Wetland Invertebrates, Unspecified Route

- Uranium

Final Remedy:

Prior to the final remedy, a removal action was performed to excavate ore debris in OU2 and stage the debris in OU1. The final remedy addresses site-wide contamination in soil, ground water, surface water, and sediment. The remedy helps mitigate risks from direct contact with soil and radiation exposure as well as risks related to contaminated water. The remedial actions taken for the entire site include

(1) excavation and containment of mine wastes in pits,

(2) seep and pit water collection and treatment,

(3) residuals waste management,

(4) surface water and sediment management,

(5) monitored natural attenuation of ground water,

(6) institutional controls and access restrictions,

(7) long-term site management, and

(8) contingent actions for sediment cleanup and acid rock drainage reduction.

The amount of each media remediated/removed was not documented.

Mine Site 2028 Removal Site Summary

EPA ID: INN000510234
Location: Brazil, IN
EPA Region: 5
Status: Removal – Time Critical

Number of Operable Units: 1
Date in CERCLIS: 2007
Last Operational Year: 1926
Documents Used: Action Memorandum & Site Assessment Report

Introduction:

Mine Site 2028 is located immediately west of 911 West Hendrix, in Brazil, Indiana (which, as of July 2006, had a population of 8,212). The area around Brazil has hosted a large number of companies that produce ceramic products ranging from ceramic pumps to tiles and bricks. In addition, Brazil has large deposits of shale, clay, and coal. Mine Site 2028 contains two large ponds and former clay/coal pits. Mining operations were conducted from 1896 until 1926. Coal was located at a depth of 80 feet and was found in a seam 4 feet thick. Due to former underground mining on this property, there are numerous subsidence areas. Mine Site 2028 is bordered by a trucking company to the east, residential areas to the east and southeast, and mixed farmland/residential/light industrial to the west and north. Mining operations and drum disposal have led to site-wide contamination. It was estimated that approximately 1,000 cubic yards of soil were contaminated along with the presence of approximately 306 drums. In addition to the physical hazard represented by the compromised land surface, deteriorating drums containing potentially combustible materials could pose a fire and explosion hazard. For these reasons, the Agency for Toxic Substances and Disease Registry (ATSDR) concluded that site conditions posed a potential public health hazard and recommended removal of the drums to be protective of the health of area residents.

Summary of Site-related Contamination:

Site-related contamination is the result of mining operations, specifically large waste ponds and clay/coal pits. During the May 2007 site assessment, four drum and six soil samples were collected, of which, two drums were found to exceed 40 CFR §261.24, toxicity characteristic, which defines waste that is hazardous due to certain characteristics. Specifically, the 40 CFR §261.24 regulatory levels were exceeded for cadmium and lead, which are, respectively, 1 and 5 milligrams per liter (mg/L). The highest toxicity characteristic leaching procedure (TCLP) drum results are 11 mg/L for cadmium and 29 mg/L for lead. The highest total concentration in soil is 520 parts per million (ppm) for cadmium and 5,000 ppm for lead. Given that only four drums were sampled, and as many as 200 drums were counted in the area, there is a possibility that greater levels of contamination and other contaminants besides metals are present in the drums and in the soils around the drums. The site is contaminated with other inorganic chemicals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, cobalt, copper, hexavalent chromium, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc).

Conclusion of Site-related Risk:

The primary threats contributing to human health, and the contaminants found to exceed the Indiana Department of Environmental Management's (IDEM's) Risk Integrated System of Closure (RISC) guidelines, are inorganic chemicals (antimony, arsenic, barium, cadmium, hexavalent chromium, lead, and mercury). These contaminants are found in varying combinations in soil and deposited drums, with the potential threat to migrate to ground water. Although it is unlikely that chronic exposures would occur at the location of the drums, a residential area lies to the east and southeast of the site within half a mile. Because access to the site is not restricted, even intermittent exposures on the property are possible.

Due to the time-critical removal as a result of ATSDR site assessment, no human health or ecological risk assessments were conducted. According to the health consultation prepared by ATSDR, concentrations of antimony, cadmium, hexavalent chromium, and lead exceed ATSDR's risk-based health criterion by as much as 48 times for antimony, 20 times for lead, and 10 times for cadmium. Human health cancer and non-cancer risks were not specifically quantified for this site.

Although the primary contributors to ecological risk were not evaluated for this site, it is reported that the Indiana Bat, a federally endangered species, inhabits the area and may be impacted by site contamination.

Final Remedy:

The selected remedy directly addresses contaminated soil and waste drums and indirectly mitigates migration of contamination into ground water. The overall approach for the removal action involves

(1) cleaning and grubbing of vegetation,

(2) drum removal from sinkhole (306 drums),

(3) drum disposal, and

(4) backfilling of sinkholes with various rocks overlain with clay and re-vegetation of the area.

Monsanto Chemical Co. (Soda Springs Plant) NPL Site Summary

EPA ID: IDD081830994
Location: Soda Springs, ID
EPA Region: 10
Status: NPL - Final

Number of Operable Units: 1
Date of NPL Listing: 1990
Last Operational Year: Currently in operation
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

Since 1952, the Monsanto Chemical Company has produced elemental phosphorus from locally mined phosphate ore in southeastern Idaho, 1 mile north of Soda Springs, Caribou County, Idaho. The 530-acre site is in a broad valley near the western base of the Aspen Range. Monsanto's Soda Springs plant generates a number of process waste streams containing inorganic compounds. Most liquid and solid wastes are stored or treated in onsite ponds or piles. Slag constitutes the greatest quantity of waste. Molten slag is tapped from the base of the electric air furnaces and poured out to cool in piles. The piles cover a large portion of the site and are more than 150-feet high. Groundwater contamination sources at the site were identified as a leaky hydro-clarifier and several unlined ponds. Monsanto has discontinued use of the old ponds, installed new lined ponds, and replaced the old hydro-clarifier. Onsite monitoring wells and sediments in an old unlined pond, having received process wastewater, were shown to be contaminated with inorganic chemicals (arsenic, cadmium, and chromium). Within 3 miles of the site are public springs and private wells that provide drinking water to an estimated 3,000 people. Water discharging from an onsite pond to Soda Creek, 2,000 feet away, is contaminated with cadmium. Water withdrawn from Soda Canal, 1.2 miles downstream, is used to irrigate 4,040 acres. There is only one Operable Unit (OU 00) designated for site-wide contamination at the Soda Springs plant.

Summary of Site-related Contamination:

Site-related contamination is the result of mining operations; specifically, liquid and solid wastes stored and treated in onsite ponds and piles, including slag. In addition, leaking equipment, such as the hydro-clarifier, contributed to groundwater contamination. Site operations have contaminated various media (ground water, soil, surface water, sediment, and air) with inorganic chemicals (primarily arsenic, beryllium, cadmium, fluoride, and selenium) and radionuclides (primarily lead-210, radium-226, thorium-230, and uranium-238) for onsite industrial and residential receptors (children and adults).

Conclusion of Site-related Risk:

The current exposure routes for residential receptors include external gamma radiation and the ingestion or inhalation of soils/dust. Industrial receptors' current exposure risks include external radiation and the ingestion or inhalation of source pile/waste materials. There is no current pathway for groundwater ingestion; however, if drinking water wells are installed in the future, groundwater ingestion may be a concern. Future exposure routes of concern for residential receptors include external gamma radiation and the ingestion or inhalation of soils, particulates, and ground water. Industrial receptors' future exposure risks include external radiation and the ingestion or inhalation of source pile/waste materials. More specifically, the primary threats to human health and the environment, and the contaminants driving the remedial action, are inorganic chemicals (arsenic, beryllium, cadmium, fluoride, and selenium) and radionuclides (lead-210, radium-226, thorium-230, and uranium-238).

Site-wide, the primary contributors to human health risks are (1) radionuclides (current cancer risk from 2E-03 [radium-226] for residential and industrial receptor external radiation with soil/source materials to 2E-06 for industrial receptor inhalation of source pile/waste material [thorium-230 and uranium-238, respectively]); (2) radium-226 (future cancer risk ranging from 2E-03 for residential and industrial receptor external radiation exposure to 1E-06 for industrial receptor ingestion of soil/source materials); (3) arsenic (future cancer risk ranging from 9E-05 for future residential ingestion of soil, particulates, and ground water to 1E-06 for current residential inhalation of soil/dust); and (4) total contaminant exposure (cancer risk ranging from 1E-04 [inorganic chemicals] for future residential exposure to soil, particulates, ground water, and gamma radiation via all exposure routes to 5E-04 [radionuclides] for future industrial exposure to source pile/waste materials via all exposure routes).

The site-wide ecological risks appeared to be minimal soil risks to mammals and plants outside the Monsanto plant boundaries; however, the discharge of contaminants into Soda Creek could lead to surface water and sediment risks for sensitive aquatic organisms. The primary contributors to ecological risk were not quantified, but may include inorganic chemicals: (1) cadmium, (2) fluoride, (3) selenium, and (4) zinc. The final ecological assessment concluded that ecological impacts were unlikely and that ecological risk-based target cleanup levels should not be used to set remediation goals.

Human Health Risk Driver(s):
Operable Unit 00 (site-wide):
Source Pile/Waste Materials
– Current & Future Worker
- Arsenic and Radium-226

Soil/Particulate/Ground Water/Gamma
– Current Resident
- Arsenic, Beryllium, Radionuclide (cumulative)

Soil/Particulate/Ground Water/Gamma
– Future Resident
- Arsenic, Beryllium, Lead-210, Radium-226, Uranium-238

Ecological Risk Driver(s):
Operable Unit 00 (site-wide):
– Combined Pathways, Multiple Routes
- Cadmium, Fluoride, Selenium, Zinc

Interim Remedy:

Actions taken by Monsanto in conjunction with EPA's activities pursuant to CERCLA have resulted in significant improvements to the plant and reduced emissions prior to the final remedy. Groundwater remedial actions included

(1) replacing the hydro-clarifier,

(2) abandoning four wells in accordance with regulatory guidelines,

(3) taking the underflow solids ponds out of service,

(4) closing and excavating the northwest pond,

(5) installing a new plant drinking water well, and

(6) installing recovery wells to intercept contaminated ground water.

Emissions remedial actions included

(1) installation of a new dryer and dust collector,

(2) installation of four high-energy venture scrubbers, separators, fans, and stacks for additional scrubbing of kiln exhaust,

(3) improved handling procedures of crushed slag in the baghouse dust disposal,

(4) implementation of emissions controls in the nodule reclaim area, and

(5) use of dust suppressants for on-plant stockpiles.

Final Remedy:

The selected remedy addresses ground water, industry property soils, and non-industrial property soils and reduces risks to onsite workers and residents. The remedy addresses contaminated ground water by monitoring natural attenuation with institutional controls. The ground water is not being used as a direct source for drinking water, so natural attenuation should mitigate risk. The remedy addresses contaminated soils through

(1) institutional controls through land-use restrictions placed on plant property and

(2) giving residential property owners in contaminated areas the choice to have their property either

  (a) cleaned up via evacuation, containment, and replacement of soils or

  (b) rendered protective of human health and the environment via land-use restrictions in the form of environmental easement held by the responsible party.

Past remedial measures, including ongoing engineering and institutional controls and compliance with regulations, have reduced onsite worker exposure to risks posed by source piles and materials within the plant. No significant human health concerns or environmental impacts were found related to air, surface water, or Soda Creek sediments, so the selected remedy did not address these media.

National Southwire Aluminum Co. NPL Site Summary

EPA ID: KYD049062375
Location: Hawesville, KY
EPA Region: 4
Status: NPL - Final

Number of Operable Units: 1
Date of NPL Listing: 1994
Last Operational Year: Currently in Operation
Documents Used: Interim ROD, Final ROD, RI/FS

Introduction:

The National Southwire Aluminum (NSW) facility is an active aluminum refining operation and a subsidiary of the Southwire Company. The site is located on approximately 900 acres in Hancock County, Kentucky, and has been in use since 1969. The operation produces primary aluminum from alumina ore. The site includes a number of manufacturing and service buildings, three former waste disposal impoundments, one active wastewater impoundment, several former waste disposal landfills, a potliner accumulation building, and a drainage ditch. The production process and materials are responsible for contamination at the site. The primary mode of contamination is produced in the carbon linings of reduction vessels (pots) during the production of aluminum. The NSW facility currently generates approximately 3,000 tons/year of spent potliners. The NSW NPL site is evaluated under one Operable Unit (OU00), which includes site-wide contamination.

Summary of Site-related Contamination:

Site-related contamination is the result of aluminum refining operations; specifically, waste disposal impoundments, wastewater impoundments, landfills, spent potliners, and a drainage ditch. Site operations have contaminated various media (surface soil, subsurface soil, sediment, surface water, and ground water) with numerous contaminants. Contamination at the site consists of inorganic chemicals (aluminum, barium, beryllium, cadmium, chromium, copper, fluoride, iron, lead, manganese, nickel, vanadium, and zinc) and organic chemicals (1,2-dichloroethane, 2-methylnaphthalene, 2,4-dimethylphenol, 4-methylphenol, acenaphthene, acenaphthylene, aroclor 1242, aroclor 1248, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, butylbenzylphthalate, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene). These contaminants appear to be migrating from the Old South Pond into the center of the North Plume.

Conclusion of Site Risk:

The primary current threats to human health, and the contaminants driving the remedial action, are one inorganic chemical (beryllium) and organic chemicals (aroclor 1242, aroclor 1248, benzo[a]anthracene, benzo[a] pyrene, benzo[b]fluoranthene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene). The major media of concern for human exposure to organic and inorganic contaminants are soil, surface water, and combined exposure from all media. Current receptors of contamination from these media are site visitors (adults and adolescents) and occupational workers. The primary routes of exposure to these media are ingestion, dermal contact, and inhalation.

The primary contributors to current human health risk at the site are (1) exposure to combined contaminants in soil from all routes to onsite visitor adolescent receptors (current cancer risk of 2E-05]); (2) exposure to combined contaminants in all media from all routes to onsite site visitor adult and adolescent receptors (current cancer risk of 2.0E-05); (3) exposure to benzo(a)pyrene in soil through all routes to onsite site visitor adolescent and adult receptors (current cancer risk of 1.4E-05 and 1.3E-05, respectively); and (4) exposure to benzo(a)pyrene from soil ingestion to onsite adolescent receptors (current cancer risk of 1.0E-05).

Current pathways of concern for ecological risks include (1) ingestion, respiration, and direct contact with sediment (benthic organism receptors); (2) ingestion, respiration, and direct contact with surface water (fish receptors); (3) ingestion and direct contact with surface soil and subsurface soil (terrestrial invertebrate receptors); and (4) uptake of chemicals in surface soil and subsurface soil via roots (terrestrial plant receptors). The primary contributors to ecological risk, for which no specific receptors were quantitatively identified, are (1) beryllium (current HQ of 1410 from sediment exposure]); (2) acenaphthylene (current HQ of 920 from surface soil exposure); (3) butylbenzylphthalate (current HQ of 385 from surface soil exposure); (4) acenaphthene (current HQ of 280 from surface soil exposure); (5) iron (current HQ of 260.5 from surface soil exposure); (6) aroclor 1242 (current HQ of 123.3 from surface soil exposure); (7) combined PAH exposure (current HQ of 99.8 from surface soil exposure); (8) chrysene (current HQ of 97.3 from surface soil exposure); (9) 4-methylphenol (current HQ of 92 from surface soil exposure); and (10) benzo(a)anthracene (current HQ of 80.6 from surface soil exposure).

Human Health Site-related Risks:
Operable Unit 00 (site-wide):
Soil, Cancer
- *Current Adolescent and Adult Site Visitor, Combined Routes*
  - Combined Inorganic and Organic Contaminants, Benzo(a)pyrene

Combined Media, Cancer
- *Current Adult Site Visitor, Combined Routes*
  - Combined Inorganic and Organic Contaminants

All Media, Cancer
- *Current Adolescent Site Visitor, Combined Routes*
  - Combined Inorganic and Organic Contaminants

Ecological Site-related Risks:
Operable Unit 00 (site-wide):
Sediment
- *Current (receptor not specified) Combined Routes*
  - Beryllium

Surface Soil
- *Current (receptor not specified) Combined Routes*
  - Acenaphthylene, Butylbenzylphthalate, Benzo(a) pyrene, Acenaphthene, Iron, Aroclor-1242, Total PAHs, Chrysene, 4-Methylphenol, Benzo(a)anthracene

Interim Remedy:

In response to evidence of cyanide- and fluoride-contaminated groundwater plumes, interim remedial actions were sought. The Old North Pond was closed using a synthetic liner, clay, and soil in 1986. It was necessary to take action at the Old South Pond to prevent additional infiltration of rainwater, facilitating mobilization of contaminants from the Old South Pond into the North Plume. Remediation of the Old South Pond began in mid-1995, beginning with a removal action that significantly reduced the hydraulic loading of the area and mitigated the migration of contaminants into the local ground water. This was followed by a new pump-and-treat system, which was able to operate more efficiently due to the removal because it would not be overly affected by Old South Pond contaminants. The volume of ground water treated was not documented.

Final Remedy:

The selected remedy addresses ground water, soil, sediment, and surface water media and reduces risks to onsite workers and site visitors from the surface soil and surface water. In addition, the remedy mitigates contaminant migration to ground water and surface water from source materials. The site was divided into contaminant areas to more effectively address the risk. The overall remedial actions taken include

(1) excavation of onsite soils with offsite disposal, deed restrictions, and installation of a physical barrier (fence), monitoring, and a cap and vegetative cover;

(2) excavation of sediment and onsite disposal (cap); and

(3) collection and treatment of leachate.

Approximately 850 cubic yards of PCB-contaminated soils, 4,200 cubic yards of other contaminated soils, and 2,000 cubic yards of contaminated sediment were excavated and disposed of.

Omaha Lead NPL Site Summary

EPA ID: NESFN0703481
Location: Omaha, NE
EPA Region: 7
Status: NPL - Final

Number of Operable Units: 2
Date of NPL Listing: 2003
Last Operational Year: 1997
Documents Used: RI/FS & RODs (Various by OU)

Introduction:

The Omaha Lead site, located in Douglas County, Nebraska, includes surface soils present at residential properties, child care facilities, schools, and other residential-type properties in eastern Omaha that have been contaminated as a result of air emissions from lead smelting operations. The total area of the Omaha Lead site is approximately 8,840 acres. Multiple facilities were involved in activities contributing to lead contamination at the site. The ASARCO facility conducted lead refining operations from the early 1870s until 1996. The ASARCO facility is located on approximately 23 acres on the west bank of the Missouri River in downtown Omaha. During the operational period, lead and other heavy metals were emitted into the atmosphere through smoke stacks. The pollutants were transported downwind in various directions and deposited on the ground surface due to the combined process of turbulent diffusion and gravitational settling. In addition, Gould, Inc. operated as a lead battery recycling plant and was considered a secondary lead smelter in the area. The Gould, Inc. plant closed in 1982. Soil testing of approximately 35,000 residential properties has revealed widespread lead contamination over eastern Omaha. The lead contamination is found in surface soils that are accessible and pose a risk to children 6 years of age and younger. In addition, the Douglas County Health Department has been screening children for lead poisoning for approximately 25 years. This blood lead screening has shown that several ZIP codes in close proximity to the former lead refinery have a high occurrence of elevated blood lead levels in young children. Lead is classified by the U.S. Environmental Protection Agency (EPA) as a probable human carcinogen and a cumulative toxicant. Due to the extent of contamination, the site response was divided into two operable units (OUs). OU1 addresses high child impact properties and the most highly contaminated Omaha Lead Site properties, and OU2 addresses the remaining properties that exceed risk-based soil lead levels.

Summary of Site-related Contamination:

Site-related contamination is the result of smelting operations; specifically, lead particulates in air emissions from smelter stacks. Site operations have contaminated surface soil media and dust particulates with several inorganic contaminants (aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, thallium, vanadium, and zinc).

Conclusion of Site-related Risk:

The primary threats contributing to human health risks, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals (antimony, arsenic, lead, mercury, and thallium). The major medium of concern for human exposure to inorganic contaminants is soil. The receptors with potentially high risk from contaminated soil are current residential adults and children. The primary routes of exposure to contamination are ingestion (accidental or intentional) and dermal contact.

Site-wide, the primary contributors to human health risk are (1) arsenic [current cancer risks of 1E-03 to residential receptors from surface soil ingestion and dermal contact combined; non-cancer HQs values of 24 and 3 for ingestion and dermal contact of soil by residential children and adults, respectively]; (2) lead [32% of total properties analyzed for lead levels had elevated blood lead levels in current residential children (P10 values exceeded by 5%)]; (3) mercury [current HQs of 17 and 2 for ingestion and dermal contact of soil by residential children and adults, respectively]; and (4) thallium [current HQs of 11 and 1 for ingestion and dermal contact of soil by residential children and adults, respectively)].

No ecological risks are available for the Omaha Lead Site because an ecological risk assessment was deemed inappropriate due to site operations and a lack of sufficient habitat.

Site-Wide Human Health Risk Driver(s):

Surface Soil

- *Current Resident, Ingestion (Blood Lead Levels)*
    - Lead

Surface Soil, Cancer

- *Current Adult and Child Resident, Ingestion and Dermal Contact*
    - Arsenic

Surface Soil, Non-cancer

- *Current Adult and Child Resident, Ingestion and Dermal Contact*
    - Antimony, Arsenic, Mercury, Thallium

Site-Wide Ecological Risk Driver(s):

Ecological risk assessment was not conducted

Interim Remedy:

A time-critical removal action was performed addressing OU1 (High Child Impact Properties) are

(1) excavation, backfilling, and re-vegetation of lead-contaminated residential soils in an estimated 5,600 residential-type properties exceeding 800 parts per million (ppm) and properties exceeding 400 ppm considered high child impact areas or with a residing child exhibiting an elevated blood lead level;

(2) participation in a comprehensive remedy with other organizations and agencies to characterize and address all identified sources of lead exposure at the site;

(3) stabilization of exterior lead-based paint that threatens the long-term protectiveness achieved through excavation and replacement of lead-contaminated surface soils;

(4) removal of interior dust in instances where contaminated soils contribute to interior lead dust loadings; and

(5) health education for the Omaha community and medical professionals to support public awareness; exposure prevention programs; in-home assessments; blood-lead screening programs; and diagnosis, treatment, and surveillance programs.

Final Remedy:

The selected remedial actions address soil for ***OU2 (Remaining Properties)*** are

(1) excavation, backfilling, and re-vegetation of lead-contaminated residential soils in an estimated 9,966 residential-type properties exceeding 400 ppm;

(2) participation in a comprehensive remedy with other organizations and agencies to characterize and address all identified sources of lead exposure at the site;

(3) stabilization of exterior lead-based paint that threatens the long-term protectiveness achieved through excavation and replacement of lead contaminated surface soils;

(4) response to interior dust involving a high efficiency particulate air vacuum program and health education at remediated properties with interior dust lead levels exceeding eligibility criteria; and

(5) health education for the Omaha community and medical professionals to support public awareness; exposure prevention programs; in-home assessments; blood lead screening programs; and diagnosis, treatment, and surveillance programs.

Ophir Mills and Smelter Removal Site Summary

EPA ID: UT0010221516
Location: Ophir, UT
EPA Region: 8

Status: Removal – Time Critical

Number of Operable Units: 1
Date in CERCLIS: 2001
Last Operational Year: Unknown, not currently operating
Documents Used: Action Memorandum & Site Assessment Report

Introduction:

The Ophir Mills and Smelter site is located in Tooele County, south of Salt Lake City, Utah. The town site is located along the intermittent flowing Ophir Creek and between steep mountains both to the north and south, with elevations more than 6,000 feet above sea level. Mining for gold, silver, lead, and zinc took place in an adjoining drainage northeast and southwest of Ophir. Most of the metals were produced between 1870 and the 1930s, and the area includes several mines, two mills, and a smelter. All past workings have been abandoned, leaving behind several old mines, waste rock and tailing piles, and mill foundations scattered throughout the town and surrounding areas. These workings were the source of wastes that have migrated to the residences, as well as to settling ponds along the drainage. These hazardous substances appear to have been released into the residential soils by site-related mining activities and spread in and around the City of Ophir by water drainage and manual and aerial deposition. Presently, the Town of Ophir has a population of 31 full-time residents. There are approximately 23 homes occupied year-round or seasonally. Additionally, there are campsites and vacant areas within the community with soil that contains metal contaminants that vary in degree but are generally high in concentrations of lead and arsenic. Mines and mine waste dumps may be located upgradient of or near the source protection area for Ophir's municipal water sources. These water sources, which include two municipal wells, provide 100 percent of the municipal water supply for Ophir's residents. The removal action was intended to take immediate steps to minimize direct exposure to individuals who come into contact with surficial soils/contaminated dust.

Summary of Site-related Contamination:

Site-related contamination is the result of mining, milling, and smelter operations; specifically, abandoned mines, waste rock and tailing piles, mill foundation debris, and settling ponds. Site operations have contaminated various media (surface soil, dust, sediment, and surface water). The site contaminants present at the site are inorganic chemicals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc).

Conclusion of Site-related Risk:

A soil screening assessment at the site focused on inorganic contaminant levels (primarily arsenic, cadmium, and lead), in surficial and sub-surface soils at occupied and vacant residential lots, tailing piles, Ophir Creek, and other suspected areas of contamination associated with site-related mining operations. Sample analyses showed the presence of arsenic varying from 12 to 2300 parts per million (ppm) and lead from 20 to 54,000 ppm. Due to high levels of arsenic and lead sampled, no human health or ecological risk assessments were conducted and an immediate, time critical, removal action was conducted to minimize the direct exposure to current residential receptors that come into contact with contaminated soil and dust. The primary routes of exposure to residential soils, increasing health risks, are the current combined exposure via ingestion, inhalation, and dermal contact.

Final Remedy:

The selected remedy addresses soil and vegetation. The remedy includes the following actions:

(1) contaminated soils will be removed and waste piles on designated residential lots with steep slopes will be stabilized;

(2) individual residences where soil is removed will be backfilled with clean material, usually sand, and top soil to the original grade and landscaped with sod or other plants, etc.;

(3) structures and fencing on the properties will be left in place or returned to their original locations if removal is necessary (if fencing cannot be reused, it will be replaced);

(4) contaminated soils may be consolidated at a staging area and secured in storage prior to disposal; contaminated soils may also be placed in an onsite repository if existing mining waste piles are available;

(5) existing shrubs and/or bushes (defined as low, densely branched plants that impede soil removal) will be removed and replaced with the same or other locally available species, standard nursery stock, and number of plants;

(6) existing perennial plants will be removed and replaced with the same (to the extent possible) or similar species, approximate size, and number of plants;

(7) existing landscape covers and borders will be removed and replaced with equivalent materials in areas requiring remediation; however, the original materials may also be used if soil is removed before replacement and materials are not damaged during removal or they are not contaminated;

(8) movable buildings and sheds will be temporarily relocated during remediation, if remediation is necessary at that location; and

(9) prevention of indoor dust will be accomplished by employing dust suppression measures during the Removal Action.

In addition, owners will be asked for permission to remediate their properties. If a property owners refuses to grant permission, that property will not be remediated. Detailed plans will be developed with the owners for each property, and owners will be provided copies. The removal schedule will also be provided to the owner. After the removal has been completed, each owner will review the action with the On-Scene Coordinator OSC and discuss any future activities.

Ormet Corporation NPL Site Summary

EPA ID: OHD004379970
Location: Hannibal, OH
EPA Region: 5
Status: NPL - Final

Number of Operable Units: 1
Date of NPL Listing: 1987
Last Operational Year: Presently in operation
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Ormet Corporation operates an active, primary aluminum smelter on approximately 245-acre tract of land on the Ohio River in Hannibal, Monroe County, Ohio. Since the facility began operations in 1958, its main process has been the reduction of alumina to produce aluminum metal. The site includes the remainder of a 10-acre former spent potliner storage area (FSPSA), five unlined former disposal ponds (FDPs) (totaling approximately18 acres), a construction material scrap dump (CMSD), and a carbon runoff and deposition area (CRDA). From 1958 to 1968, approximately 85,000 tons of spent potliner were placed in the unlined FSPSA. From 1968 to 1981, Ormet removed much of the potliner waste from the FSPSA and transported it to an onsite recovery plant that removed cryolite from the potliner. Approximately 370,000 cubic yards of waste slurry from the cryolite recovery plant was routed to the largest FDP, although the other FDPs may have received minor amounts of cryolite plant waste. The tailings are alkaline and consist primarily of carbonaceous material from the potliner, along with sodium and calcium-based salt. The four smaller FDPs received approximately 50,000 cubic yards of process waste from the air emissions wet-scrubbing system in the form of sludge. From about 1966 until mid-1979, Ormet deposited waste (e.g., construction materials and other miscellaneous plant debris, including capacitors and spent potliners) in the CMSD. In 1972, following the identification of high groundwater levels of fluoride coming from one of the FDPs, two extraction wells were installed to intercept the contaminated groundwater plume before it reaches the process water well on the reduction plant property; these wells have operated continuously through the present day. This contaminated ground water is sent to an onsite treatment plant. Since 1980, spent potliner material generated by the plant has been transported off site for disposal. The CRDA contains carbon deposits, probably carried there by stormwater runoff from an area of the Ormet plant where spent graphite anodes were crushed in a mill. The site has one operable unit (OU), which is addressed by the human health and ecological risks.

Summary of Site-related Contamination:

Site-related contamination is the result of smelting operations and aluminum production; specifically, a potliner storage area, unlined disposal pond impoundments, a scrap dump, and a carbon run-off and deposition area. Site operations have contaminated various media (soil, sediment, surface water, and ground water) with numerous contaminants. Ground water is contaminated with inorganic chemicals (arsenic, beryllium, fluoride, vanadium, and manganese) and also cyanide compounds and tetrachloroethene (PCE). Soils and sediments in a backwater area were contaminated with inorganic fluoride, cyanide, polyaromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). In addition to defining the contamination found in the disposal areas, seeps were discovered during the Remedial Investigation near the Plant Recreational Area ball fields and along the western edge of the CMSD. The seeps contained cyanide ranging in concentrations from 79 to 950 parts per billion (ppb).

Conclusion of Site-related Risk:

The primary threats contributing to human health risk, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals (arsenic, beryllium, fluoride, manganese, and vanadium), PAHs (tetrachloroethene), and PCBs. The media of concern for human exposure to contaminants are soil, surface water, ground water, sediment, air, and contaminated fish. The receptors with potentially unacceptable risk from these media are current residential adults and trespassers, future residential children and adults, and occupational receptors. The primary routes of exposure to these media are ingestion (accidental or intentional), dermal contact, and inhalation.

In OU1, the primary contributors to human health risk are (1) carcinogenic contaminants (current cancer risk of 1E-01, 2E-04, and 2E-05 for residential adult ingestion of fish, trespasser ingestion of sediment [PCBs and PAHs], and trespasser dermal contact of sediment, respectively; future cancer risk for residential receptors ranging from 7E-06 to 7E-03 [arsenic, beryllium, vanadium, PAHs, and PCBs] for the inhalation of air and ingestion of soil, respectively; future occupational cancer risks of 1E-03 [arsenic, beryllium, fluoride, manganese, vanadium, cyanide, and PCE] for ingestion of ground water); and (2) non-carcinogenic contaminants (future non-cancer HQs of 600 [arsenic, beryllium, fluoride, manganese, vanadium, cyanide, and PCE], 100, and 30 [arsenic, beryllium, fluoride, manganese, vanadium, cyanide, and PCE] for residential child, residential adult, and occupational receptors ingestion of ground water, respectively).

In OU1, ecological risks have been identified from exposure to inorganic chemicals (antimony and lead) and organic chemicals, such as cyanide and semi-volatiles (PAHs and PCBs). The pathways of concern to ecological receptors are surface water and sediment. The ecological receptors with potentially unacceptable risk from these media are current aquatic organisms. Although not quantified, the potential ecological risks were reported as sub-lethal and adverse or other toxic effects. Additionally, two state endangered species are found in the general vicinity of the site: the Ohio Lamprey and Channel Darter.

Human Health Risk Driver(s):

<u>Operable Unit 1:</u>

Food-Fish, Cancer
- *– Current Adult Resident, Ingestion*
  - Carcinogenic Contaminants

Air, Cancer
- *– Future Resident, Inhalation*
  - Carcinogenic Contaminants

Ground Water, Cancer
- *– Future Resident and Worker, Ingestion*
  - Arsenic, Beryllium, Fluoride, Manganese, Vanadium, Cyanide, Tetrachloroethene

Ground Water, Non-cancer
- *– Future Adult and Child Resident and Worker, Ingestion*
  - Arsenic, Beryllium, Fluoride, Manganese, Vanadium, Cyanide, Tetrachloroethene

Sediment, Cancer
- *– Current Trespasser, Ingestion*
  - PAHs and PCBs

Soil, Cancer
- *– Future Resident and Trespasser, Ingestion*
  - Arsenic, Beryllium, Vanadium, PAHs, and PCBs

Surface Water, Cancer
- *– Future Resident, Ingestion and Dermal Contact*
  - Carcinogenic Contaminants

Ecological Risk Driver(s):

<u>Operable Unit 1:</u>

Surface Water and Sediment
- *– Current Aquatic Organisms*
  - Antimony, Lead, Cyanide, PCBs, and PAHs

Final Remedy:

The selected remedy addresses ground water, leachate, soil, and sediment and reduces risks associated with exposure to contaminated media. Additionally, the remedy mitigates contaminant migration to surface water from ground water and source materials. The overall remedial actions taken include

(1) pumping of ground water, the use of interceptor wells to maintain the capture zone of contaminated ground water, and subsequent treatment, with discharge into the Ohio River;

(2) use of trench drains to intercept and extract seeping leachate, with subsequent treatment to National Pollution Discharge Elimination System discharge limits;

(3) soil excavation, recontouring, and covering, with a dual-barrier cap;

(4) soil treatment by in-situ flushing;

(5) sediment dredging, with solidification and capping for sediments with PCB concentrations below 50 ppm and offsite disposal in an EPA-approved disposal facility for those sediments that exceed 50 ppm PCBs; and

(6) use of institutional controls to limit ground water and land use.

Palmerton Zinc Pile NPL Site Summary

EPA ID: PAD002395887
Location: Palmerton, PA
EPA Region: 3
Status: NPL – Final
Number of Operable Units: 4
Date of NPL Listing: 1983
Last Operational Year: 1980
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Palmerton Zinc Pile Site is a former primary zinc smelting operation located in Carbon County, Pennsylvania, near the Lehigh Gap and ~15 miles north of Allentown, Pennsylvania. The site and resulting contamination originates from Palmerton smelting operations. Over 70 years, the New Jersey Zinc Company deposited 33 million tons of slag at the site, creating a cinder bank—a smoldering residue pile—that is approximately 2.5 miles long, 100 feet high, 500 to and 1,000 feet wide, and that covers approximately 200 acres. Smelting operations emitted large amounts of lead, cadmium, zinc, and arsenic as dust and particulate fallout from stack emissions. Primary zinc smelting was discontinued in December 1980. The West Plant is currently not active. The East Plant houses a current electric arc furnace dust processing operation. The site was added to the NPL in 1983 because of environmental risks posed by the cinder bank. Emissions from the former smelting operations have led to elevated levels of inorganic chemicals throughout the Palmerton area. As a result, approximately 2,000 acres on nearby Blue Mountain have been defoliated, leaving a barren mountainside. Soil on the defoliated area of the mountain has contaminated the runoff flowing across it, and erosion has carried contaminants into Aquashicola Creek and the Lehigh River. The site is divided into four Operable Units (OUs):

OU1– addresses re-vegetation of approximately 2,000 acres of non-residential land;

OU2– consists of remediation of the cinder bank;

OU3– consists of remediation of residential soils and interior house dust exhibiting elevated levels of lead; and

OU4– concerns an area-wide investigation of contamination in the ground and surface waters and includes an Ecological Risk Assessment.

Summary of Site-related Contamination:

Site-related contamination is the result of smelting operations, specifically slag piles and dust/particulates emitted from smelting stacks. Site operations have contaminated various media (surface soil, sediment, ground water, surface water, fish tissue, plant tissue, residential dust, and debris) with inorganic chemicals. OU1 (Blue Mountain) and OU2 (Cinder Bank Contamination) is primarily due to cadmium, lead, and zinc; OU3 (Community Soil Contamination) is primarily due to arsenic, cadmium, lead, and zinc and has elevated exposure risks for residential receptors; and OU4 (Ground Water, Surface Water, and Fish Tissue Contamination) is due to inorganic chemicals (arsenic, cadmium, chromium, copper, lead, manganese, nickel, and zinc) and has elevated exposure risks for residential (adult and child) and occupational receptors, as well as avian and mammalian ecological receptors.

Conclusion of Site-related Risk:

The primary threats contributing to human health and ecological risks, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals (arsenic, cadmium, lead, manganese, nickel, and zinc). The two major media of concern for human exposure to inorganic contaminants are soil/dust and ground water. The receptors with potentially unacceptable risk from these media are occupational workers and residential child and adult. The primary routes of exposure to these media are ingestion (accidental or intentional) and dermal contact. In past years, children in Palmerton have been found to have elevated levels of lead in their blood from exposure to contaminated community soils.

OU1 and OU2 narratively state that human health risks do exist from exposure to inorganic contaminants; however, no quantitative risks were provided. In OU3, the primary contributor to human health risks are (1) arsenic (current and future risk of 3E-04 to residential receptor from ingestion of contaminated soil/dust); and (2) lead (current probability of 5.9% that residential children exceed the blood lead level of 10 µg/dL from ingestion of soil/dust). In OU4, the primary contributors to human health risk are (1) manganese (future non-cancer risk – hazard quotient (HQ) of 204, 80.1, and 57.2 for residential children, residential adult, and occupational receptor's ingestion of contaminated ground water, respectively), (2) nickel (future non-cancer risk – HQ of 19.7 and 7.74 for residential children and residential adult's ingestion of contaminated ground water, respectively), and (3) zinc (future non-cancer risk – HQ of 154, 60.5, and 43.2 for residential children, residential adult, and occupational receptor's ingestion of contaminated ground water, respectively).

Site-wide ecological risks have been identified for a number of avian and mammalian species from exposure to inorganic chemicals (arsenic, cadmium, chromium, copper, lead, and zinc). The receptor-specific scenarios of exposure were individually evaluated; however, the major pathways were not individually evaluated for each receptor. The pathways analyzed include ingestion of food items and surface water, as well as ingestion, dermal contact, and inhalation of soil and sediment. The greatest site-related risk is posed to two avian receptors (Woodcock and American Robin) from lead exposure. The primary contributors to site-wide ecological risk are (1) arsenic (current HQ of 16.9 for the Meadow Vole); (2) cadmium (current HQ of 77, 56, and 13.5 for the American Robin, Woodcock, and Meadow Vole, respectively); and (3) lead (current HQ of 1585.22, 1156.54, 85.36, and 35.1 for the American Robin, Woodcock, Barn Owl, and Northern Harrier, respectively); and (4) zinc (current HQ of 54.3, 39.6, 15.35, and 12.54 for the American Robin, Woodcock, King Fisher, and Barn Owl, respectively).

Human Health Risk Driver(s):

Operable Unit 3:

Soil, Cancer

– *Current & Future Resident, Ingestion*
- Arsenic

Soil/Dust, Non-cancer

– *Current & Future Resident, Ingestion and Dermal Contact*
- Arsenic

– *Current Child Resident, Ingestion (Blood Lead Levels)*
- Lead

Operable Unit 4:

Ground Water, Non-cancer

– *Current Child Resident, Ingestion*
- Cadmium

– *Future Adult and Child Resident, Ingestion*
- Manganese, Nickel, Zinc

Operable Unit 4 (cont'd):

– *Future Worker, Ingestion*
- Manganese, Nickel, Zinc

– *Future Worker, Dermal Contact*
- Manganese

Ecological Risk Driver(s):

Operable Unit 00 (site-wide):

– *Current Avian, Combined Pathways/ Multiple Routes*
- Cadmium, Lead, Zinc

– *Current Mammalian, Combined Pathways/ Multiple Routes*
- Arsenic, Cadmium

Final Remedy:

The selected remedial actions address soil, ground water, surface water, and indoor air include:

OU1 (Denuded Land on Blue Mountain) –

(1) Soil amendments and re-vegetation with deed restrictions, including the mixing of sewage sludge with a lime and fly ash mixture; and

(2) grass cover has been established on approximately 1,000 acres of Blue Mountain, with approximately 1,000 acres remaining to be re-vegetated.

OU2 (Cinder Bank) – Installation of a cap and cover (about 200 acres to be capped), using soil amendments of sewage sludge with a lime and fly ash mixture, plus collection and treatment of all run-on and run-off water.

OU3 (Residential Soils and Dust) – Pre-amendment of soil with in-situ treatment, soil compaction, soil removal, and/or re-vegetation as a contingent remedy, specialized interior cleaning, including HEPA vacuuming, wet wiping of hard surfaces, and clearance sampling for floors. Finally,

OU4 (Area Wide Ground and Surface Water Contamination) is currently being studied for remedy selection.

Reynolds Metal Company NPL Site Summary

EPA ID: ORD009412677
Location: Troutdale, OR
EPA Region: 10
Status: NPL – Final

Number of Operable Units: 2
Date of NPL Listing: 1994
Last Operational Year: 2000
Documents Used: RI/FS & RODs (Varies by OU)

Introduction:

The Reynolds Metals Company (RMC) site is a former primary aluminum reduction plant. The facility is located approximately 20 miles east of Portland, Oregon. The property borders the Columbia River to the north, the Sandy River to the east, and Salmon Creek to the west. Approximately 108 acres of the 800-acre site were occupied by the former plant area. A U.S. Army Corps of Engineers dike surrounds the plant on the northern and eastern sides and protects the plant from floods. The plant was constructed for the U.S. Government in 1941 to produce aluminum for wartime operations. RMC operated the plant until 2000, when the aluminum-reduction operations were permanently discontinued. Large quantities of wastes were produced at the Reynolds plant during the production of aluminum from electrical equipment. The Columbia and Sandy rivers are used for recreation and fishing, and people reach the rivers by traversing the Reynolds property. The site was divided into two Operable Units (OUs): OU1 addresses source area contamination, and OU2 addresses contaminated ground water. OUs 1 and 2 were remediated together, as documented in the interim remedial action ROD and final action ROD. The risks associated with the site were calculated in a site-wide RI/FS.

Summary of Site-related Contamination:

Site-related contamination is the result of aluminum reduction and processing; specifically, settling ponds, spent potliners, diesel spill areas, dewatering sumps, process residues, and a scrap yard. Site operations have contaminated various media (ground water, surface and subsurface soils, surface water, sediment, and plant tissues). The RMC OUs are contaminated with inorganic chemicals (aluminum, chromium, vanadium, zinc), halides (cyanide, fluoride), and organic polyaromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

Conclusion of Site-related Risks:

The primary threats contributing to human health risk, and the contaminants ultimately driving the site's remedial action, are arsenic, fluoride, PAHs (principally benzo[a]pyrene, dibenz[a,h]anthracene, and benzo[b]fluoranthene), PCBs, and tetrachloroethene. The major media of concern for human exposure to contaminants are surface and subsurface soil, sediment, dredge spoils, and ground water. Potentially unacceptable risks from these media are for future occupational, trespasser, and residential adult receptors. The primary routes of exposure to these media are ingestion (accidental or intentional), inhalation, and dermal contact.

Site-wide, the primary contributors to human health risk are (1) PAHs (current and future risk of 1.01E-04 [benzo(a)pyrene] and 1.95E-05 [dibenzo(a,h)anthracene] for occupational ingestion of soil; 4.88E-05 [benzo(a)pyrene] and 8.91E-05 [benzo(a)pyrene] for trespasser ingestion of soil and sediment, respectively; 5.91E-06 [benzo(a)pyrene] to residential receptors from ingestion of soil); (2) arsenic (current and future risk of 1.39E-05, 9.16E-06, 3.53E-06 for residential ingestion of soil, residential ingestion of dredge spoils, and occupational ingestion of soil, respectively); (3) combined PCB exposure (current and future risk of 2.17E-06 and 1.35E-06 for occupational ingestion of soil and residential ingestion of dredge spoils, respectively); (4) tetrachloroethene (future risk of 4.47E-06 for occupational inhalation of ground water); and (5) fluoride (future residential receptors, non-cancer HI of 3.3 from ingestion of fluoride in ground water).

The pathways of concern to ecological receptors are unspecified, but occur in the upland area and the open water/wetland area habitats. These habitats contain avian and mammalian ecological receptors with current elevated risks from all exposure routes. Avian and mammalian receptors, including the bald eagle and American peregrine falcon, have potential health risks from exposure to inorganic chemicals and halides and organic PAHs and PCBs. Site-wide ecological risks have been identified for a number of avian and mammalian species (coyote and mink) from exposure to site-contaminated media in the upland areas and open water/wetland areas habitats, primarily from inorganic chemicals (aluminum, chromium, fluoride, vanadium, zinc), PCBs, and PAHs. Only the American robin was found to have ecological risks greater than 1E+01 (HQ of 13.0 for aluminum from all pathways in upland areas via all exposure routes).

Human Health Risk Driver(s):
Operable Unit 00 (site-wide):
Soil, Cancer
– *Current & Future Resident, Trespasser, and Worker, Ingestion*
- Arsenic, Benzo(a)pyrene, and Dibenzo(a,h)anthracene

Sediment, Cancer
– *Current & Future Trespasser, Ingestion*
- Risk Driver(s) = Benzo(a)pyrene

Dredge Spoils, Cancer
– *Current & Future Resident and Worker, Ingestion*
- Arsenic and Combined PCBs

Ground Water, Cancer
– *Future Worker, Inhalation*
- Tetrachloroethene

Ground Water, Non-cancer
– *Future Resident, Ingestion*
- Fluoride

Ecological Risk Driver(s):
Operable Unit 00 (site-wide):
Upland Areas
– *Current Avian, Unspecified Pathway/All Routes*
- Aluminum, Chromium, Zinc

– *Current Mammalian (Coyote), Unspecified Pathway/All Routes*
- Aluminum

Open Water/Wetland Areas
– *Current Avian, Unspecified Pathway/All Routes*
- Total PCBs, Fluoride

– *Current Mammalian (Mink), Unspecified Pathway/All Routes*
- Total PBCs, Aluminum, Vanadium, Total PAHs

Interim Remedy:

Between 1995 and 2002, early actions resulting in excavation and off-site disposal of 170,401 tons of contaminated soil and waste material and the installation of rock and soil caps, including 283 tons of contaminated soil from sumps; 515 tons of PCB-contaminated dust, siding, soil, and concrete; 13,900 tons of cryolite; 2,650 tons of soil; 11,542 tons of spent potliner and soil; 1,193 tons of contaminated material; 150 tons of debris; 22,918 tons of waste and soil; 90 tons of PCB-contaminated process residue and soil; and 8,775 tons of process residue, soil, and sediment. Groundwater remedial actions selected in the interim ROD and completed at the site include

(1) the previously described soil source removals;

(2) decommissioning of several production wells and sumps; and

(3) installation of a focused extraction and production well optimization (FE/PWO) system with groundwater monitoring.

Final Remedy:

Following completion of the interim remedial action, no further soil remedial activity was required. Demolition of the RMC plant occurred between 2003 and 2005, during which soil and debris contaminated with asbestos, PCBs, PAHs, and spent potliner was removed to permitted offsite disposal facilities. The selected final remedial actions address ground water with the following actions:

(1) institutional controls to protect future users of the site and ensure that future site uses and the associated ground water are compatible with the cleanup levels achieved;

(2) continued operation of the FE/PWO system until groundwater cleanup levels are achieved;

(3) maintenance and monitoring of capped areas to protect the integrity of the remedy, as well as human health and the environment; and

(4) groundwater monitoring to evaluate the effectiveness of the completed and ongoing cleanup actions.

Silver Mountain Mine NPL Site Summary

EPA ID: WAD980722789
Location: Horse Springs Coulee, WA
EPA Region: 10
Status: NPL - Deleted
Number of Operable Units: 1
Date of NPL Listing: 1986
Last Operational Year: 1982
Documents Used: ROD

Introduction:

The Silver Mountain Mine site is located on 5-acres in Okanogan County, Washington. Silver Mountain Mine was originally opened as the Silver Star in 1902 by the Silver Star Mining Corporation, Tonasket, Washington. Silver, gold, and copper were all extracted from the mine. The main features of interest at the site include a heap of mined material ("leach heap") and a trench remaining from an abandoned cyanide heap leaching operation ("leachate pond"). Directly west of the leach heap is a larger pile of unprocessed mined material (the "mine dump"). In 1980 and 1981, the mine used cyanide in its processing operations. Approximately 1,100 gallons of cyanide were poured over silver tailings, which had been placed on top of a plastic liner, in an effort to extract gold. The water running off the pile was collected in a plastic lined basin. The site contains more than 2,500 tons of contaminated tailings and 20,000 gallons of contaminated liquid. According to the state, at one time the site contained liquid cyanide at 1,100 parts per million (ppm). The leach heap operation was abandoned in late 1981 without cleanup of contaminated material. The site was kept as one Operable Unit (OU 00) that addresses site-wide contamination.

Summary of Site-related Contamination:

Site-related contamination is the result of mining operations; specifically, leaching operations and leaching ponds. Site operations have contaminated various media (surface soil, ground water, and surface water) with numerous inorganic chemicals, primarily aluminum, antimony, arsenic, copper, and lead. These contaminants originate from the leach heap operations that took place at the mining site.

Conclusion of Site-related Risk:

The primary threat contributing to human health and ecological risks, and the contaminant driving the site's remedial action, is arsenic. Other inorganic chemicals that may pose an elevated health risk include aluminum, antimony, arsenic, copper, and lead. The media of concern for human exposure to inorganic contaminants are surface soil and ground water. Potentially unacceptable risks from exposure to these media are for future site visitors, industrial, and residential receptors. The primary routes of exposure to these media are ingestion (accidental or intentional) and dermal contact.

Site-wide, the primary contributors to future industrial receptors: arsenic (cancer risk of 2.3E-03 from the ingestion and dermal contact of soil and the ingestion of ground water; additionally, risks of 1.9E-03, 1.6E-03, and 2.3E-04 from dermal contact with soil, ingestion of ground water, and ingestion of soil).

Quantified ecological risk information was not available. However, qualitative descriptions of the possible ecological risk were provided. Ecological receptors are primarily exposed to arsenic, aluminum, copper, and lead from soil and surface water. Receptors at greatest risk include vegetation and ruminant wildlife. The greatest documented risk to wildlife and plants is from the arsenic concentrations in the soils surrounding the leach heap. Surface water may continue to be a source of elevated arsenic impacting wildlife. There does not appear to be current risk to wildlife and plants from ground water, and future risk is not anticipated. The seep area may continue to be a source of elevated risk due to aluminum, copper, and lead.

Human Health Risk Driver(s):
Operable Unit 00 (site-wide):
For Industrial Receptors (Residential and site visitor receptors qualitatively stated to also be at risk):
Soil, Cancer
– Future Ingestion & Dermal Contact
- Arsenic

Ground Water, Cancer
– Future Ingestion and Dermal Contact
- Arsenic

Ecological Risk Driver(s):
Operable Unit 00 (site-wide):
Soil and Surface Water – Current Exposure for Vegetation and Wildlife – Possible Risk

Interim Remedy:

The Washington Department of Ecology stabilized the site in June 1985. This activity included

(1) draining the leachate and removing it for off-site treatment;
(2) covering the site with a 3/4-inch cotton liner and a plastic liner;
(3) securing the liners with tires;
(4) removing drums that previously contained hazardous materials;
(5) removing a wooden structure that appeared insecure; and
(6) fencing the site with barbed wire. The life of the liner is estimated at 20 years.

Final Remedy:

The selected remedy addresses ground water, soil, and contaminated mine dump materials and reduces risks to onsite workers and site visitors from the surface soil and waste materials. Additionally, the remedy mitigates contaminant migration to ground water and surface water from source materials. The overall remedial actions taken include

(1) consolidating and grading approximately 5,740 cubic yards of contaminated materials;
(2) covering the materials with a soil/clay cap;
(3) fencing the site and sealing the entrance to the mine;
(4) disconnecting the mine drainage pipe from the existing stock tank and installing a new well in the Horse Springs Coulee aquifer to provide an alternate water supply for the cattle;
(5) placing a deed restriction to protect the cap; and

(6) monitoring the ground water to assure that it does not become contaminated. If groundwater analyses indicate contamination at a concentration in excess of the U.S. Environmental Protection Agency health-based levels, a contingent groundwater treatment program will be implemented.

During construction, conditions prevented the establishment of an alternative stock water supply. Additional risk assessment was conducted, and this element of the remedy was removed. Approximately 5,740 cubic yards of contaminated waste materials were excavated and removed for disposal. Construction has been completed, and the Silver Mountain Site was deleted from the NPL in 1997.

Silverton Mercury Condenser Removal Site Summary

EPA ID: WAN001002702
Location: Silverton, WA
EPA Region: 10
Status: Removal, Time Critical
Number of Operable Units: 1
Date in CERCLIS: 2007
Last Operational Year: 1942
Documents Used: Action Memorandum

Introduction:

The Silverton Mercury Condenser site is located 0.25 miles southwest of Silverton, Washington. Mercury condensers were used on site to extract mercury from ore mined nearby. Currently, two of the original four mercury condensers are still standing, and two of them have been demolished, either intentionally or by age and weather, leaving only the foundation. The site is located on the north bank of Silver Gulch, a historically small, dry stream bed that in the winter of 2006 was widened by flooding. During the flood event, some amount of the north bank soils were eroded down the gulch. This erosion removed soil directly underneath two of the condensers, causing them to partially hang over the edge of the north bank. This site is located in the Mount Baker Snoqualmie National Forest, and there is low-density residential property in the surrounding area. Extraction of mercury in condensers occurs when the ore is placed in a furnace and heated to high temperatures. Potential sources of contamination at the site include the mercury condensers and onsite soils. The potential contaminants of concern at the site associated with these sources are Target Analyte List (TAL) metals. The mine's last years of operation were between 1939 and 1942 when, by federal law, mines that were not producing large amounts of war-essential minerals were closed. Minerals mined or found in the mine include copper, silver, lead, gold, and mercury.

Summary of Site-related Contamination:

Condenser operations have led to site-wide contamination via condenser waste and brick material. Onsite surface soil was contaminated with elevated levels of inorganic chemicals, including arsenic, cadmium, lead, and mercury. Sediments in the Silver Gulch and South Fork Stillaguamish River contain levels of mercury above background concentrations.

Conclusion of Site-related Risk:

The primary current threats to human health and the environment, and the contaminants driving the removal action, are inorganic chemicals (primarily arsenic, cadmium, lead, and mercury). Elevated health risk is possible for human receptors exposed to arsenic, cadmium, lead, and mercury from ingestion of onsite soils. It is also possible that receptors exposed to elevated levels of mercury in downstream sediments may have potential elevated health risks. Migration of contaminants from onsite soils into surface water and ground water may be a problem in the future to residential receptors ingesting these media. Ecological threats may exist from exposure to contaminated surface water, primarily in the gully south of the Stillaguamish River due to elevated inorganic chemicals migrating from the site and elevated mercury in sediments. Specific risk information was not provided in available documentation.

Final Remedy:

The selected remedy addresses soil and condenser structures as well as the migration of contaminants to water. To reduce the risk to residents, the selected remedy includes

(1) the excavation and removal of remaining condenser structures,

(2) soil excavation and removal, and

(3) backfilling and topping of excavated areas. The quantity of media removed was not indicated.

Stauffer Chemical Co. (Tarpon Springs) NPL Site Summary

EPA ID: FLD010596013
Location: Tarpon Springs, FL
EPA Region: 4
Status: NPL - Final

Number of Operable Units: 2
Date of NPL Listing: 1994
Last Operational Year: 1981
Documents Used: RI/FS & ROD

Introduction:

The Stauffer Chemical Company Tarpon Springs site is situated on 130 acres along the Anclote River in Tarpon Springs, Pinellas County, Florida. The facility was used to produce elemental phosphorous using phosphate ore mined from deposits in Florida. The plant began production in 1947 and continued to manufacture elemental phosphorous until the plant's closure in 1981. While operating, the plant utilized a system of 17 waste ponds onsite; these unlined ponds no longer contain waste or water. During site operations, radioactive waste material, suspected to have originated from the phosphate ore (radium) processing plant, was disposed onsite. Land use in the surrounding area includes light industrial, commercial, and residential functions. The most significant surface water bodies near the Tarpon Springs site are the Anciote River, located along the site's southern and western boundaries, and the Gulf of Mexico, located approximately 2 miles from the site. Two primary aquifers underlie Pinellas County and the site: the surficial aquifer and the Floridan aquifer. The surficial aquifer ground water is relatively shallow, which limits its usefulness as a drinking water supply; however, the aquifer provides water for irrigation purposes. The Floridan aquifer, consisting of a thick sequence of carbonate (limestone) rocks that are hydraulically connected, provides most of the public water supply for Pinellas County. There are no active residential or commercial wells either onsite or between the site and the Anclote River; therefore, no ground water users exist onsite or down-gradient of the site. The decision to decommission and dismantle the plant permanently was made in 1983. The site is divided into two operable units (OUs): OU1 addresses contaminated soil and ground water affected by source material, and OU2 addresses contaminated ground water in the surficial aquifer. A remedial investigation of OU2 had not yet begun as of March 22, 2011.

Summary of Site-related Contamination:

Site-related contamination is the result of mineral processing operations; specifically, unlined waste ponds and radioactive waste material from phosphate ore processing. Site operations resulted in the contamination of soils, sediment, ground water, surface water, and plant and fish tissues. OU1 is primarily contaminated with inorganic chemicals (arsenic, beryllium, cadmium, and fluoride), polyaromatic hydrocarbons (PAHs), and radionuclides (lead-210, radium-226, radon-222, and radium-228).

Conclusion of Site-related Risk:

The primary threats contributing to human health risk, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals (arsenic, beryllium, cadmium, and fluoride) and radionuclides (lead-210, radium-226, radon-222, and radium-228). The two main media of concern for human exposure to inorganic contaminants are ground water and surface soil, while the media of concern for human exposure to radionuclides are surface soil, plant tissue, and road-bed material. The receptors with potentially unacceptable risk from exposures to these media are residential child and adult (future) and occupational worker (current and future).

The primary routes of exposure to these media are ingestion (accidental or intentional), inhalation, and external radiation.

In OU1 (contaminated soil and ground water), the primary contributors to human health risk are (1) combined radionuclide contaminants (current risks range from 4.5E-03 for occupational external radiation to 1.8E-06 for occupational ingestion of surface soil, while current residential risks are highest for adults inhaling radon-222 in outdoor air; future risks range from 2.2E-02 and 5.7E-03 to 2.5E-06 and 1.6E-04 for adult and child residential receptors, respectively, from ingestion of plant tissue; and future risks range from 1.2E-02 (non-cancer HQ of 200) and 4.5E-03 (non-cancer HQ of 90) to adult residential and both adult occupational receptor and residential child, respectively, from external radiation from surface soil)l (2) arsenic (future risks range from 2.0E-02 and 1.0E-2 for adult residential and child residential receptors, respectively, from ingestion of ground water to 1E-04 and 3E-04 for the ingestion of surface soil); and (3) beryllium (future cancer risk of 6.0E-03 for a child receptor from ingestion of surface soil). OU2, a remedial investigation of contaminated ground water in the surficial aquifer, has not been performed; therefore, health risks are unavailable.

Current and future ecological receptors with elevated risk are in the wetlands and in the deepwater habitats contaminated with inorganic chemicals and PAHs, although no individual species are named as receptors. OU1 ecological risks have been qualitatively captured for wetland and deep-water habitats as ranging from low to moderate risk. The pathways analyzed include current and future exposure via sediment and surface water, primarily contaminated from inorganic chemicals and PAHs. The ecological risk assessment identified 34 threatened species that inhabit the area in and around Stauffer Chemical Co., including avian, mammalian, and reptilian species. The ecological analysis was conducted on a site-wide, rather than OU-specific, basis.

Human Health Risk Driver(s):

Operable Unit 00 (site-wide):

Food-Plant Tissue, Cancer

– Future Adult & Child Resident, Ingestion
- Lead-210, Radium-226, Radium-228

Ground Water, Cancer

– Future Adult & Child Resident, Ingestion
- Arsenic

Surface Soil, Cancer

– Future Adult & Child Resident, Ingestion
- Radium-226, Beryllium

Surface Soil/Roadbed Material, Cancer

– Future Adult & Child Resident, and Worker, External Radiation
- Radium-226

Air (Indoor and Outdoor)

– Future Adult & Child Resident, and Worker, Inhalation
- Radon-222

Ground Water, Non-cancer

– Future Adult & Child Resident, Ingestion
- Arsenic, Fluoride

Ecological Risk Driver(s):

Operable Unit 00 (site-wide):

Low to moderate qualitative risk for wetland and deep-water habitat

Final Remedy:

The following lists outline the selected remedial actions address soil, waste material, and ground water.

OU1 –

(1) excavation of radiological and chemical contaminated material/soil exceeding Residential Cleanup Standards;

(2) consolidation of the radiological and contaminated media (soil) in the main pond area and capping of the consolidation area;

(3) implementation of institutional controls, including deed restrictions, land-use ordinances, physical barriers, and water supply well permitting prohibitions to limit access to the site and prohibit the disturbance of the remedy; and

(4) in-situ solidification/stabilization of pond material and contaminated soil below the water table in the consolidation areas onsite.

OU2, the remedial investigation study, has not yet begun.

Summitville Mine NPL Site Summary

EPA ID: COD983778432
Location: Rio Grande County, CO
EPA Region: 8
Status: NPL - Final

Number of Operable Units: 5
Date of NPL Listing: 1994
Last Operational Year: 1992
Documents Used: RI/FS & ROD (Various by OU)

Introduction:

The Summitville Mine Site is a former open-pit mining operation located in the San Juan Mountains near Del Norte in Rio Grande County, Colorado. Gold and silver mining began around 1870 at the site. The most recent operator, Summitville Consolidated Mining Corp., Inc. (SCMCI), began open-pit mining and gold recovery through heap leaching in 1986. SCMCI originally designed the mining operation as a non-discharging wastewater facility. Problems with discharges eventually required SCMCI to obtain a NPDES permit from the state to operate a wastewater treatment plant. Several releases of water contaminated with cyanide and metals have been documented at the mine. The state has issued Notices of Violation to SCMCI for unpermitted releases of contaminated water. Fish kills have been reported from Wightman Fork, approximately 20 miles downstream from the mine site. The site was added to the NPL in 1994 due to the threat to human health and the environment posed by contamination of soil, surface water, and ground water resulting from the mining and heap leaching operations. Due to the highly mineralized character of the site, almost all exposed earthen materials are capable of acid generation. The site is divided into five Operable Units (OUs):

OU1– addresses acid mine drainage (AMD) and cyanide contaminated waters from the Heap Leach Pad (HLP);

OU2– addresses acid mine drainage from the Cropsy Waste Pile (CWP), Summitville Dam Impoundment (SDI), Beaver Mud Dump (BMD), and Mine Pits;

OU3– (South Mountain Groundwater) was incorporated into the site-wide RI/FS in the late 1990s and moved into OU5;

OU4– (Mine Site Reclamation/Re-vegetation) includes grading and re-vegetation, rehabilitation of existing ditch systems, and construction of new ditches; and

OU5– (Final Site-wide Remedy) is a final action that will address the threats to the environment that remain at the site after completion of emergency and interim remedial actions.

Summary of Site-related Contamination:

Site-related contamination is the result of mining operations; specifically, heap leaching operations. Site operations have contaminated various media (surface soil, ground water, and surface water) with numerous contaminants; specifically, inorganic chemicals (aluminum, arsenic, cadmium, hexavalent chromium, copper, cyanide, iron, lead, mercury, manganese, silver, and zinc). All of these contaminants, except cyanide, occur naturally at the site, but are made soluble in the AMD generating chemical process, which is accelerated by the mining activities. AMD water contributes metal loads to Wightman Fork and the Alamosa River. This creates adverse conditions that prevent the growth and maintenance of a healthy aquatic ecosystem. These adverse effects have been noted in various studies of water quality of Wightman Fork and the Alamosa River.

Conclusion of Site-related Risk:

Human exposure to these site-related contaminants is limited, since no one lives onsite or within 2 miles of the site, and site ground water is not used for drinking. For those risks present offsite, the primary threats contributing to human health risks, and the contaminants ultimately driving the site's remedial action, are arsenic and manganese. The major media of concern for human exposure to these inorganic contaminants are surface water and ground water. The receptors with potentially unacceptable risk from these media are residential and recreational receptors. The primary routes of exposure to these media are ingestion (accidental or intentional) and dermal contact.

Due to limited potential exposure, human health risks were only captured for OU5. The primary contributors to human health risk are (1) arsenic (cancer risk of 2.0E-06 to current residential and recreational receptors from ingestion or dermal contact with surface water, respectively); and (2) total inorganic contaminants (primarily manganese) (current hazard quotient [HQ] values of 8 and 3 from groundwater ingestion to current residential child and adult receptors, respectively).

The primary contributors to ecological risk include inorganic chemicals (primarily copper). The receptors identified to have significant risk include rainbow trout and benthic macroinvertebrates, both of which had an HQ >1 associated with direct contact and ingestion of surface water and sediment and ingestion of food items.

Human Health Risk Driver(s):

Operable Unit 5:

Ground Water, Non-cancer

– Current Resident, Ingestion

- Manganese

Surface Water, Cancer

– Current Resident & Recreational Adult, Ingestion and Dermal Contact

- Arsenic

Ecological Risk Driver(s):

Operable Unit 5:

Surface Water, Sediment, Food Items

– Current Rainbow Trout and Macroinvertebrates, Ingestion and Direct Contact

- Copper

Interim Remedy:

The selected interim remedial actions addressing soil, ground water, and surface water include the following for each OU.

OU1 –

(1) development and implementation of HLP solution collection system consisting of injection/extraction wells installed in the HLP;

(2) pumping and treating of the contaminated leachate;

(3) short-term bio-treatment of waters, in-situ bio-treatment of ore and leachate using cyanide-destroying bacteria;

(4) grading, re-contouring, capping, and re-vegetating the HLP to reduce the volume of water to be treated;

(5) installation of a lined surge pond and a bioreactor using sulfate-reducing bacteria to treat acid waters generated after the HLP is remediated; and

(6) periodic monitoring of ground water for cyanide and/or metal concentrations.

OU2 –

(1) excavation of the Cropsy Waste Pile to an elevation of 11,620 feet;

(2) excavation of the Beaver Mud Dump and Summitville Dam Impoundment;

(3) lining of the Bottom of the Mine Pits with a layer of pH neutralizing material; and

(4) placement and capping of excavated material in the Mine Pits, comprising approximately 4.5 million cubic yards.

OU3 – OU 3 was incorporated into OU5.

OU4 –

(1) reclamation of approximately 504 acres of disturbed land;

(2) rough grading of all areas to be reclaimed to a 33 percent or less grade;

(3) use of on-site topsoil that was previously stockpiles and stored;

(4) addition of an optimum amount of amendments needed to produce a topsoil capable of promoting and sustain plant growth;

(5) reconfiguration of the areas for slope stabilization, erosion control, and moisture retention;

(6) seeding with a seed mixture designed to establish a natural, self-sustaining vegetative cover; and

(7) provision of adequate weather protection for the severe site conditions.

Final Remedy:

The selected remedial actions addressing soil, ground water, and surface water include the following for each OU.

OU5 (Final Site-wide Remedy) –

(1) on-site contaminated water impoundment upstream of the Wightman Fork-Cropsy Creek confluence;

(2) construction of a new gravity-fed water treatment plant downstream of the contaminated water impoundment;

(3) possible breach and removal of the existing Summitville Dam Impoundment;

(4) construction of a sludge disposal repository;

(5) upgrade of Wightman Fork Diversion;

(6) upgrade of select site ditches;

(7) construction of groundwater interceptor drains;

(8) construction of a Highwall ditch;

(9) rehabilitation of Reynolds Adit;

(10) management of mine pool water;

(11) continued site maintenance, and ground water/surface water and geotechnical monitoring on-site; and

(12) surface water, sediment, and aquatic life monitoring in Alamosa River and Terrace Reservoir.

OU00 (site-wide) – continued treatment of the Cropsy Waste Pile drainage and the French Drain waters in the Cropsy Water Treatment Plant.

Teledyne Wah Chang NPL Site Summary

EPA ID: ORD050955848
Location: Millersburg, OR
EPA Region: 10
Status: NPL - Final

Number of Operable Units: 4
Date of NPL Listing: 1983
Last Operational Year: Currently in operation
Documents Used: RI/FS & RODs (Various by OU)

Introduction:

The Oremet-Wah Chang (OWC) (formerly Teledyne Wah Chang) plant is a producer of zirconium and other rare earth metals and alloys. The site is located in Millersburg, Oregon, and includes two areas: (1) a 110-acre plant and a 115-acre area made up of four ponds containing sludges from the plant's wastewater treatment facility, and (2) a 60-acre field where sludge containing radium was used as a soil amendment. Production at the site began in 1957. Solids generated from the process wastewater treatment system have been stored in a number of surface impoundments. Until 1980, sludge was taken to seven unlined storage ponds onsite. Due to the complexity of site contamination, the U.S. Environmental Protection Agency (EPA) divided the site into four Operable Units (OUs): (1)

OU1– addresses a sludge ponds unit, which is being dealt with separately due to the property owners' and the public's wish for an expeditious cleanup of the sludge materials, which may be contributing to ground water contamination at the site;

OU2– addresses ground water and sediments;

OU3– addresses surface and subsurface soils; and

OU4– addresses soils amendment area (recently listed, pending further study).

Summary of Site-related Contamination:

Process wastes from site operations have contaminated various media (surface soil, subsurface soil, sediment, surface water, ground water, and sludge) with numerous contaminants (primarily inorganic chemicals, organic chemicals including chlorinated solvents, and radionuclides). Onsite sludge has been contaminated with radionuclides (radium, thorium, and uranium), volatile organic compounds (VOCs; e.g., methylene chloride, TCE, PCE, 1,1,1 trichloroethane, hexachlorobenzene), metals (chromium, thorium, arsenic, barium, beryllium, copper, mercury, nickel, lead, antimony, selenium, zinc,, and zirconium) and cyanide compounds (unspecified). Creek sediments are contaminated with polychlorinated biphenyls (PCBs). Soil is contaminated with radionuclides, inorganic chemicals, PCBs, and VOCs. Shallow ground water is contaminated with radium, other inorganic chemicals, and VOCs. Radium-contaminated soil may produce radon gas emissions. The discharge of contaminated ground water into nearby creeks could pose ecological risks to aquatic organisms via contaminated surface water, sediment, and food items.

Conclusion of Site-related Risk:

The primary current threats to human health and the environment, and the contaminants driving the remedial action, are inorganic chemicals, organic chemicals (primarily VOCs and PCBs), and radionuclides, accounting for a total of approximately 50 contaminants.

The media of concern for human health include sludge, soil, and ground water exposure for residential, occupational, and trespassing receptors. Primary routes of exposure include ingestion, inhalation, and external radiation. Most human health cancer and non-cancer risks were calculated for contaminants grouped as radionuclides or non-radionuclides. The primary contributors to (future) residential receptor risk include:

OU1– combined ingestion and inhalation of sludge contaminated with radionuclides and non-radionuclides (cancer risk of 3E-03; non-cancer risk hazard quotient [HQ] of 16.5; risk drivers include radionuclides, arsenic, chromium VI, nickel, and hexachlorobenzene);

OU2– ingestion of ground water contaminated with all inorganic chemicals, organic chemicals, and radionuclides (cancer risk of 4E-04; HQ of 5.5; risk drivers for cancer: VOCs, arsenic; risk drivers for non-cancer: VOCs, inorganic constituents); and

OU3– inhalation of soil contaminated with radon (cancer risk of 1.4E-02).

The primary contributors to (future) trespasser receptor risk include combined ingestion and inhalation of sludge contaminated with radionuclides and non-radionuclides contaminants (cancer risk of 5E-06).

The primary contributors to occupational receptor risk include:

OU1– combined ingestion and inhalation of sludge contaminated with radionuclides or non-radionuclides (cancer risk of 1E-03; HQ of 5.2; future occupational receptors; risk drivers include radionuclides, arsenic, chromium VI, nickel, and hexachlorobenzene);

OU2– ingestion of ground water contaminated with inorganic chemicals, organic chemicals, and radionuclides (cancer risk of 6E-03; HQ of 84.75; current occupational receptors; risk drivers for cancer:VOCs, arsenic; risk drivers for non-cancer VOCs, inorganic constituents); and

OU3– inhalation of soil contaminated with radon (cancer risk of 2.9E-03; future occupational receptors).

Ecological risks have been identified for OU2 and include PCBs and hexachlorobenzene. The receptors identified include aquatic organisms and predatory fish. The pathways of concern include ingestion of sediment and fish tissue. The primary contributors to ecological risk are (1) PCBs (ingestion of sediment by aquatic organisms and fish tissue ingestion by predatory fish), and (2) hexachlorobenzene (ingestion of sediment by aquatic organisms and fish tissue ingestion by predatory fish). No ecological HQs were provided. Ecological risk information was not available for other OUs.

Human Health Site-Related Risks:

Operable Unit 1:

Sludge, Cancer

– *Future Resident, Worker, and Trespasser, Ingestion and Inhalation*

- Radionuclides, Arsenic, Chromium VI, Nickel, and Hexachlorobenzene

Sludge, Non-cancer

– *Future Resident and Worker, Ingestion and Inhalation*

- Radionuclides, Arsenic, Chromium VI, Nickel, and Hexachlorobenzene

Operable Unit 2:

Ground Water, Cancer

– *Future Resident, Ingestion*

- VOCs and Arsenic

Ground Water, Cancer

– *Current Worker, Ingestion and Inhalation*

- VOCs and arsenic

Ground Water, Non-cancer

– *Future Resident and Worker, Ingestion*

- VOCs and inorganic constituent

Operable Unit 3:

Soil, Cancer

– *Future Resident and Worker, Inhalation*

- Risk Driver(s) = Radon

Ecological Site-Related Risks:

Operable Unit 2:

Sediment

– *Aquatic Organisms, Direct Contact*

- PCBs and hexachlorobenzene

Food (Fish)

– *Predatory Fish, Ingestion*

- PCBs and hexachlorobenzene

Interim Remedy:

The selected remedial actions addressing sludge include: OU1 –

(1) excavation and removal of 85,000 cubic yards sludge;

(2) a treatment plant that will be built to partial solidify sludge to improve handling and reduce gross mobility of the solid; and

(3) disposal in an offsite landfill.

Final Remedy:

The following lists outline the selected remedy to address ground water and soils.

OU2 –

(1) Extraction and remediation of ground water for areas with unacceptable cancer risk levels until concentrations throughout the site are below Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), non-zero MCL goals, or cancer levels are no longer unacceptable;

(2) discharge of extracted ground water to Teledyne Wah Chang Albany's wastewater treatment plant;

(3) treatment or removal of subsurface source material near the Feed Makeup Building on the main plant;

(4) slope erosion protection consisting of a geotextile covered by riprap placed along the banks of Truax Creek to prevent contaminated fill material from entering the creek;

(5) removal of approximately 3,600 cubic yards of contaminated sediments from the surface water bodies adjacent to, or flowing through, the site (additional ecological characterization prior to removal to determine potential impacts of sediment removal to the local ecosystem and to provide mechanisms to mitigate those impacts);

(6) deed restrictions and institutional controls on land and ground water use for both the main plant and Farm Ponds area (the objective of this component of the remedy is to ensure that the property and ground water are used only for purposes appropriate to the cleanup levels achieved);

(7) environmental evaluations of currently uncharacterized potential contaminant source areas, as needed, to ensure achievement of ground water remedial action objectives RAOs; and

(8) long-term onsite and offsite ground water, surface water, and sediment monitoring, which shall include, at a minimum, the monitoring of onsite wells that are in exceedance of maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) cancer risk levels of 10[-6], and non-cancer risk Hazard Index (HI) > 1 for residential exposure.

OU3 –

(1) Excavation of contaminated material exceeding the gamma radiation action level of 20 micro-rem/hour above background levels;

(2) transportation of the excavated material to an appropriate offsite facility for disposal;

(3) for areas of the site where modeling indicates that radon concentrations in future buildings could exceed 4 pCi/liter, institutional controls requiring that future buildings be constructed using radon-resistant construction methods;

(4) requirement that information on areas of subsurface PCB and radionuclide contamination, which do not pose a risk if they are not disturbed, be incorporated into the TWCA facilities maintenance plan and be made available to future site purchasers or regulatory agencies;

(5) because the determination that action is not required for certain areas of the site is based on scenarios that do not allow unrestricted use, should excavation occur as part of future development of the TWCA Main Plant or the Soil Amendment Area, excavated material must be properly handled and disposed of in accordance with federal and state laws; and

(6) institutional controls requiring that land use remain consistent with current industrial zoning.

Tex-Tin Corp. NPL Site Summary

EPA ID: TXD06211332
Location: Texas City, TX
EPA Region: 6
Status: NPL – Final

Number of Operable Units: 4
Date of NPL Listing: 1990
Last Operational Year: 1991
Documents Used: RI/FS, ROD (Various by OU)

Introduction:

The Tex-Tin site is located in a mixed industrial/petrochemical/residential area at the intersection of State Highway 146 and farm Road FM 519 in Texas City, Galveston County, Texas. The site is approximately 10 miles north of Galveston, Texas, and the City of LaMarque is located about half a mile northwest of the site. The 170-acre Tex-Tin site is a former tin and copper smelter, constructed during World War II. The smelter produced Grade A tin ingots from 1941 to 1988. Annual production at the facility varied from 4,000 to more than 40,000 metric tons of Grade A tin. The waste products consisted primarily of an iron-rich acidic liquid (ferrous and ferric chloride) and slag. From 1988 to 1991, the facility operated as a secondary copper smelter. Tin-lead materials with a high lead content have been used at the facility. Bolivian ore, which was processed at the facility, contains high concentrations of arsenic and copper. Roasting was employed in the smelting process at Tex-Tin, and some of the arsenic and lead present in the materials was removed by volatilization. The site contained numerous waste piles, five wastewater treatment ponds, open and closed acid ponds, slag piles, a permitted low-level radioactive waste landfill, and an inactive hydrocarbon recovery facility. Industrial facilities are located north and west of the site, and marsh areas are located to the south. The site is divided into four Operable Units (OUs):

- OU1– (Tex-Tin Facility) addresses the former tin and copper smelting facility and covers approximately 140 acres, including Ponds 22, 24, 25, and 26;
- OU2– (Amoco Parcel H) addresses 27 acres of the former smelter facility owned by BP Amoco Corporation;
- OU3– (Off-site Residential Area) addresses La Marque residential areas located northwest from the former smelter facility; and
- OU4– (Swan Lake Salt Marsh) addresses the Swan Lake, associated salt marsh habitats, and the Wah Chang ditch east of Loop 197.

Summary of Site-related Contamination:

Site operations have contaminated various media (soil, ground water, sediment, surface water, waste ponds, drums, and additional debris) with numerous contaminants. The site is contaminated primarily with inorganic chemicals (aluminum, antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, tin, vanadium, and zinc), poly-aromatic hydrocarbons (PAHs), and radionuclides (radium-226, radium-228, thorium-228, thorium-230, thorium-232, uranium-234, uranium-235, and uranium-238). Chemical analyses of the surface soil samples collected from 51 residential yards indicate metal contamination at levels greater than three times background levels. An estimated 25,000 people live within a three-mile radius of the site.

Conclusion of Significant Site-related Risk:

The primary threats contributing to human health risk, and the contaminants ultimately driving the site's remedial action, are inorganic chemicals (primarily antimony, arsenic, beryllium, chromium, copper, lead, molybdenum, nickel, silver, tin, and zinc) and radionuclides (primarily radium-226, radium-228, thorium-228). The major media of concern include surface and subsurface soils, sediment, surface water, ground water, drums, waste piles, and homegrown produce. The receptors with potentially unacceptable risk are current and future residential, occupational, and trespassing receptors. The primary routes of exposure to these media include inhalation, ingestion, and external exposure.

The primary contributors to human health cancer risk include the following:

OU1–

(1) radionuclides (cancer risk of 2.30E-02, 1.90E-02, and 7.50E-03 from the inhalation/external radiation to future onsite industrial workers from surface and subsurface soils and waste piles contaminated with radium-226, radium-228, and thorium-228, respectively);

(2) arsenic (cancer risk ranging from 6.30E-03 to 1.6E-04 for current and future onsite occupational receptors from the ingestion of drum contents and sediment/surface water, respectively; the ingestion of arsenic contaminated drum contents also has a non-cancer risk for future onsite occupational receptors of 193.5);

(3) beryllium (cancer risk of 1.5E-03 for future onsite occupational receptors from the ingestion of ground water); and

(4) other inorganic chemicals (non-cancer HQs of 51.5, 39, 29.7, and 27.6 for future onsite occupational receptors ingesting ground water contaminated with cadmium, manganese, copper, and silver, respectively).

OU2: combined exposure to arsenic, chromium, and lead from soil to current and future receptors (cancer risk of 2.04E-04 to industrial workers, 3.33E-06 to construction workers, 6.43E-06 to residential receptors, and 8.45E-06 to trespassers; specific exposure routes were not present in the documents available).

OU3:

(1) arsenic (cancer risk of 8.50E-05 for residential adult ingestion of surface soil and homegrown produce; non-cancer risk of 1.2 and 2.6 for residential ingestion of surface soil to adults and children, respectively);

(2) beryllium (cancer risk of 5.50E-06 to current residential adults from ingestion of surface soil and homegrown produce).

The media of concern for ecological risk are sediment and surface water. The primary contributors to ecological risk are (1) chromium (current HQ of 14.3), (2) lead (current HQ of 8.7), (3) copper (current HQ of 5.2); and (4) zinc (current HQ of 4.3) to benthic macro invertebrates from exposure to sediment. In addition, the site is considered critical habitat for two threatened or endangered species: the White-Faced Ibis and the Reddish Egret.

Human Health Risk Driver(s):

Operable Unit 1:

Soils and Waste Piles, Cancer

– *Future Worker, Inhalation and External Radiation*

- Radium-226, Radium-228, Thorium-228

Drum Contents and Sediment/Surface Water, Cancer

– *Current & Future Worker, Ingestion*

- Arsenic

Ground Water, Cancer

– *Future Worker, Ingestion*

- Beryllium

Drum Contents, Non-cancer

– *Future Worker, Ingestion*

- Arsenic

Ground Water, Non-cancer

– *Future Worker, Ingestion*

- Cadmium, Manganese, Copper, Silver

Operable Unit 2:

Soil, Cancer

– *Future Resident, Worker, and Trespasser (Exposure Route Not Documented)*

- Arsenic, chromium and lead.

Operable Unit 3:

Surface Soil and Homegrown Produce, Cancer

– *Current Adult and Child Resident, Ingestion*

- Arsenic, Beryllium

Ecological Risk Driver(s):

Operable Unit 4:

Sediment

– *Current Benthic Macroinvertebrates*

- Chromium, Copper, Lead and Zinc

Interim Actions:

Response Actions have already addressed exposure risk to industrial workers in OU2. Response Actions included installation of a soil/vegetative cover, construction of a slurry cutoff wall, implementation of a long-term groundwater monitoring program, restricted use of site ground water, and limiting future site use to industrial purposes only. A Time-Critical Removal Action has already reduced risk to residents in OU3 by evacuating soil, backfilling, and re-vegetating affected areas.

Final Remedy:

To address human health and ecological risk from contaminants the following remedial actions were employed:

OU1–

(1) neutralization of acid ponds and disposal of acid liquid, neutralization of acidic sediments, excavation and disposal of sediments exceeding preliminary remediation goals, and capping of materials with clay soil cover;

(2) stabilization of drums and disposal of inorganic contents; offsite disposal of organic content and capping of stabilized materials with clay soil cover;

(3) onsite disposal and capping of naturally occurring radioactive material (NORM) slag, onsite disposal of hazardous non-NORM slag and covering with RCRA Type C or equivalent cap;

(4) covering of soils exceeding preliminary remediation goals (PRGs) with clay soil cover, including the low-level radioactive landfill area, stabilization and disposal of soils identified as principal threat materials, and treatment and disposal of hazardous soils;

(5) discharge of wastewater pond liquids, usage of Pond 2 as a consolidation cell for disposal of hazardous materials, covering of materials exceeding health-based levels with clay soil cover, and capping materials exceeding Toxicity Characteristic Leaching (not Leachate) Procedure (TCLP) levels with an RCRA Type C or equivalent cap;

(6) groundwater remedial actions, including installation of a slurry wall barrier, installation of an enhanced evapotranspiration system, cap and cover of Pond 7 with an impermeable layer, and long-term monitoring;

(7) offsite disposal of organic contents from above ground storage tanks;

(8) removal of dust and asbestos from buildings, building demolition and onsite disposal of debris, recycling of building structural components, and use of building foundations to function as part of cap/cover over surface contamination.

For OU2 and OU3, see interim actions above.

OU4–

(1) implementation of segmented wave barriers in Swan Lake totaling approximately 5,200 feet;

(2) operations and maintenance to ensure wave barrier integrity.

Attachment B3. References for Case Study Historical Sites

Most Superfund documents are available for download at:
https://www.epa.gov/superfund/search-superfund-documents

Five-Year review documents are available for download at:
https://www.epa.gov/superfund/search-superfund-five-year-reviews

Decision documents are available for download at: https://www.epa.gov/superfund/search-superfund-decision-documents

Anaconda (MTD093291656)

ARCO. 1996a. ARCO. *Anaconda Regional Water and Waste Operable Unit, Final Remedial Investigation Report, Volume 1 of 4, Text*. ARCO, Anaconda, MT. February. Retrieved from http://anacondasuperfund.com/library/files/2.18.10.08A.pdf

ARCO. 1996b. ARCO. *Anaconda Regional Water and Waste Operable Unit, Final Remedial Investigation Report, Volume 2 of 4, Text and Appendices*. ARCO, Anaconda, MT. February. Retrieved from http://anacondasuperfund.com/library/files/2.18.10.08B.pdf

ARCO. 1996c. ARCO. *Anaconda Regional Water and Waste Operable Unit, Final Remedial Investigation Report, Volume 3 of 4, Appendices*. ARCO, Anaconda, MT. February. Retrieved from http://anacondasuperfund.com/library/files/2.18.10.08C.pdf

ARCO. 1996d. ARCO. *Anaconda Regional Water and Waste Operable Unit, Final Remedial Investigation Report, Volume 4 of 4, Plates*. ARCO, Anaconda, MT. February. Retrieved from http://anacondasuperfund.com/library/files/2.18.10.08D.pdf

ARCO. 1996e ARCO. *Anaconda Smelter NPL Site, Anaconda Regional Spoils Operable Unit, Remedial Investigation Report, Volume 2 of 2, Figures*. Prepared by Titan Environmental Corporation, Bozeman, MT, for ARCO, Anaconda, MT. October.

ARCO. 1996f ARCO. *Anaconda Smelter NPL Site, Smelter Hill Operable Unit, Remedial Investigation Report, Volume I*. ARCO, Anaconda, MT. December.

ARCO. 1996g. ARCO. *Anaconda Smelter NPL Site, Smelter Hill Operable Unit, Remedial Investigation Report, Volume II: Plates*. ARCO, Anaconda, MT. December. Retrieved at http://anacondasuperfund.com/library/files/2.13.05.05B.pdf

ARCO, 1996h. ARCO. Anaconda Smelter NPL Site, Smelter Hill Operable Unit, Remedial Investigation Report, Volume III: Appendices. ARCO, Anaconda, MT, December 1996. Retrieved at http://anacondasuperfund.com/library/files/2.13.05.05C.pdf

Tetra Tech. 1985. *Background Wells at the Anaconda Smelter Site (Anaconda Smelter RI/FS, Technical Memorandum No. 1)*. Tetra Tech, Inc., Bellevue, WA. October. Retrieved at http://anacondasuperfund.com/library/files/2.01.09.09.pdf

U.S. EPA (Environmental Protection Agency). 1987. *Record of Decision: Mill Creek, Montana, Anaconda Smelter Superfund Site, First Operable Unit, Volume I*. U.S. Environmental Protection Agency, Region 8, Helena, MT. October.

U.S. EPA (Environmental Protection Agency). 1988a. *EPA Superfund Record of Decision: Anaconda Co. Smelter, EPA ID: MTD093291656 OU 15 Anaconda, MT 10/02/1987*. EPA/ROD/R08-88/018. U.S. Environmental Protection Agency, Region 8, Helena, MT.

U.S. EPA (Environmental Protection Agency). 1988b. *EPA Superfund Record of Decision Amendment: Anaconda Co. Smelter EPA ID: MTD093291656 OU 15 Anaconda, MT 01/06/1988*. EPA/AMD/R08-88/500. U.S. Environmental Protection Agency, Region 8, Helena, MT. January 6.

U.S. EPA (Environmental Protection Agency). 1991. *EPA Superfund Record of Decision: Anaconda Co. Smelter EPA ID: MTD093291656 OU 11 Anaconda, MT 09/23/1991*. EPA/ROD/R08-91/053. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. September.

U.S. EPA (Environmental Protection Agency). 1996. *Final Baseline Human Health Risk Assessment, Anaconda Smelter NPL Site, Anaconda, Montana*. Prepared by CDM Federal Programs Corporation, Golden, CO, for U.S. Environmental Protection Agency, Region 8, Helena, MT. January 24.

U.S. EPA (Environmental Protection Agency). 2005. *Third Five-Year Review Report for Anaconda Company Smelter Site, Anaconda, Deer Lodge County, Montana*. U.S. Environmental Protection Agency, Region 8, Helena, MT. September 29. Retrieved from https://quicksilver.epa.gov/work/HQ/179170.pdf

U.S. EPA (Environmental Protection Agency). 2010. *Fourth Five-Year Review Report, Anaconda Smelter Superfund Site, Anaconda, Montana*. U.S. Environmental Protection Agency, Region 8, Helena, MT. September 30.

US EPA & Montana DEQ, 1995. U.S. Environmental Protection Agency and Montana Department of Environmental Quality. *Explanation of Significant Differences: Anaconda Smelter Superfund Site, Old Works/East Anaconda Development Area, Operable Unit (OU 7), Anaconda, Deer Lodge County, Montana*. EPA/ESD/R08-96/501. U.S. Environmental Protection Agency, Region 8, Helena, MT. October. Retrieved from http://www.mtech.edu/academics/clsps/ptc/sciencesocietysuperfund/pdfs/archival_materials/anaconda_archives/anaconda_rod/a_esd_anaconda.pdf

US EPA & Montana DEQ, 1996. U.S. Environmental Protection Agency & Montana Department of Environmental Quality. *EPA Superfund Record of Decision: Anaconda Co. Smelter EPA ID: MTD093291656 OU 16 Anaconda, MT 09/30/1996*. EPA/ROD/R08-96/127. U.S. Environmental Protection Agency, Region 8, Helena, MT. September 30.

US EPA & Montana DEQ, 1998. U.S. Environmental Protection Agency and Montana Department of Environmental Quality. *EPA Superfund Record of Decision: Anaconda*

Regional Water, Waste, and Soils Operable Unit, Anaconda Smelter NPL Site, Anaconda, MT. U.S. Environmental Protection Agency, Region 8, Helena, MT. September.

US EPA & Montana DEQ, 2011. U.S. Environmental Protection Agency and Montana Department of Environmental Quality. *EPA Superfund Record of Decision Amendment: Anaconda Regional Water, Waste, and Soils Operable Unit, Anaconda Smelter NPL Site, Anaconda-Deer Lodge County, MT*. U.S. Environmental Protection Agency, Region 8, Helena, MT. September.

US EPA & Montana DHES, 1994. U.S. Environmental Protection Agency and Montana Department of Health and Environmental Sciences. *EPA Superfund Record of Decision: Old Works/East Anaconda Development Area, Operable Unit, Anaconda Smelter NPL Site, Anaconda, Montana*. EPA/ROD/R08-94/083. U.S. Environmental Protection Agency, Region 8, Helena, MT. July.

Bunker Hill (IDD048340921)

TerraGraphics. 2001. TerraGraphics Environmental Engineering. *Final Human Health Risk Assessment for the Coeur d'Alene Basin Extending from Harrison to Mullan on the Coeur d'Alene River and Tributaries Remedial, Investigation/Feasibility Study*. Prepared by TerraGraphics Environmental Engineering for Idaho Department of Health and Welfare, Idaho Department of Environmental Quality, and U.S. Environmental Protection Agency, Region 10. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/hhra_080101.pdf

U.S. EPA (Environmental Protection Agency). 1991a. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex EPA ID: IDD048340921 OU 1 Smelterville, ID*. EPA/ROD/R10-91/028. U.S. Environmental Protection Agency, Region 10, Seattle, WA. August 30.

U.S. EPA (Environmental Protection Agency). 1991b. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex, ID*. EPA/ROD/R10-91/028. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. August.

U.S. EPA (Environmental Protection Agency). 1992a. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex, EPA ID: IDD048340921 OU 02*. EPA/ROD/R10-92/041. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 22.

U.S. EPA (Environmental Protection Agency). 1992b. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex, ID*. EPA/ROD/R10-92/041. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. September.

U.S. EPA (Environmental Protection Agency). 1996. *EPA Superfund Record of Decision Amendment: Bunker Hill Mining & Metallurgical Complex EPA ID: IDD048340921 OU*

2 Smelterville, ID 09/09/1996. EPA/AMD/R10-96/146. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 9.

U.S. EPA (Environmental Protection Agency). 1997. *EPA Superfund Record of Decision Amendment: Bunker Hill Mining & Metallurgical Complex (Non-Populated Areas) Superfund Site Smelterville, ID 9/9/1996*. EPA/AMD/R10-96/146. U.S. Environmental Protection Agency, Region 10, Seattle, WA., April.

U.S. EPA (Environmental Protection Agency). 1998a. EPA Superfund Explanation of Significant Difference for the Record of Decision: Bunker Hill Mining and Metallurgical Complex Smelterville, ID 4/18/1998. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC, PB98-963106. EPA 541-R98-037, September.

U.S. EPA (Environmental Protection Agency). 1998b. EPA Superfund Explanation of Significant Differences: Bunker Hill Mining and Metallurgical Complex EPA ID: IDD048340921 OU 02 Smelterville, ID 4/18/1998. U.S. Environmental Protection Agency, Region 10, Seattle, WA, EPA/ESD/R10-98/037. April 8.

U.S. EPA (Environmental Protection Agency). 1999. *Superfund Cleanup at Bunker Hill: An Overview*. EPA 910-R-99-09. U.S. Environmental Protection Agency, Region 10, Seattle, WA. April.

U.S. EPA (Environmental Protection Agency). 2000. *First 5-Year Review of the Non-Populated Area Operable Unit Bunker Hill Mining and Metallurgical Complex Shoshone County, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/bh_unpopulated_fyr_2000.pdf

U.S. EPA (Environmental Protection Agency). 2001a. *Bunker Hill Mine Water Management Remedial Investigation/Feasibility Study*. Prepared by URS Greiner, Inc., Seattle, WA, and CH2M HILL, Bellevue, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA, April. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/mine_water_management_rifs_apr2001.pdf

U.S. EPA (Environmental Protection Agency). 2001b. *EPA Superfund Record of Decision Amendment: Bunker Hill Mining & Metallurgical Complex EPA ID: IDD048340921 OU 2 Smelterville, ID 12/10/2001*. EPA/AMD/R10-02/604. U.S. Environmental Protection Agency, Region 10, Seattle, WA. November.

U.S. EPA (Environmental Protection Agency). 2002. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex EPA ID: IDD048340921 OU 3 Smelterville, ID*. EPA/ROD/R10-02/032. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 12.

U.S. EPA (Environmental Protection Agency). 2005. *Second Five Year Review for the Bunker Hill Mining and Metallurgical Complex Superfund Site, Operable Units 1, 2, and 3,* *Idaho and Washington*. EPA 910-R-05-006. U.S. Environmental Protection Agency, Region 10, Seattle, WA. October. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/bh_2nd_fyr_102505.pdf

U.S. EPA (Environmental Protection Agency). 2008. *Source Areas of Concern Report, Operable Unit 2, Bunker Hill Mining and Metallurgical Complex Superfund Site*. Prepared by CH2M HILL, Bellevue, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. March 24. Retrieved from https://yosemite.epa.gov/R10/CLEANUP.NSF/box/Technical+Documents/$FILE/OU2+Source+Areas+of+Concern+Report.pdf

U.S. EPA (Environmental Protection Agency). 2010a. *Hardrock Mine Site Data Summary – NPL or NPL Equivalent, Bunker Hill Mining & Metallurgical Complex, Smelterville, ID*. U.S. Environmental Protection Agency, Washington, DC. July 12.

U.S. EPA (Environmental Protection Agency). 2010b. *Draft Final, Focused Feasibility Study Report. Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site, Volume 1 – Executive Summary and Main Text*. Prepared by CH2M HILL, Bellevue, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/cda_basin/final_ffs_report_volume_1.pdf

U.S. EPA (Environmental Protection Agency). 2010c. *Draft Final, Focused Feasibility Study Report. Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site, Volume 4*. Prepared by CH2M HILL, Bellevue, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July. Retrieved from https://www3.epa.gov/region10/pdf/sites/bunker_hill/cda_basin/final_ffs_report_volume_4.pdf

Captain Jack Mill (COD981551427)

Colorado DPHE (Department of Public Health and Environment). 2008a. *Final Captain Jack Superfund Site Feasibility Study Report*. Prepared by Walsh Environmental Scientists and Engineers, Boulder, CO, for Colorado Department of Public Health and Environment, Denver, CO. May 22.

Colorado DPHE (Department of Public Health and Environment). 2008b. *Final Captain Jack Superfund Site Remedial Investigation and Risk Assessment Report, Vol. 1*. Prepared by Walsh Environmental Scientists and Engineers, Boulder, CO, for Colorado Department of Public Health and Environment, Denver, CO. May 22.

Colorado DPHE (Department of Public Health and Environment). 2008c. *Final Captain Jack Superfund Site Remedial Investigation and Risk Assessment Report, Vol. 2*. Prepared by Walsh Environmental Scientists and Engineers, Boulder, CO, for Colorado Department of Public Health and Environment, Denver, CO. May 22.

Colorado DPHE & US EPA, 2008. Colorado Department of Public Health and Environment & U.S. Environmental Protection Agency. *Final Captain Jack Superfund Site Record of Decision*. Prepared by Walsh Environmental Scientists and Engineers, Boulder, CO, for Colorado Department of Public Health and Environment, Denver, CO, and U.S. Environmental Protection Agency, Region 8, Denver, CO. September 23.

Cimarron (NMD980749378)

Carrizozo, 2006. Carrizozo, NM. *Prohibition Against Disturbance. Executed by Town of Carrizozo, NM. April 25*. Retrieved from https://quicksilver.epa.gov/work/06/209690.pdf

Means, 2006. Means, Timothy. *Prohibition Against Disturbance. Executed by Timothy Means for Cimarron Mining Corporation Superfund Site, Carrizozo, NM*. April 25. Retrieved From https://semspub.epa.gov/work/06/209691.pdf

U.S. EPA (Environmental Protection Agency). 1990a. *EPA Superfund Record of Decision: Cimarron Mining Corp. EPA ID: NMD980749378 OU 01 Carrizozo, NM 09/21/1990*. EPA/ROD/R06-90/060. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 1990b. *EPA Superfund Record of Decision: Cimarron Mining, NM: Decision Summary, Cimarron Mining Corporation Site, Operable Unit 1*. EPA/ROD/R06-90/060. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. September.

U.S. EPA (Environmental Protection Agency). 1991a. *EPA Superfund Record of Decision, Cimarron Mining, NM: Decision Summary, Cimarron Mining Corporation Site, Operable Unit 2 (Sierra Blanca)*. EPA/ROD/R06-91/067. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. September.

U.S. EPA (Environmental Protection Agency). 1991b. *Decision Summary, Cimarron Mining Corporation Site, Operable Unit 2 (Sierra Blanca), Record of Decision*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September. Retrieved from https://quicksilver.epa.gov/work/HQ/187893.pdf

U.S. EPA (Environmental Protection Agency). 1998. *Cimarron Mining Corporation Superfund Site Ground Water Remedial Action Five-Year Review*. U.S. Environmental Protection Agency, Region 6, Superfund Division, Dallas, TX. July.

U.S. EPA (Environmental Protection Agency). 2003. *Second Five-Year Review Report for Cimarron Mining Corporation Superfund Site Operable Unit 1 and 2, Carrizozo, Lincoln County, New Mexico*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. June.

U.S. EPA (Environmental Protection Agency). 2008. *Third Five-Year Review Report for Cimarron Mining Corporation Superfund Site Operable Unit 1 and 2, Carrizozo, Lincoln County, New Mexico*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. July.

Eagle Mine (COD081961518)

Morrison Knudsen & ICF Kaiser, 1997. *Final Eagle Mine Site, Task 5: Risk Assessment Deliverables*. Morrison Knudsen Corporation, Englewood, CO, and ICF Kaiser Engineers, Lakewood, CO. February 11.

U.S. EPA (Environmental Protection Agency). 1993a. *Final Report on the Health Risk Assessments for the Eagle Mine Superfund Site, Minturn, Colorado*. Prepared by John S. Reif for EREBA under a Technical Advisory Grant for U.S. Environmental Protection Agency, Region 8, Denver, CO. April 15.

U.S. EPA (Environmental Protection Agency). 1993b. *EPA Superfund Record of Decision: Eagle Mine EPA ID: COD081961518 OU 01 Minturn/Redcliff, CO 03/29/1993*. EPA/ROD/R08-93/068. U.S. Environmental Protection Agency, Region 8, Denver, CO. March 29.

U.S. EPA (Environmental Protection Agency). 1998. *EPA Superfund Record of Decision: Eagle Mine, EPA ID: COD081961518 OU 02 Minturn/Redcliff, CO 09/03/1998*. EPA/ROD/R08-98/079. U.S. Environmental Protection Agency, Region 8, Denver, CO. September 3.

U.S. EPA (Environmental Protection Agency). 2005. *Second Five-Year Review Report for Eagle Mine Superfund Site, CERCLIS ID: COD081961518, Minturn, Eagle County, Colorado*. Prepared by Colorado Department of Public Health and Environment, Denver, for U.S. Environmental Protection Agency, Region 8, Denver, CO. September.

U.S. EPA (Environmental Protection Agency). 2006. *Remedial Investigation Report: Bolts Lake Area and Areas within OU-1 of Eagle Mine Site*. Prepared by Environmental Resources Management, Greenwood Village, CO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. September 15.

U.S. EPA (Environmental Protection Agency). 2007a. *Human Health Risk Assessment: Bolts Lake Area and Areas within OU-1 of Eagle Mine Site*. Prepared by Environmental Resources Management, Greenwood Village, CO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. February 2.

U.S. EPA (Environmental Protection Agency). 2007b. *Remediation Feasibility Study: Bolts Lake Area and Areas within OU-1 of Eagle Mine Site*. Prepared by Environmental Resources Management, Greenwood Village, CO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. February 16.

U.S. EPA (Environmental Protection Agency). 2008. *Third Five-Year Review Report for Eagle Mine Superfund Site, CERCLIS ID: COD081961518, Minturn, Eagle County, Colorado*. Prepared by U.S. Environmental Protection Agency, Region 8, Denver, CO. September.

East Helena (MTD006230346)

U.S. EPA (Environmental Protection Agency). 1989. *Record of Decision: East Helena Smelter Site, Process Ponds Operable Unit, East Helena, Montana*. U.S. Environmental Protection Agency, Region 8, Helena, MT. November.

U.S. EPA (Environmental Protection Agency). 1990a. *Volume 5: Comprehensive Remedial Investigation/Feasibility Study – ASARCO, Inc., East Helena, Montana*. Prepared by Hydrometrics, Inc., Helena, MT., for U.S. Environmental Protection Agency, Region 8, Helena, MT. March 30.

U.S. EPA (Environmental Protection Agency). 1990b. *EPA Superfund Record of Decision: East Helena Site_ EPA ID_ MTD 006230346 OU 01 East Helena, MT 11/22/1989*. EPA/ROD/R08-90/027. U.S. Environmental Protection Agency, Region 8, Denver, CO.

U.S. EPA (Environmental Protection Agency). 2005. *Technical Memorandum: Supplemental Ecological Risk Assessment for the East Helena Smelter Site, Montana*. U.S. Environmental Protection Agency, Region 8, Denver, CO. January 25.

U.S. EPA (Environmental Protection Agency). 2006. *Second Five-Year Review Report for the East Helena Superfund Site, East Helena, Lewis and Clark County, Montana*. Prepared by HDR One Company, for U.S. Environmental Protection Agency, Region 8, Helena, MT. March 31.

U.S. EPA (Environmental Protection Agency). 2009. *East Helena Superfund Site, Operable Unit No. 2, Residential Soils and Undeveloped Lands, Final Record of Decision*. U.S. Environmental Protection Agency, Washington, DC. September.

U.S. EPA (Environmental Protection Agency). 2011. *Third Five-Year Review Report for the East Helena Superfund Site, East Helena, Lewis and Clark County, Montana*. Prepared by Pacific Western Technologies, Ltd, for U.S. Environmental Protection Agency, Region 8, Helena, MT. September 20.

Eastern Michaud (IDD984666610)

FMC. 2010a. FMC. *Volume 1: Supplemental Remedial Investigation Report for the FMC Plant Operable Unit*. FMC Idaho LLC, Pocatello, ID. January.

FMC. 2010b. FMC. *Volume 2 - Appendices: Supplemental Remedial Investigation Report for the FMC Plant Operable Unit*. FMC Idaho LLC, Pocatello, ID. January.

U.S. EPA (Environmental Protection Agency). 1995a. *Baseline Human Health Risk Assessment, Eastern Michaud Flats, Pocatello, Idaho*. Prepared by Ecology and Environment, Inc., Lancaster, NY, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July.

U.S. EPA (Environmental Protection Agency). 1995b. *Baseline Human Health Risk Assessment, Eastern Michaud Flats, Pocatello, Idaho: Appendices A – K*. Prepared by Ecology and Environment, Inc., Lancaster, NY, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July.

U.S. EPA (Environmental Protection Agency). 1995c. *Ecological Risk Assessment, Eastern Michaud Flats, Pocatello, Idaho*. Prepared by Ecology and Environment, Inc., Lancaster, NY, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July.

U.S. EPA (Environmental Protection Agency). 1998. *Record of Decision: Declaration, Decision Summary, and Responsiveness Summary for Eastern Michaud Flats Superfund Site, Pocatello, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. June. Retrieved from https://quicksilver.epa.gov/work/10/100002719.pdf

Foote Mineral (PAD077087989)

ATSDR (Toxic Substances and Disease Registry). 1994. *Preliminary Public Health Assessment for Foote Mineral Company, Frazer, Chester County, Pennsylvania, CERCLIS No. PAD077087989*. Prepared by the Pennsylvania Department of Health for the Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Atlanta, GA. April 7. Available at http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=309&pg=0

ERM (Environmental Resources Management). 1999. *Cyprus Foote Mineral Remedial Investigation/Risk Assessment Report Volume II, Appendices A to K, East Whiteland Township, Pennsylvania*. Environmental Resources Management, Exton, PA. April 2.

ERM (Environmental Resources Management). 2000. *Cyprus Foote Mineral Remedial Investigation/Risk Assessment Report Volume III, Appendices D to L, East Whiteland Township, Pennsylvania*. Environmental Resources Management, Exton, PA. May 23.

ERM (Environmental Resources Management). 2000. *Cyprus Foote Mineral Remedial Investigation/Risk Assessment Report Volume IV, Appendices M to R, East Whiteland Township, Pennsylvania*. Environmental Resources Management, Exton, PA. May 23.

U.S. EPA (Environmental Protection Agency). 2006. *Superfund Record of Decision: Foote Mineral Co. EPA ID: PAD077087989 OU 01 East Whiteland Township, PA.* EPA/ROD/R2006030001596. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. March 31.

Gilt Edge (SDD987673985)

U.S. EPA (Environmental Protection Agency). 2001a. *Early Action – Interim Record of Decision, OU2 – Water Treatment Operations, Gilt Edge Mine NPL Site, Lawrence County, South Dakota*. EPA/ROD/R08-01/611. U.S. Environmental Protection Agency, Denver, CO. April 23.

U.S. EPA (Environmental Protection Agency). 2001b. *Interim Record of Decision, Operable Unit 3, Ruby Gulch Waste Rock Dump, Gilt Edge Mine NPL Site, Lawrence County, South Dakota*. EPA/ROD/R08-01/548. U.S. Environmental Protection Agency, Denver, CO. August 30.

U.S. EPA (Environmental Protection Agency). 2003. *Baseline Ecological Risk Assessment for the Gilt Edge Mine, Lead, South Dakota, Final*. U.S. Environmental Protection Agency, Region 8, Denver, CO. November.

U.S. EPA (Environmental Protection Agency). 2006. *Final Baseline Human Health Risk Assessment for the Gilt Edge Mine Site, Lawrence County, South Dakota*. U.S. Environmental Protection Agency, Region 8, Denver, CO. July.

U.S. EPA (Environmental Protection Agency). 2007. *First Five-Year Review Report for Gilt Edge Mine Superfund Site Operable Units 2 and 3, Lawrence County, South Dakota*. U.S. Environmental Protection Agency, Region 8, Denver, CO. April.

U.S. EPA (Environmental Protection Agency). 2008a. *Final Feasibility Study Report for the Gilt Edge Superfund Site, Operable Unit 1 (OU1) Lawrence County, South Dakota*. Prepared by CDM Federal Programs Corporation, Kansas City, MO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. May.

U.S. EPA (Environmental Protection Agency). 2008b. *Final Remedial Investigation Report for the Gilt Edge Superfund Site Lawrence County, South Dakota, Volume I – Text*. Prepared by CDM Federal Programs Corporation, Denver, CO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. February 1.

U.S. EPA (Environmental Protection Agency). 2008c. *Final Remedial Investigation Report for the Gilt Edge Superfund Site Lawrence County, South Dakota, Volume II – Figures and Tables*. Prepared by CDM Federal Programs Corporation, Denver, CO, for U.S. Environmental Protection Agency, Region 8, Denver, CO. February 1.

U.S. EPA (Environmental Protection Agency). 2008d. *Record of Decision for Gilt Edge Mine Superfund Site Operable Unit 1, Lawrence County, South Dakota*. U.S. Environmental Protection Agency, Region 8, Denver, CO. September.

Homestake (NMD007860935)

U.S. EPA (Environmental Protection Agency). 1989a. *Record of Decision: Homestake Mining Company, Radon Operable Unit, Cibola County, New Mexico*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 1989b. *EPA Superfund Record of Decision: Homestake Mining Company, EPA ID: NMD007860935, OU 01, Milan, New Mexico*. EPA/ROD/R06-89/050. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September 27.

U.S. EPA (Environmental Protection Agency). 2001. *First Five-Year Review Report for Homestake Mining Company Superfund Site, Cibola County, New Mexico*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2006. *Second Five-Year Review Report for Homestake Mining Company Superfund Site, Cibola County, New Mexico*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

Li Tungsten (NYD986882660)

U.S. EPA (Environmental Protection Agency). 1998a. *Li Tungsten, Glen Cove, New York, Draft Final Remedial Investigation (Rl) Report, Volume I of IV*. U.S. Environmental Protection Agency, Region 2, New York, NY. May.

U.S. EPA (Environmental Protection Agency). 1998b. *Li Tungsten, Glen Cove, New York, Draft Final Remedial Investigation (Rl) Report, Volume II of IV (Tables, Figures, Plates)*. U.S. Environmental Protection Agency, Region 2, New York, NY. May.

U.S. EPA (Environmental Protection Agency). 1998c. *Li Tungsten, Glen Cove, New York, Draft Final Remedial Investigation (Rl) Report, Volume III of IV*. U.S. Environmental Protection Agency, Region 2, New York, NY. May.

U.S. EPA (Environmental Protection Agency). 1998d. *Li Tungsten, Glen Cove, New York, Draft Final Remedial Investigation (Rl) Report, Volume IV of IV*. U.S. Environmental Protection Agency, Region 2, New York, NY. May.

U.S. EPA (Environmental Protection Agency). 1999a. *Draft Final Feasibility Study Report: Li Tungsten, Glen Cove, New York, Work Assignment No. 028-RICO-024, Volume I of II*. U.S. Environmental Protection Agency, Region 2, New York, NY. July.

U.S. EPA (Environmental Protection Agency). 1999b. *Draft Final Feasibility Study Report: Li Tungsten, Glen Cove, New York, Work Assignment No. 028-RICO-024, Volume II of II*. U.S. Environmental Protection Agency, Region 2, New York, NY. July.

U.S. EPA (Environmental Protection Agency). 1999c. *Record of Decision for OU1_Facility and OU2_Captains Cove for the Li Tungsten Corporation Site*. U.S. Environmental Protection Agency, Region 2, New York, NY. September.

U.S. EPA (Environmental Protection Agency). 1999d. *Record of Decision: Li Tungsten Corporation Superfund Site, EPA ID: NYD986882660, OU 01, 02, Glen Cove, Nassau County, New York*. EPA/ROD/R02-99/158. U.S. Environmental Protection Agency, Region 2, New York, NY. September 30.

U.S. EPA (Environmental Protection Agency). 2005a. *EPA Superfund, Explanation of Significant Differences: Li Tungsten Corp. EPA ID: NYD986882660 OU 02 Glen Cove, NY 05/02/2005*. EPA/ESD/E2005020001615. U.S. Environmental Protection Agency, Region 2, New York, NY. May 2

U.S. EPA (Environmental Protection Agency). 2005b. *Five-Year Review Report for Li Tungsten Superfund Site, Glen Cove, Nassau County, New York*. U.S. Environmental Protection Agency, Region 2, New York, NY. August.

U.S. EPA (Environmental Protection Agency). 2005c. *Record of Decision: Li Tungsten Corporation Superfund Site, Operable Unit Four - Glen Cove Creek, City of Glen Cove, Nassau County, New York.*. EPA/ROD/R02-05/017. U.S. Environmental Protection Agency, Region 2, New York, NY. March 30.

Macalloy (SCD003360476)

Macalloy. 1994. Macalloy Corporation. *Human Health Risk Assessment for Macalloy Corporation, Charleston, South Carolina*. Prepared by ChemRisk Division, McLaren/Hart Environmental Engineering Corporation, Wexford, PA, for Macalloy Corporation, Charleston, SC. September.

Macalloy. 2001a. Macalloy Corporation. *Final Phase I Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina, Volume I of V, Sections 1 to 10*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. April 18.

Macalloy. 2001b. Macalloy Corporation. *Final Phase I Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina, Volume II of V, Figures*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. April 18.

Macalloy. 2001c. Macalloy Corporation. *Final Phase I Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina, Volume III of V, Appendix 2.A to Appendix 4.A (Grid Soil Borings)*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. April 18.

Macalloy. 2001d. Macalloy Corporation. *Final Phase I Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina, Volume IV of V, Appendix 4.A (Groundwater Monitoring Wells) to Appendix 8.A*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. April 18.

Macalloy. 2001e. Macalloy Corporation. *Final Phase I Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina, Volume V of V, Ecological Risk Assessment of the Macalloy Corporation and Shipyard Creek*. Prepared by Breedlove, Dennis & Young, Inc., Franklin, TN, for Macalloy Corporation, Charleston, SC. April 18.

Macalloy. 2002a. Macalloy Corporation. *Final Feasibility Study Report, Macalloy Corporation, Charleston, South Carolina*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. March 29.

Macalloy. 2002b. Macalloy Corporation. *Final Phase II Remedial Investigation Report, Macalloy Corporation, Charleston, South Carolina*. Prepared by EnSafe Inc., Memphis, TN, and BDY Breedlove, Dennis, Young & Associates, Inc., for Macalloy Corporation, Charleston, SC. January 28.

Macalloy. 2002c. Macalloy Corporation. *Final Phase II Remediation Report, Macalloy Corporation, Charleston, South Carolina*. Prepared by EnSafe Inc., Memphis, TN, for Macalloy Corporation, Charleston, SC. January 28.

U.S. EPA (Environmental Protection Agency). 2002. *Superfund Record of Decision: Macalloy Corporation, EPA ID: SCD003360476, OU 01, North Charleston, SC, 8/21/2002*. EPA/ROD/R04-02/084. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. August 21.

U.S. EPA (Environmental Protection Agency). 2010. *First Five-Year Review Report, Macalloy Corporation National Priorities List Site Charleston, Charleston County, South Carolina*. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. June 24.

Midnite Mine (WAD980978753)

U.S. EPA (Environmental Protection Agency). 2005a. *Final Feasibility Study Report for Midnite Mine Stevens County, Washington*. Prepared by URS Corporation, Seattle, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 30.

U.S. EPA (Environmental Protection Agency). 2005b. *Final Midnite Mine Human Health Risk Assessment Report*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September.

U.S. EPA (Environmental Protection Agency). 2005c. *Final Remedial Investigation Report for Midnite Mine Stevens County, Washington*. Prepared by URS Corporation, Seattle, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 30.

U.S. EPA (Environmental Protection Agency). 2005d. *Final Report, Midnite Mine Site, Ecological Risk Assessment, Wellpinit, Washington*. Prepared by Lockheed Martin, Edison, NJ, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. September.

U.S. EPA (Environmental Protection Agency). 2006. *Midnite Mine Superfund Site, Spokane Indian Reservation, Washington, Record of Decision*. U.S. Environmental Protection Agency Region 10, Seattle, WA. September.

Monsanto (IDD081830994)

Monsanto. 1993. Monsanto Chemical Company. *Phase II Remedial Investigation Report for the Monsanto Soda Springs Elemental Phosphorus Plant, Volume IV*. Prepared by Golder Associates, Redmond, WA, for Monsanto Chemical Company, Soda Springs, ID. October 6.

Monsanto. 1995. Monsanto Chemical Company. *Phase II Remedial Investigation Report for the Monsanto Soda Springs Elemental Phosphorus Plant, Volume I*. Prepared by Golder Associates, Redmond, WA, for Monsanto Chemical Company, Soda Springs, ID. November 21.

U.S. EPA (Environmental Protection Agency). 1997. *Record of Decision, Monsanto Chemical Company Superfund Site, Caribou County, Idaho*. U.S. Environmental Protection Agency Region 10, Seattle, WA. April.

U.S. EPA (Environmental Protection Agency). 2003. *First Five-Year Review Report for Monsanto Chemical Co. (Soda Springs Plant), Caribou County, Idaho*. U.S. Environmental Protection Agency Region 10, Seattle, WA. September.

U.S. EPA (Environmental Protection Agency). 2008. *Second Five-Year Review Report for Monsanto Chemical Co. (Soda Springs Plant), EPA ID: IDD081830994, Caribou County, Idaho*. U.S. Environmental Protection Agency Region 10, Seattle, WA. August.

National Southwire (KYD049062375)

U.S. EPA (Environmental Protection Agency). 1993. *EPA Superfund Record of Decision: National Southwire Aluminum Co. EPA ID: KYD049062375 OU 01 Hawesville, KY 02/19/1993*. EPA/ROD/R04-93/132. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. February 19.

U.S. EPA (Environmental Protection Agency). 2000. *EPA Superfund Record of Decision: National Southwire Aluminum Co. EPA ID: KYD049062375 OU 00 Hawesville, KY 07/06/2000*. EPA/ROD/R04-00/079. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. July.

U.S. EPA (Environmental Protection Agency). 2001. *Superfund First Five-Year Review Report for National Southwire Aluminum Co., Hawesville, Hancock County, Kentucky*. Prepared by U.S. Army Corps of Engineers, Louisville District, for U.S. Environmental Protection Agency, Region 4, Atlanta, GA. July.

U.S. EPA (Environmental Protection Agency). 2006. *Superfund Second Five-Year Review Report, Final, National Southwire Aluminum Co., Hawesville, Kentucky*. Prepared by U.S. Army Corps of Engineers, Louisville District, for U.S. Environmental Protection Agency, Region 4, Atlanta, GA. July.

Omaha Lead (NESFN0703481)

U.S. EPA (Environmental Protection Agency). 2004. *Omaha Lead Site, Operable Unit 01, Interim Record of Decision*. U.S. Environmental Protection Agency, Region 7, Kansas City, KS. December 15.

U.S. EPA (Environmental Protection Agency). 2008. *Draft-Final Baseline Human Health Risk Assessment for the Omaha Lead Site, Omaha, Nebraska*. Prepared by Syracuse Research Corporation, Denver, CO, for U.S. Environmental Protection Agency, Region 7, Kansas City, KS. October.

U.S. EPA (Environmental Protection Agency). 2009a. *Final Omaha Lead Site Final Feasibility Study, Omaha, Nebraska*. Prepared by Black & Veatch Special Projects Corp., Overland Park, KS, for U.S. Environmental Protection Agency, Region 7, Kansas City, KS. April.

U.S. EPA (Environmental Protection Agency). 2009b. *Omaha Lead Site Final Remedial Investigation Report, Volume I, Omaha, Nebraska*. Prepared by Black & Veatch Special

Projects Corp., Overland Park, KS, for U.S. Environmental Protection Agency, Region 7, Kansas City, KS. April.

U.S. EPA (Environmental Protection Agency). 2009c. *Omaha Lead Site Final Remedial Investigation Report, Volume II, Appendices A through L, Omaha, Nebraska*. Prepared by Black & Veatch Special Projects Corp., Overland Park, KS, for U.S. Environmental Protection Agency, Region 7, Kansas City, KS. April.

U.S. EPA (Environmental Protection Agency). 2009d. *Omaha Lead Site Final Remedial Investigation Report, Volume III, Appendix M, Omaha, Nebraska*. Prepared by Black & Veatch Special Projects Corp., Overland Park, KS, for U.S. Environmental Protection Agency, Region 7, Kansas City, KS. April.

U.S. EPA (Environmental Protection Agency). 2009e. *Omaha Lead Site, Operable Unit 02, Final Record of Decision*. U.S. Environmental Protection Agency, Region 7, Kansas City, KS. May 13.

Ormet (OHD004379970)

U.S. EPA (Environmental Protection Agency). 1994. *EPA Superfund Record of Decision: Ormet Corp., EPA ID: OHD004379970, OU 01, Hannibal, OH, 09/12/1994*. EPA/ROD/R05-94/259. U.S. Environmental Protection Agency, Region 5, Chicago, IL. September 12.

U.S. EPA (Environmental Protection Agency). 2002. *First Five-Year Review Report for Ormet Corp. Superfund Site, Hannibal, Monroe County, Ohio*. U.S. Environmental Protection Agency, Region 5, Chicago, IL. April.

U.S. EPA (Environmental Protection Agency). 2007. *Second Five-Year Review Report for Ormet Corp. Superfund Site, Monroe County, Ohio*. U.S. Environmental Protection Agency, Region 5, Chicago, IL. May.

Palmerton (PAD002395887)

U.S. EPA (Environmental Protection Agency). 1987. *EPA Superfund Record of Decision: Palmerton Zinc Pile EPA ID: PAD002395887 OU 01 Palmerton, PA 09/04/1987*. EPA/ROD/R03-87/036. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. September.

U.S. EPA (Environmental Protection Agency). 1988. *EPA Superfund Record of Decision: Palmerton Zinc Pile EPA ID: PAD002395887 OU 02 Palmerton, PA 06/29/1988*. EPA/ROD/R03-88/063. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. June.

U.S. EPA (Environmental Protection Agency). 1998. *Final Risk Assessment Report for the Palmerton Zinc Site, Palmerton, Pennsylvania*. Prepared by CDM Federal Programs Corporation, Wayne, PA, for U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. May.

U.S. EPA (Environmental Protection Agency). 2000. *Feasibility Study Report for the Palmerton Zinc Site Residential Soil and Household Dust, Operable Unit (OU 3), Palmerton, Pennsylvania*. Prepared by Black and Veatch Special Projects, Corp., Philadelphia, PA, for U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. May.

U.S. EPA (Environmental Protection Agency). 2001a. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 1: Executive Summary and Problem Formulation*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001b. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 2: Aquatic Community Endpoints*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001c. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 3: Terrestrial Community Endpoints*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001d. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 4: Project Summary, Uncertainty and Wetland Community Endpoints*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001e. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 5: Appendices A and B*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001f. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 6: Appendix C*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001g. *Final Draft, Palmerton Zinc Site Ecological Risk Assessment, Volume 7: Appendices D through K*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2001h. *Record of Decision: Palmerton Zinc Pile Superfund Site, Operable Unit #3, Community Soils, Palmerton, Carbon County, Pennsylvania*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. October.

U.S. EPA (Environmental Protection Agency). 2002a. *Second Five-Year Review Report, Palmerton Zinc Pile Superfund Site, Palmerton, Carbon County, Pennsylvania*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2002b. *EPA Superfund Explanation of Significant Differences: Palmerton Zinc Pile EPA ID: PAD002395887 OU 02 Palmerton, PA 08/27/2002*. EPA/ESD/R03-02/058. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. February.

U.S. EPA (Environmental Protection Agency). 2002c. *EPA Superfund Record of Decision: Palmerton Zinc Pile EPA ID: PAD002395887 OU 03 Palmerton, PA 10/09/2001*. EPA/ROD/R03-88/063. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. October.

U.S. EPA (Environmental Protection Agency). 2007. *Third Five-Year Review Report for Palmerton Zinc Pile Superfund Site, Palmerton, Carbon County, PA*. U.S. Environmental Protection Agency, Region 3, Philadelphia, PA. September.

Reynolds (ORD009412677)

RMC (Reynolds Metals Company). 2006a.. *Post-Demolition Residual Remedial Investigation Report*. Reynolds Metals Company, Troutdale Facility. June.

RMC (Reynolds Metals Company). 2006b. *Post-Demolition Residual Risk Assessment*. Reynolds Metals Company, Troutdale Facility. June.

U.S. EPA (Environmental Protection Agency). 2002. *Reynolds Metals Company (RMC) Superfund Site Troutdale, Oregon, Record of Decision for Interim Remedial Action*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 30.

U.S. EPA (Environmental Protection Agency). 2006. *Reynolds Metals Company Superfund Site, Troutdale, Oregon, Record of Decision for Final Remedial Action*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 29.

U.S. EPA (Environmental Protection Agency). 2008. *Five-Year Review Report, First Five-Year Review Report for Reynolds Metals Superfund Site, City of Troutdale Multnomah County, Oregon*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. July.

Silver Mountain (WAD980722789)

U.S. EPA (Environmental Protection Agency). 1990a. *Declaration for the Silver Mountain Mine Superfund Site, Record of Decision, Silver Mountain Mine, Okanogan County, Washington*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. March.

U.S. EPA (Environmental Protection Agency). 1990b. *EPA Superfund Record of Decision: Silver Mountain Mine, EPA ID: WAD980722789, OU 01, Loomis, WA, 03/27/1990*. EPA/ROD/R10-90/022. U.S. Environmental Protection Agency, Region 10, Seattle, WA. March 27.

U.S. EPA (Environmental Protection Agency). 1995. *EPA Superfund Explanation of Significant Differences: Silver Mountain Mine, EPA ID: WAD980722789, OU 01, Loomis, WA, 10/12/1994*. EPA/ESD/R10-95/116. U.S. Environmental Protection Agency, Region 10, Seattle, WA.

U.S. EPA (Environmental Protection Agency). 2002. *Second 5-Year Review of the Silver Mountain Mine, Okanogan County, Washington*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September.

U.S. EPA (Environmental Protection Agency). 2007. *Third Five-Year Review of the Silver Mountain Mine Superfund Site, Okanogan County, Washington*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September.

Stauffer (FLD010596013)

U.S. EPA (Environmental Protection Agency). 1995. *Revised Final Baseline Risk Assessment Part A and B for Stauffer Chemical Company, Tarpon Springs, Florida*. Prepared by Black & Veatch Waste Science, Inc., Atlanta, GA, for U.S. Environmental Protection Agency, Region 4, Waste Management Division, Atlanta, GA. July 21.

U.S. EPA (Environmental Protection Agency). 1998. *EPA Superfund Record of Decision: Stauffer Chemical Co. (Tarpon Springs), EPA ID: FLD010596013, OU 01, Tarpon Springs, FL, 07/02/1998*. EPA/ROD/R04-98/103. U.S. Environmental Protection Agency, Region 4, Atlanta, GA.

Weston. 1993. Weston. *Stauffer Management Company, Tarpon Springs, Florida, Final Site Remedial Investigation Report, Volume I of V*. Roy F. Weston, Inc., West Chester, PA. December.

Summitville (COD983778432)

Colorado DPHE (Department of Public Health and Environment). 2005. *Second Five-Year Review, Summitville Mine Superfund Site, Rio Grande County, Colorado*. Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, Denver, CO. September.

Colorado DPHE (Department of Public Health and Environment). 2010. *Third Five-Year Review Report, Summitville Mine Superfund Site, Rio Grande County, Colorado*. Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, Denver, CO. September.

U.S. EPA (Environmental Protection Agency). 1995a. *EPA Superfund Record of Decision: Summitville Mine EPA ID: COD983778432 OU 00 Rio Grande County, CO 12/15/1994*. EPA/ROD/R08-95/095. U.S. Environmental Protection Agency, Region 8, Denver, CO. January.

U.S. EPA (Environmental Protection Agency). 1995b. *EPA Superfund Record of Decision: Summitville Mine EPA ID: COD983778432 OU 01 Heap Leach Pad, Rio Grande County, CO 12/15/1994*. EPA/ROD/R08-95/096. U.S. Environmental Protection Agency, Region 8, Denver, CO.

U.S. EPA (Environmental Protection Agency). 1995c. *EPA Superfund Record of Decision: Summitville Mine, EPA ID: COD983778432, OU 02, Cropsy Waste Pile, Beaver Mud Dump/Summitville Dam Impoundment, and Mine Pits, Rio Grande County, CO, 12/15/1994*. EPA/ROD/R08-95/097. U.S. Environmental Protection Agency, Region 8, Denver, CO. January.

U.S. EPA (Environmental Protection Agency). 1995d. *EPA Superfund Record of Decision: Summitville Mine EPA ID: COD983778432 OU 04 Rio Grande County, CO 12/15/1994*. EPA/ROD/R08-95/098. U.S. Environmental Protection Agency, Region 8, Denver, CO. January.

U.S. EPA (Environmental Protection Agency). 2001a. *Record of Decision for Summitville Mine Final Site-Wide Remedy Operable Unit 5, Summitville Mine Superfund Site, Rio Grande County, Colorado*. U.S. Environmental Protection Agency, Region 8, Denver, CO.

U.S. EPA (Environmental Protection Agency). 2001b. *EPA Superfund Record of Decision: Summitville Mine EPA ID: COD983778432 OU 05 Rio Grande County, CO 09/28/2001*. EPA/ROD/R08-01/538. U.S. Environmental Protection Agency, Region 8, Denver, CO.

Teledyne Wah Chang (ORD050955848)

U.S. EPA (Environmental Protection Agency). 1989. *Record of Decision, Decision Summary, and Responsiveness Summary for Interim Response Action, Teledyne Wah Chang Albany Superfund Site, Operable Unit #1 (Sludge Ponds Unit), Albany, Oregon*. EPA/ROD/R10-90/021. U.S. Environmental Protection Agency, Region 10, Seattle, WA. December.

U.S. EPA (Environmental Protection Agency). 1990. *EPA Superfund Record of Decision: Teledyne Wah Chang EPA ID: ORD050955848 OU 02 Albany, OR 12/28/1989*. EPA/ROD/R10-90/021.U.S. Environmental Protection Agency, Region 10, Seattle, WA.

U.S. EPA (Environmental Protection Agency). 1994. *EPA Superfund Record of Decision: Teledyne Wah Chang EPA ID: ORD050955848 OU 02 Albany, OR 06/10/1994*. EPA/ROD/R10-94/078. U.S. Environmental Protection Agency, Region 10, Seattle, WA.

U.S. EPA (Environmental Protection Agency). 1995. *EPA Superfund Record of Decision: Teledyne Wah Chang EPA ID: ORD050955848 OU 03 Albany, OR 09/27/1995*. EPA/ROD/R10-95/125. U.S. Environmental Protection Agency, Region 10, Seattle, WA.

U.S. EPA (Environmental Protection Agency). 1997. *EPA Superfund Explanation of Significant Differences: Teledyne Wah Chang, EPA ID: ORD050955848, OU 01, Albany, OR, 10/08/1996*. EPA/ESD/R10-97/082. U.S. Environmental Protection Agency, Seattle, WA.

U.S. EPA (Environmental Protection Agency). 1998. *EPA Superfund Explanation of Significant Differences for the Record of Decision: Teledyne Wah Chang Superfund Site Albany, OR 10/8/1996*. EPA/514/R-97/082. U.S. Environmental Protection Agency, Office of Environmental Cleanup, Seattle, WA. January.

U.S. EPA (Environmental Protection Agency). 2001. *EPA Superfund Explanation of Significant Differences: Teledyne Wah Chang, EPA ID: ORD050955848, OU 03, Albany, OR, 09/28/2001*. EPA/ESD/R10-01/550. U.S. Environmental Protection Agency, Office of Environmental Cleanup¸ Seattle, WA. September.

U.S. EPA (Environmental Protection Agency). 2003. *Second Five-Year Review Report for Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon*. U.S. Environmental Protection Agency, Environmental Cleanup Division, Region 10, Seattle, WA. January.

U.S. EPA (Environmental Protection Agency). 2008. *Final Third Five-Year Review Report for the Teledyne Wah Chang Superfund Site*. U.S. Environmental Protection Agency, Region 10, Environmental Cleanup Division, Seattle, WA. January.

U.S. EPA (Environmental Protection Agency). 2009. *Second Explanation of Significant Differences for the June 10, 1994, Record of Decision for the Final Remedial Action of the Groundwater and Sediments Operable Unit Teledyne Wah Chang Superfund Site, Albany, Oregon*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. June.

Tex Tin (TXD06211332)

U.S. EPA (Environmental Protection Agency). 1999. *EPA Superfund Record of Decision: Tex Tin Corp. EPA ID: TXD062113329, OU 01, Texas City, Texas, 05/17/1999*. EPA/ROD/R06-99/093. U.S. Environmental Protection Agency, Region 6, Dallas, TX. May 17.

U.S. EPA (Environmental Protection Agency). 2000a. *Amended Record of Decision, Tex Tin Corporation Superfund Site, Operable Unit No. 1, Texas City, Galveston County, Texas*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2000b. *Record of Decision, Tex Tin Corporation Superfund Site, Operable Unit No. 3 – Residential Property, La Marque, Galveston County, Texas*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2001a. *Record of Decision, Tex Tin Corporation Superfund Site, Operable Unit No. 2 – Amoco Property, Texas City, Texas*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2001b. *Record of Decision, Tex Tin Corporation Superfund Site, Operable Unit No. 4, Galveston County, Texas City, Texas*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2003. *Five-Year Review Report, Tex Tin Corporation Superfund Site, Operable Unit No. 2, Texas City, Texas, Galveston County*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. September.

U.S. EPA (Environmental Protection Agency). 2005. *Second Five-Year Review Report for the Tex Tin Corporation Superfund Site, Texas City, Galveston County, Texas*. U.S. Environmental Protection Agency, Region 6, Dallas, TX. August.

Attachment B4. Expanded 108(b) Historical CERCLA Sites Universe

Row	Site Name	EPA ID	State	Site Type
1	Abandoned Uranium Mines on the Navajo Nation	NNN000906087	NM and AZ	Removal
2	Abbot/Turkey Run Mine	CAN000908401	CA	Removal
3	ACM Smelter and Refinery	MTD093291599	MT	NPL
4	Aerojet General	CAD980358832	CA	NPL, removal
5	Agrico Chemical Company	FLD980221857	FL	NPL
6	Agrifos Acid Spill 2	TXD099387474	TX	NPL, removal
7	AGRIUM ACID SPILL	IDN001002691	ID	
8	AKRON MILL	CON000802707	CO	Removal
9	ALCOA (Vancouver Smelter)	WAD009045279	WA	Deleted NPL
10	ALCOA Properties	ILSFN0508010	IL	Removal
11	ALCOA/Lavaca Bay	TXD008123168	TX	NPL, removal
12	Alder Mill	WAD980722847	WA	Removal
13	Allied-Pulaski	VAD980551915	VA	Removal
14	Altoona Mine	CAN000908402	CA	Removal
15	Aluminum Company of America	NYD980506232	NY	Removal
16	Ambler Asbestos Piles	PAD000436436	PA	Deleted NPL, removal
17	American Fork Canyon/UINTA National	UTD988074951	UT	Removal
18	American Lead and Zinc Mill	CON000802649	CO	Removal
19	AMERICAN ZINC & LEAD SMELTING CO - FORMER	KSD984971986	KS	Removal
20	Anaconda Co. Smelter	MTD093291656	MT	NPL, removal
21	Anaconda Copper Company	NVD083917252	NV	Removal
22	Anderson-Calhoun Mine/Mill	WAN001002309	WA	Removal
23	Annapolis Lead Mine	MO0000958611	MO	NPL, removal
24	Annie Creek Mine Tailings	SDD987666013	SD	Proposed NPL/ withdrawn, unknown
25	ARCELORMITTAL CAUSTIC SPILL	INN000510508	IN	Removal
26	Argonaut Mine	CAD983650011	CA	Enforcement site
27	ARMCO, Inc., Hamilton Plant	OHD074705930	OH	Proposed NPL
28	ARSENIC MINES	NYD982531469	NY	Removal
29	ASARCO Hayden Plant	AZD008397127	AZ	Removal
30	ASARCO INC	WAD010187896	WA	
31	ASARCO Sodium - East Helena	MTN000802439	MT	Removal
32	ASARCO Taylor Springs	ILN000508170	IL	NPL, removal

33	ASARCO, Inc. (Globe Plant)	COD007063530	CO	Proposed NPL
34	Ashepoo Phosphate/Fertilizer Works	SC0001645373	SC	Removal
35	Atlantic Phosphate Works	SC0002332815	SC	Removal
36	Atlas Asbestos Mine	CAD980496863	CA	NPL, removal
37	Austin Avenue Radiation Site	PAD 987341716	PA	Deleted NPL
38	Badger Mine/Mill	MON000706006	MO	Removal
39	Balaklala Mine	CAD980814867	CA	Enforcement site
40	BALLARD MINE	IDN001002859	ID	
41	Barite Hill/Nevada Goldfields	SCN000407714	SC	NPL, removal
42	Barker Hughesville Mining District	MT6122307485	MT	NPL, removal
43	BARTH SMELTING CORP.	NJN008010373	NJ	Removal
44	Basin Mining Area	MTD982572562	MT	NPL, removal
45	Bautsch-Gray Mine	ILN000510407	IL	Proposed NPL, removal
46	Belden Cribbings	CON000802450	CO	Removal
47	BERGSTROM DUMP SITE	NVD986775260	NV	Removal
48	Berks Sand Pit	PAD980691794	PA	NPL, removal
49	Big River Hills Lead Tailings	MON000705784	MO	Removal
50	Big River Mine Tailings/St. Joe Minerals Corp.	MOD981126899	MO	NPL, removal
51	BINGHAM MAGNA DITCH	UTN000802691	UT	
52	Black Butte Mine	OR0000515759	OR	NPL
53	Blackbird Mine	IDD980725832	ID	Proposed NPL, removal
54	Blende Smelter	CON000802698	CO	Removal
55	Blue Ledge Mine	CAN000906063	CA	NPL, removal
56	Bluewater Uranium Mine	NND983469891	NM	Removal
57	Bluewater Uranium Mine (DOE)	NND986683290	NM	Removal
58	BLUEWATER URANIUM MINE (SANTA FE)	NND986683316	NM	Removal
59	BM-ROLLA RESEARCH CENTER	MOSFN0703485	MO	Removal
60	Bodie State Historical Park	CAN000908532	CA	Removal
61	Bonanza Mill	WASFN1002221	WA	Removal
62	Bonne Terre Mine Tailings	MOD985818236	MO	Removal
63	Borden Chem Co/ Tenoric Mine	FLD980727432	FL	
64	BoRIt Asbestos	PAD981034887	PA	NPL, removal
65	Brewer Gold Mine	SCD987577913	SC	NPL, removal
66	Broad Brook Mill	CT0002055887	CT	Proposed NPL
67	Brushy Creek Mine/Mill Facility	MOT300010691	MO	Removal
68	Bueno Mill & Mine SIte	CON000802129	CO	Removal
69	Bunker Hill Mining & Metallurgical Complex	IDD048340921	ID	NPL
70	BUTTERFIELD CREEK-HERRIMAN RESIDENTIAL	UT0002055176	UT	Removal
71	BUTTERFIELD MINE (ST. JOE'S TUNNEL)	UTD981548993	UT	Removal

72	California Gulch	COD980717938	CO	NPL, removal
73	Callahan Mining Corp	MED980524128	ME	NPL
74	CANE VALLEY NAVAJO RADIOACTIVE STRUCTURES	NNN000908623	AZ	Removal
75	Captain Jack Mill	COD981551427	CO	NPL, removal
76	Caraleigh Phosphate and Fertilizer Works	NCN000407686	NC	Removal
77	Carpenter Snow Creek Mining District	MT0001096353	MT	NPL, removal
78	Carson River Mercury Site	NVD980813646	NV	NPL, removal
79	Carthage City and Eastern Jasper County Lead	MON000705445	MO	Removal
80	Cedartown Industries, Inc.	GAD095840674	GA	Deleted NPL, removal
81	Cedartown Municipal Landfill	GAD980495402	GA	Deleted NPL
82	Celtor Chemical Works	CAD980638860	CA	Deleted NPL, removal
83	Central City, Clear Creek	COD980717557	CO	NPL, removal
84	Central Eureka Mine	CA0000726539	CA	Removal
85	CENTRAL FARMERS ACTIVITY	IDD980722292	ID	Removal
86	Central Mining District Lead – Camden Co.	MON000705679	MO	Removal
87	Central Mining District Lead – Cole Co.	MON000705444	MO	Removal
88	Central Mining District Lead – Miller Co.	MON000705678	MO	Removal
89	Central Mining District Lead – Moniteau Co.	MON000705681	MO	Removal
90	Central Mining District Lead – Morgan Co.	MON000705680	MO	Removal
91	CERRILLOS MILL/SMELTER	NMD986668721	NM	Removal
92	Chemet Co.	TND987768546	TN	Deleted NPL, removal
93	Cherokee County	KSD980741862	KS	NPL, removal
94	Chevron Questa	NMD002899094	NM	NPL
95	Chlor-Alkali Facility (Former)	NHN000103313	NH	NPL
96	CHURCH ROCK NAVAJO RADIOACTIVE STRUCTURES	NNN000908945	AZ	Removal
97	CIMA ROAD MINE WASTE SITE	CAN000905903	CA	Removal
98	Cimarron Mining Corp.	NMD980749378	NM	NPL, removal
99	Cinnabar Mine	IDD980665160	ID	Removal
100	Circle Smelting Corp.	ILD050231976	IL	Proposed NPL, removal
101	Claim Jumper/Shock Hill	CON000802644	CO	Removal
102	Clayton Silver Mine & Assoc Properties	ID0000135798	ID	Removal
103	Cleve Reber	LAD980501456	LA	Deleted NPL, removal
104	Cleveland Mill	NMD981155930	NM	Deleted NPL, removal
105	Cleveland Mine and Mill	WAN001002247	WA	Removal
106	Coalinga Asbestos Mine	CAD980817217	CA	Deleted NPL, removal
107	COLORADO SCHOOL OF MINES RI/CREEKSIDE	COD000823401	CO	Removal

108	Columbia Nitrogen	SC0001040393	SC	Not on NPL, not a removal
109	COMEBACK MINE	IDD980982953	ID	Removal
110	Commencement Bay, Near Shore/Tide Flats	WAD980726368	WA	NPL, removal
111	COMMODITY METALS SITE - HAZMAT	MIN000510097	MI	Removal
112	CONDA MINE	IDN001002862	ID	Removal
113	Conjecture Mine	IDN001002661	ID	Removal
114	Continental Mine and Mill	IDN001002317	ID	Removal
115	Copper Basin Mining District	TN0001890839	TN	Removal
116	Coronet Industries	FLD001704741	FL	Enforcement site
117	COVE NAVAJO RADIOACTIVE STRUCTURE SITE	NNN000908603	AZ	Removal
118	COVE RED VALLEY(NORTHERN AGENCY) RADIOACTIVE STRUCTURE SITE	NNN000909454	AZ	Removal
119	COVE TRANSFER STATION	NNN000906016	AZ	Removal
120	CUBA SMELTER SITE	NMD986668457	NM	Removal
121	Cyprus Tohono Mine	AZD094524097	AZ	Removal
122	Davenport and Flagstaff Smelters	UTD988075719	UT	NPL, removal
123	Denver Radium Site	COD980716955	CO	NPL, removal
124	DEPUE/New Jersey Zinc/Mobil Chemical Corp.	ILD062340641	IL	NPL
125	Diamond Shamrock (Painesville Works)	OHD980611909	OH	Proposed NPL, removal
126	Dona Ana Metal Survey	NM0000605387	NM	Removal
127	DOUGLAS MINE	ID0000010108	ID	Removal
128	E.I. du Pont de Nemours & Co., Inc. (Newport Pigment Plant Landfill)	DED980555122	DE	NPL, removal
129	Eagle Mine	COD081961518	CO	NPL, removal
130	Eagle Zinc Co Div T L Diamond	ILD980606941	IL	NPL, removal
131	East Helena Site	MTD006230346	MT	Removal
132	Eastern Michaud Flats Contamination	IDD984666610	ID	NPL, removal
133	Elizabeth Mine	VTD988366621	VT	Removal
134	ELVINS MINE TAILINGS	MOD985818244	MO	Removal
135	Ely Copper Mine	VTD988366571	VT	NPL
136	Empire Canyon	UT0002005981	UT	Removal
137	ENOCH VALLEY MINE	IDN001002861	ID	
138	Estech General Chemical	NCD051827905	NC	Removal
139	Eureka Mills	UT0002240158	UT	NPL, removal
140	Evening Star Mine	CON000802651	CO	Removal
141	Everett Smelter	WAN001002564	WA	Removal
142	FEDERAL MINE TAILINGS	MOD985808070	MO	Removal
143	Feed Materials Production Center (USDOE)	OH6890008976	OH	NPL, removal

144	FIBERFINE OF MEMPHIS	TND007017056	TN	Removal
145	Fields Brook	OHD980614572	OH	NPL, removal
146	Flat Creek IMM	MT0012694970	MT	NPL, removal
147	Flat Top Mine	SDN000802781	SD	Removal
148	Foote Mineral Co.	PAD077087989	PA	NPL, removal
149	Former United Zinc Smelter	KSN000705026	KS	Proposed ? NPL, removal
150	FORMER W&J LANYON ZINC WORKS	KSN000706199	KS	Enforcement site
151	Formosa Mine	ORN001002616	OR	NPL, removal
152	Fourco Glass	WVD988768693	WV	Removal
153	Franklin County Lead	MON000705442	MO	Removal
154	Fremont National Forest/White King and Lucky Lass Uranium Mines (USDA)	OR7122307658	OR	NPL, removal
155	French Gulch	CO0001093392	CO	Removal
156	Gambonini Mercury Mine	CA0002322469	CA	Removal
157	GAY MINE SITE	IDN001002730	ID	Enforcement site
158	Gem Park Complex	CON000801985	CO	Removal
159	Georgetown Railroad	MTD986068930	MT	Removal
160	Gilt Edge Mine	SDD987673985	SD	NPL, removal
161	GIRARDEAU STEVEDORES PYRITE FIRE	MON000705901	MO	Removal
162	GLEN RIDGE RADIUM SITE	NJD980785646	NJ	Deleted NPL
163	Golden Age Mine	CO0000023077	CO	Enforcement site
164	Goldome Mine	CAN000908600	CA	Removal
165	Grandview Mine	WASFN1002165	WA	Removal
166	Great Republic Smelter	MTN000802591	MT	Removal
167	GREEN RIVER CYANIDE DRUMS	UTD980717995	UT	Removal
168	Grey Eagle Mine	CAD000629923	CA	Removal
169	Grouse Creek Mine	IDSFN1002152	ID	Removal
170	Gulf States Steel/Black Creek	ALD004014973	AL	Removal
171	Halliburton Plant Fire	TXN000607023	TX	Removal
172	HAMMOND HULL SITE FOUND NOT TO BE VIRGINIA CAROLINA CHEMICAL (VCC)	SCN000407726	SC	Removal
173	Hanford 1100-Area (USDOE)	WA4890090075	WA	Deleted NPL, removal
174	Hanlin-Allied-Olin	WVD024185373	WV	NPL, removal
175	Harmony Mine & Mill Site	IDSFN1002104	ID	Removal
176	HAYSTACK NAVAJO RADIOACTIVE STRUCTURES	NNN000909132	NM	Removal
177	HEARST MILL	NM0000037408	NM	Removal
178	Hegeler Zinc	ILN000508134	IL	NPL, removal
179	HEMATITE RADIOACTIVE	MOD985770767	MO	

180	Hendricks Mining & Milling	COD078348737	CO	Enforcement site
181	HENRY MINE	IDN001002860	ID	Enforcement site
182	Herculaneum Lead Smelter Site	MOD006266373	MO	Removal
183	Highway 00 Lead	MON000705438	MO	Removal
184	Hocomonco Pond	MAD980732341	MA	NPL
185	Holden Mine	WA9122307672	WA	Removal
186	Holtra Chem	NCD991278631	NC	Removal
187	Homestake Mining Co.	NMD007860935	NM	NPL
188	Horton Iron and Metal	NCN000407480	NC	NPL
189	Idaho Lakeview Mine	IDN001002537	ID	Removal
190	Ilse Mine AKA Terrible Mine	COD980957674	CO	Removal
191	Industrial Minerals	CO0001407543	CO	Removal
192	INDUSTRI-PLEX	MAD076580950	MA	NPL
193	Intermountain Insulation SLC Plant	UT0010165126	UT	Removal
194	International Minerals and Chemicals (IMC)	SCD003350493	SC	Removal
195	International Smelting and Refining	UTD093120921	UT	NPL
196	Iron King Mine - Humboldt Smelter	AZ0000309013	AZ	NPL, removal
197	Iron Mountain Mine	CAD980498612	CA	NPL, removal
198	Iron Springs Mining District	CO0001916360	CO	Removal
199	Jackpile-Paguate Uranium Mine	NMN000607033	NM	Proposed NPL, unknown
200	Jackson Township Landfill	NJD980505283	NJ	Deleted NPL
201	Jacobs Smelter	UT0002391472	UT	NPL, removal
202	JEFFERSON CITY RESIDENTIAL YARDS	MTN000802725	MT	Removal
203	Jewett White Lead Co. Site	NYD980531545	NY	Removal
204	JIS Landfill	NJD097400998	NJ	NPL
205	JOHNNY M MINE AREA	NMN000607139	NM	Removal
206	JORDAN VIEW LOT	UTD988073466	UT	Removal
207	JOSEPHINE MILL # 1 AKA OLD JOSEPHINE MILL	WAN001002401	WA	Removal
208	Joslyn Street Tailings	MT0000616409	MT	SF Alternative Site
209	Kaaba Texas Mine	WASFN1002145	WA	Removal
210	Kaiser Aluminum (Mead Works)	WAD000065508	WA	NPL, removal
211	Kemira Acid Spill	GASFN0406941	GA	Removal
212	Kennecott (North Zone) (SA)	UTD070926811	UT	Proposed NPL, removal
213	Kennecott (South Zone) (SA)	UTD000826404	UT	Withdrawn NPL, removal
214	KERBER CREEK SITE	CON000802775	CO	Removal
215	KERN RIVER/BINGHAM CREEK PIPELINE	UTD988073458	UT	Removal
216	KerrAmerican Mine	MED055715775	ME	Other Cleanup Activity
217	KERR-MCGEE (REED-KEPPLER PARK)	ILD980824007	IL	NPL

218	KERR-MCGEE (RESIDENTIAL AREAS)	ILD980824015	IL	NPL
219	Kerr-McGee Chemical Soda Springs Plant	IDD041310707	ID	NPL
220	Kerr-McGee Kress Creek/West Branch Dupage River	ILD980823991	IL	NPL
221	KING CREEK	MTD986069920	MT	Removal
222	King Tutt Mesa Aggregate Site	NND986667434	NM	Enforcement site
223	KINGSBURY CREEK MINE LAB	CA0002373736	CA	Removal
224	Klau/Buena Vista Mine	CA1141190578	CA	NPL, removal
225	Landsdowne Radiation	PAD980830921	PA	Deleted NPL, removal
226	LARK WASTE ROCK AND TAILINGS (KENNECOTT)	UTD980959258	UT	Removal
227	Lava Cap Mine	CAD983618893	CA	NPL, removal
228	Lawrence County Mining Area Sites	MON000703982	MO	Removal
229	LCP Chemicals	GAD099303182	GA	NPL, removal
230	LCP Chemicals Inc.	NJD079303020	NJ	NPL
231	Le Roi Co Smelter	WAD988507323	WA	Removal
232	LEADWOOD MINE TAILINGS	MOD985818210	MO	Removal
233	Leeds 5 Stamp Mill	UT0000934653	UT	Removal
234	Leeds Silver Reclamation Site	UTD981550619	UT	Removal
235	Leviathan Mine	CAD980673685	CA	NPL, removal
236	Li Tungsten Corp.	NYD986882660	NY	NPL, removal
237	Libby Asbestos Site	MT0009083840	MT	NPL, removal
238	Lincoln Park	COD042167858	CO	NPL
239	Loflin Gold Mine	NCN000407301	NC	Removal
240	LOUISA MINE (VA VERMICULITE LTD.)	VAN000305634	VA	
241	Macalloy Corporation	SCD003360476	SC	NPL, removal
242	Madison County Mines	MOD098633415	MO	NPL, removal
243	Magma Copper Co.	AZD001886654	AZ	Enforcement site
244	MARIANO LAKE AUM SITE	NNN000908585	NM	Removal
245	Marsh Creek Rd Abandoned Dump Site	CAD980736060	CA	Removal
246	Martin-Marietta Aluminum Co.	ORD052221025	OR	Deleted NPL
247	Matthiessen and Hegeler Zinc Company	IL0000064782	IL	NPL, removal
248	MAYFLOWER MOUNTAIN TAILINGS PONDS	UTD980951438	UT	Removal
249	Maywood Chemical	NJD980529762	NJ	NPL, removal
250	McCleur Tailings	AZ0000309096	AZ	Removal
251	McLaren Mill Tailings	MTD981550841	MT	Removal
252	MEMPHIS DEFENSE DEPOT (DLA)	TN4210020570	TN	NPL
253	Midnite Mine	WAD980978753	WA	NPL, removal
254	Midvale Slag	UTD081834277	UT	NPL, removal
255	MILLTOWN RESERVOIR SEDIMENTS	MTD980717565	MT	NPL
256	Minnie Moore Mine	IDN001002295	ID	Removal

257	Monarch Mill do not confuse with Monarch Stamp Mill in Elmore County	IDN001002609	ID	Removal
258	Monsanto	GAD001700699	GA	Deleted NPL
259	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	ID	NPL
260	MONTCLAIR/WEST ORANGE RADIUM SITE	NJD980785653	NJ	Deleted NPL
261	Monticello Mill Tailings (USDOE)	UT3890090035	UT	NPL
262	MONTICELLO RADIOACTIVELY CONTAMINATED PROPERTIES	UTD980667208	UT	NPL
263	Morning Star Mine	CA0000466748	CA	Removal
264	Mouat Industries	MTD021997689	MT	Removal
265	Mountain View Mobile Home Estates	AZD980735724	AZ	Deleted NPL, removal
266	MT NORRIS SCOUT RESERVATION	VTN000105934	VT	Removal
267	MTA Vermiculite Rail Spur	CAN000905933	CA	Removal
268	MULBERRY PHOSPHATES INC	FLD004106415	FL	Removal
269	Murray Smelter	UTD980951420	UT	Proposed NPL, removal
270	NATIONAL MINE TAILINGS	MOD985818228	MO	Removal
271	National Southwire Aluminum Co.	KYD049062375	KY	NPL, removal
272	National Zinc Co.	KSD980406698	KS	Removal
273	National Zinc Corp.	OKD000829440	OK	Proposed NPL, removal
274	NAVAJO RADIOACTIVE HOGANS	NNN000905864	AZ	Removal
275	Ne Churchrock Quivira Mines	NNSFN0905492	NM	Removal
276	Nelson Tunnel/Commodore Waste Rock	CON000802630	CO	NPL, removal
277	New Idria Mercury Mine	CA0001900463	CA	NPL, removal
278	Newton County Mine Tailings	MOD981507585	MO	NPL, removal
279	NL IND, Mine Mill	COD980634604	CO	Removal
280	NORFOLK NAVAL BASE (SEWELLS POINT NAVAL COMPLEX)	VA6170061463	VA	NPL
281	North Cave Hills Mining Sites	SD0012261936	SD	Removal
282	Northeast Chemical	NCSFN0406973	NC	Removal
283	Northeast Churchrock Mine Site	NNN000906132	NM	Removal
284	Novak Sanitary Landfill	PAD079160842	PA	NPL
285	Nuclear Metals, Inc.	MAD062166335	MA	NPL and Removal
286	Ohio River Park	PAD980508816	PA	NPL
287	Old American Zinc Plant	IL0000034355	IL	Removal
288	Old Cobalt Tailings Pond	UTD980717987	UT	Removal
289	Olin Corporation (McIntosh Plant)	ALD008188708	AL	NPL, removal
290	Omaha Lead	NESFN0703481	NE	NPL, removal
291	Onondaga Lake	NYD986913580	NY	NPL, removal
292	Ophir Mills and Smelter	UT0010221516	UT	Removal

293	Ore Knob Mine	NCN000409895	NC	NPL, removal
294	Ormet Corp.	OHD004379970	OH	NPL
295	Oronogo-Duenweg Mining Belt	MOD980686281	MO	NPL, removal
296	OVERNIGHT INN MERCURY	UTN000802436	UT	Removal
297	Palmerton Zinc Pile	PAD002395887	PA	NPL, removal
298	Park City Mine Chemical	MON000705985	MO	Removal
299	Pend Oreille Village	WAN001002719	WA	Removal
300	Phelps Dodge New Cornelia Branch	AZD081687063	AZ	Enforcement site
301	PHILLIPS CHEMICAL CO.	NED000325167	NE	Proposed NPL/ withdrawn
302	Pike Hill Copper Mine	VTD988366720	VT	NPL
303	Pioneer Pit and Gardner's Point Placer Mines	CAN000905978	CA	Removal
304	Pittsburg Zinc	KSD985015338	KS	Removal
305	PLUMAS EUREKA STATE HISTORIC PARK	CAN000908832	CA	Removal
306	Polar Star Mine	CASFN0905494	CA	Removal
307	Portland Cement (Kiln Dust 2 & 3)	UTD980718670	UT	NPL
308	PORTLAND CEMENT KILN DUST #1,4,5	UTD980952832	UT	Removal
309	Powhatan Mining Company	MDN000306665	MD	Removal
310	Prime Western Smelter	KSD980685366	KS	Removal
311	Quinton Smelter	OKD987088366	OK	Removal
312	RAMSHORN MINE	IDN001002538	ID	Removal
313	RED VALLEY NAVAJO RADIOACTIVE STRUCTURE SITE	NNN000908604	AZ	Removal
314	RED WATER MINE	MT0001120534	MT	Removal
315	Reeser's Landfill	PAD980829261	PA	Deleted NPL
316	Reilly Tar & Chemical Corp. (Dover Plant)	OHD980610042	OH	NPL, removal
317	Reynolds Metals Aluminum Reduction Site	NYD002245967	NY	Removal
318	Reynolds Metals Company	ORD009412677	OR	NPL, removal
319	Richardson Flat Tailings	UTD980952840	UT	Proposed NPL
320	Richmond Hill Project	SD0001014406	SD	Enforcement site
321	Rico - Argentine	COD980952519	CO	Removal
322	Riconada Mine	CA0141190579	CA	Removal
323	Ringwood Mines/Landfill	NJD980529739	NJ	NPL, removal
324	RIO TINTO COPPER MINE	NV3141190030	NV	Proposed or withdrawn NPL ?
325	Riverbank Army Ammunition Plant	CA7210020759	CA	NPL, removal
326	Robinson Insulation	ND0010165116	ND	Removal
327	Rock Creek Mine	AKN001002823	AK	Removal
328	ROCKWOOL BUTTONS	CO0001580463	CO	Removal
329	Rocky Flats Plant (USDOE)	CO7890010526	CO	NPL, removal

330	Rumsey Tailings	MT0001992585	MT	Removal
331	Salmon River Uranium Development	IDN001002662	ID	Removal
332	Salt Chuck Mine	AK0001897602	AK	NPL
333	Saltville Waste Disposal Ponds	VAD003127578	VA	NPL, removal
334	San Vincente Creek Tailings	NMD980879415	NM	Removal
335	Sandoval Zinc Company	ILD053980454	IL	NPL
336	Sandy Smelter Site	UTD988078044	UT	Enforcement site
337	SANTA FE MINE #2 - RED MOUNTAIN	CAN000908979	CA	Removal
338	Savannah River Site (US DOE)	SC1890008989	SC	NPL, removal
339	SECTION 32 AUM SITE	NNN000908747	NM	Removal
340	SECTION 33 AUM SITE	NNN000908748	NM	
341	Shaharald Mine	CAN000908300	CA	Removal
342	Sharon Steel Corp. (Midvale Tailings)	UTD980951388	UT	Deleted NPL, removal
343	Sheildalloy Metallurgical Corporation	OHD042319244	OH	Removal
344	Shieldalloy Corp.	NJD002365930	NJ	NPL
345	Silver Bow Creek/Butte Area	MTD980502777	MT	NPL, removal
346	Silver Creek Tailings	UTD980951404	UT	Proposed NPL/ withdrawn
347	Silver Mountain Mine	WAD980722789	WA	Deleted NPL
348	SILVERADO HEAP LEACH	NVD982029019	NV	Removal
349	Silverton Mercury (Hg) Concentrators	WAN001002702	WA	Removal
350	SKYLINE AUM WASTE PILE SITE	NNN000908358	UT	Removal
351	Sloan Glass Site	WV0004294104	WV	Removal
352	Smeltertown Site	COD983769738	CO	Proposed NPL, removal
353	Smoky Canyon Mine	IDN001002800	ID	Removal
354	Smuggler Mountain	COD980806277	CO	Deleted NPL, removal
355	Southeast Idaho Selenium Project	IDN001002245	ID	Removal
356	Southwest Jefferson County Mining	MON000705443	MO	NPL, removal
357	Spelter Zinc Plant	WV0000634584	WV	Removal
358	St Louis Smelting & Refining Co	ILD980607006	IL	Removal
359	St. Joe Mineral Corp – Viburnum	MOD000823252	MO	Removal
360	St. Louis River Site	MND039045430	MN	NPL
361	Standard Mine	CO0002378230	CO	NPL, removal
362	Starmet CMI	SCD987570405	SC	Removal
363	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	FL	NPL, removal
364	Stauffer Chemical LeMoyne	ALD008161176	AL	NPL
365	Steeler, Inc. Drywall Construction Supply	CAD981389653	CA	Removal
366	Stephenson – Bennett Mine	NMD986684231	NM	Removal

367	Stibnite/Yellow Pine Mining Area	IDD980665459	ID	Proposed NPL, removal
368	Stono Phosphate Works	SC0002316404	SC	Removal
369	Success Mine	IDD984674986	ID	Removal
370	Sulphur Bank Mercury Mine	CAD980893275	CA	NPL, removal
371	Summitville Mine	COD983778432	CO	NPL, removal
372	Swift Agri-Chem	SCD058181991	SC	Enforcement site
373	Sydney Mine Sludge Ponds	FLD000648055	FL	NPL, removal
374	Talache Mine	ID0002007250	ID	Removal
375	Tar Creek (Ottawa County)	OKD980629844	OK	NPL, removal
376	Tar Lake	MID980794655	MI	NPL, removal
377	TEEC NOS POS NAVAJO RADIOACTIVE STRUCTURES	NNN000908610	AZ	Removal
378	Teledyne Wah Chang	ORD050955848	OR	NPL
379	TERRERO MINE	NMD986668820	NM	
380	Tex-Tin Corp.	TXD062113329	TX	NPL, removal
381	TOOELE VALLEY RAILROAD	UT0011980278	UT	Removal
382	Torch Lake	MID980901946	MI	NPL, removal
383	Triumph Mine Tailings Piles	IDD984666024	ID	Proposed NPL/withdrawn
384	Trona Mercury	CAN000908696	CA	Removal
385	TUBA CITY ABANDONED LDFL	NND982400145	AZ	Remedial enforcement
386	TUBA CITY ACID TANK	AZD981621899	AZ	Removal
387	TUBA CITY NAVAJO RADIOACTIVE STRUCTURES SITE	NNN000908774	AZ	Removal
388	Tulsa Fuel and Manufacturing	OKD987096195	OK	NPL, removal
389	TWO BROTHERS MINE	CO0012044960	CO	Removal
390	U S Smelter	CO0009354248	CO	Removal
391	U.S. DOE Gaseous Diffusion Plant	KY8890008982	KY	NPL, removal
392	U.S. DOE Oak Ridge Reservation	TN1890090003	TN	NPL, removal
393	U.S. Magnesium	UTN000802704	UT	NPL
394	U.S. Radium Corp.	NJD980654172	NJ	NPL, removal
395	U.S. Smelter and Lead Refinery, Inc.	IND047030226	IN	NPL, removal
396	U.S. Titanium	VAD980705404	VA	NPL
397	Union Pacific Vermiculite Rail Spur	CAN000905932	CA	Removal
398	UNITED MINES TUCSON CYANIDES	AZN000909469	AZ	Removal
399	United Nuclear Corp.	NMD030443303	NM	NPL
400	Upper Tenmile Creek Mining Area	MTSFN7578012	MT	NPL, removal
401	Uravan Uranium Project (Union Carbide Corp.)	COD007063274	CO	NPL
402	USDA FS Boise NF: Monarch Mine Stamp Mill USDA	ID0001413723	ID	Removal
403	USDOI BLM HWS GOLD & SILVER MINE ELK CY	IDD980835904	ID	

404	Vasquez Boulevard and I-70	CO0002259588	CO	NPL, removal
405	VCC Albany	GAD981237043	GA	Removal
406	VCC Augusta	GAN000407494	GA	Removal
407	VCC Columbus	GAN000409850	GA	Removal
408	VCC Greenville	SCN000407814	SC	Removal
409	VCC Opelika	ALD983186123	AL	Removal
410	VCC Pon Pon	SCS123457002	SC	Removal
411	VCC Rome	GAN000410416	GA	Removal
412	VCC Social Circle	GAN000407760	GA	Removal
413	VCC Winston Salem	NCN000410344	NC	Removal
414	Vermiculite EXFO W R Grace GAO150	SCD003344108	SC	Removal
415	Vermiculite Intermountain Site	UTN000802119	UT	Removal
416	Vermiculite Northwest	WAN001002259	WA	Removal
417	Vermiculite of Hawaii	HIN000905638	HI	Removal
418	Vermiculite WRG4	PAN000305592	PA	Removal
419	Vermont Asbestos Group Mine	VTN000105222	VT	Removal
420	Veta Grande Mining Co	NVD038275020	NV	Removal
421	VIBURNUM TREND LEAD HAUL ROADS	MON000704445	MO	Removal
422	Virginia Carolina Chemical (VCC) Columbia	SCN000410253	SC	Removal
423	Virginia Carolina Chemical (VCC) Port of Baldwin Mines	SCN000407725	SC	Removal
424	Virginia Carolina Chemical (VCC) Wando	SCN000410243	SC	Removal
425	Vulcan-Louisville/Fansteel	ILD097271563	IL	Removal
426	Vulture Mill Site	AZ0000262725	AZ	Enforcement site
427	W.R. Grace - Wilder, KY	KYN000407413	KY	Removal
428	W.R. Grace & Co., Inc./Wayne Interim Storage Site (USDOE)	NJ1891837980	NJ	NPL, removal
429	Washington County Lead District - Furnace Creek	MON000705842	MO	NPL, removal
430	Washington County Lead District - Old Mines	MON000705027	MO	NPL, removal
431	Washington County Lead District - Pea Ridge	MON000706017	MO	Removal
432	Washington County Lead District - Potosi	MON000705023	MO	NPL, removal
433	Washington County Lead District - Richwoods	MON000705032	MO	NPL, removal
434	Weldon Spring Quarry/Plant/Pits (USDOE/Army)	MO3210090004	MO	NPL, removal
435	Western Mineral Products	MNN000508056	MN	Removal
436	Western Minerals Denver Plant	CO0010165136	CO	Removal
437	Westlake Landfill OU2	MOD079900932	MO	NPL
438	Whitewood Creek	SDD980717136	SD	Deleted NPL
439	Wolff-Alport Chemical	NYC200400810	NY	NPL, removal
440	WR Grace Hamilton TWP	NJD067387472	NJ	Removal
441	Wright Chemical Corporation	NCD024766719	NC	NPL

442	Wrigley Charcoal Plant	TND980844781	TN	NPL, removal
443	YOUNG AMERICA MINE	WASFN1002166	WA	Removal
444	Yttrium Processing Plant	WYD982587461	WY	Removal
445	Zeibright Mine	CAN000905925	CA	Removal
446	Zonolite Road GAO 144	GAN000410399	GA	Removal
447	Zonolite/W.R. Grace	MASFN0103055	MA	Removal

Attachment B5. 2009 Current Sites Universe

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
1	1	2	--	Copper Queen Branch	AZ	2	Copper Ore NEC	Surface mine	Mine_ Combo	Non-producing	Freeport McMoRan Corporation	Freeport-McMoRan Copper & Gold Inc
2	1	90	--	Copreco LLC	AZ	2	Copper Ore NEC	Surface mine	Mine_ Combo	Active	Copreco LLC	Phelps Dodge Mining Co; Bio Teq Environmental Technologies
3	3	92	--	Saint-Gobain Proppants	AR	2	Alumina	Surface mine	Mine_ Combo	Active	Saint-Gobain Proppants	St Gobain
4	3	93	--	Saint-Gobain Proppants	AR	2	Aluminum Ore-Bauxite	Surface mine	Mine_ Combo	Active	Saint-Gobain Proppants	St Gobain
5	4	251	--	New Birmingham Resources LLC	--	0	Iron Ore	Surface mine	Mine_ Combo	Active	New Birmingham Resources LLC	David J Durrett; Lewie Byers
6	4	252	--	New Birmingham Resources, LLC #2	--	0	Iron Ore	Surface mine	Mine_ Combo	Active	New Birmingham Resources, LLC	David J Durrett; Lewie Byers
7	5	174	--	Barrick Cortez	NV	2	Gold Ore	Surface mine	Mine_ Combo	Active	Cortez Joint Venture	Barrick Gold Corp
8	5	211	--	Barrick Cortez Underground	NV	2	Gold Ore	Underground mine	Mine_ Combo	Active	Cortez Joint Venture	Barrick Gold Corp
9	7	35	--	Getchell Mine	NV	2	Gold Ore	Underground mine	Mine_ Combo	Non-producing	Barrick Turquoise Ridge Incorporated	Barrick Gold Corp
10	7	198	--	Turquoise Ridge Mine	NV	2	Gold Ore	Underground mine	Mine_ Combo	Active	Barrick Turquoise Ridge Inc	Barrick Gold Corp
11	8	276	--	General Chemical Mine	WY	2	Trona	Underground mine	Mine_ Combo	Active	General Chemical (Soda Ash) Partners	Tata Chemicals Ltd
12	8	277	--	General Chemical Mill	WY	2	Trona	Surface mine	Mine_ Combo	Active	General Chemical (Soda Ash) Partners	Tata Chemicals Ltd
13	9	319	--	C-100 Jaw Plant Nordberg #42165100B	MA	1	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine_ Combo	NewMine	Gagliarducci Construction, Inc.	Jerome J Gagliarducci
14	9	320	--	Screener-Warrior Power Screen #12203097	MA	1	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine_ Combo	NewMine	Gagliarducci Construction, Inc.	Jerome J Gagliarducci
15	12	326	--	Yellowstone Mine	MT	1	Talc	Surface mine	Mine_ Combo	Active	Luzenac America Incorporated	Rio Tinto Group

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
16	12	347	--	Three Forks Mill	--	0	Talc	Processor	Mine_ Combo	Active	Luzenac America Incorporated	Rio Tinto Group
17	13	--	38	Corpus Christi Grinding Plant	TX	1	Barite Barium Ore	Processor	Processor_ Combo	Active	--	--
18	13	--	45	Battle Mountain Grinding Plant	NV	2	Barite Barium Ore	Processor	Processor_ Combo	Active	--	--
19	14	--	46	Sherwin Alumina Co.	TX	2	bauxite and alumina	Processor	Processor_ Combo	NA	--	--
20	14	--	291	Sherwin Alumina	TX	2	Alumina	Processor	Processor_ Combo	Active	--	--
21	15	--	1	Bayer Alumina Plant	TX	1	Alumina	Processor	Processor_ Combo	Active	--	--
22	15	--	48	Alcoa World Alumina Atlantic	TX	1	Bauxite and alumina	Processor	Processor_ Combo	NA	--	--
23	17	--	260	W.R. Grace & Co.	SC	2	Vermiculite	Processor	Processor_ Combo	NA	--	--
24	18	--	55	Searles Valley Minerals Inc	CA	2	Boron	Processor	Processor_ Combo	NA	--	--
25	18	--	235	IMC Chemicals Incorporated	CA	2	Soda ash	Processor	Processor_ Combo	NA	--	--
26	19	--	24	Excalibar Minerals	TN	2	Barite	Processor	Processor_ Combo	NA	--	--
27	19	--	41	Dyersburg Plant	TN	2	Barite Barium Ore	Processor	Processor_ Combo	Active	--	--
28	20	--	266	Young Mill	TN	2	Zinc	Processor	Processor_ Combo	Active	--	--
29	21	--	59	Nyrstar NV	TN	2	Cadmium	Processor	Processor_ Combo	NA	--	--
30	21	--	75	Strategic Resource Acquisition Corp	TN	2	Germanium	Processor	Processor_ Combo	NA	--	--
31	21	--	267	Plasminco (probably should be Pasminco)	TN	2	Zinc	Processor	Processor_ Combo	NA	--	--
32	22	148	--	United Plant	MN	1	Iron Ore	Surface mine	Mine_ Combo	Active	United Taconite LLC	Cliffs Natural Resources Inc
33	22	151	--	United - Mine	MN	2	Iron Ore	Surface mine	Mine_ Combo	Active	United Taconite LLC	Cliffs Natural Resources Inc

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
34	23	225	--	Lewis Mine	NY	2	Wollastonite	Surface mine	Mine_ Combo	Inter-mittent	NYCO Minerals Inc	Rolling Rock Minerals Inc
35	23	228	--	Oak Hill Mine	NY	2	Wollastonite	Surface mine	Mine_ Combo	Inter-mittent	NYCO Minerals, Inc.	Rolling Rock Minerals Inc
36	24	321	--	Tilden Mine	MI	2	Iron Ore	Surface mine	Mine_ Combo	Active	Tilden Mining Company L C	Ontario Tilden Company; Cliffs TIOP Inc
37	24	322	--	Empire Mine	MI	2	Iron Ore	Surface mine	Mine_ Combo	Active	Empire Iron Mining Partnership	Inland Steel Industries Inc - Cleveland Cliffs Inc
38	27	--	108	US Steel Granite City	IL	2	Iron and steel	Processor	Processor_ Combo	NA	--	--
39	27	--	110	Beelman Truck Co.	IL	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_ Combo	NA	--	--
40	27	--	135	Stein, Inc.	IL	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_ Combo	NA	--	--
41	28	--	180	Elkem Metals Co.	OH	2	Manganese	Processor	Processor_ Combo	NA	--	--
42	28	--	183	Eveready Battery Co. Inc.	OH	2	Manganese	Processor	Processor_ Combo	NA	--	--
43	29	--	106	US Steel Braddock	PA	2	Iron and steel	Processor	Processor_ Combo	NA	--	--
44	29	--	142	Tube City IMS, LLC	PA	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_ Combo	NA	--	--
45	30	--	103	Severstal Warren	OH	2	Iron and steel	Processor	Processor_ Combo	NA	--	--
46	30	--	124	Lafarge North America Inc.	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_ Combo	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
47	30	--	132	MultiServ Plt 6	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
48	31	--	100	Republic Engineered Products Inc	OH	1	Iron and steel	Processor	Processor_Combo	NA	--	--
49	31	--	138	Stein, Inc.	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
50	32	--	92	Arcelor Mittal Burns Harbor	IN	1	Iron and steel	Processor	Processor_Combo	NA	--	--
51	32	--	139	The Levy Co., Inc.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
52	33	--	98	Arcelor Mittal USA Indiana Harbor	IN	1	Iron and steel	Processor	Processor_Combo	NA	--	--
53	33	--	107	US Steel Gary Works	IN	1	Iron and steel	Processor	Processor_Combo	NA	--	--
54	33	--	111	Beemsterboer Slag Corp.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
55	33	--	112	Beemsterboer Slag Corp.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
56	33	--	113	Edward C. Levy Co.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
57	33	--	119	Holcim (US) Inc./Mercier Corp.?	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
58	33	--	122	Lafarge North America Inc.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
59	33	--	128	MultiServ	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
60	33	--	140	The Levy Co., Inc.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
61	33	--	141	Tube City IMS, LLC	IN	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
62	33	--	144	U.S. Aggregates, Inc.	IN	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
63	34	--	96	Arcelor Mittal Riverdale	IL	1	Iron and steel	Processor	Processor_Combo	NA	--	--
64	34	--	127	MultiServ	IL	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
65	34	--	134	Phoenix Services LLC/listed as Harsco Multiserv Plt 27?	IL	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor_Combo	NA	--	--
66	1001	222	--	NO. 4 Mine	NY	2	Misc. Nonmetallic Mnls. NEC	Underground mine	Mine_Processor_Combo	Active	R.T.Vanderbilt Co, Gouverneur Mineral Division	R T Vanderbilt Company Inc
67	1001	223	--	Balmat Mining Operations	NY	2	Talc	Surface mine	Mine_Processor_Combo	Active	R T Vanderbilt Co Gouverneur Mineral Division	R T Vanderbilt Company Inc
68	1001	226	--	No. 4 Mine	NY	2	Talc	Surface mine	Mine_Processor_Combo	Active	R.T.Vanderbilt Co, Gouverneur Mineral Division	R T Vanderbilt Company Inc

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
69	1001	--	263	R.T.Vanderbilt Company	NY	1	Wollastonite	Processor	Mine_ Processor_ Combo	NA	--	--
70	1002	325	--	Barretts Mill	MT	1	Talc	Surface mine	Mine_ Processor_ Combo	Active	Barretts Minerals Inc	Minerals Technologies Inc
71	1002	--	274	Specialty Minerals Inc. (Barretts Minerals)	MT	2	Pyrophyllite	Processor?	Mine_ Processor_ Combo	NA	--	--
72	1003	346	--	Boron Operations	CA	2	Boron Minerals	Surface mine	Mine_ Processor_ Combo	Active	U S Borax Inc	Rio Tinto Group
73	1003	--	53	US Borax waste pile from Boron CA operations	CA	2	Boron	Processor	Mine_ Processor_ Combo	NA	--	--
74	1004	351		Brownsville Mill	--	0	Barite Barium Ore	Processor	Mine_ Processor_ Combo	Active	Milwhite, Inc.	Milwhite Inc
75	1004	--	32	Milwhite	TX	2	Barite	Processor	Mine_ Processor_ Combo	NA	--	--
76	1005	78	--	Freeport McMoRan Miami Inc	AZ	2	Copper Ore NEC	Surface mine	Mine_ Processor_ Combo	Active	Freeport McMoran Miami Inc	Freeport-McMoRan Copper & Gold Inc
77	1005	--	67	Copper Cities Unit	AZ	1	Copper	Processor	Mine_ Processor_ Combo	NA	--	--
78	1006	36	--	Open Pit & Continental Surf Comp	NM	2	Copper Ore NEC	Surface mine	Mine_ Processor_ Combo	Non-producing	Freeport-McMoRan Cobre Mining Company	Freeport-McMoRan Copper & Gold Inc
79	1006	38	--	Chino Mines Co Mine	NM	2	Copper Ore NEC	Surface mine	Mine_ Processor_ Combo	Non-producing	Freeport-McMoRan Chino Mines Company	Freeport-McMoRan Copper & Gold Inc
80	1006	--	70	SX-EW	NM	2	Copper Ore NEC	Processor	Mine_ Processor_ Combo	Active	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
81	1006	--	278	Continental Mill Complex	NM	1	Copper Ore NEC	Processor	Mine_ Processor_ Combo	Non-producing	--	--
82	1006	--	279	Ivanhoe Concentrator	NM	1	Copper Ore NEC	Processor	Mine_ Processor_ Combo	Non-producing	--	--
83	1007	315		Du Pont Florida Mine & Plant	FL	2	Titanium Ore	Surface mine	Mine_ Processor_ Combo	Active	E I Dupont De Nemours & Co Inc	EI DuPont De Nemours & Co Inc
84	1007		271	E.I. Dupont de Nemours	FL	2	Zirconium and hafnium	Processor	Mine_ Processor_ Combo	NA		
85	1008	132		Enoch Valley Mine	ID	2	Phosphate Rock	Surface mine	Mine_ Processor_ Combo	Active	P4 Production LLC	Monsanto Company
86	1008		207	P4 Production LLC	ID	2	Phosphate rock	Processor	Mine_ Processor_ Combo	NA		
87	1009	332		Enoree Operations	SC	2	Vermiculite	Surface mine	Mine_ Processor_ Combo	Active	W R Grace & Co.	W R Grace & Company
88	1009		255	WR Grace and Co.	SC	1	Vermiculite	Processor	Mine_ Processor_ Combo	NA	--	--
89	1010	139		Excalibar Minerals	--	0	Barite Barium Ore	Surface mine	Mine_ Processor_ Combo	Active	Excalibar Minerals LLC	Newpark Resources Inc
90	1010		30	Excalibar Minerals of Louisiana LLC	LA	2	Barite	Processor	Mine_ Processor_ Combo	NA		
91	1011	308	--	Freeport-McMoRan Morenci Inc.	AZ	2	Copper Ore NEC	Surface mine	Mine_ Processor_ Combo	Active	Freeport-McMoRan Morenci Inc.	Freeport-McMoRan Copper & Gold Inc
92	1011	--	199	Phelps-Dodge Morenci	AZ	2	Molybdenum	Processor	Mine_ Processor_ Combo	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
93	1012	178	--	Genesis	NV	2	Gold Ore	Surface mine	Mine_ Processor_ Combo	Active	Newmont USA Limited	Newmont Mining Corp
94	1012	188	--	Meikle Mine	NV	2	Gold Ore	Underground mine	Mine_ Processor_ Combo	Active	Barrick Goldstrike Mines Inc	Barrick Gold Corp
95	1012	189	--	Goldstrike Mine	NV	2	Gold Ore	Surface mine	Mine_ Processor_ Combo	Active	Barrick Goldstrike Mines Inc	Barrick Gold Corp
96	1012	195	--	Leeville	NV	1	Gold Ore	Underground mine	Mine_ Processor_ Combo	Active	Newmont USA Limited	Newmont Mining Corp
97	1012	203	--	Deep Post	NV	1	Gold Ore	Underground mine	Mine_Processor_Combo	Intermittent	Newmont USA Limited	Newmont Mining Corp
98	1012	207	--	Storm Exploration Decline	NV	1	Gold Ore	Underground mine	Mine_Processor_Combo	Active	Barrick Goldstrike Mine Inc	Barrick Gold Corp
99	1012	--	79	Roaster Operations	NV	2	Gold Ore	Processor	Mine_Processor_Combo	Active	--	--
100	1012	--	81	Mill/Autoclave Operations	NV	2	Gold Ore	Processor	Mine_Processor_Combo	Active	--	--
101	1013	84		Hayden Concentrator	AZ	2	Copper Ore NEC	Surface mine	Mine_Processor_Combo	Active	Asarco LLC	Grupo Mexico S A
102	1013		66	Asarco, LLC - Hayden	AZ	2	Copper	Processor	Mine_Processor_Combo	NA	--	--
103	1014	143	--	Minntac Maintenance Dept.	MN	2	Iron Ore	Surface mine	Mine_Processor_Combo	Active	United States Steel Corp-Minnesota Ore Operations	USX Corp (United States Steel Corp)
104	1014	147	--	Minntac Mine	MN	2	Iron Ore	Surface mine	Mine_Processor_Combo	Active	United States Steel Corp-Minnesota Ore Operations	USX Corp (United States Steel Corp)

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
105	1014	--	146	Minntac Plant	MN	1	Iron Ore	Processor	Mine_Processor_Combo	Active	--	--
106	1015	316	--	New Riverside Ochre Company Incorporated	GA	2	Barite Barium Ore	Surface mine	Mine_Processor_Combo	Active	New Riverside Ochre Company Incorporated	Dellinger James R Jr & Estate Of James R Dellinger
107	1015	--	22	Baroid Drilling Fluids	GA	1	Barite	Processor	Mine_Processor_Combo	NA	--	--
108	1016	349	--	Plant #2	--	0	Boron Minerals	Processor	Mine_Processor_Combo	Active	Industrial Minerals Inc	L G Wilson Jr
109	1016	--	54	American Borate/Industrial Minerals Co.	SC	2	Boron	Processor	Mine_Processor_Combo	NA	--	--
110	1017	175	--	South Area	NV	2	Gold Ore	Surface mine	Mine_Processor_Combo	Active	Newmont USA Limited	Newmont Mining Corp
111	1017	210	--	Chukar	NV	2	Gold Ore	Underground mine	Mine_Processor_Combo	Active	Newmont USA Limited	Newmont Mining Corp
112	1017	--	82	Mill 6	NV	2	Gold Ore	Processor	Mine_Processor_Combo	Active		
113	1018	190		Twin Creeks Mine	NV	2	Gold Ore	Surface mine	Mine_Processor_Combo	Active	Newmont USA Limited	Newmont Mining Corp
114	1018	--	58	Sage Mill	NV	2	Brucite	Processor	Mine_Processor_Combo	Active		
115	1019	221		Willsboro Mine (Fox Knoll)	NY	2	Wollastonite	Surface mine	Mine_Processor_Combo	Active	NYCO Minerals, Inc.	Rolling Rock Minerals Inc
116	1019	--	264	NYCO Minerals	NY	2	wollastonite	Processor	Mine_Processor_Combo	NA		

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
117	1020	244	--	Young Mine	TN	2	Zinc	Underground mine	Mine_Processor_Combo	Active	Nyrstar Tennessee Mines, Strawberry Plains LLC	Nyrstar NV
118	1020	--	265	Maintenance and Supply	TN	2	Zinc	Processor	Mine_Processor_Combo	Active	--	--
119	1021	231	--	Celatom Mine	OR	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine_Processor_Combo	Inter-mittent	EP Minerals, LLC	Eagle-Picher Industries Inc
120	1021	--	192	Celatom Plant	OR	2	Misc. Nonmetallic Mnls. NEC	Processor	Mine_Processor_Combo	Active	--	--
121	1022	310	--	Mission/San Xavier/Eisenhower	AZ	2	Copper Ore NEC	Surface mine	Mine_Processor_Combo	Active	Asarco LLC, a Delaware limited liability	Grupo Mexico S A
122	1022	--	197	Asarco LLC Mission Complex	AZ	2	Molybdenum	Processor	Mine_Processor_Combo	NA	--	--
123	2003	--	--	Pinenut	AZ	2	Uranium Ore	Underground mine	Mine	Non-producing	Denison Mines (USA) Corp	International Uranium Corp
124	2004	4	--	North American Industries	AZ	2	Chem. and Fertil. Mnls. NEC	Surface mine	Mine	Inter-mittent	NORTH AMERICAN INDUSTRIES	Heinz Brung
125	2005	5	--	Rosemont Copper Project	AZ	2	Copper Ore NEC	Surface mine	Mine	Non-producing	Rosemont Copper Company	Augusta Resource Corp
126	2007	7	--	Sixteen To One Mine	CA	2	Gold Ore	Underground mine	Mine	Non-producing	Original Sixteen To One Mine Inc	Michael M Miller
127	2008	8	--	Washington Niagara Mine	--	0	Gold Ore	Underground mine	Mine	Non-producing	French Gulch (Nevada) Mining Corp	Timothy A Callaway
128	2009	9	--	Red Arrow	CO	2	Gold Ore	Underground mine	Mine	Non-producing	Red Arrow Gold Corporation	Craig A Liukko
129	2010	10	--	Liberty	--	0	Gold Ore	Underground mine	Mine	Non-producing	The Mining Company, Inc.	Kenneth J Orvis; Cristy L Orvis
130	2011	11	--	S P Chase Partner Newcomb	--	0	Gold Ore	Underground mine	Mine	Non-producing	Barnhard Mining Company LLC	Albert J Barnhard
131	2012	12	--	Whirlwind Mine	CO	2	Uranium-Vanadium Ore	Underground mine	Mine	Non-producing	Energy Fuels Resources	Energy Fuels Incorporated

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
132	2013	13	--	Sunshine Mine	ID	2	Silver Ore	Underground mine	Mine	Non-producing	Sterling Mining Company	Roger Van Voorhees
133	2014	14	--	Bunker Hill Mine	ID	2	Lead-Zinc Ore	Underground mine	Mine	Non-producing	Placer Mining Corporation	Robert Hopper
134	2015	15	--	Rescue Mine	ID	2	Gold Ore	Underground mine	Mine	Non-producing	Shoshone Silver Mining Co	Carol Stephan
135	2016	16	--	Golden Chest Project	ID	1	Gold Ore	Underground mine	Mine	Non-producing	New Jersey Mining Company	Fred W Brackebusch; Grant A Brackebusch
136	2025	25	--	Humboldt Mill	MI	2	Iron Ore	Surface mine	Mine	Non-producing	Kennecott Eagle Land LLC	Rio Tinto Group
137	2027	27	--	Wings Enterprise Phase One	--	0	Iron Ore	Surface mine	Mine	Non-producing	Wings Enterprise Inc	James C Kennedy
138	2029	29	--	Montana Tunnels Mining Inc	MT	2	Gold Ore	Surface mine	Mine	Non-producing	Montana Tunnels Mining Inc	Apollo Gold Corporation; Elkhorn Tunnels LLC
139	2031	31	--	Montanore Project	MT	2	Silver Ore	Underground mine	Mine	Non-producing	Mines Management, Inc.	Glenn M. Dobbs
140	2032	32	--	Sterling Mine	NV	2	Gold Ore	Underground mine	Mine	Non-producing	Sterling Gold Mining Corp	Imperial Metals Corp
141	2033	33	--	Fencemaker	NV	1	Antimony Ore	Underground mine	Mine	Non-producing	Stockpile Reserves LLC	Richard Brown; Mary Fitzpatrick
142	2034	34	--	February Premier		0	Gold Ore	Underground mine	Mine	Non-producing	Lode Star Gold Inc	Lonnie S Humphries
143	2037	37	--	H B Potash	NM	1	Potash	Underground mine	Mine	Non-producing	H B Potash LLC	Hugh E Harvey
144	2039	39	--	Balmat Mine No. 4 & Mill	--	0	Lead-Zinc Ore	Underground mine	Mine	Non-producing	St. Lawrence Zinc Company, LLC	Ontzinc
145	2040	40	--	Horizon Ag Products	--	0	Chem. and Fertil. Mnls. NEC	Surface mine	Mine	Active	Horizon Ag Products	Brad Knickel; Michael Farmar
146	2042	42	--	Cumberland Mine	TN	2	Zinc	Underground mine	Mine	Non-producing	Nyrstar Gordonsville, LLC	Nyrstar NV
147	2044	44	--	Tony M	UT	2	Uranium Ore	Underground mine	Mine	Non-producing	Denison Mines (USA) Corp	International Uranium Corp
148	2048	48	--	Kensington	AK	2	Gold Ore	Underground mine	Mine	Non-producing	Coeur Alaska Inc	Coeur D'Alene Mines Corp

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
149	2049	49	--	Cyprus Tohono Corporation	AZ	2	Copper Ore NEC	Surface mine	Mine	Non-producing	Cyprus Tohono Corp	Freeport-McMoRan Copper & Gold Inc
150	2050	50	--	Niblack Project LLC	AK	2	Gold Ore	Underground mine	Mine	Non-producing	Niblack Project LLC	Heatherdale Resources; CBR Gold Corporation
151	2052	52	--	Resolution Mine	AZ	2	Copper Ore NEC	Underground mine	Mine	Non-producing	Resolution Copper Mining LLC	RTZ Corp PLC; Broken Hill Proprietary Co Ltd
152	2068	68	--	Walla Walla Mine	ID	2	Gold Ore	Underground mine	Mine	Non-producing	F & H Mining	James Johnston; Roy A Sternes
153	2077	77	--	Dudley Red #1	AL	2	Iron Ore	Surface mine	Mine	Active	Alabama Pigments Co LLC	Gerald Cobern
154	2079	79	--	Freeport-McMoRan Bagdad Inc	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Freeport-McMoRan Bagdad Inc	Freeport-McMoRan Copper & Gold Inc
155	2080	80	--	Ray	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Asarco LLC	Grupo Mexico S A
156	2081	81	--	Mineral Park Inc	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Mineral Park Inc	Mercator Minerals Ltd
157	2082	82	--	Pinto Valley Operations	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	BHP Copper Inc	Broken Hill Proprietary Company Ltd
158	2083	83	--	Freeport-McMoRan Sierrita Inc	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Freeport-McMoRan Sierrita Inc	Freeport-McMoRan Copper & Gold Inc
159	2085	85	--	Arizona #1	AZ	2	Uranium Ore	Underground mine	Mine	Active	Denison Mines (USA) Corp	International Uranium Corp
160	2086	86	--	Carlota Copper Company	AZ	1	Copper Ore NEC	Surface mine	Mine	Active	Carlota Copper Company	Quadra Mining Ltd
161	2087	87	--	Gold Road Mine	AZ	2	Gold Ore	Underground mine	Mine	Intermittent	Addwest Minerals Inc	Addwest Minerals International Ltd
162	2088	88	--	Johnson Camp Mine	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Nord Resources Corporation	Nord Resources Corp
163	2089	89	--	The Old Wasp Mine	AZ	2	Gold Ore	Surface mine	Mine	Inter-mittent	The Old Wasp Mine	Clay Worst
164	2091	91	--	Freeport-McMoRan Safford Inc	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	Freeport-McMoRan Safford Inc	Freeport-McMoRan Copper & Gold Inc
165	2095	95	--	Alabama Mine	AR	2	Aluminum Ore-Bauxite	Surface mine	Mine	Active	McGeorge Contracting Co., Inc.	Haskell L Dickinson II
166	2096	96	--	Section 27	--	0	Aluminum Ore-Bauxite	Surface mine	Mine	Inter-mittent	Semcoa	Ted Smith; Tom Reed

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
167	2097	97	--	Owens Lake Mine	--	0	Trona	Surface mine	Mine	Active	U S Borax Inc	Rio Tinto Group
168	2098	98	--	Colorado Quartz	CA	2	Gold Ore	Underground mine	Mine	Inter-mittent	Colorado Quartz Gold Corp	Lance W Barker
169	2099	99	--	Dredge 17	CA	1	Gold Ore	Surface mine	Mine	Active	Cal Sierra Development Inc	Jemco LLC
170	2100	100	--	Baxter Mine	CA	2	Iron Ore	Surface mine	Mine	Active	Hahm International Inc	Scott R Descher
171	2101	101	--	Mt Pass Mine & Mill	CA	2	Rare Earths Ore	Surface mine	Mine	Active	Molycorp Minerals LLC	Resource Capital Funds; Traxys North America LLC
172	2102	102	--	Big Seam Mine	--	0	Gold Ore	Underground mine	Mine	Inter-mittent	Wildcat Mining LLC	Richard R Sykora
173	2103	103	--	Mesquite	CA	2	Gold Ore	Surface mine	Mine	Active	Western Mesquite Mines, Inc.	New Gold Inc
174	2104	104	--	CR Briggs	CA	2	Gold Ore	Surface mine	Mine	Active	CR Briggs	Canyon Resources Corp
175	2105	105	--	Jerico Products Incorporated	CA	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Jerico Products Inc	Michael Lind
176	2106	106	--	Silverlake Mine	--	0	Iron Ore	Surface mine	Mine	Active	Hahm International Inc	Scott R Descher
177	2107	107	--	Red Ledge Mining	CA	2	Gold Ore	Surface mine	Mine	Inter-mittent	Red Ledge Mining Company LLC	Barry Yampol; David Yampol
178	2108	108	--	Mockingbird Mine	CA	1	Gold Ore	Underground mine	Mine	Inter-mittent	Emmett's Excavation Inc	John Emmett
179	2109	109	--	Ocean View Mine	CA	2	Misc. Nonmetallic Mnls. NEC	Underground mine	Mine	Inter-mittent	Ocean View Mines LLC	Jeffrey A Swanger
180	2110	110	--	Joiner Portable #2	--	0	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Inter-mittent	Joiner Construction Inc	Craig W Joiner
181	2111	111	--	Climax Mine	CO	2	Molybdenum Ore	Surface mine	Mine	Inter-mittent	Climax Molybdenum Company	Freeport-McMoRan Copper & Gold Inc
182	2113	113	--	May Day - Idaho	CO	1	Gold Ore	Underground mine	Mine	Inter-mittent	Wildcat Mining Corp	Mike Clements
183	2114	114	--	Cresson Project	CO	2	Gold Ore	Surface mine	Mine	Active	Anglogold Ashanti (Colorado) Corp	Anglogold Ltd; Golden Cycle Gold Corp
184	2115	115	--	Alma Placer Mine	CO	2	Gold Ore	Surface mine	Mine	Inter-mittent	Environmental Mining Corp	Zane Schmeeckle; Jerry Miller

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
185	2116	116	--	Hookers Prairie Mine	FL	2	Phosphate Rock	Surface mine	Mine	Active	Mosaic Fertilizer LLC	Mosaic Company
186	2117	117	--	Hardee Phosphate Complex	FL	2	Phosphate Rock	Surface mine	Mine	Active	C F Industries Inc	Stephen R Wilson
187	2118	118	--	Swift Creek Mine	FL	2	Phosphate Rock	Surface mine	Mine	Active	PCS Phosphate-White Springs	Potash Corp Of Saskatchewan
188	2119	119	--	Four Corners	FL	2	Phosphate Rock	Surface mine	Mine	Active	Mosaic Phosphates Company	Mosaic Global Holdings
189	2120	120	--	Manko Co Sec 5 Mine/Phos	FL	1	Phosphate Rock	Surface mine	Mine	Active	Manko Company	Manko Company
190	2121	121	--	South Fort Meade Mine	FL	2	Phosphate Rock	Surface mine	Mine	Active	Mosaic Fertilizer LLC	Mosaic Company
191	2122	122	--	Wingate Creek Mine	FL	2	Phosphate Rock	Surface mine	Mine	Active	Mosaic Fertilizer LLC	Mosaic Company
192	2123	123	--	Hopewell	FL	2	Phosphate Rock	Surface mine	Mine	Active	Mosaic Phosphates Company	Mosaic Global Holdings
193	2124	124	--	Thompson Creek Mining Co	ID	2	Molybdenum Ore	Surface mine	Mine	Active	Thompson Creek Metals Co.	Blue Pearl Mining
194	2125	125	--	Galena	ID	2	Silver Ore	Underground mine	Mine	Active	U.S. Silver - Idaho, Inc.	U S Silver Corporation
195	2126	126	--	Lucky Friday	ID	2	Silver Ore	Underground mine	Mine	Active	Hecla Limited	Hecla Mining Company
196	2127	127	--	Enoch Valley & South Rass Mines	ID	2	Phosphate Rock	Surface mine	Mine	Active	Degerstrom Ventures	Dravo Corp & N A Degerstrom Inc
197	2128	128	--	Dry Valley Mine	ID	1	Phosphate Rock	Surface mine	Mine	Active	Nu-West Industries Inc	Agrium Inc
198	2129	129	--	Smoky Canyon Mine	ID	2	Phosphate Rock	Surface mine	Mine	Active	J R Simplot Company	Scott Simplot
199	2130	130	--	Bond Mine		0	Gold Ore	Underground mine	Mine	Inter-mittent	Gold Pan Dan's	Daniel K Vaughan
200	2131	131	--	New Acers	ID	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Inter-mittent	Clayton's Calcium Inc	Todd G Clayton
201	2133	133	--	Atlanta Mountain	ID	2	Gold Ore	Surface mine	Mine	Inter-mittent	Atlanta Gold Corp	Atlanta Gold Inc
202	2134	134	--	McKinley Mine	ID	2	Gold Ore	Surface mine	Mine	Inter-mittent	Caldera LLC	Matthew Miller; Darrel E Cox

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
203	2135	135	--	Golden Eagle	ID	2	Gold Ore	Underground mine	Mine	Active	Greyhound Mine & Milling, Inc.	Daniel R Yanke; Christopher Clark
204	2136	136	--	Rasmussen Ridge Mine	ID	2	Phosphate Rock	Surface mine	Mine	Inter-mittent	Nu-West Industries Inc	Agrium Inc
205	2137	137	--	Robins Shop	IA	1	Misc. Metal Ore NEC	Surface mine	Mine	Active	Wendling Quarries Inc	Manaco Corporation
206	2138	138	--	National Oilwell Varco LP	--	0	Barite Barium Ore	Surface mine	Mine	Active	Nationa Oilwell Varco LP	NOW, Inc.; NOW Oilfield Services, Inc
207	2140	140	--	6 X 20 Cedar Rapids Portable Screen	--	0	Iron Ore	Surface mine	Mine	Inter-mittent	A Lindberg & Sons Inc	David J Crimmins; Roger C Crimmins
208	2141	141	--	Northshore Mine	MN	2	Iron Ore	Surface mine	Mine	Active	Northshore Mining Company	Cleveland-Cliffs Inc
209	2142	142	--	SP-16 6X20 Screen Plant	--	0	Iron Ore	Surface mine	Mine	Inter-mittent	A Lindberg & Son's Inc	David J Crimmins; Roger C Crimmins
210	2144	144	--	ArcelorMittal Minorca Mine Inc	MN	2	Iron Ore	Surface mine	Mine	Active	ArcelorMittal Minorca Mine Inc	Mittal Steel USA Inc
211	2145	145	--	Cedar Rapids Screen #2	--	0	Iron Ore	Surface mine	Mine	Inter-mittent	A Lindberg & Sons Inc	David J Crimmins; Roger C Crimmins
212	2146	146	--	Peterson Mine	MI	1	Iron Ore	Surface mine	Mine	Inter-mittent	Bessemer Iron Ore Company Inc	Virginia L. Poquette
213	2149	149	--	Spread Three (3)	--	0	Iron Ore	Surface mine	Mine	Inter-mittent	Hoover Construction Company	Peter J Johnson
214	2150	150	--	Keewatin Taconite	MN	2	Iron Ore	Surface mine	Mine	Active	United States Steel Corp-Minnesota Ore Operations	USX Corp (United States Steel Corp)
215	2152	152	--	Viburnum #29 Mine	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group
216	2153	153	--	Brushy Creek Mine/Mill	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group
217	2154	154	--	Fletcher Mine and Mill	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group
218	2155	155	--	Buick Mine/Mill	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group
219	2156	156	--	Sweetwater Mine/Mill	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group
220	2157	157	--	Viburnum #35 (Casteel Mine)	MO	2	Lead-Zinc Ore	Underground mine	Mine	Active	Doe Run Company	Renco Group

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
221	2158	158	--	Genesis Inc. Troy Mine	MT	2	Copper Ore NEC	Underground mine	Mine	Active	Genesis Inc.	Revett Silver Company
222	2159	159	--	Continental Mine	MT	2	Copper Ore NEC	Surface mine	Mine	Active	Montana Resources	Montana Resources Inc; Asarco Inc
223	2160	160	--	Treasure Mine	MT	2	Talc	Surface mine	Mine	Active	Barretts Minerals Inc	Minerals Technologies Inc
224	2161	161	--	Norweigen	MT	2	Gold Ore	Underground mine	Mine	Active	Belmont Mining & Explorations	Edward Barrier; Matthew Ratteree
225	2162	162	--	Drumlummon Mine	MT	1	Gold Ore	Underground mine	Mine	Active	New Millennium Mining Contracting LLC	Ben P Gunsinger
226	2163	163	--	Golden Sunlight Mine Inc	MT	2	Gold Ore	Surface mine	Mine	Active	Golden Sunlight Mine Inc	Barrick Gold Corp
227	2164	164	--	Stillwater Mine	MT	2	Platinum Group Ore	Underground mine	Mine	Active	Stillwater Mining Company	Stillwater Mining Company
228	2165	165	--	Oro Management	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Oro Management	Richard Mathey; Zane Pasma
229	2166	166	--	East Boulder mine	MT	2	Platinum Group Ore	Underground mine	Mine	Active	Stillwater Mining Company	Stillwater Mining Company
230	2167	167	--	Regal Mine	MT	2	Talc	Surface mine	Mine	Active	Barretts Minerals Inc	Minerals Technologies Inc
231	2168	168	--	Butte Highlands	MT	2	Gold Ore	Underground mine	Mine	Active	Small Mine Development LLC	Ronald W Guill
232	2169	169	--	Indian Creek	MT	2	Gold Ore	Surface mine	Mine	Inter-mittent	Tracy Fortner	Tracy Fortner
233	2171	171	--	Victoria / Madison Gold	MT	2	Copper Ore NEC	Underground mine	Mine	Inter-mittent	Coronado Resources Inc	Coronado Resources Ltd
234	2172	172	--	Black Butte Mine	MT	2	Iron Ore	Surface mine	Mine	Inter-mittent	Holcim (US) Inc	Holcim Ltd
235	2173	173	--	Ashdown Mine	NV	2	Molybdenum Ore	Underground mine	Mine	Active	Ashdown Project LLC	Win-Eldrich Mines Ltd; Golden Phoenix Minerals Inc
236	2176	176	--	Phoenix Mine	NV	1	Gold Ore	Surface mine	Mine	Active	Newmont USA Limited	Newmont Mining Corp
237	2177	177	--	Sexton Mine	NV	2	Barite Barium Ore	Surface mine	Mine	Inter-mittent	Nutritional Additives	Donald Sexton; David Sexton
238	2179	179	--	Nevada Barth Iron Mine and Mill	NV	2	Iron Ore	Surface mine	Mine	Inter-mittent	Saga Exploration Inc.	Gregory G Austin

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
239	2180	180	--	Grefco Mine & Mill	NV	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Grefco Minerals Inc	Belmont Holdings Corp
240	2181	181	--	Inland Navigator Project	NV	1	Rare Earths Ore	Surface mine	Mine	Inter-mittent	Columbus SM LLC	Ireland Inc
241	2182	182	--	Denton-Rawhide Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Kennecott Rawhide Mining Co	Rtz-CRA Group; Dayton Mining Corporation
242	2183	183	--	Fernley Plant	--	0	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Celite Corp	Imerys S A
243	2184	184	--	Rochester Mine	NV	2	Silver Ore	Surface mine	Mine	Active	Coeur Rochester Inc	Coeur D'Alene Mines Corp
244	2185	185	--	Jerritt Canyon Mill	NV	2	Gold Ore	Surface mine	Mine	Active	Queenstake Resources U.S.A., Inc.	Yukon-Nevada Gold Corp
245	2186	186	--	Lone Tree Mine	NV	2	Gold Ore	Surface mine	Mine	Non-producing	Newmont USA Limited	Newmont Mining Corp
246	2187	187	--	Bald Mountain Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Barrick Gold U S Inc	Barrick Gold Corp
247	2191	191	--	Moltan Mine	NV	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Moltan Company	Cheryl Followell
248	2192	192	--	Midas Mine	NV	2	Gold Ore	Underground mine	Mine	Active	Newmont USA Limited	Newmont Mining Corp
249	2193	193	--	Marigold Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Marigold Mining Co	Glamis Gold Ltd; Homestake Mining Co
250	2194	194	--	Spring Valley Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Geo Nevada Inc	Hau Sun Ho
251	2196	196	--	Hollister Mine	NV	2	Gold Ore	Underground mine	Mine	Active	Rodeo Creek Gold	Great Basin Gold
252	2197	197	--	Rossi Jig Plant	NV	2	Barite Barium Ore	Surface mine	Mine	Active	Halliburton Energy Services-Baroid	Halliburton
253	2199	199	--	Ruby Hill Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Homestake Mining Company Of California	Barrick Gold Corp
254	2200	200	--	Sunrise Gold Placer Mine	NV	1	Gold Ore	Surface mine	Mine	Active	Sunrise Minerals	Donald E Siecke
255	2201	201	--	Robinson Operation	NV	2	Copper Ore NEC	Surface mine	Mine	Active	Robinson Nevada Mining Company	Quadra Mining Ltd

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
256	2202	202	--	Florida Canyon Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Florida Canyon Mining Inc	Jipangu International
257	2204	204	--	Hycroft Mine	NV	2	Gold Ore	Surface mine	Mine	Active	Hycroft Resources & Development Inc	Vista Gold Corporation
258	2205	205	--	PAP Portable #1	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Portable Aggregate Producers LLC	Sandy Robles; Laura A Lintz
259	2206	206	--	Esmeralda Mine	NV	2	Gold Ore	Underground mine	Mine	Active	Antler Peak Gold Inc	Great Basin Gold Limited
260	2208	208	--	Black Mountain Screening Plant	NV	2	Fluorspar	Surface mine	Mine	Active	Black Mountain Industrial Minerals LLC	Barbara Spurgeon
261	2209	209	--	Lee Smith Mine	NV	2	Gold Ore	Underground mine	Mine	Active	Small Mine Development LLC	Ronald W Guill
262	2212	212	--	Exodus	--	0	Gold Ore	Underground mine	Mine	Active	Small Mine Development LLC	Ronald W Guill
263	2214	214	--	Intrepid Potash West	NM	2	Potash	Underground mine	Mine	Active	Intrepid Potash NM LLC	Hugh E Harvey
264	2215	215	--	Tyrone Mine	NM	2	Copper Ore NEC	Surface mine	Mine	Active	Freeport-McMoRan Tyrone Inc	Freeport-McMoRan Copper & Gold Inc
265	2216	216	--	Mesa Verde Resources	NM	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Mesa Verde Resources	Bruce Reid
266	2217	217	--	St Cloud Surface	NM	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	St Cloud Mining Company	Imagin Minerals Incorporated
267	2218	218	--	Questa Mine & Mill	NM	2	Molybdenum Ore	Underground mine	Mine	Active	Chevron Mining Inc	Chevron Corporation
268	2219	219	--	Summit Mine Site	NM	2	Gold Ore	Underground mine	Mine	Active	Lordsburg Mining Company	Santa Fe Gold Corporation
269	2220	220	--	Star Lake Mine	NM	1	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Menefee Mining Corp	John F Lown
270	2224	224	--	Ruby Mountain	NY	2	Misc. Metal Ore NEC	Surface mine	Mine	Active	Barton Mines Co LLC	Charles H Bracken Jr
271	2227	227	--	Lee Creek Mine	NC	2	Phosphate Rock	Surface mine	Mine	Active	PCS Phosphate Company Inc	Potash Corp Of Saskatchewan

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
272	2229	229	--	Tripoli	OK	1	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	American Tripoli Inc	Fording Inc
273	2230	230	--	Don J	OR	2	Gold Ore	Surface mine	Mine	Inter-mittent	Rocking C Mining LLC	Carl Cummings; Richard Huret
274	2232	232	--	Oregon Belle Mine	OR	2	Gold Ore	Underground mine	Mine	Inter-mittent	Oregon Belle Holdings Inc	L R Hata; L G Hurlburt
275	2233	233	--	GPM-1		0	Gold Ore	Surface mine	Mine	Inter-mittent	M.R. Miller Inc.	Michael R Miller
276	2235	235	--	Sullivan Pit	OR	2	Gold Ore	Surface mine	Mine	Inter-mittent	LuDan LLC	Dan Kukla; Luvernia Buddrius
277	2238	238	--	Penn Mag Inc. Plant #2	--	0	Chromite Chromium Ore	Surface mine	Mine	Active	Penn Mag, Inc.	Anil Bhadsavle
278	2239	239	--	Brown # 2	SC	2	Vermiculite	Surface mine	Mine	Active	Carolina Vermiculite Division-Va Vermiculite LP	Robert Sansom
279	2240	240	--	The Wharf Mine	SD	2	Gold Ore	Surface mine	Mine	Active	Wharf Resources (USA) Inc	Goldcorp Inc
280	2241	241	--	Candy Branch	--	0	Gold Ore	Surface mine	Mine	Active	Confederate Mining Company	Robert Andrew Price
281	2242	242	--	CF & I PIT	--	0	Iron Ore	Surface mine	Mine	Active	Pete Lien & Sons Inc	Pete Lien & Sons Inc
282	2243	243	--	Coy Mine	TN	2	Zinc	Underground mine	Mine	Active	Nyrstar Tennessee Mines, Strawberry Plains LLC	Nyrstar NV
283	2245	245	--	Immel Mine	TN	2	Zinc	Underground mine	Mine	Active	Nyrstar Tennessee Mines, Strawberry Plains LLC	Nyrstar NV
284	2246	246	--	Elmwood/Gordonsville Mine	TN	2	Zinc	Underground mine	Mine	Active	Nyrstar Gordonsville, LLC	Nyrstar NV
285	2247	247	--	Houston Mill	--	0	Talc	Surface mine	Mine	Active	Luzenac America	Rio Tinto Group
286	2248	248	--	Houston Plant	--	0	Barite Barium Ore	Surface mine	Mine	Active	Excalibar Minerals LLC	Newpark Resources Inc
287	2250	250	--	Portable #2	--	0	Iron Ore	Surface mine	Mine	Active	Nash Trucking & Construction Ltd.	Michael Nash
288	2253	253	--	Brush Mine	UT	2	Beryl-Beryllium Ore	Surface mine	Mine	Active	Brush Resources Inc	Brush Engineered Materials Inc
289	2254	254	--	OTR Crushing LLC	TX	2	Iron Ore	Surface mine	Mine	Inter-mittent	OTR Crushing LLC	William Mark Miller

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
290	2255	255	--	Bingham Canyon Mine	UT	2	Copper Ore NEC	Surface mine	Mine	Active	Kennecott Utah Copper LLC	Rio Tinto Group
291	2256	256	--	Deer Trail	UT	2	Gold Ore	Underground mine	Mine	Inter-mittent	Unico Incorporated	Ray C Brown
292	2257	257	--	Pandora Complex	UT	1	Uranium Ore	Underground mine	Mine	Active	Denison Mines (USA) Corp.	International Uranium Corp
293	2258	258	--	Gdc Crusher #1	UT	1	Iron Ore	Surface mine	Mine	Inter-mittent	Gilbert Development Corp	Steve L Gilbert
294	2259	259	--	Kennecott Barneys Canyon Mining	UT	2	Gold Ore	Surface mine	Mine	Active	Kennecott Barneys Canyon Mining	Rio Tinto Group
295	2260	260	--	Cresent Creek Project	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Martinique Mining Corp	Bromide Mining LLC; Henry Mountain Mining & Exploration LLC
296	2261	261	--	OK and Hidden Treasure	UT	1	Copper Ore NEC	Surface mine	Mine	Active	Western Utah Copper Company	Mark D Dotson
297	2262	262	--	Lisbon Valley Mining Co	UT	2	Copper Ore NEC	Surface mine	Mine	Active	Lisbon Valley Mining Co LLC	Lisbon Valley Holdings LLC
298	2263	263	--	Daneros	UT	2	Uranium Ore	Underground mine	Mine	Inter-mittent	Utah Energy Corporation	White Canyon Uranium Ltd
299	2265	265	--	Luzenac America Inc	VT	2	Talc/Pyrophyllite	Surface mine	Mine	Active	Luzenac America Inc	Rio Tinto Group
300	2266	266	--	R. E. Sansom Mine & Mill	VA	2	Vermiculite	Surface mine	Mine	Active	Virginia Vermiculite LLC	Ned Gumble
301	2267	267	--	Pend Oreille Mine	WA	2	Lead-Zinc Ore	Underground mine	Mine	Inter-mittent	Teck Washington Incorporated	Teck Resources Limited
302	2268	268	--	Concord Mine & Concentrator	VA	2	Titanium Ore	Surface mine	Mine	Active	Iluka Resources Inc.	Iluka Resources Ltd
303	2269	269	--	Brink Mine & Concentrator	VA	2	Titanium Ore	Surface mine	Mine	Active	Iluka Resources Inc.	Iluka Resources Ltd
304	2270	270	--	Kenite Plants 1 & 2		0	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Celite Corp	Imerys S A
305	2271	271	--	Kettle River Mill Site	WA	2	Gold Ore	Surface mine	Mine	Active	Kinross Gold Corp Kettle River Operations	Kinross Gold Corp

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
306	2272	272	--	D D One	--	0	Gold Ore	Underground mine	Mine	Inter-mittent	Diversified Development Company	Lane A Griffin
307	2273	273	--	White Rock Quarry	WA	2	Misc. Metal Ore NEC	Surface mine	Mine	Inter-mittent	Dawson Trucking Inc	Dennis L Dawson
308	2274	274	--	Buckhorn Mine	WA	2	Gold Ore	Underground mine	Mine	Active	Crown Resources-Kettle River Operations	Kinross Gold Corp
309	2275	275	--	Reiss Viking Div OF C Reiss Coal	WV	1	Magnetite	Surface mine	Mine	Active	Reiss Viking Div of C Reiss Coal	Koch Industries Inc
310	2278	278	--	NYAC Mining Co	AK	1	Gold Ore	Surface mine	Mine	Inter-mittent	NYAC Mining Co	John M James
311	2279	279	--	Middle Fork Mine		0	Gold Ore	Surface mine	Mine	Inter-mittent	Hoffman Mining	Russell D Hoffman
312	2280	280	--	Fort Knox Mine	AK	2	Gold Ore	Surface mine	Mine	Active	Fairbanks Gold Mining Inc	Kinross Gold Corp
313	2281	281	--	Fairbanks Creek Mine	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Earth Movers Of Fairbanks	James L Thurman
314	2282	282	--	Nome Operations	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Alaska Gold Company	Novagold Resources Inc
315	2283	283	--	Ketchum Creek Location; Alaska	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Sherlund Mining LLC	Rick G Sherlund
316	2284	284	--	Hecla Greens Creek Mine	AK	2	Silver Ore	Underground mine	Mine	Active	Hecla Greens Creek Mining Company	Hecla Mining Company
317	2285	285	--	Ketchem Creek	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Miller Creek Mining	Fred Wilkinson
318	2286	286	--	Robert P. Wright	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Robert P. Wright	Robert P Wright
319	2287	287	--	Placer Mine	AK	1	Gold Ore	Surface mine	Mine	Inter-mittent	Seuffert Mining	George Seuffert
320	2288	288	--	Taiga Mining Company Incorporated	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Taiga Mining Company Inc	Jerome Birch
321	2290	290	--	#7 Below Discovery	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Kenwin Enterprises	Kenneth A Lee; Winona Jo Lee
322	2291	291	--	Red Dog	AK	2	Lead-Zinc Ore	Surface mine	Mine	Active	Teck Alaska Inc	Teck Resources Limited
323	2292	292	--	Fox Mine	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Polar Mining Inc	Daniel J May
324	2293	293	--	Eagle Creek	AK	1	Gold Ore	Surface mine	Mine	Inter-mittent	L & L Mining Inc	Clayton Lapp
325	2294	294	--	Tillicum Resources	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Tillicum Resources	Fred G Cornelius
326	2295	295	--	Linda Creek	AK	2	Gold Ore	Underground mine	Mine	Inter-mittent	Compass Mining Inc	Thomas E Hall

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
327	2296	296	--	Pogo Mine	AK	2	Gold Ore	Underground mine	Mine	Active	Sumitomo Metal Mining Pogo LLC	Sumitomo Metal Mining Co Ltd
328	2297	297	--	MS 1890	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Freedom Resources, LLC	Judy A Martinson
329	2298	298	--	R & M Mining	AK	1	Gold Ore	Surface mine	Mine	Inter-mittent	R & M Mining	Roger Moore; Walter Largent
330	2299	299	--	Platinum Creek Mine	AK	2	Platinum Group Ore	Surface mine	Mine	Inter-mittent	XS Platinum Inc.	Bruce Butcher
331	2300	300	--	NAGC	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Nome Alaska Gold Concentrates	Marvin Rapose; Robert Sanders
332	2301	301	--	R B Gravel Company	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	R B Gravel Company	Gerald Hassel
333	2302	302	--	Magnet & Gold Creek	AK	1	Gold Ore	Surface mine	Mine	Inter-mittent	RTD Mining	Richard L Wright
334	2303	303	--	Anderson & Sons Mining	--	0	Gold Ore	Surface mine	Mine	Inter-mittent	Anderson & Sons Mining	Ralph Anderson; Floyd Anderson
335	2304	304	--	Channel Quest	AK	2	Gold Ore	Surface mine	Mine	Inter-mittent	Ellet Enterprises Inc	Michael J Kingsbury; Deborah M Albert
336	2309	309	--	Silver Bell Mining LLC	AZ	2	Copper Ore NEC	Surface mine	Mine	Active	ASARCO LLC, a Delaware limited liability company	Grupo Mexico S A
337	2311	311	--	Stratcor, Inc.	AR	1	Vanadium Ore	Surface mine	Mine	Active	Stratcor, Inc.	Strategic Minerals Corp (Stratcor)
338	2312	312	--	Lompoc Plant	CA	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Celite Corp	Imerys S A
339	2313	313	--	Henderson Operations	CO	2	Molybdenum Ore	Underground mine	Mine	Active	Climax Molybdenum Company	Freeport-McMoRan Copper & Gold Inc
340	2314	314	--	Golden Wonder	--	0	Gold Ore	Underground mine	Mine	Inter-mittent	Coal Creek Construction	Michael Ray Schell
341	2317	317	--	New Jersey Mine & Mill	ID	2	Gold Ore	Underground mine	Mine	Inter-mittent	New Jersey Mining Company	Fred W Brackebusch; Grant A Brackebusch
342	2318	318	--	Intermountain Minerals	--	0	Gold Ore	Underground mine	Mine	Inter-mittent	Intermountain Minerals	Randy D Mattson
343	2323	323	--	Hibbing Taconite Company	MN	1	Iron Ore	Surface mine	Mine	Active	Hibbing Taconite Company	Mittal-US Steel Canada-Cliffs Natural Resources
344	2324	324	--	PolyMet	MN	2	Copper Ore NEC	Surface mine	Mine	NewMine	PolyMet Mining	Polymet Mining Corp

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
345	2327	327	--	Smoky Valley Common Operations	NV	2	Gold Ore	Surface mine	Mine	Active	Round Mountain Gold Corporation	Kinross Gold Corp
346	2328	328	--	Clark Mine	NV	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	EP Minerals LLC	Eagle-Picher Industries Inc
347	2329	329	--	Intrepid Potash East	NM	1	Potash	Underground mine	Mine	Active	Intrepid Potash NM LLC	Hugh E Harvey
348	2330	330	--	Mosaic Potash Carlsbad, Inc.	NM	1	Potash	Underground mine	Mine	Active	Mosaic Potash Carlsbad Inc	Mosaic Company
349	2331	331	--	Hillsborough Mine	NC	2	Alumina	Surface mine	Mine	Active	Resco Products Inc / Piedmont Minerals Div	Bill K Brown
350	2333	333	--	TP Claims 1 & 2 / Rosa Blanca	--	0	Talc	Surface mine	Mine	Active	American Talc Company	John Wold
351	2334	334	--	Sidco Minerals Siderite Mine	TX	2	Misc. Nonmetallic Mnls. NEC	Surface mine	Mine	Active	Sidco Minerals Inc	William J Fuerst
352	2335	335	--	Fuglar Pit	--	0	Iron Ore	Surface mine	Mine	Inter-mittent	J H Oden Construction	Tom Oden
353	2336	336	--	FMC @ Westvaco	--	0	Trona	Underground mine	Mine	Active	FMC Corp	FMC Corp
354	2337	337	--	Big Island Mine & Refinery	WY	2	Trona	Underground mine	Mine	Active	OCI Wyoming LP	OCI Company, Ltd.; Anadarko Petroleum Corp
355	2338	338	--	Solvay Chemicals, Inc	--	0	Trona	Underground mine	Mine	Active	Solvay Chemicals, Inc	Solvay S A
356	2340	340	--	Alum Pit	NV	2	Potassium Compounds	Surface mine	Mine	Inter-mittent	DC Minerals Inc.	Dale Fought
357	2343	343	--	American Tripoli Inc.	MO	2	Tripoli	Surface mine	Mine	Active	American Tripoli Inc	Fording Inc
358	2344	344	--	Apex	MT	2	Garnet	Surface mine	Mine	Inter-mittent	Apex Abrasives Inc.	Dirk E Nelson; Ernest E Nelson; John J Womack
359	2345	345	--	TPC Aggregates Jean Quarry	--	0	Brucite	Surface mine	Mine	Active	TPC Aggregates Jean Quarry	Tutor-Saliba Corp.
360	2348	348	--	Premier Chemicals LLC	--	0	Magnesite	Processor	Mine	Active	Premier Chemicals LLC	Premier Chemicals LLC
361	2350	350	--	American Talc Co - Mill	--	0	Talc	Processor	Mine	Active	American Talc Co - Mill	John Wold

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
362	3002	--	2	Gramercy Facility	LA	2	Alumina	Processor	Processor	Active	--	--
363	3003	--	3	Alcan Primary Metal Sebree Works	KY	2	Aluminum	Processor	Processor	NA	--	--
364	3004	--	4	Alcoa	TX	2	Aluminum	Processor	Processor	NA	--	--
365	3005	--	5	Alcoa Inc Wenatchee Works	WA	2	Aluminum	Processor	Processor	NA	--	--
366	3006	--	6	Alcoa Intalco Works	WA	2	Aluminum	Processor	Processor	NA	--	--
367	3007	--	7	Alcoa Warrick Operations	IN	2	Aluminum	Processor	Processor	NA	--	--
368	3009	--	9	Alumax of SC Incorporated	SC	2	Aluminum	Processor	Processor	NA	--	--
369	3010	--	10	Aluminum Co of America Badin	NC	2	Aluminum	Processor	Processor	NA	--	--
370	3011	--	11	Century Aluminum of Kentucky	KY	2	Aluminum	Processor	Processor	NA	--	--
371	3012	--	12	Columbia Falls Aluminum Company, LLC	MT	2	Aluminum	Processor	Processor	NA	--	--
372	3013	--	13	Eastalco Aluminum Company	MD	2	Aluminum	Processor	Processor	NA	--	--
373	3014	--	14	Noranda Aluminum Incorporated	MO	1	Aluminum	Processor	Processor	NA	--	--
374	3015	--	15	Ormet Aluminum Mill Products Corp	OH	2	Aluminum	Processor	Processor	NA	--	--
375	3016	--	16	United State Antimony Corporation	MT	2	Antimony	Processor	Processor	NA	--	--
376	3017	--	17	Unknown barite grinding operation	--	0	Barite	Processor	Processor	NA	--	--
377	3018	--	18	Unknown barite grinding operation	--	0	Barite	Processor	Processor	NA	--	--
378	3019	--	19	US Clay		0	Barite	Processor	Processor	NA	--	--
379	3020	--	20	Excalibar Minerals LLC	TX	1	Barite	Processor	Processor	NA	--	--
380	3021	--	21	Halliburton Energy Services		0	Barite	Processor	Processor	NA	--	--
381	3023	--	23	Elementis Pigments	IL	2	Barite	Processor	Processor	NA	--	--
382	3026	--	26	Halliburton Energy Services	TX	1	Barite	Processor	Processor	NA	--	--
383	3027	--	27	M-I LLC	TX	2	Barite	Processor	Processor	NA	--	--
384	3028	--	28	New Riverside Ochre	GA	2	Barite	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
385	3029	--	29	Ambar Drilling Fluids	LA	2	Barite	Processor	Processor	NA	--	--
386	3031	--	31	M-I L L Cß		0	Barite	Processor	Processor	NA	--	--
387	3033	--	33	Dunphy Mill	NV	2	Barite Barium Ore	Processor	Processor	Active	--	--
388	3034	--	34	Evanston Barite Mill	WA	2	Barite Barium Ore	Processor	Processor	Active	--	--
389	3035	--	35	Corpus Christi Grinding Plant	TX	2	Barite Barium Ore	Processor	Processor	Active	--	--
390	3036	--	36	Amelia Barite Plant	LA	1	Barite Barium Ore	Processor	Processor	Active	--	--
391	3037	--	37	Morgan City Grinding Plant	LA	1	Barite Barium Ore	Processor	Processor	Active	--	--
392	3039	--	39	Corpus Christi Plant	TX	1	Barite Barium Ore	Processor	Processor	Active	--	--
393	3040	--	40	De Quincy Plant	LA	1	Barite Barium Ore	Processor	Processor	Active	--	--
394	3042	--	42	Halliburton	LA	2	Barite Barium Ore	Processor	Processor	Active	--	--
395	3043	--	43	Galveston GBT Barite Grinding Plant	TX	2	Barite Barium Ore	Processor	Processor	Active	--	--
396	3044	--	44	Argenta Mine and Mill	NV	2	Barite Barium Ore	Processor	Processor	Active	--	--
397	3047	--	47	Ormet Primary Aluminum Corp	LA	2	Bauxite and alumina	Processor	Processor	NA	--	--
398	3049	--	49	Brush Resources Inc	UT	2	Beryllium	Processor	Processor	NA	--	--
399	3050	--	50	Brush Wellman Inc	OH	2	Beryllium	Processor	Processor	NA	--	--
400	3051	--	51	US Borax or Rio Tinto Borax	--	0	Boron	Processor	Processor	NA	--	--
401	3052	--	52	American Borate/Industrial Minerals Co.	--	0	Boron	Processor	Processor	NA	--	--
402	3056	--	56	Chemtura	AR	1	Bromine	Processor	Processor	NA	--	--
403	3057	--	57	Albemarle	AR	2	Bromine	Processor	Processor	NA	--	--
404	3060	--	60	Cabot	PA	2	Cesium	Processor	Processor	NA	--	--
405	3061	--	61	Savage Plant	MN	2	Chem. and Fertil. Mnls. NEC	Processor	Processor	Active	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
406	3062	--	62	Global Tungsten & Powders Corp.	PA	2	Cobalt	Processor	Processor	NA	--	--
407	3063	--	63	Umicore Cobalt & Energy Products	NC	2	Cobalt	Processor	Processor	NA	--	--
408	3064	--	64	Chino Mine - Hurley Facility	NM	2	Copper	Processor	Processor	NA	--	--
409	3065	--	65	White Pine Copper Refinery Inc	MI	2	Copper	Processor	Processor	NA	--	--
410	3068	--	68	Kennecott Corp-Smelter & Refinery	UT	1	Copper	Processor	Processor	NA	--	--
411	3069	--	69	Copperton Concentrator	UT	2	Copper Ore NEC	Processor	Processor	Active	--	--
412	3071	--	71	Rosiclare Facility Hastie Mining	IL	2	Fluorspar	Processor	Processor	Active	--	--
413	3072	--	72	Hastie Mining and Trucking Co	IL	1	Fluorspar	Processor	Processor	NA	--	--
414	3073	--	73	Germanium Corporation of America	NY	1	Germanium	Processor	Processor	NA	--	--
415	3074	--	74	Umicore Optical Materials USA	OK	1	Germanium	Processor	Processor	NA	--	--
416	3076	--	76	Prospect Mine	MT	2	Gold Ore	Processor	Processor	Non-producing	--	--
417	3077	--	77	Idaho Lakeview Mill	--	0	Gold Ore	Processor	Processor	Inter-mittent	--	--
418	3078	--	78	Gold Mountain Mine	--	0	Gold Ore	Processor	Processor	Inter-mittent	--	--
419	3080	--	80	Pickett Mining Group	NC	2	Gold Ore	Processor	Processor	Inter-mittent	--	--
420	3083	--	83	Clarkdale Metals Corp	AZ	2	Gold Ore	Processor	Processor	Active	--	--
421	3084	--	84	Intrepid Potash North	NM	2	Gold Ore	Processor	Processor	Active	--	--
422	3085	--	85	Shenandoah Mill	NV	2	Gold Ore	Processor	Processor	Active	--	--
423	3086	--	86	Umicore Indium Products	RI	2	Indium	Processor	Processor	NA	--	--
424	3087	--	87	Indium Corp of America	NY	2	Indium	Processor	Processor	NA	--	--
425	3088	--	88	Iochem	OK	2	Iodine	Processor	Processor	NA	--	--
426	3089	--	89	Iofina plc	MT	2	Iodine	Processor	Processor	NA	--	--
427	3090	--	90	Arcelor Mittal Cleveland	--	0	Iron and steel	Processor	Processor	NA	--	--
428	3091	--	91	Arcelor Mittal South Chicago	--	0	Iron and steel	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
429	3093	--	93	AK Ashland	KY	2	Iron and steel	Processor	Processor	NA	--	--
430	3094	--	94	AK Middletown Works	OH	2	Iron and steel	Processor	Processor	NA	--	--
431	3095	--	95	AK Steel Corp. Mansfield	OH	2	Iron and steel	Processor	Processor	NA	--	--
432	3097	--	97	Severstal Wheeling	OH	2	Iron and steel	Processor	Processor	NA	--	--
433	3099	--	99	Arcelor Mittal Weirton	WV	2	Iron and steel	Processor	Processor	NA	--	--
434	3101	--	101	Severstal Dearborn	MI	2	Iron and steel	Processor	Processor	NA	--	--
435	3102	--	102	Severstal Sparrows Point	MD	2	Iron and steel	Processor	Processor	NA	--	--
436	3104	--	104	US Steel (ET Works)	PA	2	Iron and steel	Processor	Processor	NA	--	--
437	3105	--	105	US Steel Birmingham (Fairfield)	AL	2	Iron and steel	Processor	Processor	NA	--	--
438	3109	--	109	US Steel Great Lakes Works	MI	2	Iron and steel	Processor	Processor	NA	--	--
439	3114	--	114	Edward C. Levy Co.	MI	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
440	3115	--	115	Edward C. Levy Co.	MI	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
441	3116	--	116	Edward C. Levy Co.	MI	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
442	3117	--	117	Fritz Enterprises, Inc.	AL	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
443	3118	--	118	Fritz Enterprises, Inc.	MD	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
444	3120	--	120	Holcim (US) Inc./Vulcan Construction Materials	AL	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
445	3121	--	121	Lafarge North America Inc.	IL	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
446	3123	--	123	Lafarge North America Inc.	OH	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
447	3125	--	125	Lafarge North America Inc.	PA	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
448	3126	--	126	Lafarge North America Inc./Maryland Slag Company	MD	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
449	3129	--	129	MultiServ	MD	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
450	3130	--	130	MultiServ	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
451	3131	--	131	MultiServ Plt 4	OH	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
452	3133	--	133	Phoenix Services LLC	MD	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
453	3136	--	136	Stein, Inc.	KY	1	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
454	3137	--	137	Stein, Inc.	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
455	3143	--	143	Tube City IMS, LLC dba Olympic Mill Service	OH	2	Iron and steel slag (non-electric arc furnace)	Processor	Processor	NA	--	--
456	3145	--	145	Quality Magnetite LLC	WV	1	Iron Ore	Processor	Processor	Active	--	--
457	3147	--	147	Densimix Incorporated	TX	2	Iron Ore	Processor	Processor	Active	--	--
458	3148	--	148	Mesabi Nugget Delaware, LLC	MN	2	Iron Ore	Processor	Processor	Active	--	--
459	3149	--	149	Northshore Mining Company	MN	2	Iron Ore	Processor	Processor	Active	--	--
460	3150	--	150	Hoover Color Corp.	VA	2	Iron oxide pigments	Processor	Processor	NA	--	--
461	3151	--	151	Doe Run Resources Corp.	MO	2	Lead	Processor	Processor	NA	--	--
462	3167	--	167	Chemetall Foote	NV	1	Lithium	Processor	Processor	NA	--	--
463	3168	--	168	Chemetall Foote	TN	2	Lithium	Processor	Processor	NA	--	--
464	3169	--	169	Chemetall Foote	NC	2	Lithium	Processor	Processor	NA	--	--
465	3170	--	170	FMC Corp. Lithium Division	NC	2	Lithium	Processor	Processor	NA	--	--
466	3171	--	171	FMC Corp. Lithium Division Bayport Texas facility	TX	2	Lithium	Processor	Processor	NA	--	--
467	3172	--	172	Giles Chemical	IN	2	Magnesium compounds	Processor	Processor	NA	--	--
468	3173	--	173	Giles Chemical	NY	1	Magnesium compounds	Processor	Processor	NA	--	--
469	3174	--	174	Giles Chemical	NC	2	Magnesium compounds	Processor	Processor	NA	--	--
470	3175	--	175	Martin Marietta Chemical Corp	MI	2	Magnesium compounds	Processor	Processor	NA	--	--
471	3176	--	176	Martin Marietta Magnesia Specialties LLC	OH	2	Magnesium compounds	Processor	Processor	NA	--	--
472	3177	--	177	Muscle Shoals Minerals Inc.	--	0	Magnesium compounds	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
473	3178	--	178	Penn Mag, Inc. Plant #1	--	0	Magnetite	Processor	Processor	Active	--	--
474	3179	--	179	Hazy Ridge Coal Company	--	0	Magnetite	Processor	Processor	Active	--	--
475	3181	--	181	Erachem Comilog Inc.	MD	2	Manganese	Processor	Processor	NA	--	--
476	3182	--	182	Erachem Comilog Inc.	TN	2	Manganese	Processor	Processor	NA	--	--
477	3184	--	184	Felman Production Inc.	WV	2	Manganese	Processor	Processor	NA	--	--
478	3185	--	185	Tronox LLC	NV	2	Manganese	Processor	Processor	NA	--	--
479	3186	--	186	Wilmington Plant	DE	1	Manganese Ore	Processor	Processor	Active	--	--
480	3187	--	187	Bethlehem Apparatus Co. Inc.	PA	2	Mercury	Processor	Processor	NA	--	--
481	3188	--	188	Mesabi Chief 3	--	0	Misc. Metal Ore NEC	Processor	Processor	Active	--	--
482	3189	--	189	Hudson River Plant	NY	2	Misc. Metal Ore NEC	Processor	Processor	Active	--	--
483	3190	--	190	Teague Mineral Products	OR	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
484	3191	--	191	A-1 Grit Co	CA	1	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
485	3193	--	193	Kittanning Plant	PA	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
486	3194	--	194	Lake Charles Plant	LA	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
487	3195	--	195	Zeox Corp. - Ash Meadows Plant & Mine	NV	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
488	3196	--	196	Unimin Corporation-Emmett Plant	ID	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
489	3198	--	198	Climax Molybdenum Co. Henderson Mill	CO	2	molybdenum	Processor	Processor	NA	--	--
490	3200	--	200	Vernal Pit & Mill	UT	2	Phosphate Rock	Processor	Processor	Active	--	--
491	3201	--	201	Agrifos Fertilizer Pasadena	TX	2	Phosphate rock	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
492	3202	--	202	Innophos - Rhodia Geismar Facility	LA	1	Phosphate rock	Processor	Processor	NA	--	--
493	3203	--	203	J R Simplot Co Pocatello	ID	2	Phosphate rock	Processor	Processor	NA	--	--
494	3204	--	204	Mississippi Phosphates Corp.	MS	1	Phosphate rock	Processor	Processor	NA	--	--
495	3205	--	205	Mosaic Fertilizer, LLC - Taft Plant	LA	1	Phosphate rock	Processor	Processor	NA	--	--
496	3206	--	206	Mosaic Fertilizer, LLC - Uncle Sam Plant	LA	2	Phosphate rock	Processor	Processor	NA	--	--
497	3208	--	208	PCS Nitr Fert	LA	1	Phosphate rock	Processor	Processor	NA	--	--
498	3209	--	209	PCS Phosphate Co. Inc. - Morehead City	NC	2	Phosphate rock	Processor	Processor	NA	--	--
499	3210	--	210	PCS Phosphate White Springs	FL	1	Phosphate rock	Processor	Processor	NA	--	--
500	3211	--	211	SF Phosphates Limited Company	OH	2	Phosphate rock	Processor	Processor	NA	--	--
501	3212	--	212	Moab Salt/Salt & Potash Production Facility	UT	2	Potash	Processor	Processor	NA	--	--
502	3213	--	213	Banner Mill Site	NM	2	Potash	Processor	Processor	Intermittent	--	--
503	3214	--	214	Great Salt Lake Minerals Corp.	UT	2	Potash	Processor	Processor	NA	--	--
504	3215	--	215	IMC Fertilizer Inc.	NM	1	Potash	Processor	Processor	NA	--	--
505	3216	--	216	IMC Potash Hersey	MI	2	Potash	Processor	Processor	NA	--	--
506	3217	--	217	Aldrich-APL LLC	IL	2	Rare earths	Processor	Processor	NA	--	--
507	3218	--	218	Boulder Scientific Co.	CO	2	Rare earths	Processor	Processor	NA	--	--
508	3219	--	219	Electron Energy Magnet Mfg	PA	1	Rare earths	Processor	Processor	NA	--	--
509	3220	--	220	Santoku America	AZ	2	Rare earths	Processor	Processor	NA	--	--
510	3221	--	221	W.R. Grace & Co. - Conn. Davison Catalysts	LA	2	Rare earths	Processor	Processor	NA	--	--
511	3222	--	222	Cabot Corp.?	--	0	Rubidium	Processor	Processor	NA	--	--
512	3223	--	223	Amarillo Copper Refinery	TX	2	Selenium and tellurium	Processor	Processor	NA	--	--
513	3224	--	224	Solsil	--	0	Silicon	Processor	Processor	NA	--	--
514	3225	--	225	MEMC Electronic Materials	--	0	Silicon	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
515	3226	--	226	Dow Corning Corp.	--	0	Silicon	Processor	Processor	NA	--	--
516	3227	--	227	Mitsubishi Materials Group	--	0	Silicon	Processor	Processor	NA	--	--
517	3228	--	228	REC Group	--	0	Silicon	Processor	Processor	NA	--	--
518	3229	--	229	Hemlock Semiconductor Corp.		1	Silicon	Processor	Processor	NA	--	--
519	3230	--	230	Elkem Metals Company?	WV	2	Silicon	Processor	Processor	NA	--	--
520	3231	--	231	Globe Metallurgical	AL	2	Silicon	Processor	Processor	NA	--	--
521	3232	--	232	Globe Metallurgical Inc.	NY	2	Silicon	Processor	Processor	NA	--	--
522	3233	--	233	Globe Metallurgical Inc.	OH	2	Silicon	Processor	Processor	NA	--	--
523	3234	--	234	American Soda, LLP / Solvay Chemicals, Inc.	CO	2	Soda ash	Processor	Processor	NA	--	--
524	3236	--	236	Olancha Mill	--	0	Talc	Processor	Processor	Inter-mittent	--	--
525	3237	--	237	IMI FABI Benwood Plant	WV	2	Talc	Processor	Processor	Active	--	--
526	3238	--	238	Laws Mill	CA	2	Talc	Processor	Processor	Inter-mittent	--	--
527	3239	--	239	American Talc Co - Wild Horse Plant	TX	2	Talc	Processor	Processor	Inter-mittent	--	--
528	3240	--	240	Mineral Separation Plant	VA	2	Titanium Ore	Processor	Processor	Active	--	--
529	3241	--	241	MSHA Mine ID 0405092	--	0	Tungsten	Processor	Processor	NA	--	--
530	3242	--	242	Tungsten Joint Venture	MN	1	Tungsten	Processor	Processor	NA	--	--
531	3243	--	243	ATI Alldyne	AL	2	Tungsten	Processor	Processor	NA	--	--
532	3244	--	244	White Mesa Mill	UT	2	Uranium Ore	Processor	Processor	Active	--	--
533	3245	--	245	Sun Gro Horticulture Canada Ltd.	--	0	Vermiculite	Processor	Processor	NA	--	--
534	3246	--	246	Isolatek International, Inc.	--	0	Vermiculite	Processor	Processor	NA	--	--
535	3247	--	247	Southwest Vermiculite Co., Inc.	--	0	Vermiculite	Processor	Processor	NA	--	--
536	3248	--	248	Vermiculite Industrial Corp.	--	0	Vermiculite	Processor	Processor	NA	--	--
537	3249	--	249	Palmetto Vermiculite Co., Inc.	SC	1	Vermiculite	Processor	Processor	NA	--	--
538	3250	--	250	J.P. Austin Associates, Inc.	PA	1	Vermiculite	Processor	Processor	NA	--	--
539	3251	--	251	P.V.P. Industries, Inc.	OH	1	Vermiculite	Processor	Processor	NA	--	--
540	3252	--	252	Therm-O-Rock East, Inc.	PA	1	Vermiculite	Processor	Processor	NA	--	--

Row	Site ID[1]	Mine ID[2]	Processor ID[2]	Mine Name	State	Location Confidence	Commodity	Operation Type	Entity Type[1]	Site Status	Operator	Controller
541	3253	--	253	Sun Gro Horticulture Canada Ltd.	MI	1	Vermiculite	Processor	Processor	NA	--	--
542	3254	--	254	Therm-O-Rock West, Inc.	AZ	1	Vermiculite	Processor	Processor	NA	--	--
543	3256	--	256	Whittemore Co., Inc.	MA	2	Vermiculite	Processor	Processor	NA	--	--
544	3257	--	257	Thermal Ceramics Inc.	IL	2	Vermiculite	Processor	Processor	NA	--	--
545	3258	--	258	Schundler Co., The	NJ	2	Vermiculite	Processor	Processor	NA	--	--
546	3259	--	259	Verlite Co.	FL	2	Vermiculite	Processor	Processor	NA	--	--
547	3261	--	261	W.R. Grace & Co.	AZ	2	Vermiculite	Processor	Processor	NA	--	--
548	3262	--	262	W.R. Grace & Co.	FL	2	Vermiculite	Processor	Processor	NA	--	--
549	3268	--	268	ATI Wah Chang	OR	2	Zirconium and hafnium	Processor	Processor	NA	--	--
550	3269	--	269	Magnesium Elektron	NJ	2	Zirconium and hafnium	Processor	Processor	NA	--	--
551	3270	--	270	Western Zirconium/Westinghouse	UT	2	Zirconium and hafnium	Processor	Processor	NA	--	--
552	3272	--	272	Protech Minerals, Inc	CA	2	Pyrophyllite	Processor?	Processor	NA	--	--
553	3273	--	273	Sappington Mill	MT	2	Pyrophyllite	Processor	Processor	Active	--	--
554	3275	--	275	Alberene Soapstone Co.	VA	2	Pyrophyllite	Processor	Processor	NA	--	--
555	3276	--	276	Cotter Mill	CO	2	Uranium Ore	Processor	Processor	Non-producing	--	--
556	3277	--	277	Iluka Resources Inc	FL	2	Titanium Ore	Processor	Processor	Non-producing	--	--
557	3280	--	280	Eufaula Plant	AL	2	Aluminum Ore-Bauxite	Processor	Processor	Non-productive	--	--
558	3281	--	281	Arkansas Operations Mill	AR	2	Aluminum	Processor	Processor	Active	--	--
559	3282	--	282	Little Rock Plant	AR	2	Aluminum Ore-Bauxite	Processor	Processor	Active	--	--
560	3283	--	283	Granusol, Inc.	IL	1	Manganese Ore	Processor	Processor	Active	--	--
561	3287	--	287	Micro-Lite LLC.	KS	2	Potash, Soda, Borate Mnls. NEC	Processor	Processor	Active	--	--
562	3290	--	290	Clark Mill	NV	2	Misc. Nonmetallic Mnls. NEC	Processor	Processor	Active	--	--
563	3292	--	292	Standard Mineral Co., Inc.	NC	2	Pyrophyllite	Processor	Processor	NA	--	--

[1]Site ID is the identifier for a site point location. This number will be the same for individual sites that are related by proximity and/or common owner or operator and that have been grouped together as representing a single site location. The 'Entity type' field also describes if a site is part of a site group or is a single mine or processor site.

[2]Mine ID is the identifier used for a single mine site and Processor ID is the identifier for a single processor site.

Known Errata for List of 491

Sherwin Alumina, Corpus Christi, TX, commodity: alumina
U.S. Magnesium, Rowley, UT, commodity: magnesium
were omitted accidentally.

Appendix C
Presence and Sources of CERCLA Hazardous Substances at 108(b) Historical CERCLA Sites

C.1 Historical Site Contamination Sources

EPA compiled the ore/mineral types that were mined and/or processed at the 251 sites in the original 108(b) Historical CERCLA Sites universe. For the 120 NPL sites, these data were drawn from CEDRCLA site documents such as Records of Decision (RODs) or Site Investigation (SI) reports. For the 131 non-NPL sites, EPA used site documents such as Removal Action Memoranda or Engineering Estimate/Cost Analysis (EECA) reports. Occasionally the data were drawn from the NPL Site Listing Narratives. These data allow general inferences to be made about the types of ores, minerals, and mining and mineral processing practices that caused CEDRCLA hazardous substance contamination of a sufficient degree to warrant a Superfund clean up or removal action.

EPA conducted a more in-depth analysis of contamination sources and CERCLA hazardous substances found to be responsible for risks at the 24 Case Study Historical sites. From available CERCLA documents (e.g., Superfund risk assessments – see **Appendix B**, **Attachment B3** for a compete list of source documents for the Case Study sites), EPA identified the CERCLA hazardous substances that were contaminants of concern (COCs) at those sites, as well as the types of contamination sources at those sites.

C.1.1 General Patterns for 108(b) Historical CERCLA Sites

Sites in the 108(b) Historical CERCLA Sites universe mine or process a wide range of ores and minerals. In general, waste disposal practices were the source of many of the COCs at these sites, although in some cases (primarily smelters), stack air emissions were a significant source of COCs. **Table C-1** presents the ore/mineral types and, when available, the contamination sources, for the NPL sites in the original 108(b) Historical CERCLA Sites universe. This information comes from EPA's NPL site summaries and site status information published at http://www.epa.gov/superfund/search-superfund-sites-where-you-live.

Table C-1. Commodities and Contamination Sources at 108(b) Historical NPL Sites, by Commodity

Row	Site Name	CERCLIS ID	Associated Commodities/Contamination Sources
1	Kaiser Aluminum (Mead Works)	WAD000065508	Aluminum reduction (potliner) waste disposal
2	National Southwire Aluminum Co.	KYD049062375	Aluminum reduction (potliner) waste disposal
3	Martin-Marietta Aluminum Co.	ORD052221025	Aluminum reduction waste disposal
4	Reynolds Metals Company	ORD009412677	Aluminum reduction waste disposal
5	Alcoa (Vancouver Smelter)	WAD009045279	Aluminum smelting (potliner) waste disposal
6	Ormet Corp.	OHD004379970	Aluminum smelting (potliner) waste disposal
7	Atlas Asbestos Mine	CAD980496863	Asbestos mining and milling waste disposal
8	Coalinga Asbestos Mine	CAD980817217	Asbestos mining and milling waste disposal
9	International Minerals (E. Plant)	INT190010876	Benezene hexachloride manufacturing, packing, and storing
10	Mouat Industries	MTD021997689	Chromium ore processing

Row	Site Name	CERCLIS ID	Associated Commodities/Contamination Sources
11	Asarco Taylor Springs	ILN000508170	Coal mining and storage, slab zinc, zinc-oxide and sulfuric acid production
12	Blackbird Mine	IDD980725832	Cobalt and copper mining
13	Pike Hill Copper Mine	VTD988366720	Copper mining and milling waste disposal and acid mine drainage
14	Ely Copper Mine	VTD988366571	Copper mining and smelting waste
15	Torch Lake	MID980901946	Copper mining waste disposal
16	Milltown Reservoir Sediments	MTD980717565	Copper ore mill tailings deposited in river
17	Anaconda Co. Smelter	MTD093291656	Copper smelting emissions and waste disposal
18	Franklin Slag Pile (Mdc)	PASFN0305549	Copper smelting slag waste
19	Midvale Slag	UTD081834277	Copper, gold, lead, and silver smelting
20	Ore Knob Mine	NCN000409895	Copper, iron, silver and gold mining and milling
21	International Smelting And Refining	UTD093120921	Copper, lead and zinc smelting and processing
22	Basin Mining Area	MTD982572562	Copper, silver, zinc, lead, iron, arsenic, sulfur, boron and silicon dioxide mining and mine waste disposal
23	Celtor Chemical Works	CAD980638860	Copper, zinc and precious metals ore processing
24	Formosa Mine	ORN001002616	Copper, zinc and thorium mine acid mine drainage
25	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Elemental phosphorus production
26	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Elemental phosphorus production
27	Macalloy Corporation	SCD003360476	Ferrochromium alloy production
28	Lava Cap Mine	CAD983618893	Gold and silver concentrating with cyanide, mining/processing waste disposal
29	Cimarron Mining Corp.	NMD980749378	Gold milling with cyanide, iron extraction
30	Central City, Clear Creek	COD980717557	Gold mining acid mine drainage
31	Summitville Mine	COD983778432	Gold mining and cyanide heap leaching
32	Whitewood Creek	SDD980717136	Gold mining and milling waste disposal
33	Gilt Edge Mine	SDD987673985	Gold mining and milling with cyanide, mercury and zinc processes
34	Brewer Gold Mine	SCD987577913	Gold mining, cyanide heap leaching, waste disposal
35	Upper Tenmile Creek Mining Area	MTSFN7578012	Gold, lead, zinc and copper mine waste disposal
36	Silver Bow Creek/Butte Area	MTD980502777	Gold, silver, copper mining and smelting waste (from 1992 ROD)
37	Asarco, Inc. (Globe Plant)	COD007063530	Gold, silver, copper, lead smelting and production of lead, arsenic trioxide, and cadmium
38	Iron Mountain Mine	CAD980498612	Gold, silver, iron, pyrite, zinc and copper mining
39	Standard Mine	CO0002378230	Gold, silver, lead and zinc mining and milling
40	Iron King Mine - Humboldt Smelter	AZ0000309013	Gold, silver, lead, zinc and copper mining and smelting waste disposal
41	Barite Hill/Nevada Goldfields	SCN000407714	Gold/silver mining and heap leaching, mine waste disposal
42	Captain Jack Mill	COD981551427	Gold/silver mining and milling, mine waste disposal
43	Carson River Mercury Site	NVD980813646	Gold/silver mining and milling, mine waste disposal
44	Stibnite/Yellow Pine Mining Area	IDD980665459	Gold-antimony and tungsten mining and milling
45	Sharon Steel Corp. (Farrell Works)	PAD001933175	Iron and ferroalloy production waste disposal
46	Tar Creek (Ottawa County)	OKD980629844	Iron and zinc mining

Row	Site Name	CERCLIS ID	Associated Commodities/Contamination Sources
47	Elizabeth Mine	VTD988366621	Iron/pyrrhotite/copper mining and copper smelting
48	Washington County Lead District - Old Mines	MON000705027	Lead and barite mining, milling or smelting
49	Washington County Lead District - Potosi	MON000705023	Lead and barite mining, milling or smelting
50	Washington County Lead District - Richwoods	MON000705032	Lead and barite mining, milling or smelting
51	Commencement Bay, Near Shore/Tide Flats	WAD980726368	Lead and copper smelting and refining
52	Bunker Hill Mining & Metallurgical Complex	IDD048340921	Lead and zinc smelting waste disposal
53	Chemet Co.	TND987768546	Lead laden ore processing
54	Big River Hills Lead Tailings	MOD981126899	Lead mine tailings disposal
55	Big River Mine Tailings/St. Joe Minerals Corp.	MOD981126899	Lead mine waste disposal
56	Madison County Mines	MOD098633415	Lead mining
57	Annapolis Lead Mine	MO0000958611	Lead mining waste disposal
58	Murray Smelter	UTD980951420	Lead smelting and arsenic refining
59	Interstate Lead Co. (ILCO)	ALD041906173	Lead smelting and lead battery recycling
60	RSR Corporation	TXD079348397	Lead smelting and processing
61	U.S. Smelter and Lead Refinery, Inc.	IND047030226	Lead smelting and recovery of lead from scrap metal and old batteries
62	Newton County Mine Tailings	MOD981507585	Lead, cadmium and zinc mining
63	Sharon Steel Corp. (Midvale Tailings)	UTD980951388	Lead, copper and zinc ore froth floatation to produce sulfide concentrates
64	California Gulch	COD980717938	Lead, silver, zinc, copper and gold mining acid mine drainage
65	Southwest Jefferson County Mining	MON000705443	Lead, zinc and barium mining; lead smelting
66	Cleveland Mill	NMD981155930	Lead, zinc and copper milling waste disposal
67	Oronogo-Duenweg Mining Belt	MOD980686281	Lead, zinc, cadmium mining, milling and smelting
68	Barker Hughesville Mining District	MT6122307485	Lead/silver ore acid mine drainage and mine waste disposal
69	Davenport And Flagstaff Smelters	UTD988075719	Lead/silver smelting and waste disposal
70	Cherokee County	KSD980741862	Lead/zinc mining waste disposal
71	East Helena Site	MTD006230346	Lead/zinc smelting
72	Foote Mineral Co.	PAD077087989	Lepidolite ore processing, lithium compound production, and monazite sand processing
73	U.S. Magnesium	UTN000802704	Magnesium production from brine
74	Black Butte Mine	OR0000515759	Mercury mining and milling waste disposal
75	Klau/Buena Vista Mine	CA1141190578	Mercury mining and ore processing
76	Richardson Flat Tailings	UTD980952840	Metal (not specified) mining and milling
77	Molycorp, Inc.	NMD002899094	Molybdenum mining and milling
78	W.R. Grace & Co., Inc./Wayne Interim Storage Site (USDOE)	NJ1891837980	Monazite ore processing to produce thorium and rare earths
79	Shieldalloy Corp.	NJD002365930	Niobium ore processing, steel, chromium and aluminum alloys and specialty metals production
80	Eagle Zinc Co DIV T L Diamond	ILD980606941	Oxide production and zinc smelting

Row	Site Name	CERCLIS ID	Associated Commodities/Contamination Sources
81	Eastern Michaud Flats Contamination	IDD984666610	Phosphate ore processing
82	Omaha Lead	NESFN0703481	Primary and/or secondary lead smelting and/or other lead processing
83	Li Tungsten Corp.	NYD986882660	Production of tungsten carbide powder, tungsten wire, and welding rods from imported tungsten ore
84	U.S. Radium Corp.	NJD980654172	Radium processing waste disposal
85	Glen Ridge Radium Site	NJD980785646	Radium processing waste disposal/"beneficial use"
86	Montclair/West Orange Radium Site	NJD980785653	Radium processing waste disposal/"beneficial use"
87	Denver Radium Site	COD980716955	Radium processing, refining and/or fabricating into products
88	Uravan Uranium Project (Union Carbide Corp.)	COD007063274	Radium, vanadium and uranium milling
89	Jacks Creek/Sitkin Smelting & Refining, Inc.	PAD980829493	Reclamation of precious metals and smelting (not specified)
90	Silver Mountain Mine	WAD980722789	Silver and gold mining with cyanide leaching
91	Smuggler Mountain	COD980806277	Silver and lead mining waste
92	Eureka Mills	UT0002240158	Silver and lead ore mining and milling, waste disposal
93	Jacobs Smelter	UT0002391472	Silver ore smelting
94	Flat Creek Imm	MT0012694970	Silver, gold, lead, copper, and zinc ore mining and milling waste
95	Nelson Tunnel/Commodore Waste Rock	CON000802630	Silver, lead and zinc mining waste
96	Carpenter Snow Creek Mining District	MT0001096353	Silver, zinc, galena, lead, and gold mining and processing waste disposal
97	Depue/New Jersey Zinc/Mobil Chemical Corp.	ILD062340641	Slab zinc and diammonium phosphate (for fertilizers)production
98	Leviathan Mine	CAD980673685	Sulfur and copper sulfate mining waste disposal
99	Sulphur Bank Mercury Mine	CAD980893275	Sulfur and mercury mining
100	Tex-Tin Corp.	TXD062113329	Tin and copper smelting, Bolivian ore processing
101	U.S. Titanium	VAD980705404	Titanium mine and ore refining to produce titanium dioxide
102	Homestake Mining Co.	NMD007860935	Uranium milling waste disposal
103	Lincoln Park	COD042167858	Uranium milling waste disposal
104	United Nuclear Corp.	NMD030443303	Uranium milling waste disposal
105	Midnite Mine	WAD980978753	Uranium mining waste disposal
106	Fremont National Forest/White King And Lucky Lass Uranium Mines (USDA)	OR7122307658	Uranium mining waste disposal and acid mine drainage
107	Monticello Mill Tailings (USDOE)	UT3890090035	Uranium, vanadium milling
108	Monticello Radioactively Contaminated Properties	UTD980667208	Uranium, vanadium milling waste disposal/"beneficial use"
109	Libby Asbestos Site	MT0009083840	Vermiculite milling waste disposal and air emissions
110	National Zinc Corp.	OKD000829440	Zinc and cadmium recovery through smelting and chemical processing
111	Eagle Mine	COD081961518	Zinc mining and milling and silver mining waste disposal
112	Tulsa Fuel and Manufacturing	OKD987096195	Zinc smelting and lead roasting waste disposal

Row	Site Name	CERCLIS ID	Associated Commodities/Contamination Sources
113	Hegeler Zinc	ILN000508134	Zinc smelting and production of sulfuric acid and fireworks
114	Circle Smelting Corp.	ILD050231976	Zinc smelting to recover zinc from scrap metals
115	Matthiessen and Hegeler Zinc Company	IL0000064782	Zinc smelting waste disposal
116	Palmerton Zinc Pile	PAD002395887	Zinc smelting waste disposal and air emissions
117	Callahan Mining Corp	MED980524128	Zinc/copper mining and milling waste disposal from mining sphalerite, chalcopyrite, pyrite and pyrrhotite.
118	Smeltertown Site	COD983769738	Zinc-sulfate manufacturing, wood treating, and smelting (Not specified)
119	Teledyne Wah Chang	ORD050955848	Zirconium and rare earth metals and alloys

C.1.2 Historical Site Commodity Categories

For the Case Study Historical sites, the information in the RODs and other CERCLA site documents provides more detail on the specific waste disposal practices and contamination sources than is generally available for the entire universe of 108(b) Historical CERCLA Sites. For example, documents for 10 of the Case Study Historical sites indicate either acid mine drainage or acid rock drainage as a contamination source; several sites' documents mention leachate, slag, fugitive dust, air/smelter emissions, and ore waste (varying descriptions).

Table C-2 groups the Case Study Historical sites into six broad categories of commodities, based on similarities in waste disposal/CERCLA hazardous substance contamination sources within each category. The six broad categories are:

- Primary metals (gold, silver, copper, zinc, and/or lead)
- Aluminum
- Iron and steel
- Phosphates
- Radioactive metals
- Other metals and minerals.

Tables C-2 and **C-3** summarize the occurrence of waste types (or sources) and the commodity mined or processed at the 24 NPL Case Study Historical sites. Wastes were also associated with specific site activities in some site records. Table C-2 shows waste by commodity and Table C-3 shows waste activity by commodity. The waste sources reported are general descriptions. The few identified specific chemical wastes are typically associated with processors. Generally, the lists below can be considered characteristic of waste associated with mining, milling, or processing activities.

Table C-2. Waste Types at Case Study Historical Sites, By Commodity and Contaminant Source

Row	Site Name	CERCLA Site ID	Waste Name or Source	Commodity
1	Reynolds Metals Company	ORD009412677	Cryolite Disposal	Aluminum
2	Ormet Corp	OHD004379970	Debris	Aluminum
3	Reynolds Metals Company	ORD009412677	Debris/Scrap	Aluminum

Row	Site Name	CERCLA Site ID	Waste Name or Source	Commodity
4	National Southwire Aluminum Co.	KYD049062375	Drainage	Aluminum
5	Reynolds Metals Company	ORD009412677	Fuel/Oil	Aluminum
6	National Southwire Aluminum Co.	KYD049062375	Potliners	Aluminum
7	Ormet Corp	OHD004379970	Potliners	Aluminum
8	Reynolds Metals Company	ORD009412677	Potliners	Aluminum
9	Reynolds Metals Company	ORD009412677	Process Residues	Aluminum
10	Ormet Corp	OHD004379970	Sludge	Aluminum
11	Macalloy Corporation	SCD003360476	Fugitive Dust	Iron and Steel
12	Cimarron Mining Corp.	NMD980749378	Sediment Piles	Iron and Steel
13	Macalloy Corporation	SCD003360476	Slag	Iron and Steel
14	Macalloy Corporation	SCD003360476	Sludge	Iron and Steel
15	Cimarron Mining Corp.	NMD980749378	Tailings	Iron and Steel
16	Cimarron Mining Corp.	NMD980749378	Unlined Pits	Iron and Steel
17	Cimarron Mining Corp.	NMD980749378	Waste Drums	Iron and Steel
18	Li Tungsten Corp.	NYD986882660	Asbestos Fibers	Other Metals
19	Foote Mineral Co.	PAD077087989	Debris	Other Metals
20	Li Tungsten Corp.	NYD986882660	Dredged Sediments	Other Metals
21	Li Tungsten Corp.	NYD986882660	Drums	Other Metals
22	Li Tungsten Corp.	NYD986882660	Household Debris	Other Metals
23	Li Tungsten Corp.	NYD986882660	Incinerator Ash	Other Metals
24	Foote Mineral Co.	PAD077087989	Municipal Waste	Other Metals
25	Li Tungsten Corp.	NYD986882660	Ore Waste	Other Metals
26	Li Tungsten Corp.	NYD986882660	Radioactive Waste Piles	Other Metals
27	Li Tungsten Corp.	NYD986882660	Rubbish	Other Metals
28	Li Tungsten Corp.	NYD986882660	Sewage Sludge	Other Metals
29	Li Tungsten Corp.	NYD986882660	Slag	Other Metals
30	Foote Mineral Co.	PAD077087989	Spent Mineral Waste	Other Metals
31	Li Tungsten Corp.	NYD986882660	Storage Tanks	Other Metals
32	Li Tungsten Corp.	NYD986882660	Transformers	Other Metals
33	Li Tungsten Corp.	NYD986882660	Waste Piles	Other Metals
34	Foote Mineral Co.	PAD077087989	Wastewater	Other Metals
35	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Calcium Fluoride	Phosphates
36	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Calcium Silicate Slag Piles	Phosphates
37	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Coke Dust Slurry	Phosphates
38	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Coke Stockpiles	Phosphates
39	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Fugitive Dust	Phosphates
40	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Nodule Stockpiles	Phosphates
41	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Non-Contacting Cool Water Effluent	Phosphates
42	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Ore Stockpiles	Phosphates
43	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Phossy Water	Phosphates
44	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Process Stacks Air Emissions	Phosphates

Row	Site Name	CERCLA Site ID	Waste Name or Source	Commodity
45	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Quartzite Dust Slurry	Phosphates
46	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Raw Coal	Phosphates
47	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Silica	Phosphates
48	Eastern Michaud Flats Contamination	IDD984666610	Slag	Phosphates
49	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Slag	Phosphates
50	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Slag	Phosphates
51	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Sulfates/Sulfites	Phosphates
52	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Treater Dust Stock Piles	Phosphates
53	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Underflow Solids Piles	Phosphates
54	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Waste Piles	Phosphates
55	Eagle Mine	COD081961518	Acid Mine Drainage	Primary Metals
56	Anaconda Co. Smelter	MTD093291656	Acid Mine Drainage/ Acid Rock Drainage	Primary Metals
57	Bunker Hill Mining & Metallurgical Complex	IDD048340921	Acid Mine Drainage/ Acid Rock Drainage	Primary Metals
58	Captain Jack Mill	COD981551427	Acid Mine Drainage/ Acid Rock Drainage	Primary Metals
59	Silver Mountain Mine	WAD980722789	Acid Mine Drainage/ Acid Rock Drainage	Primary Metals
60	Summitville Mine	COD983778432	Acid Mine Drainage/ Acid Rock Drainage	Primary Metals
61	Eagle Mine	COD081961518	Acid Rock Drainage	Primary Metals
62	Gilt Edge Mine	SDD987673985	Acid Rock Drainage	Primary Metals
63	Omaha Lead	NESFN0703481	Airborne Emissions	Primary Metals
64	Anaconda Co. Smelter	MTD093291656	Demolition Dumps	Primary Metals
65	Gilt Edge Mine	SDD987673985	Exposed Mineralized Bedrock	Primary Metals
66	Tex-Tin Corporation	TXD062113329	Ferrous-chloride	Primary Metals
67	Anaconda Co. Smelter	MTD093291656	Flue Dust	Primary Metals
68	Tex-Tin Corporation	TXD062113329	Gypsum	Primary Metals
69	Tex-Tin Corporation	TXD062113329	Iron-rich Liquid Acid	Primary Metals
70	Captain Jack Mill	COD981551427	Leachate	Primary Metals
71	Palmerton Zinc Pile	PAD002395887	Leachate	Primary Metals
72	Summitville Mine	COD983778432	Leachate	Primary Metals
73	Eagle Mine	COD081961518	Manual/Aerial Deposition	Primary Metals
74	Tex-Tin Corporation	TXD062113329	Ore Slimes	Primary Metals
75	East Helena Site	MTD006230346	Ore Storage	Primary Metals
76	Eagle Mine	COD081961518	Overburden	Primary Metals
77	Silver Mountain Mine	WAD980722789	Overburden	Primary Metals
78	East Helena Site	MTD006230346	Process Fluids	Primary Metals
79	East Helena Site	MTD006230346	Process Ponds	Primary Metals
80	Captain Jack Mill	COD981551427	Run-off	Primary Metals
81	Tex-Tin Corporation	TXD062113329	Slag	Primary Metals
82	East Helena Site	MTD006230346	Slag Pile	Primary Metals
83	Palmerton Zinc Pile	PAD002395887	Slag Piles	Primary Metals

Row	Site Name	CERCLA Site ID	Waste Name or Source	Commodity
84	Gilt Edge Mine	SDD987673985	Sludge	Primary Metals
85	Anaconda Co. Smelter	MTD093291656	Smelter Emissions	Primary Metals
86	East Helena Site	MTD006230346	Smelter Emissions	Primary Metals
87	Gilt Edge Mine	SDD987673985	Spent Ore	Primary Metals
88	Anaconda Co. Smelter	MTD093291656	Tailings	Primary Metals
89	Eagle Mine	COD081961518	Tailings	Primary Metals
90	Silver Mountain Mine	WAD980722789	Tailings	Primary Metals
91	Summitville Mine	COD983778432	Tailings	Primary Metals
92	Anaconda Co. Smelter	MTD093291656	Waste Piles	Primary Metals
93	Eagle Mine	COD081961518	Waste Piles	Primary Metals
94	Summitville Mine	COD983778432	Waste Piles	Primary Metals
95	Anaconda Co. Smelter	MTD093291656	Waste Ponds	Primary Metals
96	Captain Jack Mill	COD981551427	Waste Rock	Primary Metals
97	Eagle Mine	COD081961518	Waste Rock	Primary Metals
98	Gilt Edge Mine	SDD987673985	Waste Rock	Primary Metals
99	East Helena Site	MTD006230346	Wastewater	Primary Metals
100	Midnite Mine	WAD980978753	Acid Mine Drainage	Radioactive Metals
101	Homestake Mining Co.	NMD007860935	Acid Mine Drainage/ Acid Rock Drainage	Radioactive Metals
102	Teledyne Wah Chang	ORD050955848	Chlorinator Residue	Radioactive Metals
103	Midnite Mine	WAD980978753	Ore Waste	Radioactive Metals
104	Midnite Mine	WAD980978753	Particulate Matter	Radioactive Metals
105	Midnite Mine	WAD980978753	Proto-ore	Radioactive Metals
106	Midnite Mine	WAD980978753	Radioactive Decay	Radioactive Metals
107	Teledyne Wah Chang	ORD050955848	Sludge	Radioactive Metals
108	Homestake Mining Co.	NMD007860935	Tailings	Radioactive Metals
109	Teledyne Wah Chang	ORD050955848	Waste Materials	Radioactive Metals

Table C-3. Waste Types and Site Activity at Case Study Historical Sites: By Commodity

Row	Site Name	Site ID	Waste Name	Reported Activity	Metal Type
1	Reynolds Metals Company	ORD009412677	Potliners	Metals Reduction	Aluminum
2	Reynolds Metals Company	ORD009412677	Cryolite Disposal	--	Aluminum
3	Reynolds Metals Company	ORD009412677	Debris/Scrap	--	Aluminum
4	Reynolds Metals Company	ORD009412677	Fuel/Oil	--	Aluminum
5	Reynolds Metals Company	ORD009412677	Process Residues	--	Aluminum
6	Ormet Corp	OHD004379970	Potliners	Smelting	Aluminum
7	Ormet Corp	OHD004379970	Sludge	Ore Processing	Aluminum
8	Ormet Corp	OHD004379970	Debris	--	Aluminum
9	National Southwire Aluminum Co.	KYD049062375	Potliners	Smelting	Aluminum
10	National Southwire Aluminum Co.	KYD049062375	Drainage	--	Aluminum
11	Cimarron Mining Corp.	NMD980749378	Tailings	Precious Metals Recovery	Iron and Steel
12	Cimarron Mining Corp.	NMD980749378	Sediment Piles	Milling	Iron and Steel
13	Cimarron Mining Corp.	NMD980749378	Unlined Pits	Cyanide Extraction	Iron and Steel
14	Cimarron Mining Corp.	NMD980749378	Waste Drums	--	Iron and Steel
15	Macalloy Corporation	SCD003360476	Slag	Smelting	Iron and Steel

Row	Site Name	Site ID	Waste Name	Reported Activity	Metal Type
16	Macalloy Corporation	SCD003360476	Sludge	--	Iron and Steel
17	Macalloy Corporation	SCD003360476	Fugitive Dust	--	Iron and Steel
18	Foote Mineral Co.	PAD077087989	Wastewater	Ore Processing	Other Metals
19	Foote Mineral Co.	PAD077087989	Debris	--	Other Metals
20	Foote Mineral Co.	PAD077087989	Municipal Waste	--	Other Metals
21	Foote Mineral Co.	PAD077087989	Spent Mineral Waste	Ore Mineral Extraction	Other Metals
22	Li Tungsten Corp.	NYD986882660	Slag	Smelting	Other Metals
23	Li Tungsten Corp.	NYD986882660	Radioactive Waste Piles	Ore Processing	Other Metals
24	Li Tungsten Corp.	NYD986882660	Drums	--	Other Metals
25	Li Tungsten Corp.	NYD986882660	Storage Tanks	--	Other Metals
26	Li Tungsten Corp.	NYD986882660	Transformers	--	Other Metals
27	Li Tungsten Corp.	NYD986882660	Asbestos Fibers	--	Other Metals
28	Li Tungsten Corp.	NYD986882660	Waste Piles	--	Other Metals
29	Li Tungsten Corp.	NYD986882660	Incinerator Ash	--	Other Metals
30	Li Tungsten Corp.	NYD986882660	Sewage Sludge	--	Other Metals
31	Li Tungsten Corp.	NYD986882660	Rubbish	--	Other Metals
32	Li Tungsten Corp.	NYD986882660	Household Debris	--	Other Metals
33	Li Tungsten Corp.	NYD986882660	Dredged Sediments	--	Other Metals
34	Li Tungsten Corp.	NYD986882660	Ore Waste	--	Other Metals
35	Eastern Michaud Flats Contamination	IDD984666610	Slag	Ore Processing	Phosphates
36	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Waste Piles	Mining	Phosphates
37	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Raw Coal	Ore Processing	Phosphates
38	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Calcium Fluoride	--	Phosphates
39	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Sulfates/Sulfites	--	Phosphates
40	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Silica	--	Phosphates
41	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Slag	--	Phosphates
42	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Ore Stockpiles	Elemental Metals Manufacturing	Phosphates
43	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Nodule Stockpiles	Mineral Beneficiation	Phosphates
44	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Fugitive Dust	Ore Processing	Phosphates
45	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Calcium Silicate Slag Piles	Ore Mineral Extraction	Phosphates
46	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Quartzite Dust Slurry	--	Phosphates
47	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Non-Contacting Cool Water Effluent	--	Phosphates
48	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Treater Dust Stock Piles	--	Phosphates

Row	Site Name	Site ID	Waste Name	Reported Activity	Metal Type
49	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Underflow Solids Piles	--	Phosphates
50	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Process Stacks Air Emissions	--	Phosphates
51	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Slag	--	Phosphates
52	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Coke Dust Slurry	--	Phosphates
53	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Phossy Water	--	Phosphates
54	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Coke Stockpiles	--	Phosphates
55	Bunker Hill Mining & Metallurgical Complex	IDD048340921	Acid Mine Drainage/Acid Rock Drainage	Mining	Primary Metals
56	Tex-Tin Corporation	TXD062113329	Iron-rich Liquid Acid	Smelting	Primary Metals
57	Tex-Tin Corporation	TXD062113329	Slag	Metals Recovery	Primary Metals
58	Tex-Tin Corporation	TXD062113329	Ferrous-chloride	Ore Processing	Primary Metals
59	Tex-Tin Corporation	TXD062113329	Ore Slimes	Wastewater Treatment	Primary Metals
60	Tex-Tin Corporation	TXD062113329	Gypsum	Oil Recovery	Primary Metals
61	Captain Jack Mill	COD981551427	Leachate	Mining	Primary Metals
62	Captain Jack Mill	COD981551427	Acid Mine Drainage/ Acid Rock Drainage	--	Primary Metals
63	Captain Jack Mill	COD981551427	Run-off	--	Primary Metals
64	Captain Jack Mill	COD981551427	Waste Rock	--	Primary Metals
65	Anaconda Co. Smelter	MTD093291656	Smelter Emissions	Smelting	Primary Metals
66	Anaconda Co. Smelter	MTD093291656	Acid Mine Drainage/Acid Rock Drainage	Milling	Primary Metals
67	Anaconda Co. Smelter	MTD093291656	Tailings	--	Primary Metals
68	Anaconda Co. Smelter	MTD093291656	Waste Ponds	--	Primary Metals
69	Anaconda Co. Smelter	MTD093291656	Demolition Dumps	--	Primary Metals
70	Anaconda Co. Smelter	MTD093291656	Flue Dust	--	Primary Metals
71	Anaconda Co. Smelter	MTD093291656	Waste Piles	--	Primary Metals
72	Eagle Mine	COD081961518	Manual/Aerial Deposition	Mining	Primary Metals
73	Eagle Mine	COD081961518	Tailings	Mineral Processing	Primary Metals
74	Eagle Mine	COD081961518	Waste Rock	Beneficiation	Primary Metals
75	Eagle Mine	COD081961518	Acid Mine Drainage	--	Primary Metals
76	Eagle Mine	COD081961518	Acid Rock Drainage	--	Primary Metals
77	Eagle Mine	COD081961518	Overburden	--	Primary Metals
78	Eagle Mine	COD081961518	Waste Piles	--	Primary Metals
79	East Helena Site	MTD006230346	Smelter Emissions	Smelting	Primary Metals

Row	Site Name	Site ID	Waste Name	Reported Activity	Metal Type
80	East Helena Site	MTD006230346	Slag Pile	--	Primary Metals
81	East Helena Site	MTD006230346	Ore Storage	--	Primary Metals
82	East Helena Site	MTD006230346	Process Ponds	--	Primary Metals
83	East Helena Site	MTD006230346	Process Fluids	--	Primary Metals
84	East Helena Site	MTD006230346	Wastewater	--	Primary Metals
85	Omaha Lead	NESFN0703481	Airborne Emissions	Smelting	Primary Metals
86	Palmerton Zinc Pile	PAD002395887	Slag Piles	Metals Processing	Primary Metals
87	Palmerton Zinc Pile	PAD002395887	Leachate	--	Primary Metals
88	Summitville Mine	COD983778432	Leachate	Mining	Primary Metals
89	Summitville Mine	COD983778432	Acid Mine Drainage/Acid Rock Drainage	--	Primary Metals
90	Summitville Mine	COD983778432	Tailings	--	Primary Metals
91	Summitville Mine	COD983778432	Waste Piles	--	Primary Metals
92	Silver Mountain Mine	WAD980722789	Acid Mine Drainage/Acid Rock Drainage	Ore Extraction	Primary Metals
93	Silver Mountain Mine	WAD980722789	Tailings	--	Primary Metals
94	Silver Mountain Mine	WAD980722789	Overburden	--	Primary Metals
95	Gilt Edge Mine	SDD987673985	Acid Rock Drainage	Mining	Primary Metals
96	Gilt Edge Mine	SDD987673985	Waste Rock	Mineral Processing	Primary Metals
97	Gilt Edge Mine	SDD987673985	Spent Ore	--	Primary Metals
98	Gilt Edge Mine	SDD987673985	Exposed Mineralized Bedrock	--	Primary Metals
99	Gilt Edge Mine	SDD987673985	Sludge	--	Primary Metals
100	Homestake Mining Co.	NMD007860935	Tailings	Ore Processing	Radioactive Metals
101	Homestake Mining Co.	NMD007860935	Acid Mine Drainage/Acid Rock Drainage	Alkaline Precipitation Process	Radioactive Metals
102	Midnite Mine	WAD980978753	Acid Mine Drainage	Open Pit Mining	Radioactive Metals
103	Midnite Mine	WAD980978753	Ore Waste	--	Radioactive Metals
104	Midnite Mine	WAD980978753	Proto-ore	--	Radioactive Metals
105	Midnite Mine	WAD980978753	Radioactive Decay	--	Radioactive Metals
106	Midnite Mine	WAD980978753	Particulate Matter	--	Radioactive Metals
107	Teledyne Wah Chang	ORD050955848	Sludge	Metals Fabrication	Radioactive Metals
108	Teledyne Wah Chang	ORD050955848	Waste Materials	Smelting	Radioactive Metals
109	Teledyne Wah Chang	ORD050955848	Chlorinator Residue	Nonferrous Metals Manufacturing	Radioactive Metals

Appendix D
Identification of Contaminants of Concern and Priority Contaminants of Concern at Case Study Historical Sites

This appendix describes how contaminants of concern (COCs) at Historical sites were identified, and how Priority COCs were selected from among the COCs.

CERCLA hazardous substances are defined by CERCLA Section 101(14) as certain substances, elements, compounds, mixtures, hazardous wastes, toxic pollutants, hazardous air pollutants or imminently hazardous chemical substances or mixtures designated under the major U.S. environmental laws. In all, the Superfund law designates more than 800 substances as hazardous substances. In addition, there are approximately 1,500 known radionuclides, approximately 760 of which are listed individually. The list of CERCLA hazardous substances (and reportable quantities) is located in 40 CFR 302.4.

Contaminants of potential concern (COPCs) are CERCLA hazardous substances which (a) are present at a site, (b) occur at concentrations which are or might be of health concern to exposed humans or ecological receptors, and (c) are or might be due to releases from a Superfund site. USEPA has derived a standard method for selecting COPCs at a site, as detailed in *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part A)* (USEPA 1989). In brief, EPA assumes that any chemical detected at a site is a candidate for selection as a COPC, but identifies a number of methods that may be used for determining when a chemical is not of concern and may be eliminated from further consideration. Each Superfund risk assessment may choose to apply some or all of the methods identified by EPA to select COPCs, as appropriate for the specific site. Those COPCs identified in the Superfund risk assessment as being present at or above a level of concern (under the National Contingency Plan, published at 40 CFR 300.430(e)(2)(i)) are generally identified as COCs.

For this report, EPA reviewed the Superfund risk assessments and other CERCLA site documents, for the Case Study Historical sites to identify which specific CERCLA hazardous substances were found to be COCs at those sites. The frequency of occurrence noted for COCs are provided in **Section D.1**.

D.1 Case Study Historical Site COCs

Table D-1 presents the CERCLA hazardous substances (in alphabetical order) identified in Superfund risk assessments performed at the 24 Case Study Historical sites in the original sample.[1] The table indicates the frequency with which each substance is above levels of concern for each type of receptor (human or ecological). A total of 86 CERCLA hazardous substances were identified as COCs at the Case Study Historical sites.

[1] As described in Appendix B ("Defining the Universes of 108(b) Historical CERCLA and 2009 Current Sites"), the 30 sites randomly selected in the original sampling included 24 NPL sites and 6 Removal sites. While data were collected for a supplemental sampling of the 108(b) Historical CERCLA sites universe, the data for the supplemental sites were not available in time and were not used in this analysis.

EPA also reviewed the COCs at the six Case Study Historical Removal sites, and found that a smaller group of 18 inorganics (including cyanide), three radionuclide groups (radium 228, 3 thorium isotopes and 2 uranium isotopes) and no organics, were identified. All COCs identified at Case Study Historical Removal sites were already represented on the list of 86 COCs shown in Table D-1.

Table D-1. CERCLA Hazardous Substances Identified as Above a Level of Concern in Superfund Risk Assessments Performed at Case Study Historical Sites

Row	CASRN	COC	Sites with Human Risks of Concern	Sites with Ecological Risks of Concern
1	83-32-9	Acenaphthene	0	2
2	208-96-8	Acenaphthylene	0	2
3	67-64-1	Acetone	0	1
4	014952-40-0	Actinium-227	1	0
5	120-12-7	Anthracene	0	1
6	7440-36-0	Antimony and compounds	11	7
7	12674-11-2	Aroclor 1016	1	1
8	11104-28-2	Aroclor 1221	1	1
9	11141-16-5	Aroclor 1232	1	1
10	53469-21-9	Aroclor 1242	2	2
11	12672-29-6	Aroclor 1248	2	2
12	11097-69-1	Aroclor 1254	1	2
13	11096-82-5	Aroclor 1260	2	1
14	7440-38-2	Arsenic and compounds	23	9
15	56-55-3	Benz[a]anthracene	5	2
16	71-43-2	Benzene	2	0
17	191-24-2	Benzo(g,h,i)perylene	0	2
18	50-32-8	Benzo[a]pyrene	7	2
19	205-99-2	Benzo[b]fluoranthene	6	2
20	207-08-9	Benzo[k]fluoranthene	1	1
21	7440-41-7	Beryllium and compounds	9	5
22	111-44-4	Bis(2-chloroethyl)ether	1	0
23	117-81-7	Bis(2-ethylhexyl) phthalate	0	2
24	75-25-2	Bromoform	1	0
25	85-68-7	Butyl benzyl phthlate	0	1
26	7440-43-9	Cadmium and compounds	13	9
27	56-23-5	Carbon tetrachloride	1	0
28	57-74-9	Chlordane, alpha isomer	0	1
29	108-90-7	Chlorobenzene	1	0
30	67-66-3	Chloroform	1	1
31	18540-29-9	Chromium (VI)	3	0
32	7440-47-3	Chromium and compounds	5	7
33	218-01-9	Chrysene	0	2
34	7440-48-4	Cobalt compounds	3	4
35	7440-50-8	Copper and compounds	7	9
36	106-44-5	Cresol, p-	0	1
37	57-12-5	Cyanides	2	2

Row	CASRN	COC	Sites with Human Risks of Concern	Sites with Ecological Risks of Concern
38	72-54-8	DDD	0	1
39	72-55-9	DDE, 4,4'-	0	1
40	50-29-3	DDT	0	1
41	53-70-3	Dibenz[a,h]anthracene	5	1
42	106-46-7	Dichlorobenzene, 1,4-	1	0
43	107-06-2	Dichloroethane, 1,2-	2	0
44	75-35-4	Dichloroethylene, 1,1-	1	0
45	156-60-5	Dichloroethylene, 1,2-	1	0
46	72-20-8	Endrin	0	1
47	206-44-0	Fluoranthene	0	1
48	7782-41-4	Fluorine (as fluoride)	5	3
49	193-39-5	Indeno[1,2 3-cd]pyrene	3	1
50	7439-92-1	Lead and compounds	6	10
51	14255-04-0	Lead-210	5	0
52	7439-96-5	Manganese and compounds	14	6
53	7439-97-6	Mercury and compounds	7	4
54	72-43-5	Methoxychlor	0	1
55	75-09-2	Methylene chloride	1	0
56	7440-02-0	Nickel and compounds	6	4
57	85-01-8	Phenanthrene	0	2
58	13981-52-7	Polonium-210	1	0
59	1336-36-3	Polychlorinated biphenyls	4	2
60	NA	Polynuclear aromatic hydrocarbons	1	2
61	13966-00-2	Potassium-40	1	0
62	129-00-0	Pyrene	0	3
63	NA	Radionuclides	6	0
64	7440-14-4	Radium	1	0
65	13982-63-3	Radium-226	6	0
66	15262-20-1	Radium-228	3	0
67	10043-92-2	Radon	2	0
68	14859-67-7	Radon-222	4	0
69	7782-49-2	Selenium and compounds	2	7
70	7440-22-4	Silver and compounds	3	5
71	7440-23-5	Sodium	0	1
72	79-34-5	Tetrachloroethane, 1,1,2,2-	2	0
73	127-18-4	Tetrachloroethylene	3	0
74	7440-28-0	Thallium and compounds	6	7
75	14274-82-9	Thorium-228	4	0
76	14269-63-7	Thorium-230	3	0
77	7440-29-1	Thorium-232	1	0
78	71-55-6	Trichloroethane, 1,1,1-	1	0
79	79-01-6	Trichloroethylene	3	1
80	7440-61-1	Uranium	1	0
81	7440-61-1	Uranium-230	1	0
82	13966-29-5	Uranium-234	3	0

Row	CASRN	COC	Sites with Human Risks of Concern	Sites with Ecological Risks of Concern
83	15117-96-1	Uranium-235	1	0
84	7440-61-1	Uranium-238	5	1
85	75-01-4	Vinyl Chloride	1	0
86	7440-66-6	Zinc and compounds	13	10

D.2 Priority COCs

To focus further study on those COCs that are most frequently found at mining and mineral processing sites, EPA selected the subset of 27 COCs, for either human or ecological receptors, at four or more of the Case Study Historical sites. This selection was modeled after the ATSDR Priority List (found at http://www.atsdr.cdc.gov/spl/). These Priority COCs are presented in **Table D-2** in rank order from highest to lowest frequency found.

Table D-2. CERCLA Hazardous Substances Identified as COCs at Four or More Case Study Historical Sites

Row	CASRN	Priority COC	Sites with Human Risks of Concern	Sites with Ecological Risks of Concern
1	7440-38-2	Arsenic and compounds	23	9
2	7439-96-5	Manganese and compounds	14	6
3	7440-43-9	Cadmium and compounds	13	9
4	7440-66-6	Zinc and compounds	13	10
5	7440-36-0	Antimony and compounds	11	7
6	7439-92-1	Lead and compounds	6	10
7	7440-41-7	Beryllium and compounds	9	5
8	7440-50-8	Copper and compounds	7	9
9	50-32-8	Benzo[a]pyrene	7	2
10	7440-47-3	Chromium and compounds	5	7
11	7439-97-6	Mercury and compounds	7	4
12	7782-49-2	Selenium and compounds	2	7
13	7440-28-0	Thallium and compounds	6	7
14	205-99-2	Benzo[b]fluoranthene	6	2
15	7440-02-0	Nickel and compounds	6	4
16	NA	Radionuclides	6	0
17	13982-63-3	Radium-226	6	0
18	56-55-3	Benz[a]anthracene	5	2
19	53-70-3	Dibenz[a,h]anthracene	5	1
20	7782-41-4	Fluorine (as fluoride)	5	3
21	14255-04-0	Lead-210	5	0
22	7440-22-4	Silver and compounds	3	5
23	7440-61-1	Uranium-238	5	1
24	7440-48-4	Cobalt compounds	3	4
25	1336-36-3	Polychlorinated biphenyls	4	2
26	14859-67-7	Radon-222	4	0
27	14274-82-9	Thorium-228	4	0

Appendix E
Geospatial Methodologies and Quality Assurance Protocol for 2009 Current Site Analyses

This appendix describes, in detail, the geospatial analysis' original selection, assessment, and documentation of secondary data sources. Section 6 discusses the issues, approaches, and quality assurance/quality control (QA/QC) procedures performed during the geospatial analysis itself. It includes references to a number of additional documents that provide more details regarding each of the primary data development and analysis tasks. The attachments (labeled E1, E2, E3, E4, and E5) reflect various refinements and additions to the original analysis.

This Quality Assurance Protocol originated as a Quality Assurance Project Plan (QAPP) formatted according to '*QAPP Requirements for Secondary Data Research Projects*', dated 7/1/1999 and EPA's *Guidance for Geospatial Data Quality Assurance Project Plans (EPA QA/G-5G)* (available at: http://www.epa.gov/quality) (March 2003).

E.1 Objectives

The objective of this geospatial work is to allow examination of potential human and ecological exposures to CERCLA hazardous substances from current and future CERCLA 108(b) mines and mineral processors (hereafter referred to as "2009 Current" sites), using national-scale secondary data. Existing data elements contained in data systems maintained by federal agencies, and other available potential sources, will be identified that can be used to characterize exposure potential. Geospatial data will also be used to evaluate the relative severity of the potential environmental impacts broadly associated with 2009 Current site activities.

The methodology uses an iterative process that integrates four subtasks:

- Subtask 1: Preliminary draft QAPP;
- Subtask 2: Identifying, Evaluating, and Documenting Data Elements and Sources;
- Subtask 3: Obtain and Process Datasets Meeting Quality Criteria; and
- Subtask 4: Identification of Factors Related to Exposure to CERCLA Hazardous Substances (Questions) and Data Analysis.

Each of the subtasks is described in greater detail in Section E.2 below.

E.2 Planned Evaluation Approach

This section describes the general approach used to identify and evaluate secondary data and describes the type of analytical and processing techniques.

E.2.1 Analytical Techniques

This evaluation used specific analyses or statistical methods to characterize types of data displays, and buffer zone queries regarding location proximity to specific features of interest. Existing federal data systems were explored to identify qualitative, semi-quantitative, and quantitative secondary data elements contained in these datasets and to evaluate the relevance of these data to examining the identified exposure factors or scenarios of interest. To the extent practicable, raw and processed data were compiled on a national scale.

E.2.2 Evaluation QAPP

The primary objectives of the evaluation include:

- the identification of data sources and data elements,
- the determination of data quality characterizing secondary data that EPA found acceptable for use, and
- the development of examination and evaluation processes and methods.

Attachment E3, Figure E3-1 illustrates the evaluation's general process flow.

E.2.3 Subtask 2. Identifying, Evaluating, and Documenting Data Elements and Sources

Step1. Identification of data sources and data elements: If existing data layers were not available or known from past EPA projects then federal data repositories were explored as the principal sources to find appropriate and sufficient datasets with coverage in the continental United States, Hawaii, Alaska, Puerto Rico, the U.S. Virgin Islands, Guam, and the Commonwealth of the Northern Mariana Islands. EPA developed summaries of the data source(s) and the associated applicable data element(s), including a general description of the data element(s).

Step 2. Evaluation of data usability: EPA evaluated the usability of the data sources in terms of accessibility; completeness; scale; timeframe in which data were obtained and compiled, relative to timeframes for which data are needed; reliability; availability of metadata that describe how the data have been obtained, compiled, and subsequently managed, along with any other pertinent information that characterizes the data quality.

Attachment E3, Figure E3-2 illustrates the general process flow for Subtask 2.

E.2.4 Subtask 3. Obtain and Process Datasets Meeting Quality Criteria

EPA generally projected national level geospatial data to a standard North American map projection such as Lambert Conformal Conic, to limit distortion of distance and area so that buffer zones, areas, and lengths of geographic features were accurately calculated. EPA queried the federal data system to obtain the required datasets for specified site locations, regions, or the areas associated with the specified national-scale coverage. In many cases file geodatabases (i.e., GIS data layers for ArcMap version 9.3) had been created using the raw data elements; however, some datasets had been processed before a spatial data layer was created. When processing data, EPA prepared metadata documenting the processing steps. The geospatial analysis software generates metadata in automated format when data elements are mapped without any manipulation. EPA archived the raw datasets along with the spatial data layer and/or other associated data products generated from the original data.

Attachment E3, Figure E3-3 illustrate the general process flow of Subtask 3.

E.2.5 Subtask 4. Identification of Factors Regarding Potential Exposure to CERCLA Hazardous Substances (Questions) and Data Analysis

Attachment E3, Figure E3-4 illustrates the integration of the exposure questions with the geospatial analyses performed.

Subtask 4, Part 1:

EPA reviewed the identified datasets for usability with respect to general questions regarding the proximity of human and ecological receptors to site features associated with release of CERCLA hazardous substances. U.S. Census Bureau data provided the best ability to measure human proximity to 2009 Current sites. Although EPA used Census 2000 data, and during the course of the project Census 2010 data became available, EPA decided that the geospatial analysis results likely would not change significantly with Census 2010 data due to the general pattern of 2009 Current site locations.

For ecological receptors, EPA distinguished between threatened and endangered species, which have special status under the Endangered Species Act, versus non-threatened and endangered species. For threatened and endangered species, the U.S. Fish and Wildlife Service data on critical habitat provided the best ability to estimate vulnerability (due to proximity) to 2009 Current sites. For other (non-threatened and endangered species) ecological receptors, a variety of federal geospatial data were used, both for assessing potential vulnerability (due to proximity) of those receptors to CERCLA hazardous substance releases at the 2009 Current sites, and for assessing impacts from low-probability, high-consequence events such as floods.

Subtask 4, Part 2: EPA used the Geographic Information System (GIS) to perform spatial analyses to answer the associated potential for exposure to CERCLA hazardous substance question or query, and documented the steps and processes included in developed algorithms.

E.3 Secondary Data Needs and Sources

EPA did not to collect primary data for the geospatial analysis due to the large volume of already-published data that could be used as secondary data in the analysis. In general, EPA used national level geospatial data to provide consistency in the analysis. National level geospatial data created by various Federal agencies are standard sources for EPA geospatial analyses. EPA generally used data covering the most recent timeframe of this report (approximately 2010-2011). Due to the complexity and cost of developing national geospatial data layers, the dates for these most recent geospatial data vary. For some subjects (e.g., surficial geology), the time period of the data is not of great importance since surficial geology generally does not change significantly over time. For other layers, such as landuse/landcover, various sources are available with dates ranging from the 1970s to the early 2000s.

National level geospatial data are available at different scales depending on the subject. National elevation data, for example, is available at 30-meter pixel resolution. National Hydrography Datasets are produced from maps at a scale of 1:100,000. Some geospatial data (such as census bureau TIGER line files) are produced from more than one scale of original maps and therefore are sometimes referred to as multi-scale themes. In general, EPA used geospatial data layers at the highest resolution (largest scale) available for each theme to produce analytical results at the best precision possible. This evaluation used Federal Geographic Data Committee (FGDC) metadata. The metadata fully document the source of the data, processing steps used to generate the data, any limitations or errors known to exist in the data, the structure of the data and source scale.

Secondary data were collected from a variety of sources and are described in Section 6 and in additional documents that are referenced in Section 6.

Attachment E5, Figures E5-1, E5-2, E5-3, and **E5-4** list the types of secondary data used for this report. In general, EPA used data sources that were 1) recognized according to a national geospatial standard, 2) the most recent available, 3) at the largest scale (most precise), and 4) had Federal Geospatial Data Coordinating Committee (FGDC) metadata. Data documentation is reproduced in **Attachments E1 and E2**.

E.4 Quality of Secondary Data

For this report, EPA assessed the quality of all secondary data for appropriateness for its intended use, as described below.

E.4.1 Quality Requirements

In general, EPA assumed that national geospatial data sources from other federal agencies were of known and appropriate accuracy, completeness, and precision. In certain cases, for feature definitions and coded attributes, EPA also made some assumptions regarding feature definitions and coded attributes for standard national datasets. For example, the National Hydrography Dataset (NHD) contains features coded as ‘Swamp/Marsh’ features. EPA assumed that Swamp/Marsh features from NHD represent what one would normally think of as ‘wetlands’ even though no feature coded as ‘wetlands’ exists in the NHD. These assumptions are documented in Attachments E-1 and E-2.

For non-spatial secondary data from sources such as spreadsheets, reports, and other documents, EPA used various techniques to assess the quality and accuracy of the information, such as spot-checking a subset of the records and comparing against other data sources, as well as evaluating the data source (agency, organization, or person creating the data).

E.4.2 QA/QC Procedures

EPA used a checklist to assess the general appropriateness and quality of each identified secondary data source for use. The checklist included items such as, “Does the source provide national coverage?”; “Does the source contain FGDC metadata?”; and “What is the scale/resolution of the data source?” Data sources that did not meet the appropriateness check either were not used, or were used with a disclaimer (see section E.3.3 below) to note that its quality was not known. In addition, a second analyst reviewed specific analytical methods such as buffers and overlays, to ensure that those analyses were carried out correctly.

E.4.3 Data Disclaimers

EPA provides disclaimers about the assessment of a data source's quality. For example, queries regarding proximity of certain receptors, such as the presence of threatened or endangered species within a given distance from each site, might only be able to be developed to indicate the number of threatened and endangered species within the counties that are touched by the distance buffer around each site. This result occurs because secondary data sources of threatened and endangered species are only available at the county geography level and it is not possible to identify where a particular threatened or endangered species may exist within a county.

E.5 Data Reporting, Data Reduction, and Data Validation

E.5.1 Data Reduction and Calculation Procedures

EPA used standard software tools for the data characterization. For example, ArcGIS® software was used to calculate geographic measurements such as areas, lengths, elevations, etc. The specific calculation code used to make these measurements is not available to the user. However, EPA ensured that the proper methods were used to analyze the data, calculate new variables, or perform data summaries and data reductions. For example, a second analyst checked query results to ensure appropriateness and accuracy of the method used.

E.5.2 Validation Procedures

The validation procedures that were used are fully documented in Attachments E1 and E2.

Geospatial data were saved in ArcGIS® 9.3 file geodatabase format. These data were structured and organized in such a way to make it easy for other ArcGIS® 9.3 users to view the secondary data sources used and to view the results of each query analysis.

E.6 QA/QC Actions and Summaries

The draft QAPP, *CERCLA 108(b) Risk Analysis Support: Geographic Information System*, described the quality assurance and quality control activities. It was subsequently updated: The current version (below) contains the most recent revisions.

The completed tasks are as follows:

- Assembled the list of 2009 Current sites
- Geolocated individual 2009 Current sites using automated and manual techniques.
- Collapsed (or combined) selected mines and processors based on distance and attribute criteria.
- Measured the widest extent of each mine
- Estimated population demographics within 1, 2, 3, 4, 5, 10, 15, and 20 miles of each 2009 Current site.
- Determined which 2009 Current sites fall in Federal Lands or Indian Lands

- Determined the NHDPlus catchment and 12-digit watershed within which each site falls, calculating downstream attributes, and summarizing presence of certain environmental characteristics downstream of each 2009 Current site. This task is generally known as the Aquatic Areas of Review (AQAOR) process.
- Determined the presence of several types of sensitive environmental areas within 3, 6 and 20-miles of 2009 Current sites, including the combined sites.

This section is structured with each of these tasks as its own sub-section. Each sub-section describes the data sources used in each task, the techniques used to evaluate the quality and usability of each data source, the techniques used to perform quality assurance/quality control (QA/QC) on techniques used to generate or enhance the data source, and the QA/QC performed on the techniques used to analyze mine and processor locations in relation to other geographic entities.

Many supporting documents that describe, in detail, processing methods and techniques, and QA/QC actities are referenced and will be referred to in this text to avoid duplication.

All processing of digital data was accomplished using the following applications and versions:

- ArcGIS® 9.3.1 or ArcGIS® 10.0 (WA 2-16): GIS processing and analysis tasks.
- Excel® 2007: Certain data organization, listing, and tabulating tasks.
- MS Access® 2007: Tabular data processing and query tasks.
- Python 2.6: Programming environment for demographic analysis application.

E.6.1 Developing the List of Commodities of Interest and Creating Lists of Mines

The principal sources of data to develop the list of commodities and the lists of hard rock mines and processors of interest to EPA is the Mine Safety and Health Administration (MSHA, part of the U.S. Department of Labor) and the U.S. Geological Survey (USGS, part of the U.S. Department of the Interior). MSHA was the primary source because MSHA maintains a database of mining operations in the U.S. that includes type of commodity mined, address of the mine, type of mine or processor (surface, underground), and its status (active, inactive, closed, etc.). The MSHA and USGS lists were supplemented with a a list of talc mines.

Details regarding the source date of all data used to develop the 2009 Current Sites list are found in **Attachment E1** and **Appendix B.** The commodities to be included in the 2009 Current Sites list were directly extracted from MSHA data files and USGS Minerals Yearbooks. Queries on the MSHA dataset based on commodity types, mine types (i.e., mine vs. processor), and site status characteristics (e.g., New, Active, Intermittent) were developed to create lists of mines and processors. There are some limitations in the source data, such as incomplete or inconsistent location data (e.g., sometimes only a state was identified, or only a county and state).

QA/QC activities:

- Manual comparison of lists provided by EPA with the resulting lists of sites.

- Extraction of actual text strings present in MSHA data to match 108(b) commodities.
- Comparing resulting lists of mines and processors against various versions of MSHA data bases and other data sources
- Identification of sites that were duplicative between datasets

Final products include:

- List of Commodities (contained in **Appendix B, Table B-4**. "MSHA and USGS Commodities Potentially Subject to CERCLA 108(b) Hard Rock Mining Rule")
- The list of 2009 Current sites, including the combined sites, is provided in **Appendix B, Attachment B5** ("2009 Current Sites").

E.6.2 Geolocating Mines and Processors

A full description of the methods, sources, and procedures used to geolocate, enhance/improve locations, and code all locations with a confidence level are provided in **Attachment E2** ("Geospatial Database Development Process"). In general, the QA/QC activities that were undertaken to ensure accuracy and usability of the locations of 2009 Current sites was based on visual inspection of the locations provided in the MHSA, USGS, and EPA data sources that were used to construct the 2009 Current Sites list.

Some individual 2009 Current mines and processors were combined into new 'sites' depending on proximity, commodity, and name. The process of combining mines and processors is described in Section 6.4 below.

Data sources used for geolocating of mines and processors included:

- The mine or processor address provided by MHSA. GIS address geocoding procedures were used to create a latitude/longitude for each site for which an address was supplied.
- Internet searches based on mine and processor name or other information provided in source lists were used to attempt to map 2009 Current sites with no known address or location. A list of the web-sites accessed and the mine or processor relevant to the search is provided in the References section of **Attachment E2**.

QA/QC activities:

- Visual review of the geocoded location was conducted on 100% of the 2009 Current sites. The visual review was accomplished using Google Earth and ArcGIS software with the highest publically available satellite imagery at each 2009 Current site.
- Mines and processors were coded at the end of visual review to indicate the subjective confidence level for the accuracy of each location. The Loc_Conf attribute contains the following codes:
    - 0 = no location could be found OR the location provided is likely to be inaccurate and no source could be found to improve it.
    - 1 = the location may or may not be accurate; further information would be required to assign a higher confidence value.
    - 2 = the location seems to be accurate based on the visual inspection of the location.

Limitations in source data and QA/QC include:

- Google Earth imagery and imagery available via ArcGIS are of recent, but unknown date in most cases. It is possible that, in some cases, a 2009 Current site could not be located because it was created after the date of the imagery that was consulted.
- The locational accuracy of the imagery in Google Earth and ArcGIS cannot be directly verified, but EPA assumes it to be accurate for the purpose of locating 2009 Current sites. Imagery available from these tools is widely used by government and industry for mapping and geolocating entities.
- Assumptions were made about the actual boundaries of 2009 Current sites. In many cases, mines may have encompassed more than one pit, or the wrong mine (when multiple pits were visible) might have been chosen. There is no way to verify that the location chosen for any 2009 Current site reflects the actual location without contacting each mine or processor.
- EPA did not use a specific quality requirement for the 2009 Current Site locations except to identify the best locations available from the available datasets and internet searches. The Loc_Conf (location confidence code) assigned to each 2009 Current site is a subjective assessment of the quality of the location.

Final products include:

- ArcGIS shapefile V8_Final_list_2011_03_03.shp of the 2009 Current sites which included individual mines, individual processors, and those mines and processors that were aggregated into "combined sites."
- MS Acccess database file (V8_Deliverable.mdb) that contains the latitude/longitude coordinatesfor the 2009 Current sites.
- A cross reference file (V8_UNIVERSAL_XREF) in the V8_Deliverable.mdb database that indicates each individual mine and processor, as well as a new site identifier (SITE_RNUM) for those mines and processors were aggregated into combined sites.
- A complete list of unique 2009 Current sites (V8_FINAL_LIST) in the V8_Deliverable.mdb database that contains a complete list of final sites along with their SITE_RNUM IDs and a flag indicating, for each site, if it is a mine, a processor, or a combination.

E.6.3 Measuring the Geographic Extent of Each Mine

Because the sizes of mines vary greatly, EPA made a general estimate of the size of each mine by measuring the length of the widest part of each mine disturbed area. These measurements are useful in determining the size of a mine and were performed relatively quickly by using existing measurement tools provided with the Google Earth applications.

The methodology employed was to visually examine Google Earth imagry of each mine, and use the interactive measurement tool to establish a rough estimate of the width of the widest part of the mine. The specific measurements are contained in two fields, Long_Site_Mile and Long_Mine_Mile.

In general, the measurements were made using the following methodology: The measurement is based on a line that transects the mined pit area, within the mine property, connecting the farthest distant and opposite points along a discernable boundary around the mined or excavated area. Conceptually, the line drawn would encompass all of the mined or pit areas if pivoted on its mid-point. This value usually represents the distance across the surface mine excavation area unless otherwise noted. Process and storage areas that are located on the periphery of the mined area were not included in the distance measurement; however, these areas are often located within the pit or excavated area and would be included. This measure does not apply to underground mines unless it is thought that the mine entrance is located inside the pit and then the pit area is used to bound this location. Note that several mine sites have multiple pit locations situated across their site and values provided are for the distance across all mined areas. However, for sites 4300150, 2601842, 2600827, 200134, 301926, and 300715, several values are provided. These values represent a median value or the measurement for the significantly larger pit area as noted. The measurements for each individual pit is also given in the comments for reference. This value is only a longest axis distance measurement and not a 2-or 3-dimensional aspect ratio of the excavated area.

All values are recorded in miles.

Data sources used for measuring the widest part of each mine:

- The 2009 Current Mines shapefile converted to KMZ format.
- Google Earth Version 5 and the imagery that is accessible via Google Earth.

QA/QC activities:

- Independent spot checks of 10% of the measurements were made to verify that the measurements were reasonable.

Limitations:

- The measurements are made interactively, using professional judgment. Different professionals may make different decisions as the shape and extent of the mines from the identical imagery.

E.6.4 Combining Selected Mines and Processors into Single 'Sites'

EPA identified which 2009 Current sites were within five kilometers of each other and also shared the same name, owner name, or operator name. The purpose of this procedure was to eliminate duplicate entities when these individual sites could reasonably be assumed to be in essence a single 'site' for regulatory purposes.

As described in detail in **Attachment E2**, EPA used a two-stage process. The first stage involved combining mines with other mines and combining processors with other processors. The second stage combined mines (or previously combined mines) with processors (or previously combined processors). When combined, a new location was chosen for the combined site that was generally between the original locations, or otherwise seemed to fall in the middle of the disturbed area encompassed by the combined sites.

New site IDs (SITE_RNUM) were assigned to all remaining sites (individual mines, individual processors, and combinations). The SITE_RNUM identifiers were coded to aid in identifying which sites were the product of the combining process and which were not. The SITE_RNUMs were coded as follows:

< 1000: Mines combined with other mines or processors combined with other processors. None of which were subsequently re-combined.
1000 – 1999: Mines (or combined mines) and processors (or combined processors) that were combined with each other. In other words, these sites are the product of combining both mines and processors.
2000 – 2999: New identifiers for individual processors that were not combined.
3000-3999: New identifiers for individual mines that were not combined.

QA/QC activities:

- A new table was created to hold a cross-reference between the original mine ID (MINE_RNUMs), original processor IDs (FAC_RNUM) and the new site IDs (SITE_RNUM) based on which mines and processors were combined.
- The cross reference table was used to examine each decision regarding which mines and processors should be combined. An analyst visually examined aerial photography of each combined site to ensure that the individual sites were within five kilometers of each other and that the owner name, operator name, and/or controller name were the same (or substantially similar).
- Based on the above QA/QC procedure minor modifications were made to the cross reference list.
- The cross reference table also contains a code to indicate which mines and/or processors were combined twice. This can occur where two mines, for example, were combined based on the criteria and then were subsequently combined with one or more processors.
- It is important to note that in many cases subjective judgments were made regarding the similarity of names, owner names, and operator names. In addition, the geographic terrain (satellite imagery) played a role in decisions depending on the extent of disturbed areas and how these areas related to the site point locations.

Final products include:

- A list of all 2009 Current sites, including individual mines, individual processors, and combined mines/processors. There are a total of 491 sites in the 2009 Current Sites list.

E.6.5 Estimating Population Demographics

As described in detail in **Attachment E1** (“Demographic Analysis Methods”), EPA estimated counts of populations by various demographic characteristics within 1, 2, 3, 4, 5, 10, 15, and 20 miles of each 2009 Current site. This procedure was first run for individual sites, and subsequently for combined sites.

A total of 48 different demographic characteristics (e.g., population counts by age group, race/ethnic group, income, etc.) were estimated for each of the eight buffer distances for each site. Due to the volume of data to be used and the potential for errors if done manually, EPA developed an ArcGIS macro program to run the analysis and construct the output files. Complete documentation on the methods, techniques, application programs, queries, and results of the demographic analysis are provided in Attachment E1. Details regarding the specific source of each input database, any limitations of those data, assessment of the usability is included in that document. The following summarizes the sources, QA/QC activities, limitations and deliverables.

Data sources:

- 2009 Current Sites shapefile.
- 2000 Census Block Group polygons provided in the ArcGIS 9.3 datasets.
- Census demographic data from the U.S. Census Summary File 3 (SF3) files available from the U.S. Census Bureau.

QA/QC activities:

- The queries that EPA developed to generate the demographic input data (for example, to combine gender-specific population data into a total for each 5-year age group) were independently checked by a second analyst to ensure that the variables selected, equations used, and calculation results for each query were correct.
- The application program developed to run the analysis was developed and tested to completion. A second GIS analyst performed a code review to ensure that the program was taking the appropriate actions and using appropriate methods to produce accurate results.
- Visual review of some output data identified a bug or error in the ArcGIS processing which resulted in the disappearance of some polygons in the output shapefiles. EPA decided to place a check on the outputs of each buffer zone to sum up the area of all output polygons for each mine and compare the sum to the area of the original buffer. This check would automatically identify cases where random polygons were dropped by ArcGIS. When problems were identified, EPA re-ran the demographic program until the check ran without identifying errors.
- Each buffer zone distance was output to its own database table. EPA checked each resulting table to ensure that each table contained the correct number of records the correct fields.
- Spot checks of demographic calculations were made on randomly selected files.
- Mines or processors having poor or no locations (Loc_Conf = 0) were coded with a value of '-99999' for all demographic variables because any demographic results for these mines or processors would be incorrect since the input location of the mine or processor was most likely incorrect.

Final products include:

Sixteen demographic analysis files were generated based on: eight buffer zone distances to be analyzed; both mines and processors were run through each buffer zone analysis. The demographic analysis for Alaska was run separately because a different map projection had to be used to accurately handle buffer distances in Alaska as compared to the contiguous U.S. There are no demographics results for processors in Alaska because no processors are located in Alaska. A list of the demographics tables is provided below:

- V8_Combined_20110412_1Mile_CONUS_final
- V8_Combined_20110412_2Mile_CONUS_final
- V8_Combined_20110412_3Mile_CONUS_final
- V8_Combined_20110412_4Mile_CONUS_final
- V8_Combined_20110412_5Mile_CONUS_final
- V8_Combined_20110412_10Mile_CONUS_final
- V8_Combined_20110412_15Mile_CONUS_final
- V8_Combined_20110412_20Mile_CONUS_final

- V8_Combined_20110412_1Mile_AK_final
- V8_Combined_20110412_2Mile_AK_final
- V8_Combined_20110412_3Mile_AK_final
- V8_Combined_20110412_4Mile_AK_final
- V8_Combined_20110412_5Mile_AK_final
- V8_Combined_20110412_10Mile_AK_final
- V8_Combined_20110412_15Mile_AK_final
- V8_Combined_20110412_20Mile_AK_final

E.6.6 Identifying Which Mines and Processors Fall on Indian Lands and Federal Lands

To determine which 2009 Current sites are located on Indian Lands and Federal Lands, EPA used a GIS overlay point-in-polygon technique to identify the Indian Land or Federal Land polygon in which each point falls.

<u>Indian Lands</u>

The ArcGIS Identity tool was used to overlay mine and processor points into a GIS layer of Indian Lands to identify whether or not each point falls on Indian Lands.

Data sources:

- 2009 Current Sites shapefile
- Indian Lands boundary layer from the United States Department of the Interior, Bureau of Indian Affairs (BIA), downloaded as a component of the USA Federal Lands layer package from https://www.arcgis.com/home/item.html?id=26c2a38f94c54ad880ff877f884ff931.

The definition of “Indian Lands” can differ, depending on the purpose for the definition. This analysis required a nationwide layer containing broad definitions of what constitutes Indian Lands produced by a U.S. agency that has the relevant knowledge to produce such a dataset. For this reason, EPA chose the data layer from the BIA. However, exact boundaries are sometimes disputed, and detailed maps are often not generated in order to avoid raising issues of jurisdiction or interpretation.

Because of the different definitions of what constitutes Indian Lands, the lack of consensus on on boundaries and considerations such as those listed above, EPA carefully examined the exact type of Indian Land that included a 2009 Current site, and used the results of this analysis with care.

QA/QC activities:

- EPA had no specific data requirements for data quality of the Indian Lands analysis. Based on this, and the lack of agreement on any particular nationwide layer, the quality of the data being used and the results are unknown.
- EPA ensured that all 2009 Current sites with location data were included in the outputs of the overlay analysis. For 2009 Current that did not fall on Indian Lands, all Indian Land attributes are blank.

Final data products inlcude:

- The Indianlands_V8.mdb file contains the results of the Indian Lands analysis. Specifically, the database query 'ON_IndianLands' was used to list the 2009 Current sites that are physically located on Indian lands.

Federal Lands

The ArcGIS Identity tool was used to overlay 2009 Current Site point locations with a GIS layer of Federal Lands to identify which sites fall on Federal Lands.

Data sources:

- 2009 Current Sites shapefile.
- U.S. National Atlas Federal and Indian Land Areas layer. This layer was chosen because it is national in scale and is a recognized and widely used source of polygon delineations of lands that are controlled by the U.S. Government.

QA/QC activities:

- EPA had no specific data requirements for data quality of the Federal Lands analysis. Based on this and the lack of an official government standard layer, the quality of the Federal Lands layer is unknown.
- EPA ensured that all 2009 Current sites with location points were included in the outputs of the overlay analysis. For 2009 Current sites that did not fall on Federal Lands, all Federal Land attributes are blank.

Final data products include:

- The Mines_V7_FedLands, and Processors_V7_FedLands data tables included in the V7_Deliverables.mdb file contains the results of the Federal Lands analysis.

E.6.7 Aquatic Areas of Review (AQAORs)

This analysis was conducted to determine the hydrologic setting and potential downstream areas that might be impacted by releases from 2009 Current sites. This procedure is described in detail in Appendix H ("Ecological Receptors"). The information that follows below is a summary of the data sources, analyses, and QA/QC procedures used on this task.

The analytical method first identified the twelve digit hydrologic catalog unit (HUC-12) that each site falls in. All catchments within the HUC-12 were then identified, and downstream flow navigation was run to select all catchments downstream of the HUC12 catchments that were estimated to be within an estimated 24-hour downstream travel distance. These areas are known as the Aquatic Areas of Review (AQAORs). A series of overlay operations were then run to determine how the AQAORs intersected with a variety of additional layers (such as major dams of the U.S., Safe Drinking Water Source Protection Areas, etc.) to identify which AQAORs might have downstream areas with sensitive environmental conditions.

Because the 2009 Current Sites universe contains combined sites, the methodology involved evaluating individual mine and processor locations, and then combining and summarizing the results for the combined sites.

Data aources:

- 2009 Current Sites shapefile
- NHDPlus surface hydrography database.
- National Wild and Scenic Rivers System from http://www.rivers.gov/maps.html
  The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. These river systems are typically viewed as Outstanding Resource Waters (Tier 3 waters) in EPA-approved State Water Quality Standards under the Clean Water Act.
- Major Dams of the United States from the NID available from https://www2.usgs.gov/science/cite-view.php?cite=244
  This map layer from the USGS National Atlas portrays major dams of the United States, including Puerto Rico and the U.S. Virgin Islands. The map layer was created by extracting dams 50 feet or more in height, or with a normal storage capacity of 5,000 acre-feet or more, or with a maximum storage capacity of 25,000 acre-feet or more, from the 79,777 dams in the U.S. Army Corps of Engineers National Inventory of Dams. Descriptive information includes the dam name and location, the risk level associated with the dam, and the purposes (beneficial uses) for which the dam was constructed. Purpose codes include the following "beneficial uses", which will correlate with CWA WQS designated uses: ’F’ Fish and Wildlife; ‘R’ Recreation; and ‘S’ Water Supply.
- FEMA Q3 Special Flood Hazard Areas selected for use from the EPA Drinking Water Mapping Application. Background and metadata is available at https://www.fema.gov/flood-map-definition
  A vector polygon GIS layer showing Special Flood Hazard Area (SFHA) polygons in the FEMA Q3 flood data GIS layers. The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA) on official FEMA National Flood Insurance Program (NFIP) maps. The SFHA is the area where the NFIP's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance of flood is also

referred to as the base flood or 100-year flood. Q3 Flood Data is a digital representation of certain features of FEMA's Flood Insurance Rate Maps, intended for use with desktop mapping and Geographic Information Systems technology. The Q3 Flood Data are produced for counties that have flood risk impacts around 70% of the population of the Untied States. This means that FEMA Q3 GIS products are not available for all counties. Materials are available for the contiguous United States, Hawaii, Alaska, Puerto Rico, and the Virgin Islands. The separate county-level Q3 GIS layers are combined into a seamless national GIS layer for polygons that are within Special Flood Hazard Areas. FEMA 100 year floodplains are likely to contain important aquatic habitats, including riverine or other wetland types.

- Surface Drinking Water Source Protection Areas available via the EPA Drinking Water Mapping Application (available at https://www.epa.gov/sourcewaterprotection/dwmaps).

  Data represent Source Protection Area (SPA) polygons for coastal and inland surface waters – based on NHDPlus catchments for the continental US (CONUS) and convex hulls for Alaska. In the CONUS, NHDPlus coastal catchments are used as SPAs for public water system facility surface sources on NHD coastal shorelines. For inland surface sources, 24 hour upstream time of travel navigation is applied to select NHDPlus catchments and define watershed-based SPAs. Information is available to identify community versus non-community public water systems related to these SPAs, but this information is not included with this dataset. The SPAs and other primary materials are EPA Sensitive Drinking Water Information. Only the "indicator" results of geospatial proximity checks with the AqAORs will be made publically available.
- Groundwater Source Protection Areas available via the EPA Drinking Water Mapping Application

  Data represent Source Protection Area (SPA) polygons for groundwater. 1-mile circular buffers were created around groundwater well facilities to create the SPAs. Information is available to identify community versus non-community public water systems related to these SPAs, but this information is not included with this dataset. The SPAs and other primary materials are EPA Sensitive Drinking Water Information. Only the "indicator" results of geospatial proximity checks with the AqAORs will be made publically available.
- Tribal Drinking Water Sources available via the EPA Drinking Water Mapping Application

  Data represent facility source points (predominantly groundwater wells) from SDWIS/FED latitude/longitude coordinates. Source Protection Areas (SPAs) have not been developed for the Drinking Water Mapping Application (DWMA) – so the coordinate points are used to determine proximity to Aq-AORs. Information is available to identify community versus non-community public water systems related to these facility points but this information is not included with this dataset. These tribal facility points and other primary materials are EPA Sensitive Drinking Water Information. Only the "indicator" results of geospatial proximity checks with the AqAORs will be made publically available.
- Federal Lands of the United States available from the National Atlas (from https://www.arcgis.com/home/item.html?id=26c2a38f94c54ad880ff877f884ff931.)

This publicly available GIS layer provides polygons for various “agency or bureau” (AGBUR) federal public lands. Federally-owned and managed public lands include National Parks, National Forests, and National Wildlife Refuges. This layer is included in the EPA OW RAD ancillary National Atlas GIS layers.

- Clean Water Act Section 303(d) Impaired Waters available from EPA’s WATERS Expert Query Tool

  A data table that documents “metals” impairments was taken from the WATERS ATTAINS database in a pull for October, 2010, for all waters showing impairments (EPA's Integrated Reporting categories 4a, 4b, 4c and 5). For GIS mapping, the most comprehensive and publicly available mapping layer is EPA’s “2002 Impaired Waters Baseline National Geospatial Dataset” (released in March, 2010).
- NPDES Major Permitted Processors available from EPA at www.epa.gov/enviro/geo_data.html

  Information is from the EPA OEI Geospatial Data Download Service. At the time of this evaluation the GDDS had last been updated on January 30, 2011. NPDES “majors” selected from the full set of facility locations for numerous EPA programs. Information based on ICIS/PCS NAICS/SIC codes is provided to be able to tell WWTP (SIC code of 4952 for SEWERAGE SYSTEMS) from other industrial/commercial (IC) facilities.
- RCRA Large Quantity Generator Processors available from EPA at www.epa.gov/enviro/geo_data.html

  Information is from the EPA OEI Geospatial Data Download Service. At the time of this evaluation the GDDS had last been updated on January 30, 2011. LQG facilities were selected from the full set of facility locations for numerous EPA programs where the contents of RCRA1_INT through RCRA6_INT contained the string "LQG."
- Alluvium Layer from USGS Generalized Geologic Map available from the National Atlas at https://pubs.usgs.gov/atlas/geologic/ (CONUS only)

  Alluvium layer from USGS Generalized Geologic Map of the United States in the National Atlas. For parts of the CONUS not covered by the FEMA Q3 floodplain GIS layer, alluvial deposits (alluvium) provide a proxy to identify areas that may be flood prone.
- Indian/Tribal Lands for Native American Groups available from the National Atlas at http:/nationalatlas.gov/mld/indlanp.html (CONUS only)

  From the USGS National Atlas layer on Indian (Tribal) Lands.
- Anadromous Waters Catalog (Alaska only) available from https://www.adfg.alaska.gov/sf/SARR/AWC/
- Alaska Native Village Statistical Area (ANVSA) (Alaska only) available from http://www.epa.gov/waters/doc/auxiliary/tiger.html

These data layers were chosen because they are the only national (or Alaska-based) source of GIS data containing the types of information required for the analysis. All of these data sets and layers are either nationally recognized and readily available GIS data sources, or they are in use in official EPA data management systems and applications (for example, the layers available from within the Drinking Water Mapping Application.

QA/QC activities:

The specific data quality of each of these datasets is provided (if available) in the metadata that is attached to each layer. For the most part, the data quality is unknown because of the lack of independent verification of these layers and because EPA had no specific data quality requirements for these layers.

Final products include:

The output tables for the AQAOR analysis are provided in the V8_AQAORs.mdb database in the following tables:

- V8_Mines_Catchments_withInfo_final
- V8_Processors_Catchments_withinfo_final
- V8_Mines_Processors_Catchments_withINFO
- V8_Final_List
- V8_Universal_Xref

E.6.8 Sensitive Environmental Lands

EPA identified those 2009 Current sites that may affect sensitive ecological areas if releases were to occur to land or water. EPA first identified a series of readily available, nationwide data layers that contain the boundaries of potentially sensitive areas.

Data sources:

- Coastal Barrier Resources System (CBRS) boundaries (contains areas designated as underveloped coastal barriers in accordance with the Coastal Barrier Resources Act)
- Critical Habitat boundaries (Areas where critical habitat exist for species listed as endangered or threatened. Produced by the FWS)
- Fish and Wildlife Service (FWS) Approved Areas (Areas approved for purchased by FWS)
- FWS Interest Areas (areas administered by the FWS)
- FWS Special Designation Areas (areas on which ‘special designations’ have been placed by FWS under the direction of the U.S. Congress)
- Protected Areas Database (PAD) (Contains areas of publically-owned lands; private conservation lands, and UNEP-World Conservation Monitoring Center’s World Database for Protected Areas.)

Detailed information on these layers was collected in a memo dated November 22, 2010.

The analytical process involved defining buffer zones around each 2009 Current site at 3-miles, 6-miles, and 20-miles and then overlaying each buffer zone onto each of the sensitive environmental lands layers noted above. The results show which 2009 Current sites touch sensitive lands for each buffer distance.

QA/QC activities:

Visual spots checks using GIS were made to examine selected V8 sites, the buffer zones created around them and the locations of sensitive areas in relation to the buffers. Spot checks ensured that the procedure was working correctly and that the output layer and tables accurately reflected the overlay process. (Note, however, that EPA requested lists of those sites that had sensitive environmental areas and therefore, only those sites whose buffers interested sensitive environmental areas were included in the output table provided to EPA.)

All V8 sites, even those with a location confidence code of ‘0’ (meaning there is no location for the site or it is presumed to be incorrect) were included in the analysis.

Attachment E1. Demographic Analysis Methods

E1-1 Introduction

This document describes the Geographic Information System (GIS) tools and methods developed to calculate demographic summary information associated with 2009 Current sites. This document describes datasets and methods to characterize the demographics within eight buffer zone areas surrounding each location, including:

- background for this work,
- data sources used in generating the demographic datasets,
- inputs of spatial and supporting data,
- process methods, and
- data limitations.

EPA developed a series of demographic datasets for the 2009 Current sites, to assess the likelihood for potential impacts to human health from 2009 Current sites. The demographics data alone are not adequate for use in a Superfund risk assessment, and it is expected that other methods and data would be needed to further refine the data for that purpose.

E1-2 Background

The 2009 Current Sites geodatabases used for this analysis were prepared for the CERCLA 108(b) hardrock mining rulemaking. The point location data 2009 Current sites are described in **Attachment E2** ("Geospatial Database Development Process").

EPA developed a set of GIS queries about the demographic profile of human receptors near 2009 Current sites to estimate the following:

- The total population within zones extending out to a 1, 2, 3, 4, 5, 10, 15 and 20 mile distance from each identified site coordinate point;
- The number of children in the following age categories for each zone: <1 year old, 1 to <2 years old, 2 to <3 years old, 3 to <6 years old, 6 to <11 years old, 11 to <16 years old, and 16 to <21 years old;
- The number of residents in each of the narrowest household income ranges provided by the census for each zone;[1]
- The number of residents by race for each zone;
- The number of residents by ethnicity for each zone.

E1-3 Data Sources

EPA used the following data sources as inputs to the demographics analysis.

[1] EPA used income by household, rather than by individual resident, because the census data doesn't include income by resident.

Census demographic data:

Source: Geolytics Inc. 2000 U.S. Census Long Form SF3 DVD.

Geolytics is a company that publishes U.S. Census data on CD-ROM, DVD, and Online (www.geolytics.com). The data from Geolytics is relatively easy to query and produces easy to use tables.

Census block group boundaries:

Source: ESRI Block Groups for 2000 U.S. Census

Environmental Systems Research Institute (ESRI) is a Geographic Information Systems software company based in Redlands, CA. With each software release ESRI provides up-to-date spatial data on a 'data disk'. EPA used version 9.3.1 and, specifically used the *census block group* boundary layer in the demographics analysis. Although *census block* polygons are smaller than *census block group* polygons, meaning more precise estimates of population counts could be determined from them, EPA chose to use *census block groups* because not all variables of interest in environmental justice analyses (such as income, poverty and educational attainment) are available at the *census block* level. *Census block groups* provide the smallest level of census geography for which all significant census demographic variables are available.

2009 Current Sites Locations:

The 2009 Current Sites locations file used for this particular demographic study was developed as described in Attachment E2. The list of mines and processors contained in this dataset was originally obtained from the *Mine Safety and Health Administration* (MSHA). Coordinate locations were determined from various sources and through a variety of methods with varying degrees of confidence.

Intermediate Datasets:

During the demographics processing, the following two types of intermediate data layers were generated:

- Buffer zones around each mine at 1, 2, 3, 4, 5, 10, 15, 20 mile distances (produced by 'Buffer Tool' in ArcMap as part of the analysis process)
- Intersected Block Groups and Buffer zones (produced by 'Identity Tool' in ArcMap as part of the analysis process)

E1-4 Processing Methods

Creation of Input Demographics Data Table

EPA queried the Geolytics census DVD by census block group for the entire U.S. to select the 87 variables needed for the analysis. The variables are listed in **Appendix E1-2: 2000 SF3 Census Variables Used in Demographic Analysis**. For total population, income, race and ethnicity, the census data were already organized sufficiently for the analysis. For age however, the demographic census data were separated by sex and individual years, so further queries were performed to create a table that mirrored the needed age groups. EPA summed counts of ‘males’ and ‘females’ values together, when necessary grouping several year fields. For example, to produce the age group of “11 to < 16 years,” EPA summed both the ‘males’ and ‘females’ values for ‘11 years’, ‘12 years’, ‘13 years’, ‘14 years’ and ‘15 years’. (The ‘make table’ query that was used to format the demographics data table is included in **Appendix E1-3: “Make Table” Query for Demographic Data Table.**)

The final table contained one record for each census block group in the U.S. and a column for each demographic field.

GIS Processing

A program was developed in the Python programming language to process each of the 2009 Current site locations for demographic characteristics (see **Appendix 4**: Python Code for Summary Statistics Calculation). This program was created due to the large number of variables that needed to be calculated and the need to complete the calculations for all of the needed distances. Automation of this repetitive task lead to a reduced likelihood of calculation errors and saved substantial amounts of time. Automation also means that tasks can easily be repeated and replicated. The program was developed to run on an individual input file with a specified buffer distance and so was run separately for each input dataset and distance. To run a new file the name of the input shapefile and the numeric distance in miles was added to the code in the indicated locations before the code was activated. The processes that the Python program ran are explained below.

Before running the code a field named “SQME” was added to the census block group’s attribute table and was calculated to be the area[2] in square meters of each of the census block group polygons.

The first process the code called was the ArcMap Buffer tool to create a buffer at the required distance from each mine/facility in the input dataset. The dissolve option was set to ‘NONE’ so that mines within close proximity to one another maintained their own individual buffers as opposed to having overlapping buffers merged into one (as shown in **Figure E1-1**).

[2] EPA used the Albers Equal Area Conic, North America projection, for all of the locations within the contiguous United States, and the Albers Equal Area Conic, Alaska projection for the Alaska sites. These projections primarily preserve area but at large scales distance is also well preserved. These projections were used for all data frames inputs and outputs during the processing. Due to this difference in necessary projections, the contiguous U.S. and Alaska were processed separately, with results being created independently for the two datasets.

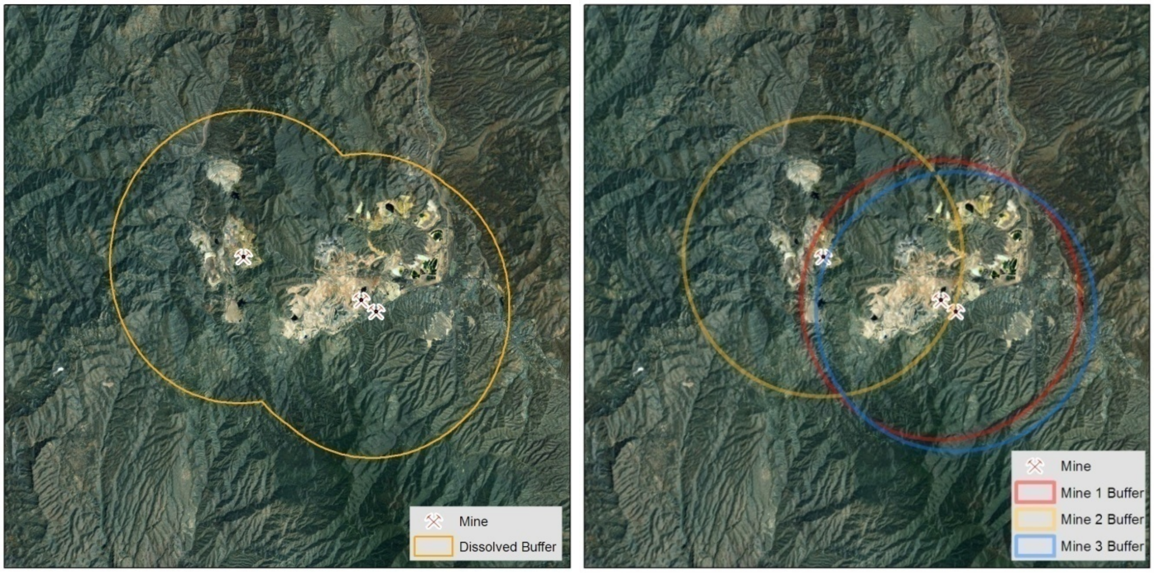


Figure E1-1: Difference between dissolved buffers (left) and individual buffers (right). RTI used the individual buffers (right) method so that each mine could be summarized independently.

The ArcMap Identify tool was then used to calculate the geometric intersections between the census block groups and the buffer zones. This tool computes the intersection of polygons in two different polygon layers and creates new polygons where polygons overlap. The new polygons consist of information from the original census block group and the identifier of the buffer zones for all intersections. Intersecting polygons for an example mine are shown in **Figure E1-2**; these polygons all have both the buffer's mine information and the census block group's information attributed to them.

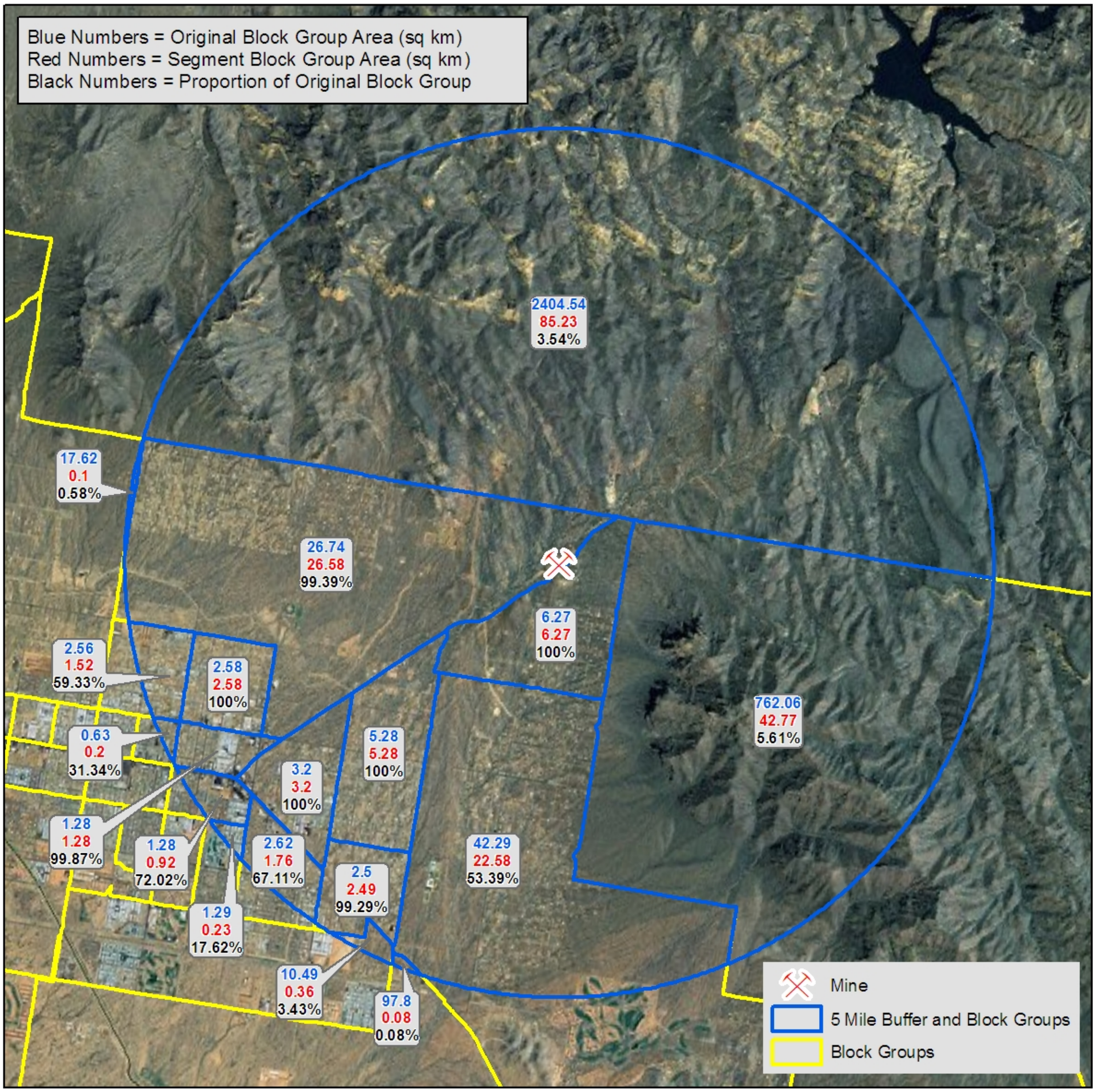


Figure E1-2: An Example of a five mile buffer zone intersected with census block group boundaries. The labels illustrate how block group areas are split by the buffer zone.

The result of the identity process was a new GIS layer and its associated data table. To properly make area-weighted calculations, the area of each original census block group and the area of the new intersected polygon are needed. To provide the new polygon areas the code called the geoprocessing tool named “Calculate Areas” which added a new field, named “F_AREA” to the new shapefile and calculated the area of each polygon in square meters.

Area-weighted Calculations

A field named “Prop” was added to the intersected layer to store the calculated value of the proportion of the new polygon’s area compared to the original census block group polygon. The equation to calculate the Prop field value is as follows:

F_AREA/SQME = Prop

Where

F_AREA = the size of the intersected census block group polygon;

SQME = the size of the original census block group polygon; and

Prop = the proportion of the original census block group present in the intersected polygon.

The value in the Prop field was then used to apportion the demographic values from the original census block groups into the intersected census blocks. This was done by multiplying the value in each variable field by the value in “Prop”:

Entire block group’s variable value x Prop = block group’s segment variable value

Note on rounding of decimals: The nature of the area-weighted calculations and the rounding of decimals during apportioning of values can lead to expected values and actual results varying by 1 or 2.

The result of this calculation is shown in **Figure E1-4** with the intersected values from **Figure E1-3** being summed to produce the total population for the entire buffer’s area.

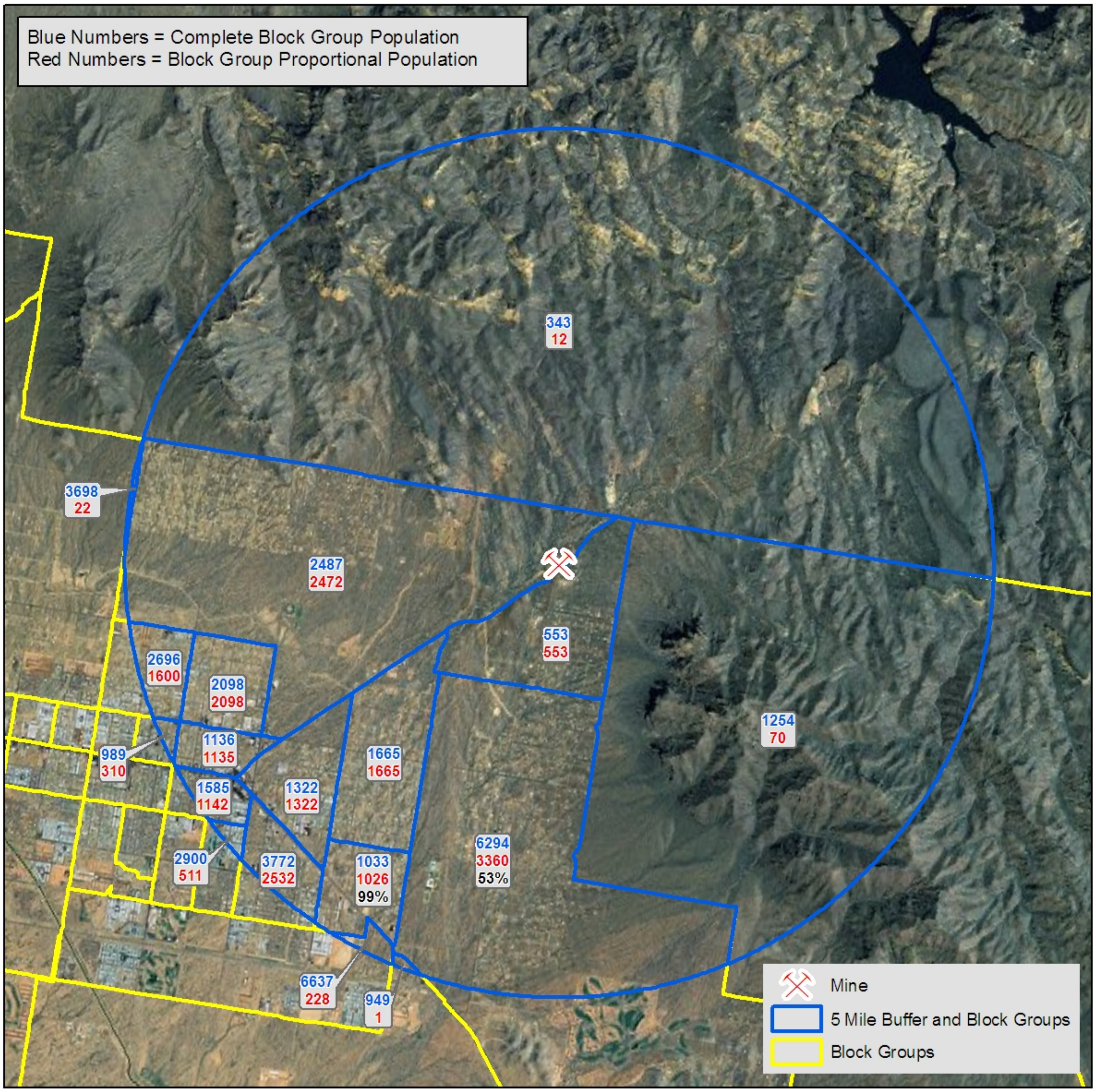


Figure E1-3: Population counts for block groups in 5 mile buffer

Once all of the calculations were completed, the ArcGIS ‘Summary Statistics Tool’ was called by the Python program to summarize the final values for each individual site. The tool achieved this by summing the values for all of the intersected polygons in each mine’s buffer area. The final value for each mine was rounded to the nearest whole number and exported to a new table.

Figure E1-4 illustrates the summed total population within the 5 mile buffer of a mine calculated by summing the apportioned population of each block group that intersected the buffer.

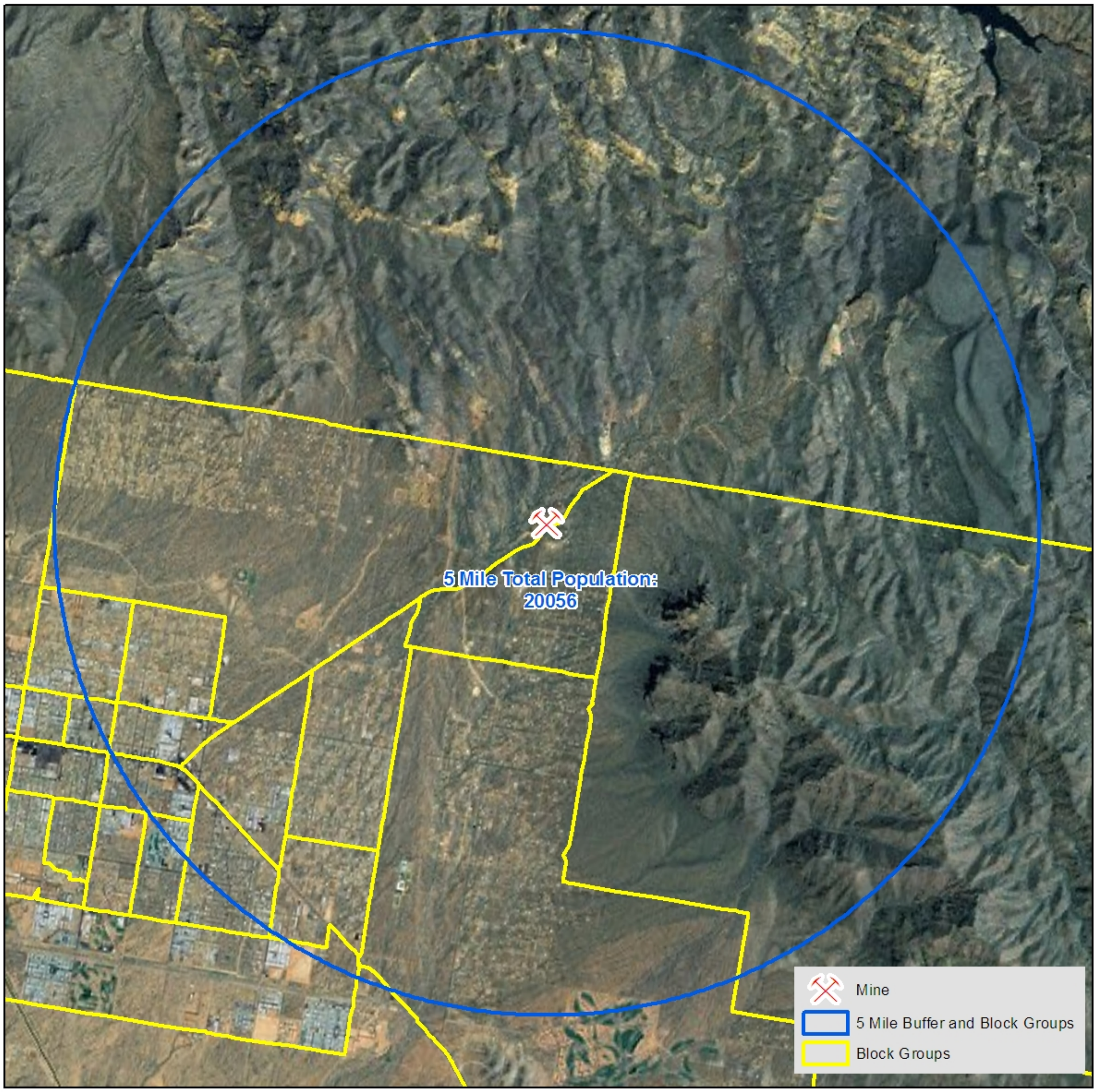


Figure E1-4: Total population for the 5-mile buffer zone calculated by summing apportioned polygons from each intersected polygon.

After testing to ensure that the sum of the areas of each site's new census tract polygons equaled the expected area for the buffer's size, a summary table containing the summarized results for each site was exported as a .dbf file, named to show whether the data were for mines or processors, along with the distance from the facility that the buffer used in the analysis represented and which area of the United States was studied. For example, the file named "mines_V7_demographicsUS(5miles)" contains analysis results for the 5 mile buffer around mines in the contiguous U.S. Likewise, the file named "mines_V7_demographicsAK(5miles)" contains analysis results for the same size buffer but for the mines located in Alaska. **Appendix E1-1** lists all of the demographics tables so produced. These files were subsequently imported into a Microsoft Access database as individual data tables.

Once the results tables were loaded into the Access database, the 2009 Current sites that had a location confidence of “0” or “1” had their demographics values calculated to “-9999”. This was done because mines and facilities with these confidence codes have either unknown locations or have locations that may not be accurate. Demographic results for those mines and facilities would have been misleading.

The 2009 Current Sites location data tables contained several fields (Mine_Name (or FACNAME for the facilities table), COMMODITY, STATE_FIPS, STATE_Abbr, CNTY_FIPS, FIPS, ZIP, ad PO_NAME) noting the general location of each site based on best available coordinates. These fields were added to each of the demographics output tables.

Appendix E1-5 lists all the variables and their contents for each demographic table.

E1-5 Limitations

Providing accurate demographic information is a challenge. Populations are constantly changing due to births, deaths, ageing and migration. The demographic analysis that is described here has attempted to provide an accurate description of the population around each 2009 Current site despite any limitations of the input data. Difficulties encountered with compiling accurate coordinate data for 2009 Current site locations, and an indication of confidence for the coordinate pairs, is discussed in Attachment E2. In addition, the use of a point location for each 2009 Current site will likely skew the demographic summary results. This is particularly a concern when a site area covers several square miles. It cannot be known if the placement of the point necessarily represents the center of the mine or facility. Rather, the point was positioned somewhere on what was perceived as the mine or part of the mine lands. The census data used was collected in 2000, meaning it reflects the population distribution of fifteen years ago. While the representativeness of these data is unknown, they were the best available data at the time for this type of demographic analysis. Changes that may have occurred through time include population totals in general, but also how the characteristics of each census block group’s composition may have changed through time.

All characteristics of a census block group’s population were assumed to be distributed uniformly across the area, without consideration of land uses that might limit population, such as water bodies, farmland, uninhabitable slopes or industrial land uses. It is likely that within a census block group the inhabitants would be located in clusters near housing developments, not in a uniform pattern. This means for example, if a buffer covers 50 percent of a census block group with a population of 100, it is possible that all 100 of those people live outside the buffer rather than the 50/50 split that is assumed by the methods described above. Furthermore, the characteristics such as race, age and income are rarely uniformly distributed. With the same 100 person block group being split down the middle it is possible that 100 percent of all members of a racial group live inside the buffer as opposed to there being an even distribution across the block group.

Appendix E1-1: Generated Tables

The following list of tables was generated, and stored within the Microsoft Access database file:

mines_V7_demographicsUS(1mile)
mines_V7_demographicsUS(2miles)
mines_V7_demographicsUS(3miles)
mines_V7_demographicsUS(4miles)
mines_V7_demographicsUS(5miles)
mines_V7_demographicsUS(10miles)
mines_V7_demographicsUS(15miles)
mines_V7_demographicsUS(20miles)

mines_V7_demographicsAK(1mile)
mines_V7_demographicsAK(2miles)
mines_V7_demographicsAK(3miles)
mines_V7_demographicsAK(4miles)
mines_V7_demographicsAK(5miles)
mines_V7_demographicsAK(10miles)
mines_V7_demographicsAK(15miles)
mines_V7_demographicsAK(20miles)

facilities_V7_demographicsUS(1mile)
facilities _V7_demographicsUS(2miles)
facilities _V7_demographicsUS(3miles)
facilities _V7_demographicsUS(4miles)
facilities _V7_demographicsUS(5miles)
facilities _V7_demographicsUS(10miles)
facilities _V7_demographicsUS(15miles)
facilities _V7_demographicsUS(20miles)

Appendix E1-2: 2000 SF3 Census Variables Used in Demographic Analysis

Below is the list of original variables from the Census SF3 tables that contained the demographic data of interest.

```
Counts Short Name    : Description
 -----------------    : -----------
    1. AreaKey        : Geography Key Code
    2. STATE          : State (FIPS)
    3. TRACT          : Census Tract
    4. BLKGRP         : Block Group
    5. P006001        : Total: population
    6. P006002        : White alone
    7. P006003        : Black alone
    8. P006004        : Native American alone
    9. P006005        : Asian alone
   10. P006006        : Pacific alone
   11. P006007        : Other alone
   12. P006008        : 2+ races
   13. P007002        : Not Hispanic:
   14. P007003        : White alone
   15. P007004        : Black alone
   16. P007005        : Native American alone
   17. P007006        : Asian alone
   18. P007007        : Pacific alone
   19. P007008        : Other alone
   20. P007009        : 2+ races
   21. P007010        : Hispanic:
   22. P007011        : White alone
   23. P007012        : Black alone
   24. P007013        : Native American alone
   25. P007014        : Asian alone
   26. P007015        : Pacific alone
   27. P007016        : Other alone
   28. P007017        : 2+ races
   29. P008003        : Male Under 1 year
   30. P008004        : Male 1 year
   31. P008005        : Male 2 years
   32. P008006        : Male 3 years
   33. P008007        : Male 4 years
   34. P008008        : Male 5 years
   35. P008009        : Male 6 years
   36. P008010        : Male 7 years
   37. P008011        : Male 8 years
   38. P008012        : Male 9 years
   39. P008013        : Male 10 years
   40. P008014        : Male 11 years
   41. P008015        : Male 12 years
   42. P008016        : Male 13 years
   43. P008017        : Male 14 years
   44. P008018        : Male 15 years
   45. P008019        : Male 16 years
```

```
46. P008020        : Male 17 years
47. P008021        : Male 18 years
48. P008022        : Male 19 years
49. P008023        : Male 20 years
50. P008042        : Female Under 1 year
51. P008043        : Female 1 year
52. P008044        : Female 2 years
53. P008045        : Female 3 years
54. P008046        : Female 4 years
55. P008047        : Female 5 years
56. P008048        : Female 6 years
57. P008049        : Female 7 years
58. P008050        : Female 8 years
59. P008051        : Female 9 years
60. P008052        : Female 10 years
61. P008053        : Female 11 years
62. P008054        : Female 12 years
63. P008055        : Female 13 years
64. P008056        : Female 14 years
65. P008057        : Female 15 years
66. P008058        : Female 16 years
67. P008059        : Female 17 years
68. P008060        : Female 18 years
69. P008061        : Female 19 years
70. P008062        : Female 20 years
71. P052001        : Total: HH
72. P052002        : under $10,000
73. P052003        : $10,000-$14,999
74. P052004        : $15,000-$19,999
75. P052005        : $20,000-$24,999
76. P052006        : $25,000-$29,999
77. P052007        : $30,000-$34,999
78. P052008        : $35,000-$39,999
79. P052009        : $40,000-$44,999
80. P052010        : $45,000-$49,999
81. P052011        : $50,000-$59,999
82. P052012        : $60,000-$74,999
83. P052013        : $75,000-$99,999
84. P052014        : $100,000-$124,999
85. P052015        : $125,000-$149,999
86. P052016        : $150,000-$199,999
87. P052017        : $200,000+
```

Appendix E1-3: "Make Table" Query for Demographic Data Table

The following SQL query statement was used to summarize the original SF3 variables into the final variables used in the analysis. These summaries were necessary, for example, to add counts of females and males by age group into total population by age groups fields.

```
SELECT MINEDAT1.[AreaKey ], MINEDAT1.[STATE ], MINEDAT1.[TRACT ],
MINEDAT1.P006001 AS TOT_POP, MINEDAT1.P006002 AS White, MINEDAT1.P006003
AS Black, MINEDAT1.P006004 AS Nat_Am, MINEDAT1.P006005 AS Asian,
MINEDAT1.P006006 AS Pac_Is, MINEDAT1.P006007 AS Other, MINEDAT1.P006008 AS
2_plus, MINEDAT1.P007002 AS NotHisp, MINEDAT1.P007003 AS WnotHisp,
MINEDAT1.P007004 AS BnotHisp, MINEDAT1.P007005 AS NAnotHisp,
MINEDAT1.P007006 AS AnotHisp, MINEDAT1.P007007 AS PnotHisp, MINEDAT1.P007008
AS OnotHisp, MINEDAT1.P007009 AS 2notHisp, MINEDAT1.P007010 AS Hisp,
MINEDAT1.P007011 AS WHisp, MINEDAT1.P007012 AS BHisp, MINEDAT1.P007013 AS
NAHisp, MINEDAT1.P007014 AS AHisp, MINEDAT1.P007015 AS PHisp,
MINEDAT1.P007016 AS OHisp, MINEDAT1.P007017 AS 2Hisp, [P008003]+[P008042] AS
0_1yr, [P008004]+[P008043] AS 1_2yr, [P008005]+[P008044] AS 2_3yr,
[P008006]+[P008007]+[P008008]+[P008045]+[P008046]+[P008047] AS 3_6yr,
[P008009]+[P008010]+[P008011]+[P008012]+[P008013]+[P008048]+[P008049]+[P008050]+[
P008051]+[P008052] AS 6_11yr,
[P008014]+[P008015]+[P008016]+[P008017]+[P008018]+[P008053]+[P008054]+[P008055]+[
P008056]+[P008057] AS 11_16yr,
[P008019]+[P008020]+[P008021]+[P008022]+[P008023]+[P008058]+[P008059]+[P008060]+[
P008061]+[P008062] AS 16_21yr, MINEDAT1.P052001 AS TotHH, MINEDAT1.P052002 AS
Less10k, MINEDAT1.P052003 AS 10K_14999, MINEDAT1.P052004 AS 15K_19999,
MINEDAT1.P052005 AS 20K_24999, MINEDAT1.P052006 AS 25K_29999,
MINEDAT1.P052007 AS 30K_34999, MINEDAT1.P052008 AS 35K_39999,
MINEDAT1.P052009 AS 40K_44999, MINEDAT1.P052010 AS 45K_49999,
MINEDAT1.P052011 AS 50K_59999, MINEDAT1.P052012 AS 60K_74999,
MINEDAT1.P052013 AS 75K_99999, MINEDAT1.P052014 AS 100K_124999,
MINEDAT1.P052015 AS 125K_149999, MINEDAT1.P052016 AS 150K_199999,
MINEDAT1.P052017 AS [200K+] INTO POP_DATA
FROM MINEDAT1;
```

Appendix E1-4: Python Code for Summary Statistics Calculation

The following Python program code was used to generate all of the demographic statistics within each buffer zone around the mines.

```
# Import system modules
import sys, string, os, arcgisscripting

# Create the Geoprocessor object
gp = arcgisscripting.create(9.3)

# Set the necessary product code
gp.SetProduct("ArcInfo")

# Load required toolboxes...
gp.AddToolbox("C:/Program Files/ArcGIS/ArcToolbox/Toolboxes/Spatial Statistics Tools.tbx")
gp.AddToolbox("C:/Program Files/ArcGIS/ArcToolbox/Toolboxes/Data Management Tools.tbx")
gp.AddToolbox("C:/Program Files/ArcGIS/ArcToolbox/Toolboxes/Analysis Tools.tbx")

# Must have a directory on local drive called C:\\test

workpath = "C:\\test\\"

print "workpath is " + workpath

gp.workspace = workpath

# Need Input from User
Distance = 10 # What number of miles to buffer?
print "Distance is " + str(Distance)
InputFile = "Facilities_V7_20101215_alb" # What is the input file name in the test directory (Do not
include .shp)?
print "Input File is called " + InputFile

# Local variables...
BufferedPoints = workpath + InputFile + str(Distance) + "_Buffer.shp" # Buffers from mines
InputPoints = workpath + InputFile + ".shp" # Mines to be buffered
IntBuffBlock = workpath + InputFile + str(Distance) + "_Buffer_Intersect.shp" # Output from intersect.
BlockArea = workpath + InputFile + str(Distance) + "_demo.shp" # Output of Calculate Area
BlockGroups = "bgp_al_meters.shp"
DEMOGRAP = "\\\\RTIFILE02\\ehe\\Projects\\0212041-ERAS_(Opt_1)\\0212041.001.016-
CERCLA108b\\Data_and_Tools\\GIS\\Mine_locations\\DEMOGRAP.dbf"
BufDist = str(Distance) + " miles"
AreaTestTable = workpath + InputFile + str(Distance) + "_AreaTest.dbf"

# Process: Buffer...
gp.Buffer_analysis(InputPoints, BufferedPoints, BufDist, "FULL", "ROUND", "NONE", "", "")
print "Buffered"

# Process: Identity...
gp.identity_analysis(BufferedPoints, BlockGroups, IntBuffBlock, "ALL", "")
print "Identified"

# Process: Calculate Areas...
```

```
gp.CalculateAreas_stats(IntBuffBlock, BlockArea)
print "Calculated"

# Process: Add Field...
gp.AddField_management(BlockArea, "Prop", "DOUBLE", "", "", "", "", "NULLABLE",
"NON_REQUIRED", "")
print "Field Added"

# Process: Calculate Field...
gp.CalculateField_management(BlockArea, "Prop", "[F_AREA] / [SQME]", "VB", "")
print "Field Calculated"

# Process: Join Field...
gp.JoinField_management(BlockArea, "FIPS", DEMOGRAP, "AREAKEY__", "")
print "Joined"


BlockAreaTable = workpath + InputFile + str(Distance) + "_demo.dbf"
Output_Table =  workpath + InputFile + str(Distance) + "_demo_final.dbf"

# Make a list of all fields that need to be calculated by area
FieldList = gp.ListFields(BlockAreaTable, "*", "ALL")

def get_fields(FieldList):
   """
      return esri field list into python list for 9.3
   """
   return [x.name for x in FieldList]
fields_list = get_fields(gp.listfields(BlockAreaTable))

print len(fields_list)

print ",".join(fields_list)

# Add Fields and calculate new demographic totals
for Field in fields_list:
   print "Field is " + str(Field)

   if Field == "OID" or Field == "FID_Mines1" or Field == "FID_bgp_al" or Field == "FID_Mine_1" or
Field == "F_AREA" or Field == "Mine_ID_2" or Field == "FAC_RNUM"  or Field == "RNUM" or Field
== "FID_" + InputFile[0:6] or Field == "FID" or Field == "FID_bgp_me" or Field == "FAC_ID" or Field
== "FACNAME" or Field ==  "Comodity_M" or Field == "FID_Facili" or Field == "FID_Mines_" or Field
== "OBJECTID" or Field == "FID_bgp_al" or Field == "Shape" or Field == "FID_Alaska" or Field ==
"Mine_ID" or Field == "Mine_Name" or Field == "FIPS" or Field == "SQMI" or Field == "OID_" or Field
== "AREAKEY__" or Field == "STATE____" or Field == "Prop" or Field == "NEW_SQME" or Field ==
"BUFF_DIST" or Field == "SQME" or Field == "ObjectID" or Field == "FID_bgp_na" or Field ==
"MINE_RNUM" or Field == "MINE_ID":
      print "ignored" + Field

   else:

      # Process: Add Field...
      gp.AddField_management(BlockAreaTable, Field + "INT", "DOUBLE", "", "", "", "", "NULLABLE",
"NON_REQUIRED", "")

      print "Added " + Field
```

```
        #Calculate the proportion of the variable that is in the intersected polygon
        Calculation = "[" + Field + "] * [Prop]"
        print Calculation

        # Process: Calculate Field...
        gp.CalculateField_management(BlockAreaTable, Field + "INT", Calculation, "", "")

#Make list of all fields to be used in the summary statistics table creation
FieldString = ""
for Field in fields_list:
    if Field == "OID"  or Field == "FID_Mines1" or Field == "FID_bgp_al" or Field == "FID_Mine_1" or
Field == "F_AREA" or Field == "Mine_ID_2"  or Field == "RNUM" or Field == "FAC_RNUM" or Field
== "FID" or Field == "FID_" + InputFile[0:6] or Field == "FID_Facili" or Field == "FID_bgp_me" or
Field == "FAC_ID" or Field ==  "Comodity_M" or Field == "FACNAME" or Field == "FID_Mines_" or
Field == "OBJECTID" or Field == "Shape" or Field == "FID_Alaska" or Field == "Mine_ID" or Field ==
"Mine_Name" or Field == "FIPS" or Field == "SQMI" or Field == "OID_" or Field == "AREAKEY__" or
Field == "STATE____" or Field == "Prop" or Field == "NEW_SQME" or Field == "SQME" or Field ==
"BUFF_DIST" or Field == "ObjectID" or Field == "FID_al_bkg" or Field == "FID_bgp_na" or Field ==
"MINE_ID" or Field == "MINE_RNUM" :
        print "ignored" + Field
    else:
        FieldString = FieldString + Field + "INT sum;"
        print FieldString
print FieldString

gp.Statistics(BlockAreaTable, Output_Table, FieldString,"FAC_RNUM") # Made sure you are using the
right unique identifier for the facilities/mines

# Convert all fields in the summary table to int
FieldList2 = gp.ListFields(Output_Table, "*", "ALL")

def get_fields(FieldList):
    """
        return esri field list into python list for 9.3
    """
    return [x.name for x in FieldList2]
fields_as_python_list2 = get_fields(gp.listfields(Output_Table))

for Field2 in fields_as_python_list2:
    print "Field2 is " + str(Field2)

    if Field2 == "OID" or Field2 == "Mine_ID" or Field2 == "RNUM" or Field2 == "MINE_RNUM" or
Field2 == "MINE_ID" or Field2 == "FAC_RNUM" or Field2 == "Mine_Name" or Field2 ==
"FREQUENCY" or Field2 == "FACNAME" or Field2 == "FAC_ID":
        print "ignored" + Field2
    else:
        #Calculate the value in the field as an integer
        Calculation = "CLng([" + Field2 + "])"
        print Calculation

        # Process: Calculate Field...
        gp.CalculateField_management(Output_Table, Field2, Calculation, "", "")

# !!!!Test the output to make sure the buffers and intersect have worked correctly!!!
```

```
gp.Statistics(BlockArea, AreaTestTable, "F_AREA sum" ,"FAC_RNUM")

gp.AddField_management(AreaTestTable, "TEST", "TEXT", "", "", "10", "", "NULLABLE",
"NON_REQUIRED", "")


if Distance == 1:
    TrueArea = 8136046.95978
    print "1TrueArea"
if Distance == 2:
    TrueArea = 32545535.5312
    print "2TrueArea"
if Distance == 3:
    TrueArea = 73228466.4858
    print "3TrueArea"
if Distance == 4:
    TrueArea = 130184829.795
    print "4TrueArea"
if Distance == 5:
    TrueArea = 203414642.649
    print "5TrueArea"
if Distance == 10:
    TrueArea = 813665288.08
    print "10TrueArea"
if Distance == 15:
    TrueArea = 1830751935.91
    print "15TrueArea"
if Distance == 20:
    TrueArea = 3254674599.36
    print "20TrueArea"


print "Distance is " + str(Distance)
print "TrueArea is " + str(TrueArea)


AreaTestTable_View = "AreaTestTable_View"
gp.AddField_management(AreaTestTable, "TESTAR", "DOUBLE", "", "", "", "", "NULLABLE",
"NON_REQUIRED", "")
gp.CalculateField_management(AreaTestTable, "TESTAR", TrueArea)


gp.delete_management(BufferedPoints)
```

Appendix E1-5: Field Names and Definitions for Demographics Tables

Mines Tables

Row	Field Name	Field Description
1	MINE_ID	Mine_ID provided for any mine that was obtained in any list from MHSA. Mine_ID of NA indicates that the mine could not be found in any MHSA database.
2	Mine_Name	Current Mine Name assigned by MSHA
3	Commodity	Description of the primary commodity mined according to MSHA
4	STATE_FIPS	State FIPS code
5	STATE_Abbr	Two letter state abbreviation
6	CNTY_FIPS	County FIPS code
7	FIPS	Concatenated state and county FIPS code
8	ZIP	Zip code
9	PO_NAME	Post office name associated with zip code
10	County	County name
11	MINE_RNUM	Unique mine ID assigned by RTI, to remain unchanged with each subsequent version of this dataset
12	SUM_POPINT	Total population
13	SUM_WHITIN	White alone
14	SUM_BLACIN	Black alone
15	SUM_NATAIN	Native American alone
16	SUM_ASIAIN	Asian alone
17	SUM_PACIN	Pacific Islander alone
18	SUM_OTHEIN	Other alone
19	SUM_XPLUIN	2+ races
20	SUM_NOTHIN	Not Hispanic
21	SUM_WNOTIN	White not Hispanic
22	SUM_BNOTIN	Black not Hispanic
23	SUM_NNOTIN	Native American not Hispanic
24	SUM_ANOTIN	Asian not Hispanic
25	SUM_PNOTIN	Pacific Islander not Hispanic
26	SUM_ONOTIN	Other not Hispanic
27	SUM_XNOTIN	2+ races Not Hispanic
28	SUM_HISINT	Hispanic
29	SUM_WHISIN	White Hispanic
30	SUM_BHISIN	Black Hispanic
31	SUM_NAHISI	Native America Hispanic
32	SUM_AHISIN	Asian Hispanic
33	SUM_PHISIN	Pacific Islander Hispanic
34	SUM_OHISIN	Other Hispanic
35	SUM_XHISIN	2+ races Hispanic
36	SUM_X_1INT	< 1 year olds
37	SUM_X_2INT	1 to 2 year olds
38	SUM_X_3INT	2 to 3 year olds
39	SUM_X_6INT	3 to 6 year olds
40	SUM_X_11IN	6 to 11 year olds
41	SUM_X1_16I	11 to 16 year olds
42	SUM_X6_21I	16 to 21 year olds
43	SUM_TOTHIN	Total households

Row	Field Name	Field Description
44	SUM_L10KIN	Household income < $10,000
45	SUM_X015IN	Household income $10,000 - $14,999
46	SUM_X_520IN	Household income $15,000 - $19,999
47	SUM_X025IN	Household income $20,000 - $24,999
48	SUM_X530IN	Household income $25,000 - $29,999
49	SUM_X035IN	Household income $30,000 - $34,999
50	SUM_X540IN	Household income $35,000 - $39,999
51	SUM_X045IN	Household income $40,000 - $44,999
52	SUM_X550IN	Household income $45,000 - $49,999
53	SUM_X060IN	Household income $50,000 - $59,999
54	SUM_X075IN	Household income $60,000 - $74,999
55	SUM_X510IN	Household income $75,000 - $99,999
56	SUM_X125IN	Household income $100,000 - $124,999
57	SUM_X255IN	Household income $125,000 - $149,999
58	SUM_X502IN	Household income $150,000 - $199,999
59	SUM_X00_IN	Household income $200,000

Facilities Tables

Row	Field Name	Field Description
1	MINE_ID	Mine_ID provided for any mine that was obtained in any list from MHSA. Mine_ID of NA indicates that the mine could not be found in any MHSA database.
2	FACNAME	Current Facility or Processor Name assigned by MSHA
3	COMMODITY	Description of the primary commodity mined according to MSHA
4	STATE_FIPS	State FIPS code
5	STATE_Abbr	Two letter state abbreviation
6	CNTY_FIPS	County FIPS code
7	FIPS	Concatenated state and county FIPS code
8	ZIP	Zip code
9	PO_NAME	Post office name associated with zip code
10	County	County name
11	FAC_RNUM	Unique facility ID assigned by RTI, to remain unchanged with each subsequent version of this dataset
12	SUM_POPINT	Total population
13	SUM_WHITIN	White alone
14	SUM_BLACIN	Black alone
15	SUM_NATAIN	Native American alone
16	SUM_ASIAIN	Asian alone
17	SUM_PACIN	Pacific Islander alone
18	SUM_OTHEIN	Other alone
19	SUM_XPLUIN	2+ races
20	SUM_NOTHIN	Not Hispanic
21	SUM_WNOTIN	White not Hispanic
22	SUM_BNOTIN	Black not Hispanic
23	SUM_NNOTIN	Native American not Hispanic
24	SUM_ANOTIN	Asian not Hispanic
25	SUM_PNOTIN	Pacific Islander not Hispanic
26	SUM_ONOTIN	Other not Hispanic
27	SUM_XNOTIN	2+ races Not Hispanic
28	SUM_HISINT	Hispanic
29	SUM_WHISIN	White Hispanic
30	SUM_BHISIN	Black Hispanic

Row	Field Name	Field Description
31	SUM_NAHISI	Native America Hispanic
32	SUM_AHISIN	Asian Hispanic
33	SUM_PHISIN	Pacific Islander Hispanic
34	SUM_OHISIN	Other Hispanic
35	SUM_XHISIN	2+ races Hispanic
36	SUM_X_1INT	< 1 year olds
37	SUM_X_2INT	1 to 2 year olds
38	SUM_X_3INT	2 to 3 year olds
39	SUM_X_6INT	3 to 6 year olds
40	SUM_X_11IN	6 to 11 year olds
41	SUM_X1_16I	11 to 16 year olds
42	SUM_X6_21I	16 to 21 year olds
43	SUM_TOTHIN	Total households
44	SUM_L10KIN	Household income < $10,000
45	SUM_X015IN	Household income $10,000 - $14,999
46	SUM_X_520IN	Household income $15,000 - $19,999
47	SUM_X025IN	Household income $20,000 - $24,999
48	SUM_X530IN	Household income $25,000 - $29,999
49	SUM_X035IN	Household income $30,000 - $34,999
50	SUM_X540IN	Household income $35,000 - $39,999
51	SUM_X045IN	Household income $40,000 - $44,999
52	SUM_X550IN	Household income $45,000 - $49,999
53	SUM_X060IN	Household income $50,000 - $59,999
54	SUM_X075IN	Household income $60,000 - $74,999
55	SUM_X510IN	Household income $75,000 - $99,999
56	SUM_X125IN	Household income $100,000 - $124,999
57	SUM_X255IN	Household income $125,000 - $149,999
58	SUM_X502IN	Household income $150,000 - $199,999
59	SUM_X00_IN	Household income $200,000

Attachment E2. Geospatial Database Development Process

E2-1 Introduction

This Attachment describes data sources and methods that EPA used to develop a geospatial data layer of locations for hard rock mines and mineral processors (as defined in the July 2009 Federal Register notice [74 FR 37213-37219]) that potentially may be regulated under the CERCLA 108(b). As described in **Appendix B** ("Defining the Universes of 108(b) Historical CERCLA and 2009 Current Sites"), the most current data available for this report to define the universe of currently operating mines and mineral processors was from 2009. The list of sites developed from those data is referred to as the "2009 Current Sites" list.

The 2009 Current Sites geodatabase was prepared to support EPA's CERCLA 108(b) hardrock mining rulemaking. As introduced in **Section 1 of the report** ("Introduction and Problem Formulation"), the purpose of this report is, in part, to summarize data regarding the potential for human and ecological exposures to CERCLA hazardous substances and resulting potential human health and ecological impacts from current and future mining and mineral processing sites.

Comparisons of some aspects of the Case Study Historical sites and 2009 Current sites (e.g., potential to impact endangered species) required identifying the actual locations of the 2009 Current sites, and formatting these locations in a GIS data layer which could then be combined with other data layers (e.g., U.S. census data).

Section E2.2 describes the principal sources of information EPA used to update the 2009 Current site list and assign a location data (referred to as "geolocating") each site. s list The sections below In addition, the accuracy of the data continues to improve as more information becomes available or is discovered by EPA. There have been several previous versios of the mines database along with various comparative datasets. Each version has been produced to reflect EPA's developing policies and/or to take advantage of new sources of information. The changes made from version 6 to create version 7 are noted in Section 4.0.

E2-2 Geolocating 2009 Current Sites

Geospatial data are not included in the MSHA and USGS data sources that EPA used to develop the 2009 Current Sites list, and therefore each site on the list had to be geolocated. Geolocating the 2009 Current sites involved deriving locations from address geocoding, the use of internet searches to find sources containing locations of mines, and/or consulting additional data file sources. When each mine location was reviewed, additional sources were consulted in an attempt to either confirm the location or to move the location to a more accurate place.

MSHA had confirmed that the addresses in the MHSA list were not necessarily locations of the mines or processors, but were only used for contacting the responsible party. Recorded addresses were frequently administrative offices, for example, rather than the actual mine or processor site itself. A series of processes (described below) were then used in an attempt to identify or improve locations for each identified 2009 Current site. These processes included the use of other lists of mine sites from federal databases (e.g., TRI, FRS, and USGS) and internet resources (e.g., company and industry web pages and online environmental documents). The source data used to locate each mine were documented to allow others to review the sources of each location. It should be noted that no information was copied directly from websites but only viewed for information that would lead to the location of the mine/processor site using the aerial imagery of the GIS. Once the mine/processor site was located then a GIS point was recorded on the site, based on best professional judgment that considered factors relevant to using these data for further geospatial analysis. An estimate for the level of confidence associated with each point location was indicated along with the coordinate pairs. Aerial photography from http://services.arcgisonline.com/v92 was used to aid in the identification of the mine.

E2-2.1 Data Sources Examined to Provide or Improve Locations

EPA used several mine datasets to help identify the ground location for each site. These datasets included coordinate data for some of the mine locations, but there was often a significant variance between the geospatial data contained in each of the datasets. The accuracy of point locations provided also varied significantly.

MSHA's 2009 end-of-year dataset (a principal data source – see Appendix B, Section B.3.2) contains coordinate point location data. A comparison was made between these coordinate data and existing locations previously found for data records in the geospatial database. The comparison revealed some of the same problems found with the other datasets used and did not curtail the need for geolocating most of the mines that did not have coordinates, however, overall the MSHA 2009 end-of-year coordinate data was of better quality than other datasets used.

Used together, all the datasets narrowed the areas searched to locate a site. The other mining site data sources that were used to aid in locating mine, are listed and described below.

EPA Facility Registry System (FRS) Data

EPA compared two sources of mine locations: a database of hard rock mine sites queried from the FRS *(05/17/10),* and a spreadsheet *(06/03/10)* of mines that had been queried and downloaded from the MHSA database. The resulting combined spreadsheet table of mine locations with latitude/longitude was called "*Matchup MSHA Facs to FRS Data_WIP Draft_060310.xls*". A subset (5 sites) of mines from the list was examined to determine confidence in the location of the mines from this source. Based on the sample of 5 mines, it was determined that the latitudes/longitudes from this source were reasonably accurate and so any of the mines that appeared in both the "*Matchup MSHA Facs to FRS Data_WIP Draft_060310.xls*" source and the MSHA data (identified by matching MSHA IDs) were given "ICF/FRS" as their source in the "LOC_SOURCE" field and the latitudes/longitudes from the "*Matchup MSHA Facs to FRS Data_WIP Draft_060310.xls*" file were used[3]. Where neither the MHSA list nor the FRS list had provided a reasonable or viable location then the master list of USGS mines dataset (see below) was used.

[3] Even though the 5 mines in the sample from the FRS source were accurate, it was later determined that many of the FRS locations were not accurate and, therefore, RTI reviewed all of the FRS locations and in RTI's final deliverable, only used those FRS-provided locations that appeared to be accurate were used.

Master List of USGS Mines

A spreadsheet called "*March 12 2010 ICF MASTER LIST OF MINES.xls"* contains mine sites compiled from various sources including USGS commodity reports and mineral year books. The spreadsheet included latitude/longitude coordinates.

This list was also based primarily on the U.S. Department of Labor's Mine Safety and Health Administration (MSHA) data from January 2010, supplemented with data from the United States Geological Survey Minerals Yearbooks, and data from 19 state agencies with readily available information on mining operations. The data contained in the '*March 12 2010 ICF MASTER LIST OF MINES.xls'* came from the following sources:

1) MSHA's Mine Data Retrieval System, found at http://www.msha.gov/drs/drshome.htm. The query retrieved records relating to 1,154 mines.

2) Data from 18 states and the U.S. Geological Survey (USGS 2008a; Alabama 2008; Arizona undated; California undated; Colorado 2010; Georgia 2009; Missouri undated; North Carolina undated; Nevada 2008; New Mexico 2001; New York, 2010; Oregon undated; South Carolina undated; South Dakota 2010; Utah 2009; Virginia 2005; Virginia 2008; Washington undated; Wyoming 2010).

3) When mining operations were found in both the MSHA list and data from a state source, the state source was used to provide data not provided by MSHA, such as latitude and longitude. Where EPA identified a mining operation in a state source which was not identified by MSHA, an additional entry was made for that mining activity. In some cases data from USGS 2005 were used for mining operations already identified by MSHA or a state source. Differences in company and operation names between data sources sometimes precluded integrating data from different data sources.

The latitude/longitude coordinates contained in the *March 12 2010 ICF MASTER LIST OF MINES.xls* spreadsheet were in a variety of formats. Inconsistencies were corrected and the latitude/longitude coordinates were standardized. Standardized coordinates were then converted to a shapefile called "*ICF_Master.shp"* using ArcMap. This shapefile was compared to the MSHA list. If the MSHA list contained a poor location or no location, the latitude/longitude was replaced with a more accurate location from the ICF_Master.shp file.

If the locations in the *Master List of Mines* were not useful, then the following references (listed in order of preference) were used in the same way:

Active Mines and Mineral Plants in the US (USGS)

USGS (shapefile) – Downloaded from http://tin.er.usgs.gov/mineplant/ on 05/12/10 (mineplant.shp). The dataset contains an extensive list of mines and their locations.

Homeland Security Infrastructure Program (HSIP) Gold 2007

HSIP Gold (geodatabase) was compiled by the USGS Minerals Information Team (MIT) and is comprised of various mining facility types including "FerrousMetalMines" and "MinesManufacturing."

EPA Toxic Release Inventory Data for Hard Rock Mines

A table from TRI containing lat/long information that was generated on 05/17/10 (*CERCLA 108(b) Hardrock Facility Classes_041510.mdb*). The latitude/longitudes provided in this table were compared to the MSHA latitude/longitudes to see if the TRI location was more accurate. If so, then the coordinates in the MSHA list were updated with those from the TRI list.

EPA Report: Population Studies of Mines and Mineral Processing Sites

The 1997 EPA report titled "Population Studies of Mines and Mineral Processing Sites" was originally prepared by EPA's Office of Solid Waste. Location data were incorporated into a database file (newpop1.dbf) to allow mapping of the coordinate locations. It was necessary to reformat coordinate data since the data were recorded in various formats. This data source was found after the initial process of identifying and improving mine locations had been completed. This source was used to attempt to find any mine/processor locations that had received confidence level of "0" or "1" during the geolocating process.

E2-2.2 Methodology to Identify Site Locations

Whenever possible a mine/processor location was identified using a comparison of the shapefiles created using the data sources discussed above. Otherwise more general and open sources of information were used to attempt to locate either the actual mine or the general local area where the mine site is located. The quality of these general sources is reflected in the confidence assigned to the point location. If visual testing of a mine/processor location (i.e., by visual inspection of an aerial photograph) observed an obvious ground signature at the found mine location, the point location was placed either on the mine pit or in a centralized area between pit locations of apparent excavated areas. The source that was used to locate the mine was noted in the Location Comments (LocCom) field in the shapefile's attribute table. The general sources and methods used in combination with point locations available from created shapefiles described in the previous section are described below.

Address Matching

Address matching was attempted for the subset of MSHA mine records obtained from the 2009 end-of-year dataset. The file was imported into ArcMap where the addresses were geocoded using ESRI's Business Analyst extension.

In examining the accuracy of the geocoding results for addresses obtained from the MSHA database, it was possible to determine if the geocoded addresses represented the administrative address of the company (e.g. the location was in an urban area) rather than the actual mine/processor location (e.g. in an area of disturbed land resembling a surface mine). It was found that the MSHA-provided address rarely represented the actual site location. Due to this shortcoming it was usually necessary to consult additional sources (noted above) to locate a more accurate latitude/longitude for each mine.

Visual Inspection

Generally, visual inspection of the mine locations provided by MSHA or the alternative sources using imagery available from ESRI and/or Google Maps was the method of determining the accuracy of the locations from the various sources.

The geocoded location contained in the MHSA list was compared to the aerial photography to see if it showed the expected representation of land use (either surface, underground or processing mine facility). If a large mine was seen in the imagery, then it was assumed that the location was accurate. If the location did not seem to fall on or near a disturbed area, then additional sources (ICF, FRS etc.) were consulted.

Internet Search

If a mine location could not be confidently determined from any of the above data sources or through address matching, Google Maps and a general internet search was used as an alternative source of information that would lead to locating the mine. Government internet pages and the various reports they contained (e.g., NPDES fact sheets, RODs, RI/FS, NEPA-related documents, etc.) were relied on as a first source of information. Some combination of the facility name, owner/operator and address were used as general search criteria to discover location information for the mines. Examples of data discovered and used from general internet searches include mine location maps and articles describing the sites from company websites and mining information websites.

E2-2.3 Location Confidence Coding

A subjective confidence value was assigned to the final identified point location (i.e., original point or a relocated point location) with a description of the source that was used to identify corrected locations, if necessary.

The list of fields below was added to the MSHA list to provide information on the latitude/longitude coordinates. These added fields indicate the source of the information used to select a latitude/longitude and code a subjective accuracy assessment of the location for the mine. The added fields are defined as follows:

Loc_Conf: This field was used to assign an overall accuracy value of the final location for each mine, after going through the review steps noted above. The codes were:

0 = no location could be found OR the location provided is likely to be inaccurate and no source could be found to improve it.
1 = the location may or may not be accurate; further information would be required to assign a higher confidence value.
2 = the location seems to be accurate based on the visual inspection of the location or corroborating evidence from other sources.

Loc_Com: This field has notes referring to how the enhanced location was chosen from all of the sources available.

E2-2.4 Reverse Geocoding of 2009 Current Site Locations

EPA ran a process to identify the actual zipcode, city, county, and state for each of the 2009 Current sites based on its actual location (based on EPA's geolocating procedures). This process resulted in several additional fields added to the data tables to provide EPA with contextual information for each site. The additional fields added for each site were:

- **STATE_FIPS**: the 2-digit Federal Information Processing System (FIPS) code for the state in which the site is located.
- **STATE_Abbr**: The 2-digit state abbreviation for the state in which the site is located.
- **CNTY_FIPS**: The 3-digit county FIPS code for the county in which the site is located.
- **County**: The name of the county in which the site is located.
- **FIPS**: the 5-digit state and county FIPS code created by concatenating the CNTY_FIPS and STATE_FIPS codes.
- **ZIP**: the 5-digit zipcode in which the site is located.
- **PO_NAME**: the name of the post office associated with the 5-digit zipcode in which the site is located.

For sites having a location confidence of zero (Loc_Conf = 0) all of these reverse geocoding fields were left blank to indicate that these data cannot accurately be derived for facilities for which we have no confidence in their location.

E2-2.5 Summary of the Final 2009 Current Site List

The geolocating process resulted in all 2009 Current sites being assessed a location confidence value to indicate the potential accuracy of the final location. The following table summarizes the results of the geolocating process.

Site Type	Total	Location Confidence Codes		
		0	1	2
Mines	293	54	38	201
Processors	271	27	72	172

E2-3 Quality Assurance/Quality Control

After the 2009 Current site locations were reviewed, updated (where possible), and enhanced, a 100% QA/QC review was performed. The QA/QC process involved an independent review in Google Earth of every 2009 Current site's final location. For each mine and processor, the reviewer checked the location against the source information and reviewed the Loc_Conf code to ensure that the Loc_Conf accurately reflected the subjective confidence that the location was accurate. The QA/QC review resulted in minor changes to Loc_Conf coding (usually to change a Loc_Conf value of '2' to Loc_Conf value of '1') and in some cases, adjusting the location slightly to better match the visual imagery. The QA/QC was conducted by a qualified geologist who used professional judgment when deciding proper locations and coding.

E2-4 Final Shapefile Creation

Separate shapefiles were created from the updated and enhanced 2009 Current Site coordinates; one shapefile for mines and one for processors. These shapefiles were named with the date of creation to allow tracking of future changes to the dataset. Maps of the contiguous

United States and Alaska is provided in Figures E2-1 and E2-2, that show the general point locations of mines and processors, respectively, contained in the geospatial database.

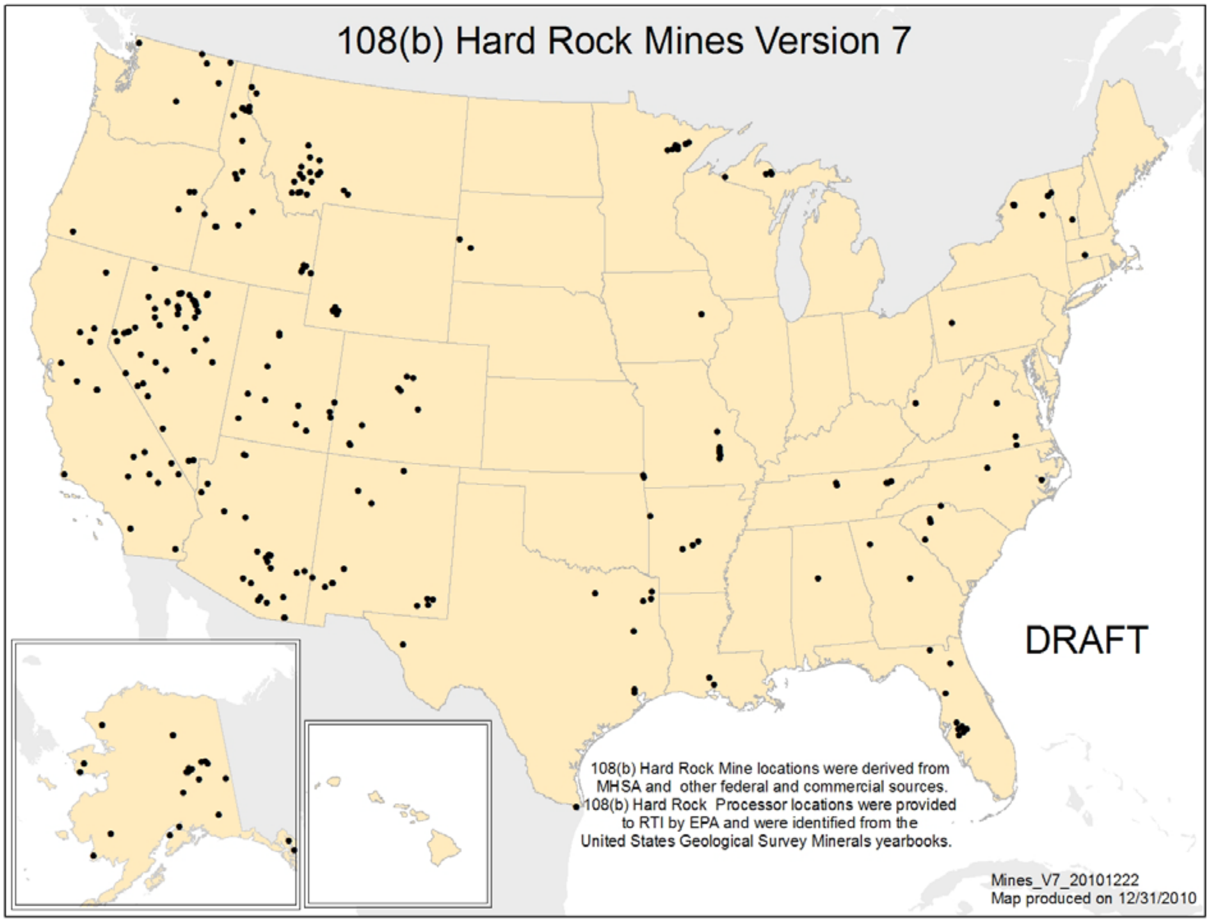


Figure E2-1. Generalized Map of 108(b) Processor Locations

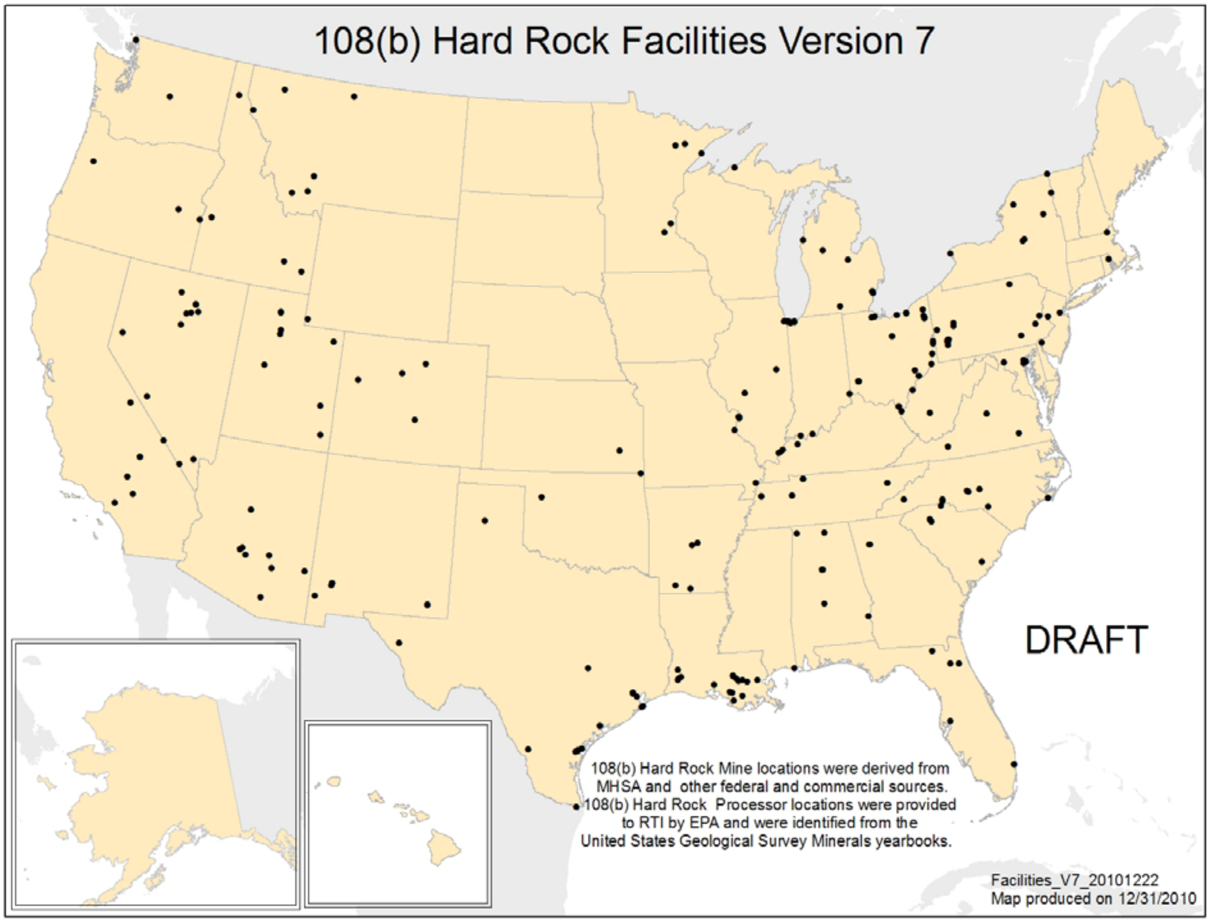


Figure E2-2. Generalized Map of 108(b) Processor Locations

E2-5 Limitations

The primary limitations in using the geolocated list of 2009 Current sites is in the uncertainty in the accuracy of some locations and in the limitations of representing very large mines with a single point.

E2-5.1 Accuracy of Site Locations

Without the ability to verify site locations by contacting site operators directly, all the locations ultimately selected for the 2009 Current sites should be considered unverified. In many cases source data were available that allowed EPA to locate the mine with a high level of confidence. But, ultimately, without contacting site operators or accessing and reviewing land records data, there is still the possibility of locational errors.

E2-5.2 Representation of Large Mines with Points

Many of the 2009 Current mines are very large (several square miles in area). Representing their location using a single latitude/longitude coordinate (even located at the center of the mine) necessarily introduces some imprecision to further analyses, especially distance-based analyses of demographics and nearby environmental indicators.

E2-6 Data Dictionary

The following is a list of the data columns in the final shapefile and description and source of each column.

MINE_RNUM:	Unique ID created by RTI.
MINE_ID:	Identification number assigned to the site by MSHA. The Mine_ID field is blank for any site that was not contained in the MSHA database.
Mine_Name:	Current site Name assigned by MSHA
Mine_Type:	Facility, Surface or Underground according to MSHA
Mine_Statu:	Current Site Status (i.e; Active, Intermittent, NonProducing) according to MSHA
FRS_ID:	Unique ID field assigned to processors by FRS (if applicable)
COMMODITY:	Description of the primary commodity mined according to MSHA or FRS
Arc_Address:	Street Address of Record according to MSHA
Arc_City:	City of Record according to MSHA
Arc_State:	Standard state abbreviation code for MSHA location
Arc_ZIP:	Standard postal zip code according to MSHA
USGS_Fac_N:	Processor name as assigned by USGS (if applicable)
Operator_N:	Current Operator Name according to MSHA
Controll_1:	Current controlling company name according to MSHA
Source:	Where the initial site location information was acquired from.
Lat:	Latitude assigned by RTI to locate site after QA/QC
Long:	Longitude assigned by RTI to locate site after QA/QC
Loc_Conf:	Confidence in the new site location assigned by RTI
Loc_Com:	Notes describing how improved location was found
Com_MNM:	Notes describing how the MNM09 points differed from the rtiMSHA points and whether they were used to improve the site location
STATE_FIPS:	The 2-digit Federal Information Processing System (FIPS) code for the state in which the site is located.
STATE_Abbr:	The 2-digit state abbreviation for the state in which the site is located.
CNTY_FIPS:	The 3-digit county FIPS code for the county in which the site is located.
FIPS:	The 5-digit state and county FIPS code created by concatenating the CNTY_FIPS and STATE_FIPS codes.
ZIP:	The 5-digit zipcode in which the site is located.
PO_NAME	The name of the post office associated with the 5-digit zipcode in which the site is located.
County:	The name of the county in which the site is located.

E2-7 References

The following list of references were those used to check and verify the locations of the 2009 Current sites. The identifier of the site that each reference supported is provided at the end of each reference.

Arizona Department of Environmental Quality (internet). c2010 [accessed November 2016]. *Iron King Mine and Humboldt Smelter*, EPA National Priorities List (NPL) Site, December, 2009; Available from: http://static.azdeq.gov/sup/ironkingmap.pdf [MSHA site 202445].

Atlanta Gold Inc. (Internet). Toronto, Ontario, Canada and Boise, Idaho, USA: [data last modified unknown. c.June 3, 2010; accessed November 2016]. Internet resource available from: http://www.atgoldinc.com/index.php/projects/atlanta-gold-property [for MSHA Site 1002144].

Augusta Resource Corporation (internet). Vancouver, BC, Canada; c2009 [accessed November 2016]. *Rosemont Project, Claim Boundary Map*, 2008; Available from: http://rosemonteis.us/files/references/westand-2007a.pdf [MSHA site 0203256].

Bureau of Land Management. 2005. *Barrick Proposes the Storm Underground Mine*. US Department of the Interior (Internet), Elko Field Office. April 22. [accessed November 2016]. Available from: http://www.blm.gov/nv/st/en/fo/elko_field_office/blm_information/newsroom/2005/Barrick_Proposes_Storm_Underground_Project.html [for MSHA Site 2602300].

Bureau of Land Management. 2010. US Department of the Interior, Henry Mountains Field Station, Hanksville, UT: *Environmental Assessment to Commence Mining Operations at the Tony M Underground Uranium Mine*; 35 pages, Appendix A (Internet); [revised July 9, 2007; accessed November 2016]. Available from: http://www.uraniumwatch.org/tonymmine/tonym_ph1EAblm070709.pdf [MSHA site 4202426].

Bureau of Land Management. 2011. US Department of the Interior, Monticell Field Office; *Decision Record, Finding of No Significant Impact, and Environmental Assessment for Daneros Mine Project;* Appendices A through M (Internet)*;* Available from: https://www.blm.gov/ut/enbb/files/Daneros__EA_FONSI_DR_revised.pdf [MSHA Site 4202525].

Bureau of Land Management. 2012. *HB In-Situ Project Environmental Impact Statement*. US Department of the Interior (Internet). Santa Fe, NM; [accessed November 2016]. Available from: http://www.nm.blm.gov/cfo/HBIS/index.html [for MSHA Site 2900173].

Campbell, Jonathan (Internet). Roslindale, MA; [accessed November 2016]: New Mexico Superfund sites; Available from: http://www.cqs.com/super_nm.htm [MSHA Site 2902356].

Carmeuse Lime & Stone (Internet). Pittsburg, PA; c2010 [accessed November 2016]. Available from: http://www.carmeusena.com/locations/maysville-operation [MSHA sites 1509740 and 2000362].

Cheney Lime & Cement Company (Internet), Allgood, AL; [accessed November 2016]. Main Page, Quicklime and Hydrated Lime Products; Available from: http://www.cheneylime.com/ [MSHA site 100008]

Coeur (Internet). Coeur d'Alene, ID; c2008. [accessed November 2016]. United States, USA–Kensington; Available from: http://www.coeur.com/mines-projects/mines/kensington-alaska#.WDMyy000Pcs [MSHA site 5001544].

Colorado Department of Public Health and Environment (Internet). [Accessed November 2016]: Available from: http://www.cdphe.state.co.us/hm/cotter/index.htm [MSHA Site 501732].

Cooksley Geophysics Inc, Redding, CA. *Ore Reserves of Heritage Mines, Inc., in the Knownothing Mining District Eight Miles South of Forks Salmon Siskiyou County, California* (Internet); [November 1996; accessed November 2016]. Available from http://www.americansierragold.com/_resources/reports/DiscoveryDayReport1996.pdf [MSHA site 405222].

Coronado Resources Ltd (Internet). Vancouver, BC, Canada; cMarch 1, 2006 [accessed November 2016]: Projects: Madison Gold Property; Available from: http://www.coronadoresourcesltd.com/properties.htm [MSHA Site 2402467].

Davis, David A., 2002. *Active Metal and Industrial Mineral Mines in Nevada – 2002* (Map), NBMG Open-File Report 03-30 (Internet); 1 page [accessed November 2016]: Nevada Bureau of Mines and Geology, University of Nevada, Reno; Available from: http://pubs.nbmg.unr.edu/Active-mines-NV-2002-color-p/of2003-30c.htm [MSHA Site 2600734].

Demand Media Sports, Trails.com, Inc. (Internet). Santa Monica, CA; c2009-2010 [accessed November 2016]; Available from: http://www.trails.com/ :

- Norwegian Mine – Madison County, MT USGS topographic map; Available from: http://www.trails.com/usgs-topo-norwegian-mine-topographic-map-804125.html [MSHA Site 12401784].
- Coy Mine USGS Jefferson City Quad, Tennessee, Topographic Map http://www.topozone.com/map.asp?lat=36.1225&lon=-83.4778&s=50&size=s [MSHA Site 4000166].

Denison Mines Corp. (Internet). Toronto, Ontario, Canada; c2007 [accessed November 2016]. U.S. Mining, Colorado Plateau; Available from: http://denisonmines.com/s/Home.asp [MSHA sites 202286 and 501197].

Department of Business & Industry, Division of Industrial Relations, State of Nevada, Carson City, NV: *Directory of Nevada Mine Operations*; 185 pages (Internet); [accessed November 2016]. Available from: http://epubs.nsla.nv.gov/statepubs/epubs/728580-2010.pdf [MSHA site 2602666]

Energy Fuels Inc. (Internet). Toronto, Ontario, Canada; c2010 [accessed November 2016]. Whirlwind Mine; Available from: http://www.energyfuels.com/operations/ [MSHA site 504816].

Findthedata.com. (Internet). [accessed November 2016]. Jerritt Canyon; Available from: http://mines.findthedata.com/l/8565/Mayday-Idaho-Mine [MSHA site 2602299]

Geody (Internet); [c2010]: Alum Mine, NV, USA Spot Image; [accessed November 2016]; Available from: http://www.geody.com/geospot.php?world=terra&map=col&ufi=100850238&alc=lmm [MSHA Site 2602599].

Gilbert Development Corporation (Internet). Hurricane UT; c2009 [accessed November 2016]. Available from: http://www.gilbertdevelopment.com/projects-3/ [MSHA Site 4201927].

Graymont Ltd. (Internet). Richmond, BC, Canada; c2010. [accessed November 2016]. Tacoma Plant (Tacoma, Washington); Available from: http://www.graymont.com/en/locations/lime-plants/western-us/lime-plant/tacoma [MSHA site 4503290] and http://www.graymont.com/en/locations/lime-plants/great-lakes/lime-plant/superior [MSHA site 4700587].

Heatherdale Resources Ltd. (Internet). Vancouver, BC, Canada; c2010. [accessed November 2016]. Location & Maps; Available from: http://www.heatherdaleresources.com/hdr/Location.asp [MSHA site 5001857].

Idaho Geological Survey (Internet): Search Results: The Idaho Geological Survey's Mines and Prospects Database; [accessed November 2016]; Available from: http://www.idahogeology.org/Services/MinesAndMinerals/results.asp?switch=Reference&value=3560 [MSHA Site 1001918].

Kansas Geological Society (Internet). Lawrence, KS; cAugust 12, 2003 [accessed November 2016]. Industrial Mineral—Chase County; Both Active and Abandoned Quarries; Available from: http://chasm.kgs.ku.edu/ords/minerals.pqd3.mainCounty?cnty=17 [MSHA site 1400060].

JR Simplot Company, Smoky Canyon Phosphate Resources (Internet). Afton, WY; c2007-09 [accessed November 2016]; Available from: http://www.simplot.com/pdf/us_operations/SmokyCanyon.pdf [MSHA Site 1001590].

Macky School of Earth Sciences and Engineering, College of Sciences, University of Nevada, Reno; *The Nevada Mineral Industry 2008: Metals, Industrial Minerals, Oil and Gas, Geothermal, Exploration, Development, Mining, and Processing*; Nevada Bureau of Mines and Geology Special Publication MI-2008; 178 pages [accessed November 2016]:

NBMG, University of Nevada, Reno; Available from: http://pubs.nbmg.unr.edu/The-NV-mineral-industry-2008-p/mi2008.htm [MSHA Site 2602522].

Nash, J. Thomas, 2005. Hydrogeochemical Studies of Historical Mining Areas in the Humboldt River Basin and Adjacent Areas, Northern Nevada: Appendix 5. Location and description of mill and tailings sites, northern Nevada; 180 pages; United States Geological Survey Scientific Investigations Report 2004-5236; [page updated Monday November 7, 2005; accessed November 2016]; Available from: http://pubs.usgs.gov/sir/2004/5236/pdf/SIR_2004-5236.pdf [MSHA Site 2600078].

Nevada Commission on Mineral Resources (Internet), Nevada Division of Minerals (NDM) Home Page. Carson City, NV and Las Vegas, NV: [Updated 05/10/10]. Internet resource available from: http://minerals.state.nv.us/; The DVM; Major Mines of Nevada 1997: Mineral Industries in Nevada's Economy; 1997 [accessed November 2016]. Available from: http://data.nbmg.unr.edu/public/freedownloads/p/p009.zip [MSHA Site 2602300].

New Jersey Mining Company (Internet). Kellogg, ID; c2005 [accessed November 2016]. Gold Properties, Golden Chest Mine (Gold); Available from: http://www.newjerseymining.com/golden_chest.html [MSHA site 1002050].

NV HomeTownLocator (internet). [accessed November 2016]. Available from: http://nevada.hometownlocator.com/maps/feature-map,ftc,2,fid,854059,n,fencemaker%20mine.cfm [MSHA site 2601650].

Oregon Water Resources Department (Internet); Well Log Query Results [accessed November 2016]; Available from: http://apps.wrd.state.or.us/apps/gw/well_log/ [MSHA Site 3503733].

Peraltra, Joe, The SingleCylinder Gazzette (Internet). c1999-2009; *A New Life For A Mine With 9 Lives*; [accessed November 2016]: Available from: http://www.gazette9.com/rt66/anewlife.htm [MSHA Site 202620].

Ralph, Jolyon and Ida Chau, Mindat.org (Internet); c1993-2010 [accessed November 2016]; Mineral and Locality Database; Available from: http://www.mindat.org/index.php :

- [MSHA Site 2602599]: http://www.mindat.org/index.php
- [MSHA Site 3503237]: http://www.mindat.org/maps.php?id=147970
- [MSHA Site 4000166]: http://www.mindat.org/loc-10373.html
- [MSHA Site 4000864]
- [MSHA Site 403828]: http://www.mindat.org/loc-7768.html
- [MSHA Site 5001571]: http://www.mindat.org/maps.php?id=197302
- [MSHA Site 5001754]: http://www.mindat.org/loc-197671.html

Rayle, Christopher E., Scott Solliday, and Victoria D. Vargas, Archeological Consulting Services, Ltd. (Internet); Tempe, AZ. 2008. *A Cultural Resource and Historic Building Survey for a Remedial Investigation/Feasibility Study at the Iron King-Humbolt Smelter Superfund Site, Dewy Humbolt, Yavapai County, Arizona*. November. Available from:

http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/7be6add78caec55288257553007b557c/$FILE/08_151_02_Report.pdf [MSHA Site 202445].

Reti e Sistemi, Usa.indettaglio.it (Internet): c2010; Peterson Mine (Gogebic): [accessed November 2016]; Available from: http://usa.indettaglio.it/eng/26/053/634724.html [for MSHA Site 2003372].

Rosemont Cooper (Internet). Tucson, AZ; c2009 [accessed November 2016]: Available from: http://www.rosemontcopper.com/mpo.html [MSHA Site 203256].

Seattle Times (Internet); Seattle WA.: [accessed November 2016]. Available from: http://seattletimes.nwsource.com/ABPub/zoom/html/2004357396.html [MSHA Site 4503615].

Szumigala, D.J., R.C. Swainbank, M.W. Henning, and F.M. Pillifant; *Alaska's Mineral Industry 2000*; [accessed November 2016]. Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (Internet). Fairbanks, AK: DGGS; c2009. Available from: http://www.dggs.alaska.gov/webpubs/dggs/sr/text/sr055.PDF [MSHA Site 5001837]

Timberline Resources Corporation (Internet). Coeur d'Alene, ID; c2010 [accessed November 2016]; Butte highlands Satellite Map; Available from: http://www.timberline-resources.com/main.php?page=84 [MSHA Site 2402563].

Topoquest (internet). [accessed November 2016]. Available from: http://www.topoquest.com/find/place.php?state=NV&search_type=start&name=fencemaker&class=mine [MSHA site 2601650].

U.S. Forest Service, Payette National Forest, McCall, ID: *Walla Walla Mine Project Project Description Summary*, 4 pages (Internet); [accessed November 2016]. Available from http://data.ecosystem-management.org/nepaweb/nepa_project_exp.php?project=27107 [MSHA site 100217]

Wade Agricultural Products, Inc. (Internet). La Cygne, KS; c2010. [accessed November 2016]. Available from: http://wadequarries.com/ [MSHA site 1401658]

Wikimapia (Internet). [accessed November 2016]: Available from: http://wikimapia.org/#lat=36.1104204&lon=-83.6904144&z=13&l=0&m=s&v=9 and http://wikimapia.org/#lat=36.0733835&lon=-83.6354828&z=14&l=0&m=s&v=9 [MSHA Site 4000168].

Zaidliez, Mike; May 14, 2008. Administrative Determination and Documentation of NEPA Adequacy Mining Operation, 43 CFR 3809; 12 pages (Internet); U.S Department of the Interior, Bureau of Land Management, Anchorage Field Office, Alaska. [accessed November 2016] Available from: https://www.blm.gov/style/medialib/blm/ak/afo/afo_nepa_docs/afo_fy2008_nepa_docs.Par.54506.File.dat/AK-010-08-DNA-025.pdf [MSHA Site 5001689].

Attachment E3. Evaluation Process Flow Diagrams

Figure E3-1. Overview of Evaluation Process Flow

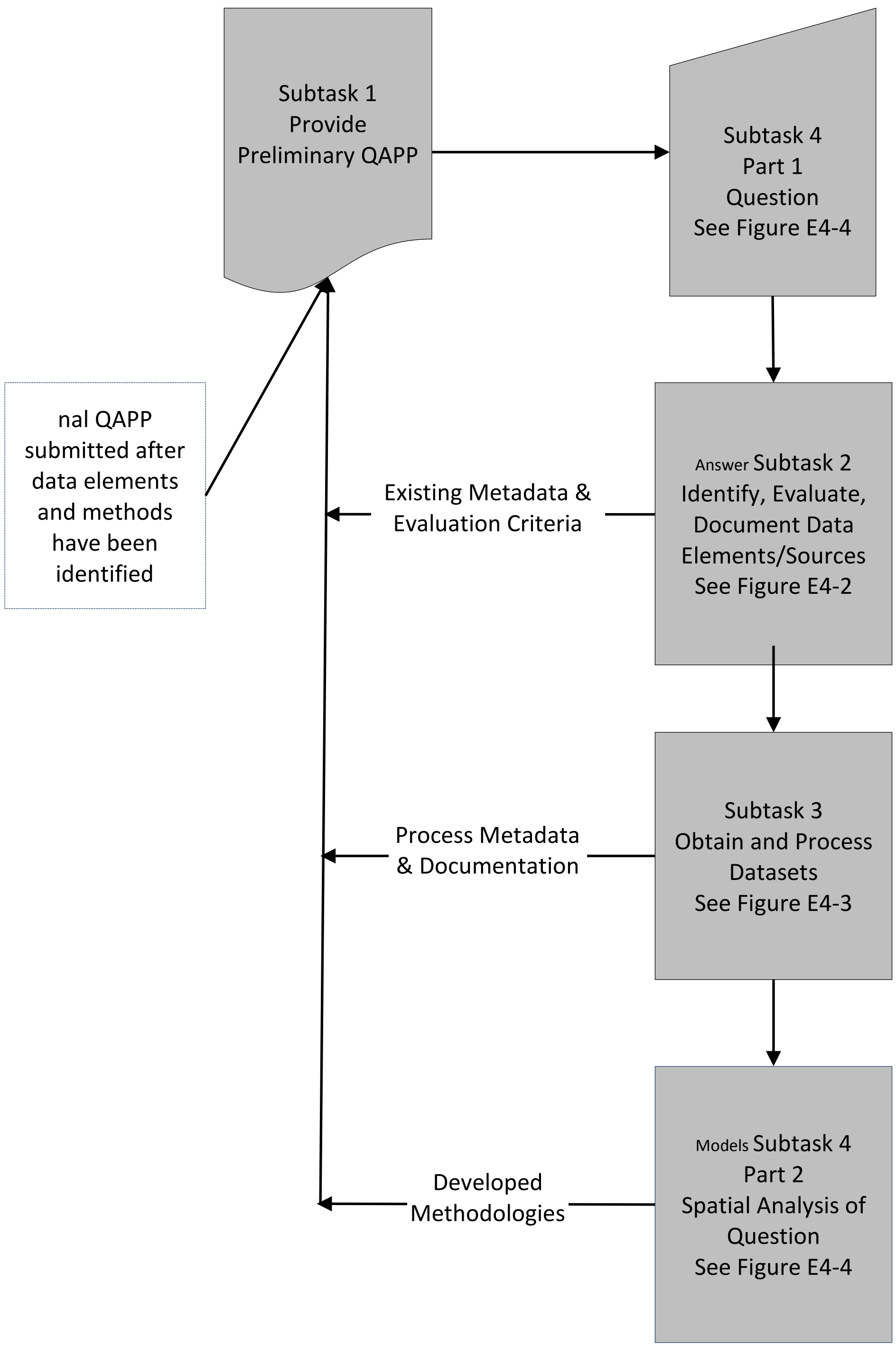


**Figure E3-2. Process Flow for Subtask 2 –
Identifying, Evaluating, and Documenting Data Elements and Sources**

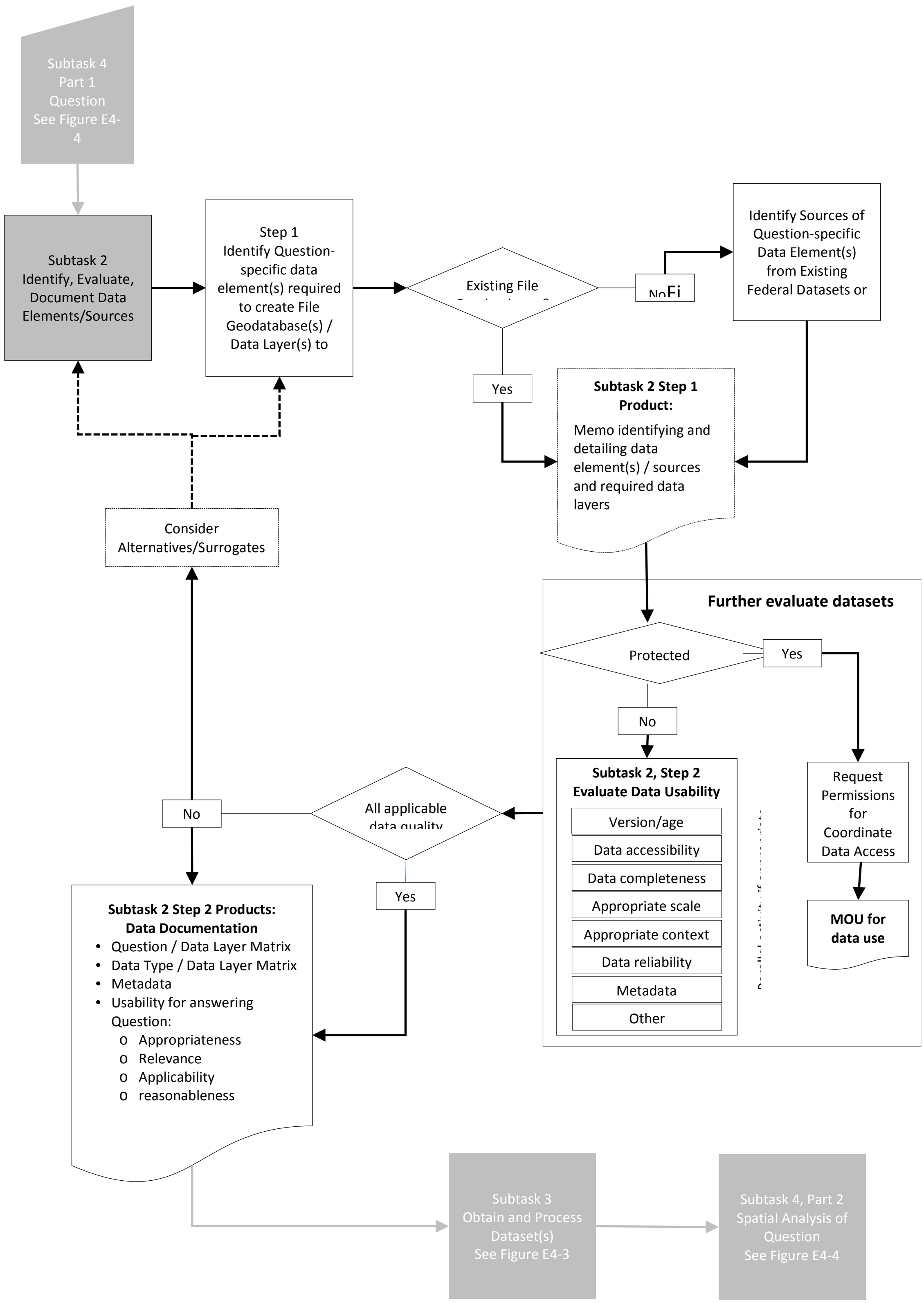


Figure E3-3. Process Flow for Subtask 3 – Obtain and Process Datasets Meeting Quality Criteria

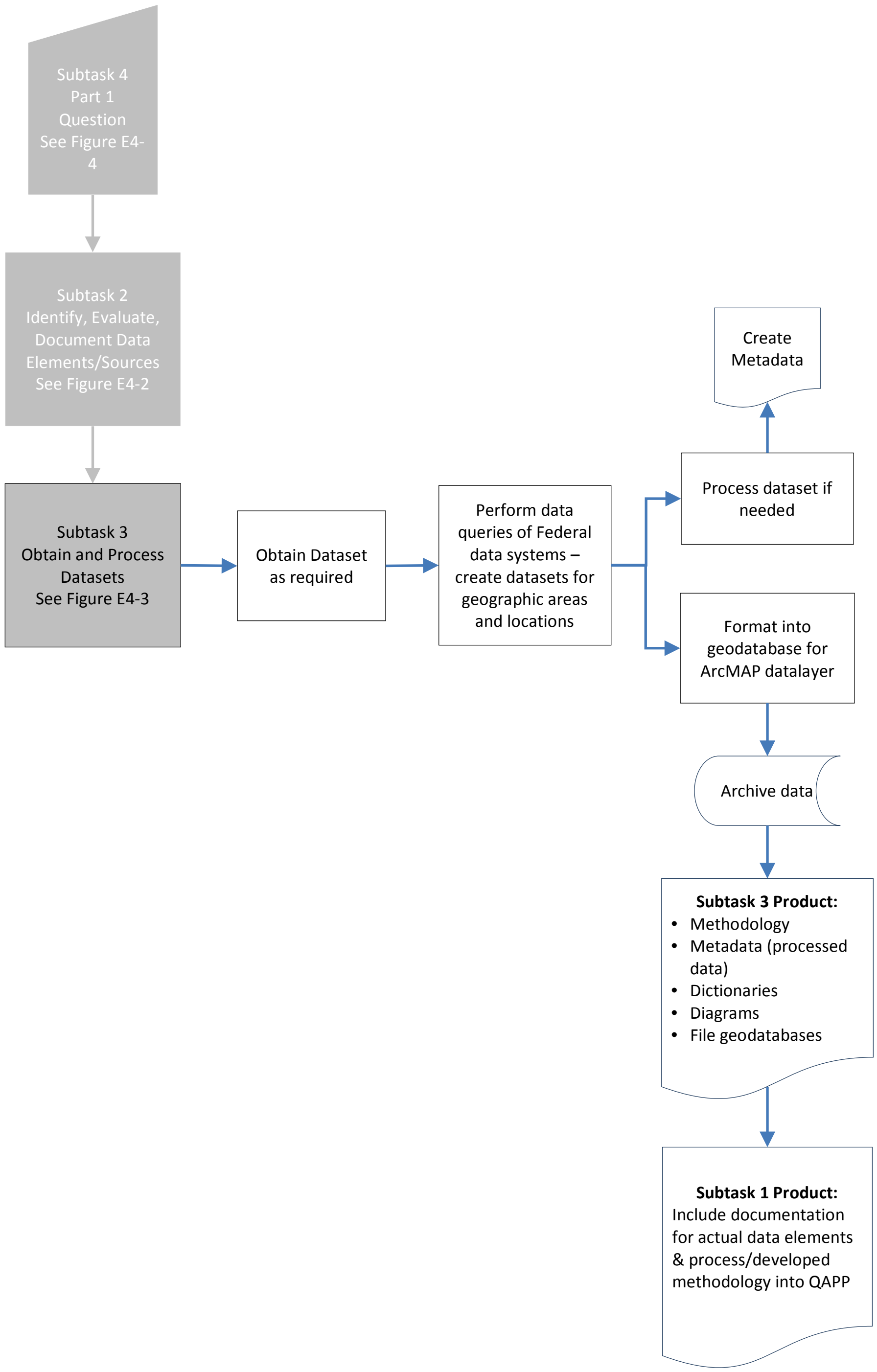
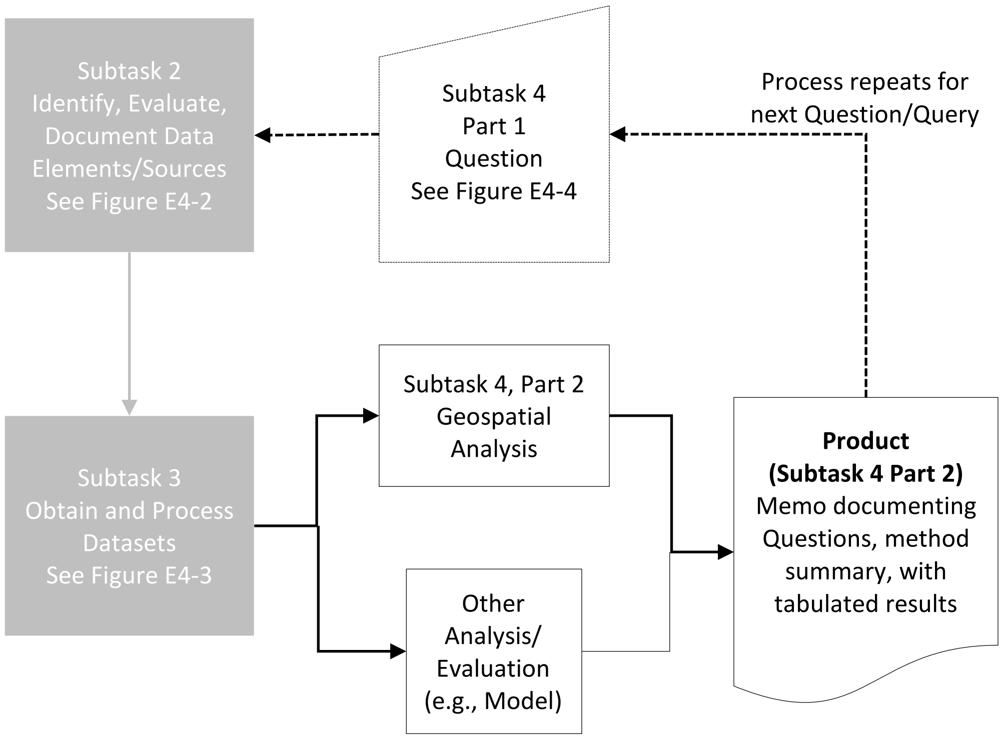


**Figure E3-4. Process Flow for Subtask 4 –
Identification of Potential for Exposure to CERCLA Hazardous Substances Questions and Data Analysis**



Attachment E4. Example Exposure Scenario and Related Questions

Exposure Senario: Will mining activities in any way jeopardize the continued existence of species listed as threatened and endangered under the Endangered Species Act, or destroy or adversely modify critical habitat?

Exposure Factor and Exposure Factor Questions (rQ):
Probability that endangered or threatened species will be exposed?

rQ1: Is the mine located in a county, or across county areas, where threatened and endangered species have been identified?

GIS Output: County-level data layer(s) showing the number of endangered and/or threatened species by type (e.g., bird, reptile, mammal, fish, and insect).

rQ2: How many areas are designated as critical habitat on the mine site, within 1-mile of the site boundary (or centroid), 5-miles of the site boundary (or centroid), 10-miles of the site boundary (or centroid), and 25-miles of the site boundary (or centroid)?

GIS Output: Data layer relating the delineation of critical (possibly sensitive) habitat on the mine site, within 1-mile of the site boundary (or centroid), 5-miles of the site boundary (or centroid), 10-miles of the site boundary (or centroid), and 25-miles of the site boundary (or centroid).

Severity Questions (sQ):

sQ1: What mine type (e.g., underground or surface mine) exists or is proposed? A surface mine might be expected to have more impact on threatened and endangered species than an underground mine?

sQ2: What type(s) of animal(s) are threatened and endangered; could they easily move to other habitat areas (e.g., birds versus amphibian)?

sQ3: What is the distance or buffer area between the mine site and the habitat?

sQ4: What type of land cover lies within the buffer area between the habitat and the mine?

sQ5: Do any critical or sensitive habitat areas occur within the same drainage area as watershed as the mine?

sQ6: Do any critical or sensitive habitat areas occur downstream of the mine site?

[This page intentionally left blank.]

Attachment E5. Potential Data Sources

Figure E5-1.

Potential Data Sources for Generalizing Environmental Baseline within Region/Watershed

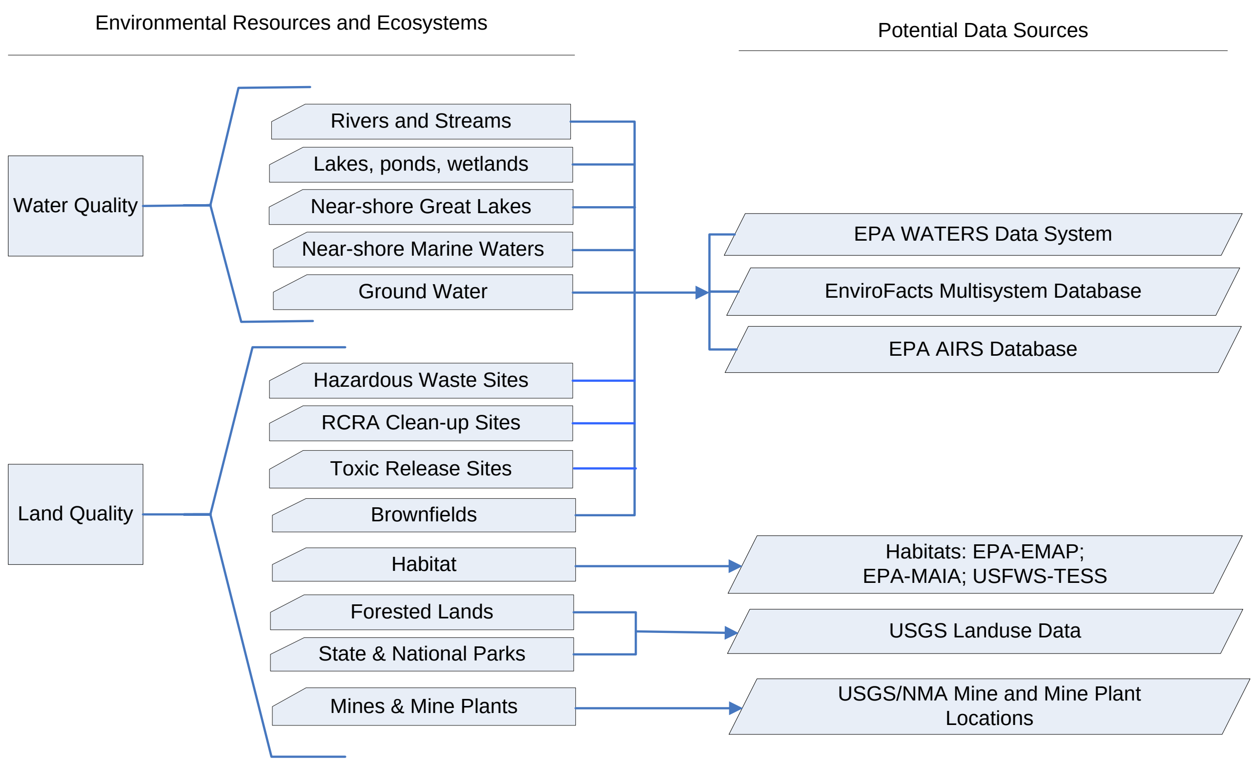


Figure E5-2.

Potential Data Sources for Terrestrial Ecosystem Services Used to Estimate Potential Exposures

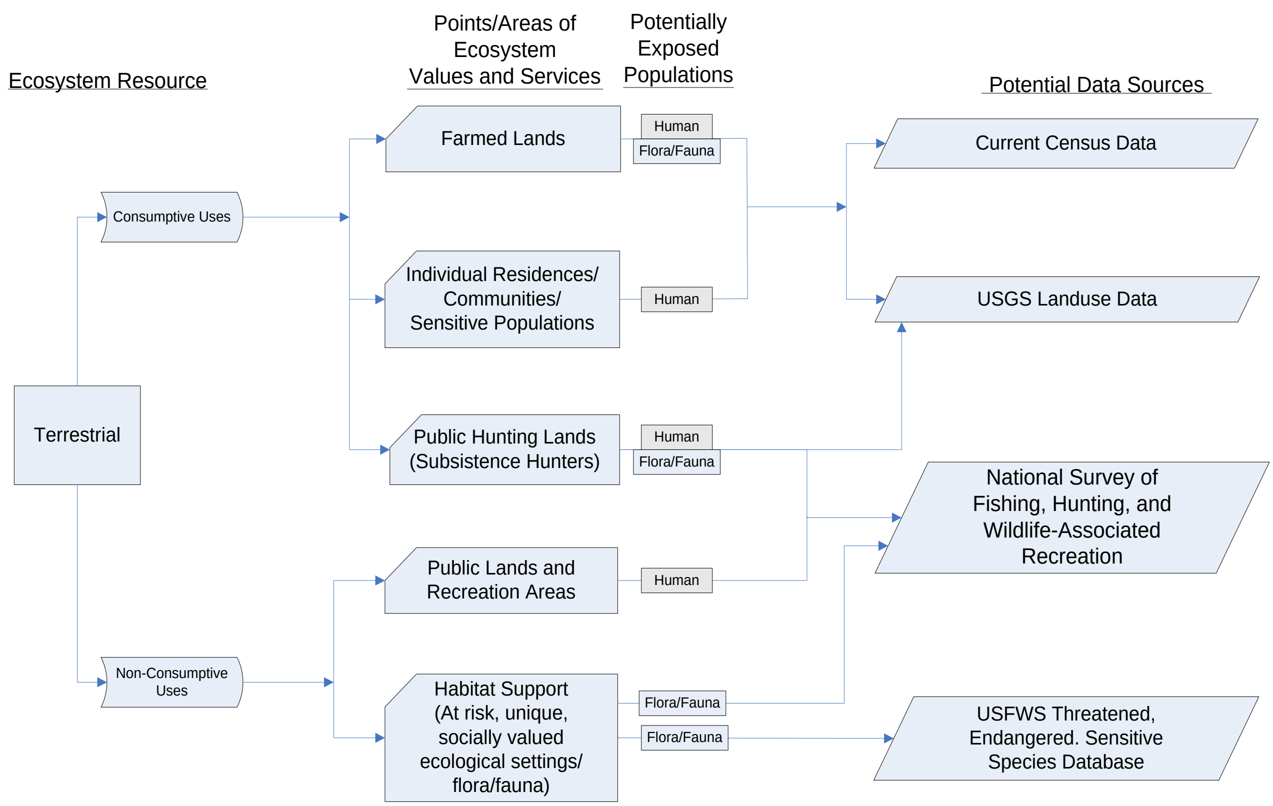


Figure E5-3.

Potential Data Sources for Aquatic Ecosystem Services Used to Estimate Potential Exposures

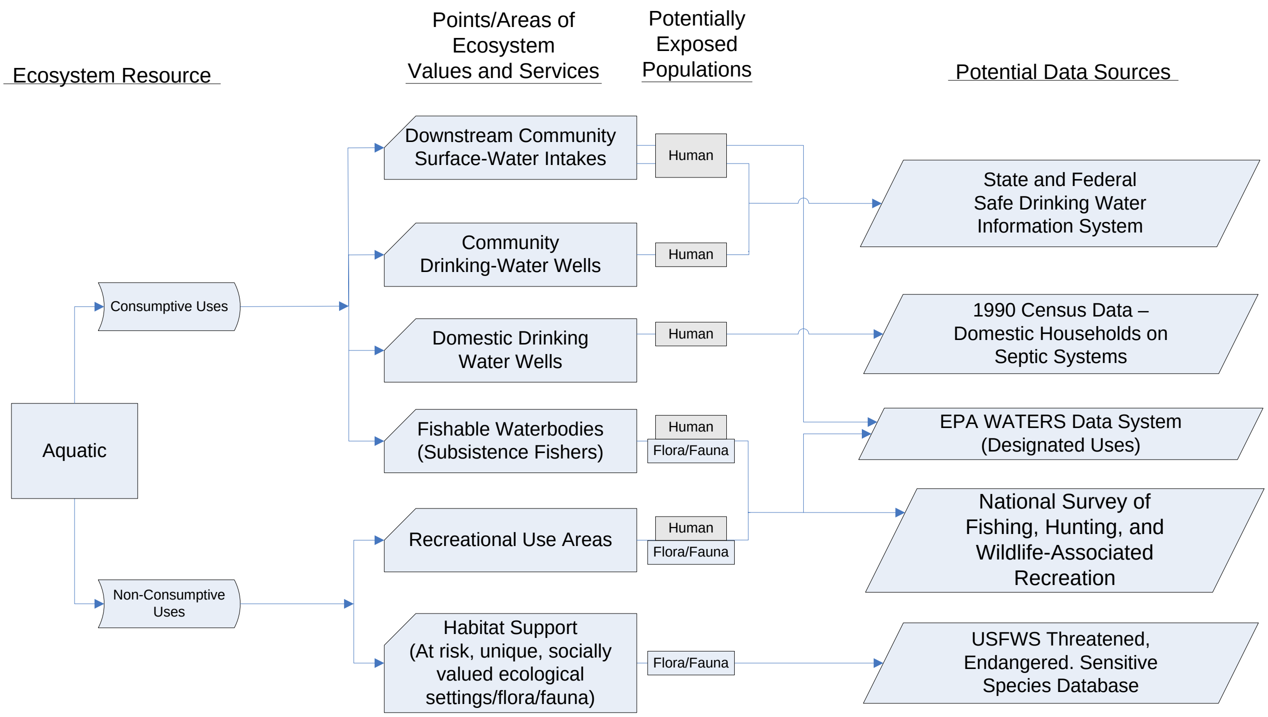
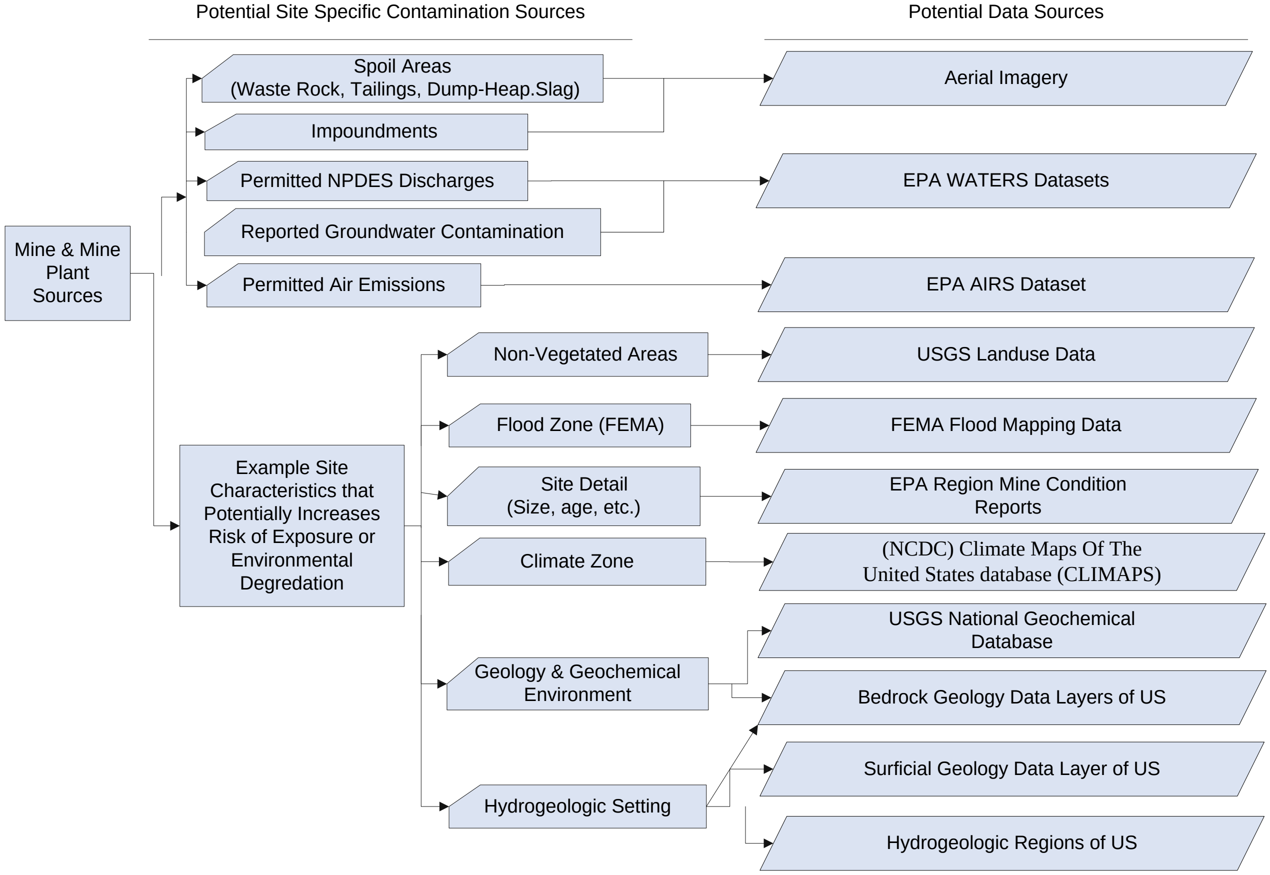


Figure E5-4.

Potential Environmental Impact of 2009 Current Sites



[This page intentionally left blank.]

Appendix F
Evidence of CERCLA Hazardous Substances at 2009 Current Sites

EPA collected available data from existing Federal government data sources pertaining to the release of CERCLA hazardous substances from mines and mineral processors. The focus of the data collection for 2009 Current sites included the following four EPA data sources:

- Toxics Release Inventory (TRI)
- Discharge Monitoring Reports (DMRs) from the National Pollutant Discharge Elimination System (NPDES); includes the Integrated Compliance Information System (ICIS) and Permit Compliance System (PCS)—NPDES Majors
- National Emissions Inventory (NEI)

These data sources are generally described in this appendix. The TRI, DMR, and NEI data presented are limited to the priority contaminants of concern (Priority COCs) as defined in report **Section 2.4** ("CERCLA Contaminants of Concern (COCs)") and **Appendix D**.

F.1 TRI Data

The TRI is administered under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) that was enacted in 1986. The TRI is primarily a public resource to inform citizens about releases of certain toxic chemicals to the air, water, and soils in their community. EPA and States are required by EPCRA to collect and publish data annually on releases and transfers of certain toxic chemicals from industrial facilities. In addition to reporting the release or transfer of chemicals, facilities are required to report on waste management and source reduction activities; these data are available after 1990 when required by the Pollution Prevention Act. In 1997, the TRI reporting was expanded to include seven additional industries including metal mining operations.

According to the TRI Program Guidance (U.S. EPA, 2011), in general a facility must report to TRI if it:

- Is in a specific industrial sector (e.g., manufacturing, mining, electric power generation)
- Employs 10 or more full-time equivalent employees
- Manufactures or processes more than 25,000 lbs of a TRI-listed chemical or otherwise uses more than 10,000 lbs of a listed chemical in a given year.

Additionally, persistent, bioaccumulative, toxic chemicals (PBTs) listed under TRI have lower reporting thresholds for mass quantities manufactured or used annually than those specified above. For mines and mineral processors, such PBTs include lead, lead compounds, mercury, mercury compounds, polychlorinated biphenyls (PCBs), and dioxin and dioxin-like compounds.

If a facility meets these criteria, it must:

- Submit a TRI Form R (long form) or Form A (short form) for each TRI-listed chemical it manufactures, processes, or otherwise uses in quantities above the reporting threshold

- Submit each TRI form to both EPA and the State in which the facility is located.

A facility is eligible to submit a Form A if:

- The chemical being reported is NOT a PBT chemical
- The chemical has not been manufactured, processed, or otherwise used in excess of 1,000,000 lbs
- The total annual waste management (i.e., releases including disposal, recycling, energy recovery, and treatment) of the chemical does not exceed 500 lbs.

Mine processors use a wide variety of chemicals that require management. Mineral processors can also produce raw chemicals (e.g., sulfuric acid) for use in mineral recovery from the mined rock. Many gold, silver, and copper mine processors report to the TRI program because of the volume of chemicals used in the commonly employed metal leaching process to liberate metals from the ore rock and ore minerals. Although ore extraction processes typically do not use many chemicals, reporting may be required because metals and metal compounds accumulate from rock waste piles. TRI data extracted from EPA data systems are provided below for currently active mine and processor sites.

Linking the individual 2009 Current sites to facilities in the TRI reveals that 55 of the mines (10%) and 109 of the processors (19%) have reported releases in TRI for the period 2005 to 2009. These mining facilities engage in the removal of naturally occurring materials from the earth. EPA had considered naturally occurring materials to be manufactured by natural processes. A recent court order set aside EPA’s interpretation of manufacturing in the mining context, stating that naturally occurring ores *in situ* have not been manufactured within the meaning of EPCRA section 313. EPA is considering clarifying how the definitions of manufacturing and processing under EPCRA section 313 apply to the mining-sector processes of extraction and beneficiation.

Attachment F1 shows the cross-walk between the 2009 Current sites and the TRI reporting facilities.

Releases of COCs from 2009 Current sites total approximately 828,111 tons to the land surface, 3,894 tons emitted into air, and 16,774 tons discharged into waters, as estimated using available data. Dioxin and dioxin-like compounds released from 2009 Current sites totals approximately 69 grams emitted to air, 36 grams to land, and 0.32 grams discharged to waters. **Attachment F2** shows TRI releases by year and COC for each 2009 Current site. **Attachment F3** shows releases for the 2009 Current sites averaged over the years reported for air (**Table F3-1**), surface water (**Table F3-2**), and on-site releases to land (**Table F3-3**).

F.2 DMR Data

The Clean Water Act (CWA) defines provisions for granting National Pollutant Discharge Elimination System (NPDES) permits in programs administered either by EPA or by State agencies where NPDES authority has been delegated by EPA. The NPDES program was introduced in 1972, under Section 402 of the CWA for regulation of pollutant discharges from point sources to waters of the United States. Point source discharges are illegal unless authorized by an NPDES permit. A point source is defined by EPA’s NPDES Program as any discernible, confined, and discrete conveyance, including (among other things) any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or landfill leachate collection system from which pollutants are or may be discharged. In most cases the NPDES permit program is administered by authorized States. Regulation for the NPDES permit program is defined in the Code of Federal Regulations, Title 40, Parts 122 - 124 (40 CFR122.1 and subsequent sections).

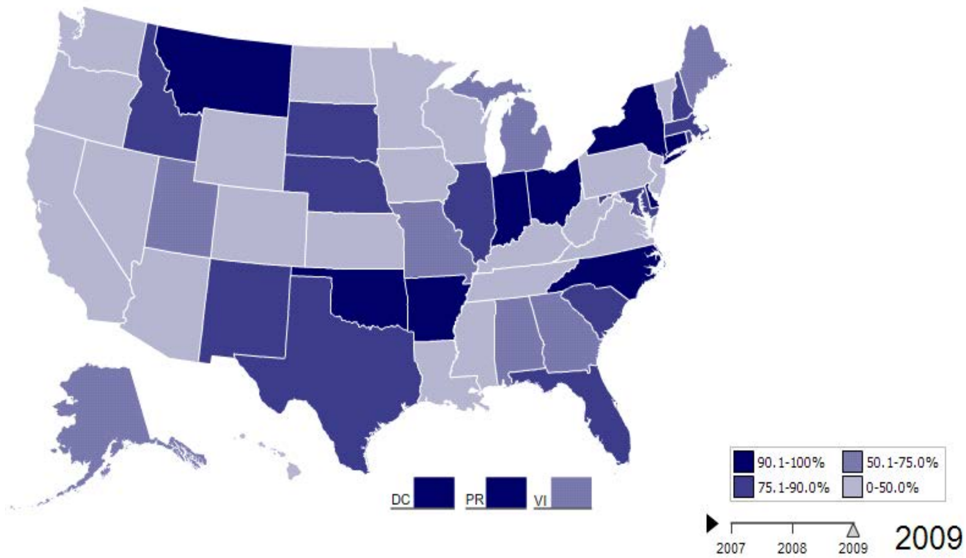
The NPDES program Discharge Monitoring Reports (DMRs) are prepared by industrial facilities (including some mines and mine processors) that are point source dischargers into surface waters of the United States. Point source discharges from a mine or mine processor can be from stormwater runoff, discharge of treated process effluent, or other sources. Both stormwater and process discharges are permitted under the NPDES, as authorized by the CWA. Although the CWA requires all point source dischargers to obtain an NPDES permit and monitor their wastewater, not all permits require the submittal of DMRs.

However, these reports are usually stipulated for major dischargers, and EPA places greater priority on the major facilities and requires authorized States to provide more information about the compliance status of these dischargers. Any NPDES facility or activity can be classified as “major” by the EPA Regional Administrator, or in the case of approved State programs, the Regional Administrator in conjunction with the State Director. Therefore, for many general (non-major) permits that are not water quality effluent based, pollutant discharge and loading information reporting is not required. These CWA releases, that are also not reported but may be applicable to mines and mine processors, could include:

- Wastewater releases from industrial facilities that are connected to a publicly owned treatment works (POTW) sewerage system, regulated through the CWA Pretreatment Program;
- Discharges related to wet-weather events, such as stormwater runoff from industrial facilities, discharges from construction activities, combined sewer overflows, and sanitary sewer overflows.

Data provided by regulated dischargers were obtained from EPA's publically available DMR Pollutant Loading Tool (http://cfpub.epa.gov/dmr/). EPA’s DMR Pollutant Loading Tool is a web-based tool designed to help identify permitted discharges, what pollutants are being discharged and the quantity, and where discharges are occurring. The tool uses pollutant DMR data from EPA’s PCS and Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES).

Though not a complete inventory of all CWA releases, the EPA DMR Loading Tool, as of June 2011, contained discharge information for more than 20,000 industrial and municipal point source facilities. The completeness of the DMR database is summarized below. Although the data presented in **Figure F-1** are for 2009, only limited updates had occurred as of the writing of this report.



From: http://cfpub.epa.gov/dmr/

Figure F-1. Completeness of CWA Discharge Monitoring Data by State

Mining or processing operations may have general permits related to retention ponds that in most cases do not require DMR tracking. Pollutant loadings are presented in the DMR as pounds per year where such reporting is required as part of an NPDES discharge permit. Data for reportable discharges associated with mining and mining processor sites was found to be limited.

The specific procedure used to identify data in the DMR that are linked to 2009 Current sites included first determining which of these had TRI identifiers, then determining which of these TRI facilities were linked with an NPDES identifier. For each 2009 Current site that has an NPDES ID, a query was entered into the DMR system to retrieve relevant data relating to the release of CERCLA hazardous substances. All other chemical releases were also noted. Those releases that included chemicals that are defined as CERCLA hazardous substances were then indicated by including the standardized name of the chemical and its CAS registry numbers.

An individual 2009 Current site may be associated with more than one TRI and NPDES identifier. Of the 2009 Current mines, 13 were linked with an NPDES ID. Of the 2009 Current processors, 44 were linked with one or more NPDES IDs; the total mine and processor counts reflects the number of ungrouped individual mines and processors. **Table F-1** shows the crosswalk between the 2009 Current mines, their corresponding TRI ID#s and TRI reporting facility names, and the NPDES permit numbers and NPDES discharger name on record in either the PCS or ICIS database. **Table F-2** shows the same crosswalk but for 2009 Current processors. **Attachment F-4** shows the results, by 2009 Current site and COC, and for phosphorus, ammonia, and cyanide.

Table F-1. Crosswalk Between 2009 Current Mines and DMR/NPDES Sites

Row	Mine_ID	TRI_ID	NPDES_ID	FRS_Facility
1	13	83837SNSHN1176B	ID0000060	Essential Metals Corporation
2	124	83227THMPSSQUAW	ID0025402	Thompson Creek Mining Co.

3	125	83873SLVRVLAKEG	ID0025429	Us Silver - Idaho Inc
4	125	83873SLVRVLAKEG	ID0000027	Us Silver - Idaho Inc
5	153	63629BRSHYHWYKK	MO0001848	Brushy Creek Mine/Mill
6	154	63629FLTCHHWYTT	MO0001856	Fletcher Mine/Mill
7	155	65440BCKMNHWYKK	MO0002003	Buick Resource Recycling Facility Llc
8	155	65440BCKMNHWYKK	MO0000337	Buick Resource Recycling Facility Llc
9	163	59759GLDNS453MO	MTR300012	Golden Sunlight Mines Incorporated
10	163	59759GLDNS453MO	MTR300199	Golden Sunlight Mines Incorporated
11	190	89414NWMNT35MIL	NV0021725	Newmont Gold Company Twin Creeks Mine
12	240	57754WHRFRTROJA	SD0025852	Wharf Resources U S A Incorporated
13	267	99153PNDRL1382P	WA0001317	Pend Oreille Mine
14	291	99752RDDGP90MIL	AK0038652	Red Dog Operations Mine Facility
15	313	80438CLMXM9MILE	CO0041467	Climax Molybdenum Henderson Mine
16	118	32096CCDNTSTATE	FL0000655	PCS Phosphate White Springs

Table F-2. Crosswalk Between 2009 Current Processors and DMR/NPDES Sites

Row	Fac_ID	TRI_ID	NPDES_ID	FRS_Facility
1	3	42420LCNNGKENTU	KY0004278	Alcan Primary Metal Sebree Works
2	4	76567LMNMCSANDO	TX0000876	Alcoa
3	6	98248NTLCL4050M	WA0002950	Alcoa Intalco Works
4	7	47630LMNMCHIGHW	IN0001155	Alcoa Warrick Operations
5	13	21701STLCL5601M	MD0002429	Eastalco Aluminum Company
6	14	63869NRNDLSTJUD	MO0105732	Noranda Aluminum Incorporated
7	35	78410CCPCC1501M	TX0076996	Equistar Corpus Christi Plant
8	48	77978LMNMCSTATE	TX0004715	Alcoa World Alumina Atlantic
9	50	43416BRSHWSOUTH	OH0002518	Brush Wellman Inc *
10	56	71730GRTLKRT7BO	AR0000680	Great Lakes South
11	62	18848GTPRDHAWES	PA0009024	Global Tungsten & Powders Corp
12	68	84006KNNCT8362W	UT0000051	Kennecott Corporation-Smelter & Refinery
13	74	74363GLPCHHIGHW	OK0001261	Umicore Optical Materials Usa
14	87	13413SPCLMMIDDL	NY0007129	Special Metals Corporation
15	92	46304NRTHR246BA	IN0000132	Nipsco Bailly Generating Station
16	93	41105RMCSHUSROU	KY0000485	AK Steel Corp Ashland Works - Coke Plant
17	93	41105RMCST4000E	KY0000485	AK Steel Corp Ashland Works - Coke Plant
18	93	41105RMCST4000E	KY0000558	AK Steel Corp Ashland Works - Coke Plant
19	94	45043RMCNC1801C	OH0009997	AK Steel Corp
20	95	44901MPRDT913BO	OH0006840	AK Steel Corp Mansfield Wo Rks
21	97	26037WHLNGROUTE	WV0023281	Mountain State Carbon Follansbee Plant
22	97	43952WHLNGSOUTH	OH0011347	Severstal Wheeling Inc
23	103	44481WRRNW1040P	OH0101079	Severstal Warren Inc.
24	104	15034SSRVNPOBOX	0	US Steel Irvin Works
25	105	35064SSFRFVALLE	AL0003646	US Steel Fairfield Works
26	105	35064SSFRFVALLE	AL0065773	US Steel Fairfield
27	106	15104SSDGRBRADD	0	Edgar Thomson Plt
28	107	46402SSGRYONENO	IN0000281	US Steel Corporation Gary Works

Row	Fac_ID	TRI_ID	NPDES_ID	FRS_Facility
29	107	46402SSGRYONENO	IN0061077	US Steel Corporation Gary Works
30	108	62040GRNTC20THS	IL0000329	National Steel Corporation Granite City Division
31	109	48229GRTLKNO1QU	MI0002313	US Steel Corporation
32	113	46312LTVST3001D	IN0000205	LTV Steel Rws 7
33	113	46312LTVST3001D	IN0000205	LTV Steel Rws 8
34	116	48121FRDM23001M	MI0043524	Rouge Steel Co
35	126	21219BTHLHDUALH	MD0001201	ISG Sparrows Point Incorporated
36	151	63048HRCLN881MA	MO0000281	Doe Run Company
37	181	37134CHMTLFOOTE	TN0001686	Erachem Comilog, Inc.
38	182	21226CHMTL711PI	MD0001775	Erachem Comilog, Inc.
39	184	25265FLMNPUSRT6	WV0000426	Felman Production Inc.
40	184	25265MNTNRRTE33	WV0048500	American Electric Power Mountaineer Plant
41	201	77501MBLMN2001J	TX0007285	Agrifos Fertilizer Pasadena
42	201	77501PHLLP100JE	TX0108332	Conocophillips Pipe Line Pasadena Terminal
43	201	77503LBMRL2500N	TX0004731	Albemarle Corporation Houston Plant
44	204	39568NSTHNPOBOX	MS0003115	Mississippi Phosphates Corp
45	205	70057CCDNTLAHWY	LA000598	Occidental Chemical Corp
46	206	70792GRCCHEASTB	LA0004847	Mosaic Fertilizer Llc - Uncle Sam Plant
47	210	32096CCDNTSTATE	FL0000655	Pcs Phosphate White Springs
48	221	70663WRGRCDAVIS	LA0001333	W. R. Grace & Co.-Conn. Davison Catalysts
49	231	36701GLBMTOLDMO	AL0025216	Globe Metallurgical
50	243	35806TLDYN7300H	AL0025585	Tdy Industries Inc (Dba Ati Alldyne)
51	249	29335CLNSM14355	SC0038229	Celanese Emulsions Enoree Plant
52	265	37871SRCNC1977W	TN0001741	Etzc Young Mine & Mill
53	267	37040SVGZN1800Z	TN0027677	Etzc Young Mine & Mill
54	268	97321TLDYN1600O	OR0001112	Wah Chang

F.3 NEI Data

The EPA reviewed the content of the National Emissions Inventory (NEI) database for the list of 2009 Current sites. Limited data for the Selected COCs were found in the NEI database. Manganese and mangnese compounds were the only Selected COCs found in the NEI that exceeded a regulatory threshold. The data compiled for the 2009 Current sites is presented below.

The EPA's National Emissions Inventory (NEI) database contains information about stationary and mobile sources that emit criteria air pollutants and their precursors, and hazardous air pollutants (HAPs). HAPs are substances that are known or suspected to cause serious health problems such as cancer. The Clean Air Act defined an initial list of substances, and EPA currently identifies 188 HAPs. All HAPs are CERCLA hazardous substances, while criteria pollutants are not, so the remainder of this NEI analysis focuses on HAPs reported in the 2005 version of the NEI.

The database includes estimates of annual air pollutant emissions from point, nonpoint, and mobile sources in the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands.

Some of the sources from which EPA compiles the NEI database include:

- Emissions inventories compiled by State and local environmental agencies
- Databases related to EPA's Maximum Achievable Control Technology (MACT) programs to reduce emissions of HAPs
- TRI data
- For nonroad sources, EPA's NONROAD computer model
- Previous emissions inventories, if States do not submit current data.

NEI data extracted for the Selected COCs are provided below.

Table F-3 shows the cross walk between the 2009 Current sites and their respective Facility Registry System (FRS) facility name used in the NEI database.

Table F-3. Cross Walk between 2009 Current and NEI Sites (Selected COCs only)

Site RNUM	Processor RNUM	Processor Name	FRS ID	FRS Facility Name
28	180	Elkem Metals Co.	110000741966	Elkem Metals Co.
3181	181	Erachem Comilog Incorporated	110000370508	Erachem Comilog Incorporated
3232	232	Globe Metallurgical Inc.	110000591994	Globe Metallurgical Inc.

Table F-4 shows the estimated NEI HAP (CERCLA hazardous substance) releases in tons, by site.

Table F-4. Summary of Collected NEI Data by Site and Selected COC with Aggregated Annual Emissions of > 10 Tons per Year

Processor RNUM	FRS ID	FRS Facility Name	Pollutant Code	HAP Category Name	Annual Emissions (Tons)
180	110000741966	Elkem Metals Co.	7439965	Manganese compounds	258
181	110000370508	Erachem Comilog Incorporated	198	Manganese compounds	90
232	110000591994	Globe Metallurgical Inc	7439965	Manganese compounds	299

F.4 Streams Exceeding TMDLs for Regulated Contaminants in Surface Waters—2009 Current Sites

The aquatic areas of review (AqAORs) of 133 sites overlap a CWA 303(d) impaired water polygon. **Figure F-2** shows the 2009 Current mine sites and **Figure F-3** shows the 2009 Current processor sites. **Table F-5** lists the streams with exceeded TMDLs and the length of stream for which a TMDL is exceeded. The GIS analysis also revealed 177 currently active sites (42%) are affected by RCRA Large Quantity Generator Facilities.

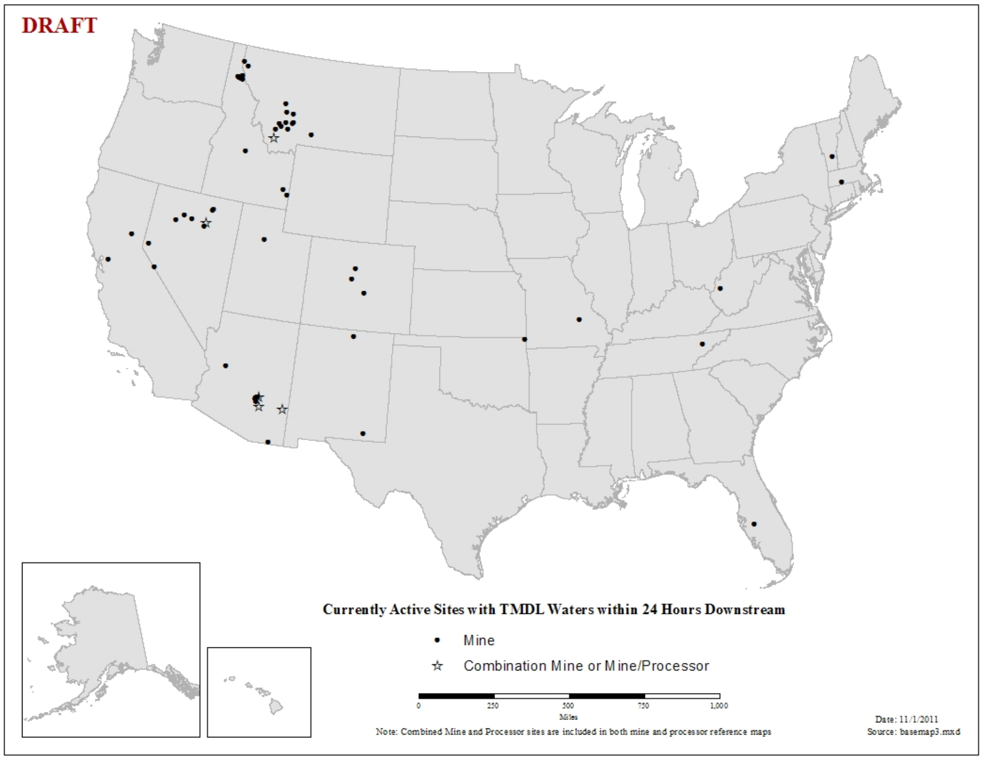


Figure F-2. 2009 Current Mines with TMDL Waters within 24 Hours Downstream

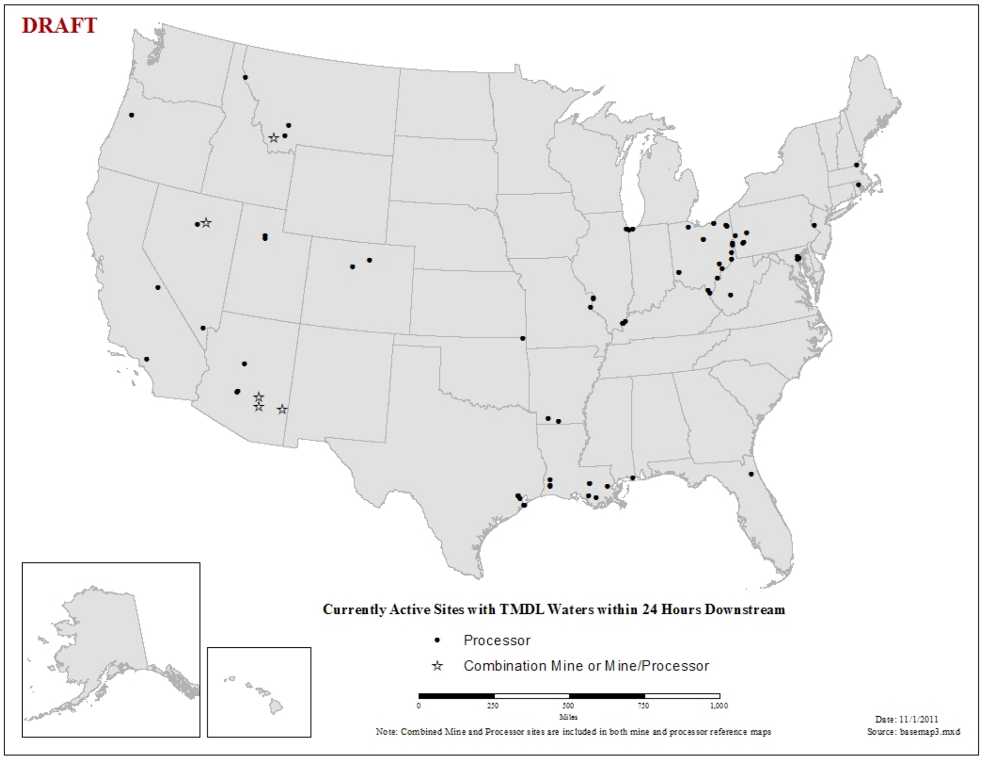


Figure F-3. 2009 Current Processors with TMDL Waters within 24 Hours Downstream

Table F-5. Streams/Rivers with Exceeded TMDLs

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
1	1	2	--	Copperco LLC	Mine Combination	Not named	29
2	1	90	--	Copper Queen Branch	Mine Combination	Not named	29
3	9	319	--	C-100 Jaw Plant Nordberg #42165100B	Mine Combination	Connecticut River	5
4	9	320	--	Screener-Warrior Power Screen #12203097	Mine Combination	Connecticut River	5
5	12	347	--	Three Forks Mill	Mine Combination	Madison River	40
6	12	326	--	Yellowstone Mine	Mine Combination	Madison River	40
7	27	--	108	US Steel Granite City	Processor Combination	Not named	27
8	27	--	110	Beelman Truck Co.	Processor Combination	Not named	27
9	27	--	135	Stein, Inc.	Processor Combination	Not named	27
10	28	--	180	Elkem Metals Co.	Processor Combination	Ohio River	172
11	28	--	183	Eveready Battery Co. inc.	Processor Combination	Ohio River	172
12	29	--	106	US Steel Braddock	Processor Combination	Turtle Creek	10
13	29	--	142	Tube City IMS, LLC	Processor Combination	Turtle Creek	10
14	30	--	103	Severstal Warren	Processor Combination	Mahoning River	169
15	30	--	124	Lafarge North America Inc.	Processor Combination	Mahoning River	169
16	30	--	132	MultiServ Pit 6	Processor Combination	Mahoning River	169
17	32	--	92	Arcelor Mittal Burns Harbor	Processor Combination	Not named	28
18	32	--	139	The Levy Co., Inc.	Processor Combination	Not named	28
19	33	--	98	Arcelor Mittal USA Indiana Harbor	Processor Combination	Not named	97
20	33	--	107	US Steel Gary Works	Processor Combination	Not named	97
21	33	--	111	Beemsterboer Slag Corp.	Processor Combination	Not named	97
22	33	--	112	Beemsterboer Slag Corp.	Processor Combination	Not named	97
23	33	--	113	Edward C. Levy Co.	Processor Combination	Not named	97
24	33	--	119	Holcim (US) Inc./Mercier Corp.?	Processor Combination	Not named	97
25	33	--	122	Lafarge North America Inc.	Processor Combination	Not named	97
26	33	--	128	MultiServ	Processor Combination	Not named	97

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
27	33	--	140	The Levy Co., Inc.	Processor Combination	Not named	97
28	33	--	141	Tube City IMS, LLC	Processor Combination	Not named	97
29	33	--	144	U.S. Aggregates, Inc.	Processor Combination	Not named	97
30	34	--	96	Arcelor Mittal Riverdale	Processor Combination	Calumet Sag Channel	70
31	34	--	127	MultiServ	Processor Combination	Calumet Sag Channel	70
32	34	--	134	Phoenix Services LLC/listed as Hasarco MultiServ Pit 27?	Processor Combination	Calumet Sag Channel	70
33	1002	325	--	Barretts Mill	Mine Processor Combination	Beaverhead River	116
34	1002	--	274	Specialty Minerals Inc. (Barretts Minerals)	Mine Processor Combination	Beaverhead River	116
35	1005	78	--	Freeport-McMoRan Miami Inc.	Mine Processor Combination	Pinto Creek	54
36	1005	--	67	Copper Cities Unit	Mine Processor Combination	Pinto Creek	54
37	1011	308	--	Freeport McMoRan Morenci Inc.	Mine Processor Combination	San Francisco River	36
38	1011	--	199	Phelps-Dodge Morenci	Mine Processor Combination	San Francisco River	36
39	1013	84	--	Hayden Concentrator	Mine Processor Combination	Gila River	0.07
40	1013	--	66	Asarco, LLC - Hayden	Mine Processor Combination	Gila River	0.07
41	1017	175	--	Chukar	Mine Processor Combination	Humboldt River	68
42	1017	210	--	SOUTH AREA	Mine Processor Combination	Humboldt River	68
43	1017	--	82	Mill 6	Mine Processor Combination	Humboldt River	68
44	2007	7	--	Sixteen To One Mine	Mine	Kanaka Creek	15
45	2013	13	--	Sunshine Mine	Mine	Big Creek	4
46	2014	14	--	BUNKER HILL MINE	Mine	Coeur d'Alene River	38
47	2016	16	--	Golden Chest Project	Mine	Prichard Creek	21
48	2029	29	--	Montana Tunnels Mining Inc	Mine	Prickly Pear Creek	36
49	2031	31	--	Montanore Project	Mine	Libby Creek	15
50	2052	52	--	Resolution Mine	Mine	Queen Creek	14
51	2079	79	--	Freeport-McMoRan Bagdad Inc	Mine	Boulder Creek	4
52	2080	80	--	Ray	Mine	Mineral Creek	14

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
53	2082	82	--	Pinto Valley Operations	Mine	Pinto Creek	52
54	2086	86	--	Carlota Copper Company	Mine	Pinto Creek	52
55	2105	105	--	Jerico Products Incorporated	Mine	Montezuma Slough	33
56	2114	114	--	Cresson Project	Mine	Cripple Creek	8
57	2115	115	--	Alma Placer Mine	Mine	Middle Fork South Platte River	5
58	2117	117	--	Hardee Phosphate Complex	Mine	Peace River	18
59	2124	124	--	Thompson Creek Mining Co	Mine	Thompson Creek	11
60	2125	125	--	Galena	Mine	South Fork Coeur d'Alene River	12
61	2126	126	--	Lucky Friday	Mine	South Fork Coeur d'Alene River	7
62	2127	127	--	Enoch Valley & South Rass Mines	Mine	Blackfoot River	24
63	2129	129	--	Smoky Canyon Mine	Mine	Sage Creek	7
64	2152	152	--	Viburnum #29 Mine	Mine	Indian Creek	3
65	2158	158	--	Genesis IncTroy Mine	Mine	Lake Creek	20
66	2161	161	--	Norweigen	Mine	Jefferson River	16
67	2162	162	--	Drumlummon Mine	Mine	Silver Creek	19
68	2163	163	--	Golden Sunlight Mine Inc	Mine	Jefferson River	39
69	2166	166	--	EAST BOULDER MINE	Mine	Boulder River	8
70	2168	168	--	Butte Highlands	Mine	Fish Creek	29
71	2169	169	--	Indian Creek	Mine	Missouri River	43
72	2171	171	--	Victoria / Madison Gold	Mine	Jefferson Slough	0.3
73	2172	172	--	Black Butte Mine	Mine	Missouri River	27
74	2179	179	--	Nevada Barth Iron Mine and Mill	Mine	Humboldt River	60
75	2185	185	--	Jerritt Canyon Mill	Mine	North Fork Humboldt River	7
76	2186	186	--	Lone Tree Mine	Mine	Humboldt River	92
77	2194	194	--	Spring Valley Mine	Mine	Carson River	54

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
78	2200	200	--	Sunrise Gold Placer Mine	Mine	Humboldt River	87
79	2202	202	--	Florida Canyon Mine	Mine	Humboldt River	96
80	2206	206	--	Esmeralda Mine	Mine	East Walker River	24
81	2209	209	--	Lee Smith Mine	Mine	North Fork Humboldt River	28
82	2218	218	--	Questa Mine & Mill	Mine	Red River	23
83	2229	229	--	Tripoli	Mine	Spring River	17
84	2243	243	--	Coy Mine	Mine	Mossy Creek	6
85	2255	255	--	Bingham Canyon Mine	Mine	Jordan River	28
86	2265	265	--	Luzenac America Inc	Mine	Not named	8
87	2275	275	--	Reiss Viking Div of C Reiss Coal	Mine	Ohio River	2
88	2313	313	--	Henderson Operations	Mine	Clear Creek	9
89	2317	317	--	New Jersey Mine & Mill	Mine	Coeur d'Alene River	38
90	2330	330	--	Mosaic Potash Carlsbad, Inc.	Mine	Pecos River	13
91	2344	344	--	Apex	Mine	Big Hole River	30
92	3015	--	15	ORMET Aluminum Mill Products Corp	Processor	Ohio River	75
93	3016	--	16	United State Antimony Corporation	Processor	Prospect Creek	24
94	3023	--	23	Elementis Pigments	Processor	Mississippi River	27
95	3026	--	26	Halliburton Energy Services	Processor	Greens Bayou	14
96	3027	--	27	M-I LLC	Processor	Galveston Bay	69
97	3029	--	29	Ambar Drilling Fluids	Processor	Not named	6
98	3036	--	36	Amelia Barite Plant	Processor	Chene, Bayou	15
99	3040	--	40	De Quincy Plant	Processor	West Fork Calcasieu River	16
100	3042	--	42	Halliburton	Processor	Pearl River	2
101	3043	--	43	Galveston GBT Barite Grinding Plant	Processor	Galveston Bay	69
102	3044	--	44	Argenta Mine And Mill	Processor	Humboldt River	162
103	3056	--	56	Chemtura	Processor	Bayou de Loutre	6
104	3057	--	57	Albemarle	Processor	Dorcheat, Bayou	7

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
105	3068	--	68	Kennecott Corp-Smelter & Refinery	Processor	Coon Creek	2
106	3069	--	69	Copperton Concentrator	Processor	Jordan River	28
107	3071	--	71	Rosiclare Facility Hastie Mining	Processor	Ohio River	76
108	3072	--	72	Hastie Mining and Trucking Co	Processor	Ohio River	68
109	3074	--	74	UMICORE Optical Materials USA	Processor	Spring River	31
110	3076	--	76	Prospect Mine	Processor	Ruby River	28
111	3083	--	83	Clarkdale Metals Corp	Processor	Verde River	1
112	3086	--	86	Umicore Indium Products	Processor	Providence River	12
113	3094	--	94	AK Middletown Works	Processor	Dicks Creek	19
114	3095	--	95	AK Steel Corp. Mansfield	Processor	Rocky Fork	33
115	3097	--	97	Severstal Wheeling	Processor	Ohio River	43
116	3099	--	99	Arcelor Mittal Weirton	Processor	Ohio River	60
117	3102	--	102	Severstal Sparrows Point	Processor	Bear Creek	6
118	3118	--	118	Fritz Enterprises, Inc.	Processor	Back River	13
119	3121	--	121	Lafarge North America Inc.	Processor	Not named	14
120	3123	--	123	Lafarge North America Inc.	Processor	Skinners Run	15
121	3125	--	125	Lafarge North America Inc.	Processor	Ohio River	5
122	3126	--	126	Lafarge North America Inc./Maryland Slag Co.	Processor	Bear Creek	6
123	3129	--	129	MultiServ	Processor	Bear Creek	6
124	3130	--	130	MultiServ	Processor	Rocky Fork	33
125	3131	--	131	MultiServ Plt 4	Processor	Mahoning River	56
126	3133	--	133	Phoenix Services LLC	Processor	Bear Creek	6
127	3136	--	136	Stein, Inc.	Processor	Ohio River	0.5
128	3137	--	137	Stein, Inc.	Processor	Cuyahoga River	1
129	3143	--	143	Tube City IMS, LLC dba Olympic Mill Service	Processor	Dicks Creek	19
130	3145	--	145	Quality Magnetite LLC	Processor	Big Sandy River	16

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
131	3147	--	147	Densimix Incorporated	Processor	Greens Bayou	14
132	3151	--	151	Doe Run Resources Corp.	Processor	Mississippi River	35
133	3171	--	171	FMC Corp. Lithium Division Bayport Texas	Processor	Vince Bayou	0.09
134	3176	--	176	Martin Marietta Magnesia Specialties LLC	Processor	Packer Creek	8
135	3181	--	181	Erachem Comilog Inc.	Processor	Curtis Creek	4
136	3184	--	184	Felman Production Inc.	Processor	Ohio River	37
137	3185	--	185	Tronox LLC	Processor	Colorado River	12
138	3191	--	191	A-1 Grit Co	Processor	Angeles River, Los	11
139	3193	--	193	Kittanning Plant	Processor	Allegheny River	3
140	3194	--	194	Lake Charles Plant	Processor	Bayou d'Inde	12
141	3198	--	198	Climax Molybdenum Co. Henderson Mill	Processor	Williams Fork	41
142	3201	--	201	Agrifos Fertilizer Pasadena	Processor	Buffalo Bayou	33
143	3202	--	202	Innophos - Rhodia Geismar Facility	Processor	Amite River	9
144	3204	--	204	Mississippi Phosphates Corp.	Processor	Casotte, Bayou	10
145	3208	--	208	PCS NITR FERT	Processor	Amite River	9
146	3211	--	211	SF Phosphates Limited Company	Processor	Mahoning River	56
147	3218	--	218	Boulder Scientific Co.	Processor	South Platte River	1
148	3220	--	220	Santoku America	Processor	Gila River	17
149	3221	--	221	W.R. Grace & Co. - Conn. Davison Catalysts	Processor	Calcasieu River	7
150	3230	--	230	Elkem Metals Company?	Processor	Kanawha River	9
151	3233	--	233	Globe Metallurgical Inc.	Processor	Ohio River	16
152	3237	--	237	IMI FABI Benwood Plant	Processor	Ohio River	43
153	3238	--	238	Laws Mill	Processor	Owens River	1
154	3250	--	250	J.P. Austin Associates, Inc.	Processor	Ohio River	33
155	3256	--	256	Whittemore Co., Inc.	Processor	Merrimack River	18
156	3261	--	261	W.R. Grace & Co.	Processor	Gila River	17
157	3268	--	268	ATI Wah Chang	Processor	Willamette River	69

Row	Site ID	Mine ID	Processor ID	Site Name	TYPE	TMDL Stream/River Name	Stream/ River Length (miles)
158	3269	--	269	Magnesium Elektron	Processor	Delaware River	36
159	3273	--	273	Sappington Mill	Processor	Jefferson River	46
160	3277	--	277	Iluka Resources Inc	Processor	Saint Johns River	18
161	3283	--	283	Granusol, Inc.	Processor	Ohio River	76

References

U.S. EPA (U.S. Environmental Protection Agency). 2011. Toxics Release Inventory (TRI) Program "Basic Information" Webpage: [Available at: https://www.epa.gov/toxics-release-inventory-tri-program]. Last updated: Wednesday, October 26, 2011.

Attachment F1
Cross-walk between 2009 Current Sites and TRI Sites

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
1	2		Copper Queen Branch	85603PHLPS36WHW	Copper Queen	Copper Ore NEC	Bisbee	Cochise	AZ
7	198		Turquoise Ridge Mine	89414GTCHL28MIN	Barrick Turquoise Ridge Inc.	Gold Ore	Golconda	Humboldt	NV
14		291	Sherwin Alumina	78359RYNLDHIGHW	Sherwin Alumina LP	Alumina	Portland	San Patricio	TX
15		48	Alcoa World Alumina Atlantic	77978LMNMCSTATE	Alcoa World Alumina LLC	Bauxite and alumina	Port Lavaca	Calhoun	TX
21		59	Nyrstar NV	37040SVGZN1800Z	Nyrstar Clarksville INC	Cadmium	Clarksville	Montgomery	TN
21		267	Plasminco (probably should be Pasminco)	37040SVGZN1800Z	Nyrstar Clarksville Inc	Zinc	Clarksville	Montgomery	TN
27		108	US Steel Granite City	62040GRNTC20THS	US Steel Granite City Works	Iron and steel	Granite City	Madison	IL
28		180	Elkem Metals Co.	45750LKMMTROUTE	Eramet Marietta Inc	Manganese	Marietta	Washington	OH
28		183	Eveready Battery Co. Inc.	45750VRDYBCOUNT	Energizer Battery Manufacturing Inc	Manganese	Marietta	Washington	OH
29		106	US Steel Braddock	15104SSDGRBRADD	USS Mon Valley Works - Edgar T Homson Plant	Iron and steel	Braddock	Allegheny	PA
29		142	Tube City IMS, LLC	15104MSDVT13BRA	Tube City IMS	Iron and steel slag (non-electric arc furnace)	Braddock	Allegheny	PA
30		103	Severstal Warren	44481WRRNW1040P	Severstal Warren Inc	Iron and steel	Warren	Trumbull	OH
30		132	MultiServ Plt 6	44482HRSCCCOLTV	Heckett Multiserv Plant 6	Iron and steel slag (non-electric arc furnace)	Warren	Trumbull	OH
31		100	Republic Engineered Products Inc	44055SSLRN1807E	Republic Engineered Products Inc Lorain Plant	Iron and steel	Lorain	Lorain	OH
33		107	US Steel Gary Works	46402SSGRYONENO	USS Gary Works	Iron and steel	Gary	Lake	IN
33		113	Edward C. Levy Co.	48217DWCLV13800	Edw C Levy Co - Plant 6	Iron and steel slag (non-electric arc furnace)	East Chicago	Lake	IN

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
33		140	The Levy Co., Inc.	46401LVYND1NBUC	Edw. C. Levy Co Indiana Slag Co	Iron and steel slag (non-electric arc furnace)	Gary	Lake	IN
33		141	Tube City IMS, LLC	46401MSDVT1NBRA	Tube City Ims	Iron and steel slag (non-electric arc furnace)	Gary	Lake	IN
34		96	Arcelor Mittal Riverdale	60627CMSTL13500	Arcelormittal Riverdale Inc	Iron and steel	Riverdale	Cook	IL
34		127	MultiServ	60627HRSCC135TH	Harsco Co Multiserv Plant 27	Iron and steel slag (non-electric arc furnace)	Riverdale	Cook	IL
1006	38		Chino Mines Co Mine	88043CHNMN210CO	Chino Mines Co Mine Concentrator-Sxew Plants	Copper Ore NEC	Bayard	Grant	NM
1007	315		Du Pont Florida Mine & Plant	32091DPNTCSTATE	Dupont Chemicals - Starke Facility	Titanium Ore	Starke	Clay	FL
1007		271	E.I. Dupont de Nemours	32091DPNTCSTATE	Dupont Chemicals - Starke facility	Zirconium and hafnium	Starke	Clay	FL
1008		207	P4 Production LLC	83276MNSNTHIGHW	P4 Production LLC	Phosphate rock	Soda Springs	Caribou	ID
1011	308		Freeport-McMoRan Morenci Inc.	85540PHLPS4521U	Freeport-McMoran Morenci Inc	Copper Ore NEC	Morenci	Greenlee	AZ
1011		199	Phelps-Dodge Morenci	85540PHLPS4521U	Freeport-McMoran Morenci Inc	Molybdenum	Morenci	Greenlee	AZ
1013		66	Asarco, LLC - Hayden	85235SRCNC64ASA	Asarco LLC Ray Complex Hayden Smelter & Concentrator	Copper	Winkelman	Gila	AZ
1018	190		Twin Creeks Mine	89414NWMNT35MIL	Newmont Mining Corp Twin Creeks Mine	Gold Ore	Golconda	Humboldt	NV
1022	310		Mission/San Xavier/Eisenhower	85629SRCNC4201W	Asarco LLC Mission Complex	Copper Ore NEC	Sahuarita	Pima	AZ
1022		197	Asarco LLC Mission Complex	85629SRCNC4201W	Asarco LLC Mission Complex	Molybdenum	Sahuarita	Pima	AZ
2029	29		Montana Tunnels Mining Inc	59638MNTNT5MILE	Montana Tunnels Mining Inc	Gold Ore	Clancy	Jefferson	MT
2039	39		Balmat Mine No. 4 & mill	13642ZCMNS408SY	St Lawrence Zinc Co Balmat 4 Mine & Mill	Lead-Zinc Ore			
2079	79		Freeport-McMoRan Bagdad Inc	86321CYPRS1MAIN	Freeport-Mcmoran Bagdad Inc	Copper Ore NEC	Bagdad	Yavapai	AZ
2080	80		Ray	85237SRCNCHWY17	Asarco LLC ray Mine Operations	Copper Ore NEC	Kearny	Pinal	AZ
2083	83		Freeport-McMoRan Sierrita Inc	85614CYPRS6200W	Freeport-Mcmoran Sierrita Inc	Copper Ore NEC	Green Valley	Pima	AZ

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
2091	91		Freeport-McMoRan Safford Inc	85548FRPRT85NFR	Freeport Mcmoran Safford Inc	Copper Ore NEC	Safford	Graham	AZ
2101	101		Mt Pass Mine & Mill	92366MLYCRI15AN	Molycorp Minerals LLC Mountain Pass Mine	Rare Earths Ore	Nipton	San Bernardino	CA
2103	103		Mesquite	92227NWMNT6502E	Mesquite Mine	Gold Ore	Winterhaven	Imperial	CA
2104	104		CR Briggs	93562CRBRGWINGA	CR Briggs Corp	Gold Ore	Death Valley	Inyo	CA
2114	114		Cresson Project	80860CRPPL2755S	Cripple Creek & Victor Gold Mining Co	Gold Ore	Florissant	Teller	CO
2118	118		Swift Creek Mine	32096CCDNTSTATE	PCS Phosphate White Springs	Phosphate Rock	Jasper	Hamilton	FL
2124	124		Thompson Creek Mining Co	83227THMPSSQUAW	Thompson Creek Mining Co	Molybdenum Ore	Stanley	Custer	ID
2125	125		Galena	83873SLVRVLAKEG	US Silver - Idaho Inc	Silver Ore	Wallace	Shoshone	ID
2126	126		Lucky Friday	83846LCKYFI90EX	Hecla Ltd Lucky Friday Mine Unit	Silver Ore	Mullan	Shoshone	ID
2153	153		Brushy Creek Mine/Mill	63629BRSHYHWYKK	Brushy Creek Mine/Mill	Lead-Zinc Ore	Bunker	Reynolds	MO
2154	154		Fletcher Mine and Mill	63629FLTCHHWYTT	Fletcher Mine/Mill	Lead-Zinc Ore	Bunker	Reynolds	MO
2155	155		Buick Mine/Mill	65440BCKMNHWYKK	Buick Mine/Mill	Lead-Zinc Ore	Bixby	Iron	MO
2156	156		Sweetwater Mine/Mill	63638SWTMMHIGHW	Sweetwater Mine/Mill	Lead-Zinc Ore	Ellington	Reynolds	MO
2159	159		Continental Mine	59701MNTNR600SH	Montana Resources Llp	Copper Ore NEC	Butte	Silver Bow	MT
2163	163		Golden Sunlight Mine Inc	59759GLDNS453MO	Golden Sunlight Mines Inc	Gold Ore	Whitehall	Jefferson	MT
2164	164		Stillwater Mine	59061SMCNY5MILE	SMC NYE Mine Site	Platinum Group Ore	Nye	Stillwater	MT
2182	182		Denton-Rawhide Mine	89406KNNCT55MIL	Kennecott Rawhide Mining Co	Gold Ore	Hawthorne	Mineral	NV
2185	185		Jerritt Canyon Mill	89801JRRTT50MIL	Jerritt Canyon Mine	Gold Ore	Elko	Elko	NV
2186	186		Lone Tree Mine	89438NWMNTSTONE	Newmont Mining Corp Lone Tree Mine	Gold Ore	Golconda	Humboldt	NV
2187	187		Bald Mountain Mine	89803BLDMN70MIL	Bald Mountain Mine	Gold Ore	Ely	White Pine	NV
2192	192		Midas Mine	89414KNSNY60MIL	Newmont Midas Operations	Gold Ore	Mountain City	Elko	NV
2196	196		Hollister Mine	89446HLLSTTWNSH	Hollister Mine	Gold Ore	Tuscarora	Elko	NV
2204	204		Hycroft Mine	89446HYCRF52MIL	Hycroft Mine	Gold Ore	Winnemucca	Humboldt	NV
2215	215		Tyrone Mine	88065PHLPSHWY90	Freeport Mcmoran Tyrone Inc	Copper Ore Nec	Silver City	Grant	NM
2227	227		Lee Creek Mine	27806TXSGLHIGHW	PCS Phosphate Co Inc Aurora Div	Phosphate Rock	Aurora	Beaufort	NC
2240	240		The Wharf Mine	57754WHRFRTROJA	Wharf Resources	Gold Ore	Lead	Lawrence	SD

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
2242	242		CF & I PIT	57702PTLNS3401U	Pete Lien & Sons Inc	Iron Ore			
2253	253		Brush Mine	84624BRSHW10MIL	Brush Resources Inc Mill	Beryl-Beryllium Ore	Delta	Millard	UT
2262	262		Lisbon Valley Mining Co	84530LSBNV92SCU	Lisbon Valley Mining Co LLC	Copper Ore Nec	Monticello	San Juan	UT
2267	267		Pend Oreille Mine	99153PNDRL1382P	Pend Oreille Mine	Lead-Zinc Ore	Metaline Falls	Pend Oreille	WA
2271	271		Kettle River Mill Site	99166KTTLR363FI	Kettle River Operations Mill	Gold Ore	Republic	Ferry	WA
2280	280		Fort Knox Mine	99707FRTKN1FORA	Fort Knox Mine	Gold Ore	Fairbanks	Fairbanks North Star	AK
2309	309		Silver Bell Mining LLC	85653SLVRB25000	Silver Bell Mining LLC	Copper Ore Nec	Marana	Pima	AZ
2311	311		Stratcor, Inc.	71901SVNDM5911M	Stratcor Inc	Vanadium Ore	Hot Springs National Park	Garland	AR
2313	313		Henderson Operations	80438CLMXM9MILE	Climax Molybdenum Co - Henderson Mine	Molybdenum Ore	Idaho Springs	Clear Creek	CO
2327	327		Smoky Valley Common Operations	89045SMKYV1SMOK	Smoky Valley Common Operation	Gold Ore	Round Mountain	Nye	NV
3003		3	Alcan Primary Metal Sebree Works	42420LCNNGKENTU	Alcan Primary Products Corp Sebree Works	Aluminum	Robards	Henderson	KY
3004		4	Alcoa	76567LMNMCSANDO	Alcoa Inc	Aluminum	Thorndale	Milam	TX
3005		5	Alcoa Inc Wenatchee Works	98807WNTCHMALAG	Alcoa Wenatchee Works	Aluminum	Malaga	Chelan	WA
3006		6	Alcoa Intalco Works	98248NTLCL4050M	Intalco Aluminum Corp	Aluminum	Ferndale	Whatcom	WA
3007		7	Alcoa Warrick Operations	47630LMNMCHIGHW	Alcoa Inc - Warrick Operations	Aluminum	Newburgh	Warrick	IN
3009		9	Alumax of SC Incorporated	29445LMXFSHIGHW	Alumax of South Carolina Inc	Aluminum	Moncks Corner	Berkeley	SC
3010		10	Aluminum Co of America Badin	28009LMNMCHWY74	Alcoa Badin Works	Aluminum	Albemarle	Stanly	NC
3011		11	Century Aluminum of Kentucky	42348CNTRY1627S	Century Aluminum of Kentucky	Aluminum	Hawesville	Hancock	KY
3012		12	Columbia Falls Aluminum Company, llc	59912CLMBF2000A	Columbia Falls Aluminum Co LLC	Aluminum	Columbia Falls	Flathead	MT
3013		13	Eastalco Aluminum Company	21701STLCL5601M	Eastalco Aluminum Co	Aluminum	Frederick	Frederick	MD
3014		14	Noranda Aluminum Incorporated	63869NRNDLSTJUD	Noranda Aluminum Inc	Aluminum	Marston	New Madrid	MO

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
3047		47	Ormet Primary Aluminum Corp	70737RMTCRLAHWY	Ormet Primary Aluminum Corp	Bauxite and Alumina	Darrow	Ascension	LA
3049		49	Brush Resources Inc	84624BRSHW10MIL	Brush Resources Inc mill	Beryllium	Delta	Millard	UT
3050		50	Brush Wellman Inc	43416BRSHWSOUTH	Brush Wellman Inc	Beryllium	Elmore	Ottawa	OH
3057		57	Albemarle	71753THYLCHIGHW	Albemarle Corp West Plant	Bromine	Magnolia	Columbia	AR
3062		62	Global Tungsten & Powders Corp.	18848GTPRDHAWES	Global Tungsten & Powders Corp	Cobalt	Towanda	Bradford	PA
3063		63	Umicore Cobalt & Energy Products	28352CRLMTAIRPO	Umicore Cobalt & Specialty Materials North America	Cobalt	Laurinburg	Scotland	NC
3064		64	Chino Mine - Hurley Facility	88043CHNMN210CO	Chino Mines Co Mine Concentrator-Sxew Plants	Copper	Hurley	Grant	NM
3065		65	White Pine Copper Refinery Inc	49971BHPCPPOBOX	White Pine Copper Refinery Inc	Copper	Ontonagon	Ontonagon	MI
3068		68	Kennecott Corp-Smelter & Refinery	84006KNNCT8362W	Kennecott Utah Copper Smelter & Refinery	Copper	Magna	Salt Lake	UT
3093		93	AK Ashland	41105RMCSHUSROU	AK Steel Corp	Iron and Steel	Ashland	Boyd	KY
3094		94	AK Middletown Works	45043RMCNC1801C	AK Steel Corp	Iron and Steel	Middletown	Butler	OH
3095		95	AK Steel Corp. Mansfield	44901MPRDT913BO	AK Steel Corp Mansfield Works	Iron and Steel	Mansfield	Richland	OH
3097		97	Severstal Wheeling	43952WHLNGSOUTH	Severstal Wheeling Inc	Iron and Steel	Steubenville	Jefferson	OH
3099		99	Arcelor Mittal Weirton	26062RCLRM1PENN	Arcelormittal Weirton Inc	Iron and Steel	Weirton	Hancock	WV
3101		101	Severstal Dearborn	48121RGSTL3001M	Severstal Dearborn Inc	Iron and Steel	Dearborn	Wayne	MI
3105		105	US Steel Birmingham (Fairfield)	35064SSFRFVALLE	USS Fairfield Works	Iron and Steel	Fairfield	Jefferson	AL
3109		109	US Steel Great Lakes Works	48229GRTLKNO1QU	US Steel Corp Great Lakes Works	Iron and Steel	Ecorse	Wayne	MI
3114		114	Edward C. Levy Co.	4820WDWCLV88DIX	Edw C Levy Co- Plant 1	Iron and Steel Slag (Non-Electric Arc Furnace)	Detroit	Wayne	MI
3116		116	Edward C. Levy Co.	46312DWCLV31DIC	Edw C Levy Co (Ecl- Indiana Harbor)	Iron and Steel Slag (Non-Electric Arc Furnace)	Detroit	Wayne	MI

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
3121		121	Lafarge North America Inc.	60633LFRGN2150E	Lafarge North America Inc	Iron and Steel Slag (Non-Electric Arc Furnace)	Chicago	Cook	IL
3130		130	MultiServ	21219HRSCCCNSTR	Harsco Co Multiserv Plant 80	Iron and Steel Slag (Non-Electric Arc Furnace)	Mansfield	Richland	OH
3151		151	Doe Run Resources Corp.	63048HRCLN881MA	Doe Run Co Herculaneum Smelter	Lead	Herculaneum	Jefferson	MO
3171		171	FMC Corp. Lithium Division Bayport Texas facility	77507FMCCR12000	Fmc Corp Bayport Plant	Lithium	Pasadena	Harris	TX
3176		176	Martin Marietta Magnesia Specialties LLC	43469MRTNM755LI	Martin Marietta Magnesia Specialties Woodville	Magnesium Compounds	Woodville	Sandusky	OH
3181		181	Erachem Comilog Inc.	37134CHMTLFOOTE	Erachem Comilog	Manganese	Curtis Bay	Anne Arundel	MD
3182		182	Erachem Comilog Inc.	21226CHMTL711PI	Erachem Comilog Inc - Baltim Ore Plant	Manganese	New Johnsonville	Humphreys	TN
3184		184	Felman Production Inc.	25265FLMNPUSRT6	Felman Production Inc	Manganese	Letart	Mason	WV
3185		185	Tronox LLC	89015KRRMC8000L	Tronox LLC	Manganese	Henderson	Clark	NV
3186		186	Wilmington Plant	19720MRCNM301PI	Prince Minerals Inc	Manganese Ore	New Castle	New Castle	DE
3198		198	Climax Molybdenum Co. Henderson Mill	80468CLMXM19302	Climax Molybdenum Co Henderson Mill	Molybdenum	Parshall	Grand	CO
3201		201	Agrifos Fertilizer Pasadena	77501MBLMN2001J	Agrifos Fertilizer LLC	Phosphate Rock	Pasadena	Harris	TX
3203		203	J R Simplot Co Pocatello	83201JRSMPDONSI	J R Simplot Co Don Sid Ing	Phosphate Rock	Pocatello	Power	ID
3204		204	Mississippi Phosphates Corp.	39568NSTHNPOBOX	Mississippi Phosphates Corp	Phosphate Rock	Pascagoula	Jackson	MS
3206		206	Mosaic Fertilizer, LLC - Uncle Sam Plant	70792GRCCHEASTB	Mosaic Fertilizer LLC Uncle Sam Plant	Phosphate Rock	Convent	St. James	LA
3208		208	PCS Nitr Fert	70734RCDNCHIGHW	Pcs Nitrogen Fertilizer Lp	Phosphate Rock	Saint Gabriel	Ascension	LA
3210		210	PCS Phosphate White Springs	32096CCDNTSTATE	Pcs Phosphate White Springs	Phosphate Rock	Jasper	Hamilton	FL
3211		211	SF Phosphates Limited Company	82901CHVRN525SH	Simplot Phosphates LLC	Phosphate Rock	Warren	Trumbull	OH

Site RNUM	Mine RNUM	Processor RNUM	Mine Name	TRI FID	TRI Facility Name	Commodity	City/Town	County	State
3223		223	Amarillo Copper Refinery	79120SRCNCHWY13	Asarco LLC Amarillo Copper Re Finery	Selenium and Tellurium	Amarillo	Potter	TX
3230		230	Elkem Metals Company?	25002LKMMTBOX61	Wv Alloys Inc	Silicon	Montgomery	Fayette	WV
3231		231	Globe Metallurgical	36701GLBMTOLDMO	Globe Metallurgical	Silicon	Selma	Dallas	AL
3232		232	Globe Metallurgical Inc.	45786GLBMTCOUNT	Globe Metallurgical Inc	Silicon	Niagara Falls	Niagara	NY
3233		233	Globe Metallurgical Inc.	14305SKWLL3801H	Globe Metallurgical Inc	Silicon	Waterford	Morgan	OH

Attachment F2
TRI Data on Releases from 2009 Current Sites: By COC

Table F2-1 shows total releases of COCs. **Table F2-2** shows total releases of dioxin and dioxin-like compounds.

Table F2-1. Total COCs Released to Air, Surface Water, and Land for 2009 Current Sites (tons)

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
21	Nyrstar NV	Zinc compounds	4.73E+02	2.12E+01	0.00E+00	0.00E+00	0.00E+00	3.28E+04	0.00E+00	3.33E+04
1013	Asarco, LLC - Hayden	Copper compounds	1.81E+02	0.00E+00	0.00E+00	1.16E+01	0.00E+00	0.00E+00	2.44E+04	2.46E+04
3068	Kennecott Corp-Smelter & Refinery	Copper compounds	1.49E+02	6.42E-01	0.00E+00	7.03E+02	0.00E+00	1.84E+04	1.30E-01	1.93E+04
1013	Asarco, LLC - Hayden	Zinc compounds	7.37E+01	0.00E+00	0.00E+00	5.95E-01	0.00E+00	0.00E+00	1.60E+04	1.61E+04
3151	Doe Run Resources Corp.	Zinc compounds	1.09E+01	9.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+04	1.51E+04
21	Nyrstar NV	Lead compounds	9.47E-01	8.57E-01	0.00E+00	0.00E+00	0.00E+00	1.50E+04	0.00E+00	1.50E+04
3068	Kennecott Corp-Smelter & Refinery	Zinc compounds	2.19E+00	4.80E-01	0.00E+00	3.20E+00	0.00E+00	1.39E+04	3.00E-04	1.39E+04
33	Edward C. Levy Co.	Manganese compounds	5.75E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.58E-01	1.53E+00
33	The Levy Co., Inc.	Manganese compounds	7.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-02
33	Tube City IMS, LLC	Manganese compounds	9.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.13E-01
33	US Steel Gary Works	Manganese compounds	8.60E+01	3.95E+01	5.00E-04	1.23E+04	0.00E+00	0.00E+00	0.00E+00	1.24E+04
33	**Total**	Manganese compounds	8.75E+01	3.95E+01	5.00E-04	1.23E+04	0.00E+00	0.00E+00	9.58E-01	1.24E+04

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
27	US Steel Granite City	Zinc compounds	5.79E+01	3.13E+00	0.00E+00	1.07E+04	0.00E+00	1.42E+02	0.00E+00	1.09E+04
33	US Steel Gary Works	Zinc compounds	1.96E+02	2.00E+01	7.50E+00	9.45E+03	0.00E+00	0.00E+00	0.00E+00	9.67E+03
28	Elkem Metals Co.	Manganese compounds	6.69E+02	2.66E+02	0.00E+00	0.00E+00	0.00E+00	7.89E+03	0.00E+00	8.83E+03
28	Eveready Battery Co. Inc.	Manganese compounds	2.41E+01	5.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+01
28	**Total**	Manganese compounds	6.93E+02	2.67E+02	0.00E+00	0.00E+00	0.00E+00	7.89E+03	0.00E+00	8.85E+03
3068	Kennecott Corp-Smelter & Refinery	Arsenic compounds	8.34E+00	2.21E+00	0.00E+00	4.29E+01	0.00E+00	8.24E+03	1.43E-02	8.29E+03
3068	Kennecott Corp-Smelter & Refinery	Lead compounds	1.93E+01	1.51E-01	0.00E+00	7.95E+01	0.00E+00	8.02E+03	9.04E-03	8.12E+03
3181	Erachem Comilog Inc.	Manganese compounds	4.27E+01	6.89E+00	0.00E+00	7.09E+03	0.00E+00	0.00E+00	0.00E+00	7.14E+03
3198	Climax Molybdenum Co. Henderson Mill	Lead compounds	4.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E+03	0.00E+00	6.90E+03
1008	P4 Production LLC	Zinc compounds	1.74E+02	2.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.65E+03	6.83E+03
1011	Phelps-Dodge Morenci	Lead compounds	2.09E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E+03	3.30E+03	5.87E+03
1022	Asarco LLC Mission Complex	Lead compounds	3.95E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E+03	0.00E+00	5.07E+03
3151	Doe Run Resources Corp.	Lead compounds	1.11E+02	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E+03	4.75E+03
3105	US Steel Birmingham (Fairfield)	Zinc compounds	1.33E+01	4.23E+00	0.00E+00	4.44E+03	0.00E+00	0.00E+00	0.00E+00	4.46E+03
1013	Asarco, LLC - Hayden	Lead compounds	1.59E+01	0.00E+00	0.00E+00	5.91E+00	0.00E+00	0.00E+00	4.31E+03	4.33E+03
1011	Phelps-Dodge Morenci	Copper compounds	2.95E+00	2.80E+01	0.00E+00	0.00E+00	0.00E+00	1.99E+03	1.95E+03	3.97E+03

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3105	US Steel Birmingham (Fairfield)	Manganese compounds	1.02E+01	1.48E+00	0.00E+00	3.14E+03	0.00E+00	0.00E+00	0.00E+00	3.15E+03
30	MultiServ Plt 6	Manganese compounds	5.75E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-01
30	Severstal Warren	Manganese compounds	1.52E+01	0.00E+00	0.00E+00	3.07E+03	0.00E+00	0.00E+00	0.00E+00	3.09E+03
30	**Total**	Manganese compounds	1.58E+01	0.00E+00	0.00E+00	3.07E+03	0.00E+00	0.00E+00	0.00E+00	3.09E+03
14	Sherwin Alumina	Zinc compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E+03	0.00E+00	2.95E+03
21	Nyrstar NV	Copper compounds	2.87E-01	5.55E-01	0.00E+00	0.00E+00	0.00E+00	2.87E+03	0.00E+00	2.87E+03
27	US Steel Granite City	Manganese compounds	1.80E+01	1.10E+01	0.00E+00	1.80E+03	0.00E+00	3.32E+01	0.00E+00	1.86E+03
21	Nyrstar NV	Manganese compounds	2.51E-02	1.08E+02	0.00E+00	0.00E+00	0.00E+00	1.66E+03	0.00E+00	1.77E+03
3064	Chino Mine - Hurley Facility	Lead compounds	9.44E-02	1.00E-04	0.00E+00	4.38E-01	0.00E+00	9.81E+01	1.50E+03	1.60E+03
3068	Kennecott Corp-Smelter & Refinery	Antimony compounds	5.48E-01	1.00E+00	0.00E+00	3.39E+00	0.00E+00	1.08E+03	3.00E-04	1.08E+03
1011	Phelps-Dodge Morenci	Manganese compounds	2.81E-01	1.25E-01	0.00E+00	0.00E+00	0.00E+00	5.07E+02	5.50E+02	1.06E+03
3068	Kennecott Corp-Smelter & Refinery	Nickel compounds	7.38E-01	1.20E+00	0.00E+00	3.20E+00	0.00E+00	1.03E+03	4.85E-01	1.04E+03
3271	E.I. Dupont de Nemours	Manganese compounds	0.00E+00	1.73E+01	0.00E+00	0.00E+00	0.00E+00	4.80E-02	1.01E+03	1.02E+03
1011	Phelps-Dodge Morenci	Zinc compounds	2.55E-01	3.75E-01	0.00E+00	0.00E+00	0.00E+00	7.57E+02	0.00E+00	7.58E+02
1008	P4 Production LLC	Cadmium compounds	1.17E+01	1.22E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.29E+02	7.41E+02
3064	Chino Mine - Hurley Facility	Copper compounds	2.02E+00	1.15E+00	0.00E+00	0.00E+00	0.00E+00	3.78E+01	5.98E+02	6.39E+02

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
14	Sherwin Alumina	Lead compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+02	0.00E+00	6.24E+02
3151	Doe Run Resources Corp.	Copper compounds	1.44E+00	9.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E+02	5.70E+02
1013	Asarco, LLC - Hayden	Arsenic compounds	8.68E+00	0.00E+00	0.00E+00	1.04E-01	0.00E+00	0.00E+00	5.48E+02	5.56E+02
15	Alcoa World Alumina Atlantic	Lead compounds	1.91E-02	9.48E-03	0.00E+00	0.00E+00	0.00E+00	5.45E+02	0.00E+00	5.45E+02
21	Nyrstar NV	Cadmium compounds	3.30E+00	1.26E+00	0.00E+00	0.00E+00	0.00E+00	5.24E+02	0.00E+00	5.28E+02
1013	Asarco, LLC - Hayden	Manganese compounds	6.00E-02	0.00E+00	0.00E+00	6.48E-01	0.00E+00	0.00E+00	4.64E+02	4.64E+02
3151	Doe Run Resources Corp.	Cobalt compounds	9.78E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E+02	4.55E+02
3007	Alcoa Warrick Operations	Zinc compounds	6.28E+00	1.74E+00	0.00E+00	0.00E+00	0.00E+00	3.74E+02	3.10E-01	3.82E+02
3007	Alcoa Warrick Operations	Copper compounds	2.28E+00	9.42E-01	0.00E+00	0.00E+00	0.00E+00	3.41E+02	8.95E-02	3.44E+02
3004	Alcoa	Manganese compounds	4.19E+00	0.00E+00	0.00E+00	3.26E+02	0.00E+00	0.00E+00	0.00E+00	3.31E+02
3151	Doe Run Resources Corp.	Arsenic compounds	5.08E-01	1.56E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E+02	3.31E+02
3007	Alcoa Warrick Operations	Manganese compounds	5.47E+00	5.61E+00	0.00E+00	0.00E+00	0.00E+00	3.18E+02	1.75E-01	3.29E+02
3068	Kennecott Corp-Smelter & Refinery	Thallium compounds	4.41E-01	1.00E+00	0.00E+00	1.25E-01	0.00E+00	3.23E+02	3.00E-04	3.24E+02
33	Edward C. Levy Co.	Lead compounds	5.35E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-04
33	Tube City IMS, LLC	Lead compounds	2.29E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-03
33	US Steel Gary Works	Lead compounds	6.43E+00	4.34E+00	4.32E+00	2.70E+02	0.00E+00	0.00E+00	0.00E+00	2.85E+02
33	**Total**	Lead compounds	6.43E+00	4.34E+00	4.32E+00	2.70E+02	0.00E+00	0.00E+00	0.00E+00	2.85E+02

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3007	Alcoa Warrick Operations	Nickel compounds	4.16E+00	2.63E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+02	1.22E-01	2.72E+02
27	US Steel Granite City	Lead compounds	1.38E+00	7.38E-01	0.00E+00	2.28E+02	0.00E+00	3.11E+01	0.00E+00	2.62E+02
1013	ASARCO, LLC - HAYDEN	Antimony compounds	3.36E-01	0.00E+00	0.00E+00	1.20E-01	0.00E+00	0.00E+00	2.51E+02	2.51E+02
3151	Doe Run Resources Corp.	Nickel compounds	3.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+02	2.51E+02
3068	Kennecott Corp- Smelter & Refinery	Selenium compounds	9.21E-01	2.17E+00	0.00E+00	9.64E-01	0.00E+00	2.18E+02	3.50E-04	2.22E+02
1008	P4 Production LLC	Selenium compounds	1.06E+01	5.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E+02	2.17E+02
3050	Brush Wellman Inc	Copper compounds	4.58E+00	2.62E-01	0.00E+00	2.12E+02	0.00E+00	0.00E+00	0.00E+00	2.17E+02
1008	P4 Production LLC	Manganese compounds	3.15E-01	8.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E+02	2.07E+02
30	MultiServ Plt 6	Lead compounds	3.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04
30	Severstal Warren	Lead compounds	1.87E+00	2.09E-01	0.00E+00	2.01E+02	0.00E+00	0.00E+00	0.00E+00	2.03E+02
30	**Total**	Lead compounds	1.87E+00	2.09E-01	0.00E+00	2.01E+02	0.00E+00	0.00E+00	0.00E+00	2.03E+02
3049	Brush Resources Inc.	Zinc compounds	4.95E-03	0.00E+00	0.00E+00	6.86E-01	0.00E+00	1.98E+02	0.00E+00	1.99E+02
3201	Agrifos Fertilizer Pasadena	Zinc compounds	1.35E-01	1.00E-01	0.00E+00	0.00E+00	0.00E+00	1.88E+02	0.00E+00	1.88E+02
3007	Alcoa Warrick Operations	Lead compounds	5.94E+00	5.95E-02	0.00E+00	0.00E+00	0.00E+00	1.76E+02	4.26E-01	1.83E+02
3003	Alcan Primary Metal Sebree Works	Polycyclic aromatic compounds	1.77E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E+02
3184	Felman Production Inc.	Manganese compounds	1.65E+02	4.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E+02
1008	P4 Production LLC	Nickel compounds	1.53E+00	1.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+02	1.49E+02

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3206	Mosaic Fertilizer, LLC - Uncle Sam Plant	Lead compounds	8.00E-04	1.63E-02	0.00E+00	1.32E+02	0.00E+00	7.21E-03	0.00E+00	1.32E+02
33	US Steel Gary Works	Thallium compounds	1.13E+00	7.65E-02	0.00E+00	1.23E+02	0.00E+00	0.00E+00	0.00E+00	1.24E+02
3007	Alcoa Warrick Operations	Arsenic compounds	3.32E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+02	3.08E-01	1.24E+02
1008	P4 Production LLC	Copper compounds	7.69E-01	1.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E+02	1.24E+02
3105	US Steel Birmingham (Fairfield)	Lead compounds	4.88E-01	2.93E-01	0.00E+00	1.22E+02	0.00E+00	0.00E+00	0.00E+00	1.23E+02
1013	Asarco, LLC - Hayden	Nickel compounds	7.65E-02	0.00E+00	0.00E+00	5.73E-01	0.00E+00	0.00E+00	1.22E+02	1.22E+02
3049	Brush Resources Inc	Manganese compounds	1.06E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+02	0.00E+00	1.22E+02
1008	P4 Production LLC	Arsenic compounds	1.04E+00	6.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+02	1.21E+02
3185	Tronox LLC	Manganese compounds	2.66E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.42E+01	0.00E+00	1.21E+02
33	US Steel Gary Works	Copper compounds	1.70E+00	1.29E+00	2.75E+00	1.09E+02	0.00E+00	0.00E+00	0.00E+00	1.15E+02
3109	US Steel Great Lakes Works	Zinc compounds	1.10E+02	1.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E+02
3093	AK Ashland	Manganese compounds	9.15E+01	9.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E+00	1.07E+02
1013	Asarco, LLC - Hayden	Cobalt compounds	7.50E-03	0.00E+00	0.00E+00	1.04E-01	0.00E+00	0.00E+00	1.01E+02	1.01E+02
1008	P4 Production LLC	Lead compounds	1.57E+00	8.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.90E+01	1.01E+02
3101	Severstal Dearborn	Zinc compounds	9.61E+01	1.94E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.81E+01
3050	Brush Wellman Inc	Beryllium compounds	1.55E-01	5.80E-02	0.00E+00	8.58E+01	0.00E+00	0.00E+00	0.00E+00	8.60E+01
3007	Alcoa Warrick Operations	Cobalt compounds	1.42E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E+01	4.90E-02	8.57E+01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3201	Agrifos Fertilizer Pasadena	Copper compounds	1.80E-02	2.85E-02	0.00E+00	0.00E+00	0.00E+00	8.48E+01	0.00E+00	8.48E+01
3068	Kennecott Corp- Smelter & Refinery	Cadmium compounds	4.82E-01	3.69E-01	0.00E+00	6.93E-01	0.00E+00	8.03E+01	3.00E-04	8.19E+01
3068	Kennecott Corp- Smelter & Refinery	Manganese compounds	4.64E-01	1.00E+00	0.00E+00	1.26E-01	0.00E+00	7.50E+01	1.50E+00	7.81E+01
3004	Alcoa	Copper compounds	9.25E-01	0.00E+00	0.00E+00	7.21E+01	0.00E+00	3.30E-02	0.00E+00	7.30E+01
3208	PCS Nitr Fert	Lead compounds	0.00E+00	6.28E-01	0.00E+00	7.22E+01	0.00E+00	0.00E+00	1.50E-02	7.29E+01
3201	Agrifos Fertilizer Pasadena	Nickel compounds	1.09E-01	8.30E-02	0.00E+00	0.00E+00	0.00E+00	6.69E+01	0.00E+00	6.71E+01
33	US Steel Gary Works	Nickel compounds	1.50E+00	3.80E+00	2.30E+00	5.50E+01	0.00E+00	0.00E+00	0.00E+00	6.26E+01
1013	Asarco, LLC - Hayden	Cadmium compounds	3.30E-01	0.00E+00	0.00E+00	8.15E-02	0.00E+00	0.00E+00	6.05E+01	6.09E+01
33	US Steel Gary Works	Antimony compounds	4.10E-01	1.18E+00	0.00E+00	5.85E+01	0.00E+00	0.00E+00	0.00E+00	6.01E+01
21	Nyrstar NV	Antimony compounds	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.77E+01	0.00E+00	5.77E+01
3223	Amarillo Copper Refinery	Copper compounds	5.68E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E+01
1013	Asarco, LLC - Hayden	Selenium compounds	2.14E+00	0.00E+00	0.00E+00	7.95E-02	0.00E+00	0.00E+00	4.84E+01	5.06E+01
3211	SF Phosphates Limited Company	Lead compounds	3.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E+01	0.00E+00	4.81E+01
29	US Steel Braddock	Zinc compounds	7.09E+00	4.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E+01
3210	PCS Phosphate White Springs	Polycyclic aromatic compounds	2.18E-05	0.00E+00	0.00E+00	4.73E+01	0.00E+00	0.00E+00	0.00E+00	4.73E+01
3271	E.I. Dupont de Nemours	Lead compounds	7.23E-03	4.22E-02	0.00E+00	0.00E+00	0.00E+00	1.15E-04	4.64E+01	4.65E+01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3151	Doe Run Resources Corp.	Antimony compounds	4.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E+01	4.50E+01
3203	J R Simplot Co Pocatello	Lead compounds	1.11E-02	0.00E+00	0.00E+00	4.48E+01	0.00E+00	0.00E+00	0.00E+00	4.48E+01
3004	Alcoa	Selenium compounds	1.86E+00	0.00E+00	0.00E+00	3.93E+01	0.00E+00	0.00E+00	0.00E+00	4.12E+01
3007	Alcoa Warrick Operations	Selenium compounds	2.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E+01	0.00E+00	4.11E+01
33	US Steel Gary Works	Polycyclic aromatic compounds	1.19E+00	7.90E-02	3.92E+01	2.29E-03	0.00E+00	0.00E+00	0.00E+00	4.05E+01
1011	Phelps-Dodge Morenci	Mercury compounds	1.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+01	1.63E+01	3.64E+01
3004	Alcoa	Zinc compounds	4.30E-01	0.00E+00	0.00E+00	3.35E+01	0.00E+00	0.00E+00	0.00E+00	3.40E+01
3223	Amarillo Copper Refinery	Lead compounds	3.27E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E+01
3223	Amarillo Copper Refinery	Selenium compounds	3.22E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E+01
34	Arcelor Mittal Riverdale	Zinc compounds	2.54E+01	6.31E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E+01
3007	Alcoa Warrick Operations	Beryllium compounds	6.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E+01	1.19E-01	3.04E+01
3004	Alcoa	Nickel compounds	3.73E-01	0.00E+00	0.00E+00	2.91E+01	0.00E+00	3.30E-02	0.00E+00	2.95E+01
31	Republic Engineered Products Inc	Zinc compounds	2.98E+00	2.42E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E+01
3201	Agrifos Fertilizer Pasadena	Cadmium compounds	6.00E-03	5.50E-03	0.00E+00	0.00E+00	0.00E+00	2.54E+01	0.00E+00	2.54E+01
3201	Agrifos Fertilizer Pasadena	Beryllium compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E+01	0.00E+00	2.52E+01
30	Severstal Warren	Zinc compounds	3.40E-01	2.28E+00	0.00E+00	2.16E+01	0.00E+00	0.00E+00	0.00E+00	2.42E+01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3011	Century Aluminum Of Kentucky	Polycyclic aromatic compounds	2.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E+01
33	US Steel Gary Works	Arsenic compounds	2.20E-01	6.00E-01	5.00E-01	2.15E+01	0.00E+00	0.00E+00	0.00E+00	2.28E+01
1011	Phelps-Dodge Morenci	Selenium compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E+01	0.00E+00	2.25E+01
3012	Columbia Falls Aluminum Company, LLC	Polycyclic aromatic compounds	1.08E+01	0.00E+00	0.00E+00	5.16E+00	0.00E+00	5.58E+00	3.67E-01	2.19E+01
3182	Erachem Comilog Inc.	Manganese compounds	1.53E+01	3.06E-01	0.00E+00	0.00E+00	0.00E+00	3.29E+00	0.00E+00	1.89E+01
3004	Alcoa	Lead compounds	1.59E-01	0.00E+00	0.00E+00	1.87E+01	0.00E+00	2.85E-02	0.00E+00	1.89E+01
30	Severstal Warren	Nickel compounds	1.61E-01	0.00E+00	0.00E+00	1.81E+01	0.00E+00	0.00E+00	0.00E+00	1.83E+01
3095	AK Steel Corp. Mansfield	Zinc compounds	1.77E+01	5.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E+01
1011	Phelps-Dodge Morenci	Cobalt compounds	1.28E-01	1.25E-01	0.00E+00	0.00E+00	0.00E+00	1.73E+01	2.00E-01	1.77E+01
3064	Chino Mine - Hurley Facility	Mercury compounds	1.01E-03	0.00E+00	0.00E+00	8.50E-03	0.00E+00	2.05E+00	1.46E+01	1.66E+01
3049	Brush Resources Inc	Beryllium compounds	2.52E-01	0.00E+00	0.00E+00	2.75E-01	0.00E+00	1.61E+01	0.00E+00	1.66E+01
3204	Mississippi Phosphates Corp.	Lead compounds	3.17E-04	0.00E+00	0.00E+00	1.56E+01	0.00E+00	0.00E+00	0.00E+00	1.56E+01
3068	Kennecott Corp-Smelter & Refinery	Silver compounds	8.36E-01	1.00E+00	0.00E+00	8.39E-01	0.00E+00	1.21E+01	3.00E-04	1.48E+01
3094	AK Middletown Works	Zinc compounds	1.43E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01
29	Tube City IMS, LLC	Manganese compounds	1.86E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-01
29	US Steel Braddock	Manganese compounds	3.99E+00	9.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
29	**Total**	Manganese compounds	4.18E+00	9.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+01
3009	Alumax Of Sc Incorporated	Polycyclic aromatic compounds	1.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E+01
3151	Doe Run Resources Corp.	Cadmium compounds	2.18E+00	3.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+01	1.27E+01
1011	Phelps-Dodge Morenci	Cadmium compounds	2.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+01	0.00E+00	1.10E+01
3003	Alcan Primary Metal Sebree Works	Manganese compounds	1.05E+01	3.08E-01	0.00E+00	7.80E-04	0.00E+00	0.00E+00	0.00E+00	1.08E+01
3101	Severstal Dearborn	Manganese compounds	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+01
94	AK Middletown Works	Manganese compounds	9.67E+00	3.75E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+01
34	Arcelor Mittal Riverdale	Manganese compounds	9.10E+00	6.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E+00
34	MultiServ	Manganese compounds	1.72E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-01
34	**Total**	Manganese compounds	9.28E+00	6.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.93E+00
3014	Noranda Aluminum Incorporated	Polycyclic aromatic compounds	9.67E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.67E+00
95	AK Steel Corp. Mansfield	Manganese compounds	1.20E+00	8.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E+00
3223	Amarillo Copper Refinery	Arsenic compounds	9.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.08E+00
1013	Asarco, LLC - Hayden	Silver compounds	4.30E-01	0.00E+00	0.00E+00	2.30E-02	0.00E+00	0.00E+00	8.22E+00	8.67E+00
3007	Alcoa Warrick Operations	Polycyclic aromatic compounds	8.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.46E+00
3109	US Steel Great Lakes Works	Lead compounds	7.77E+00	6.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E+00

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
1022	Asarco LLC Mission Complex	Copper compounds	7.43E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-01	0.00E+00	7.73E+00
3201	Agrifos Fertilizer Pasadena	Lead compounds	1.50E-03	5.00E-04	0.00E+00	0.00E+00	0.00E+00	7.53E+00	0.00E+00	7.53E+00
3099	Arcelor Mittal Weirton	Zinc compounds	5.88E-01	6.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.41E+00
3109	US Steel Great Lakes Works	Manganese compounds	5.79E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E+00
3176	Martin Marietta Magnesia Specialties LLC	Lead compounds	8.95E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.33E+00	5.33E+00
27	US Steel Granite City	Nickel compounds	8.30E-02	8.20E-01	0.00E+00	4.39E+00	0.00E+00	0.00E+00	0.00E+00	5.29E+00
3050	Brush Wellman Inc	Nickel compounds	2.14E-01	6.45E-02	0.00E+00	4.91E+00	0.00E+00	0.00E+00	0.00E+00	5.19E+00
94	AK Middletown Works	Lead compounds	4.65E+00	1.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E+00
1011	Phelps-Dodge Morenci	Nickel compounds	1.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E+00	4.67E+00
3006	Alcoa Intalco Works	Polycyclic aromatic compounds	4.29E+00	6.05E-06	7.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E+00
3004	Alcoa	Polycyclic aromatic compounds	4.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E+00
15	Alcoa World Alumina Atlantic	Mercury compounds	2.65E+00	3.84E-03	0.00E+00	5.75E-03	0.00E+00	1.19E+00	3.18E-02	3.88E+00
3099	Arcelor Mittal Weirton	Manganese compounds	4.73E-02	3.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00
3005	Alcoa Inc Wenatchee Works	Polycyclic aromatic compounds	3.86E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.86E+00
3181	Erachem Comilog Inc.	Lead compounds	4.50E-03	0.00E+00	0.00E+00	3.72E+00	0.00E+00	0.00E+00	0.00E+00	3.72E+00
1011	Phelps-Dodge Morenci	Antimony compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-03	3.65E+00	3.65E+00

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
1011	Phelps-Dodge Morenci	Arsenic compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E+00	3.65E+00
3062	Global Tungsten & Powders Corp.	Nickel compounds	6.25E-02	3.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-02	3.60E+00
3047	Ormet Primary Aluminum Corp	Lead compounds	2.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.54E+00	0.00E+00	3.54E+00
34	Arcelor Mittal Riverdale	Lead compounds	2.94E+00	3.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E+00
34	MultiServ	Lead compounds	8.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E-05
34	**Total**	Lead compounds	2.94E+00	3.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E+00
3223	Amarillo Copper Refinery	Antimony compounds	3.32E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E+00
3064	Chino Mine - Hurley Facility	Cobalt compounds	0.00E+00	1.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E+00	3.31E+00
33	US Steel Gary Works	Selenium compounds	2.86E-01	1.59E-01	4.65E-02	2.49E+00	0.00E+00	0.00E+00	0.00E+00	2.98E+00
3184	Felman Production Inc.	Zinc compounds	2.88E+00	1.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.89E+00
14	Sherwin Alumina	Mercury compounds	1.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E+00	0.00E+00	2.79E+00
3186	Wilmington Plant	Manganese compounds	2.41E+00	2.95E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E+00
3068	Kennecott Corp-Smelter & Refinery	Mercury compounds	1.16E-01	3.23E-03	0.00E+00	8.25E-01	0.00E+00	1.74E+00	0.00E+00	2.69E+00
3105	US Steel Birmingham (Fairfield)	Antimony compounds	3.25E-02	2.25E-01	0.00E+00	2.25E+00	0.00E+00	0.00E+00	0.00E+00	2.51E+00
3184	Felman Production Inc.	Lead compounds	2.34E+00	1.35E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E+00
3013	Eastalco Aluminum Company	Polycyclic aromatic compounds	2.29E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+00

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3062	Global Tungsten & Powders Corp.	Cobalt compounds	4.75E-01	1.74E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-02	2.22E+00
29	Tube City IMS, LLC	Lead compounds	3.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-05
29	US Steel Braddock	Lead compounds	2.41E-01	1.94E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E+00
29	**Total**	Lead compounds	2.41E-01	1.94E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E+00
3093	AK Ashland	Lead compounds	1.58E+00	1.95E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E-01	2.17E+00
3003	Alcan Primary Metal Sebree Works	Nickel compounds	2.07E+00	6.04E-02	0.00E+00	3.50E-05	0.00E+00	0.00E+00	0.00E+00	2.13E+00
1008	P4 Production LLC	Mercury compounds	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-01	2.12E+00
3105	US Steel Birmingham (Fairfield)	Nickel compounds	8.00E-02	1.93E-01	0.00E+00	1.60E+00	0.00E+00	0.00E+00	0.00E+00	1.87E+00
21	Nyrstar NV	Mercury compounds	1.11E-03	9.50E-05	0.00E+00	0.00E+00	0.00E+00	1.84E+00	0.00E+00	1.84E+00
3232	Globe Metallurgical Inc.	Polycyclic aromatic compounds	1.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E+00
3203	J R Simplot Co Pocatello	Mercury compounds	1.76E-03	0.00E+00	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	1.62E+00
3230	Elkem Metals Company?	Polycyclic aromatic compounds	1.55E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E+00
3101	Severstal Dearborn	Lead compounds	1.35E+00	1.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00
3101	Severstal Dearborn	Copper compounds	2.91E-01	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00
3232	Globe Metallurgical Inc.	Manganese compounds	1.33E+00	3.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E+00
3050	Brush Wellman Inc	Lead compounds	1.79E-01	0.00E+00	0.00E+00	1.07E+00	0.00E+00	0.00E+00	0.00E+00	1.24E+00

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
1022	Asarco LLC Mission Complex	Zinc compounds	1.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E+00
3206	Mosaic Fertilizer, LLC - Uncle Sam Plant	Mercury compounds	0.00E+00	7.30E-04	0.00E+00	1.14E+00	0.00E+00	1.45E-06	0.00E+00	1.14E+00
28	Elkem Metals Co.	Mercury compounds	8.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-01	0.00E+00	1.12E+00
3223	Amarillo Copper Refinery	Silver compounds	9.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.66E-01
3007	Alcoa Warrick Operations	Mercury compounds	5.35E-01	2.00E-04	0.00E+00	0.00E+00	0.00E+00	3.44E-01	7.50E-02	9.54E-01
3049	Brush Resources Inc	Lead compounds	3.00E-03	0.00E+00	2.00E-04	0.00E+00	0.00E+00	9.26E-01	0.00E+00	9.30E-01
95	AK Steel Corp. Mansfield	Lead compounds	6.97E-01	1.96E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-01
3063	Umicore Cobalt & Energy Products	Cobalt compounds	7.50E-01	1.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.80E-01
21	Nyrstar NV	Thallium compounds	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-01	0.00E+00	8.40E-01
3004	Alcoa	Mercury compounds	5.03E-01	0.00E+00	0.00E+00	2.56E-01	0.00E+00	0.00E+00	0.00E+00	7.59E-01
3109	US Steel Great Lakes Works	Copper compounds	1.93E-01	4.97E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.89E-01
3130	MultiServ	Manganese compounds	6.86E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-01
3223	Amarillo Copper Refinery	Nickel compounds	6.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-01
28	Elkem Metals Co.	Polycyclic aromatic compounds	6.25E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.25E-01
3062	Global Tungsten & Powders Corp.	Zinc compounds	1.65E-02	5.65E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-01
3099	Arcelor Mittal Weirton	Lead compounds	2.53E-02	5.24E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3062	Global Tungsten & Powders Corp.	Copper compounds	0.00E+00	5.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.35E-01
3003	Alcan Primary Metal Sebree Works	Lead compounds	5.02E-01	1.37E-02	0.00E+00	5.00E-06	0.00E+00	0.00E+00	0.00E+00	5.15E-01
1013	Asarco, LLC - Hayden	Mercury compounds	3.30E-02	0.00E+00	0.00E+00	5.01E-03	0.00E+00	0.00E+00	4.69E-01	5.07E-01
27	US Steel Granite City	Polycyclic aromatic compounds	4.72E-01	2.44E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E-01
3006	Alcoa Intalco Works	Lead compounds	3.97E-01	0.00E+00	4.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-01
29	US Steel Braddock	Nickel compounds	4.31E-01	8.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-01
3099	Arcelor Mittal Weirton	Nickel compounds	3.03E-01	8.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-01
3232	Globe Metallurgical Inc.	Lead compounds	3.77E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-01
3109	US Steel Great Lakes Works	Selenium compounds	3.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-01
94	AK Middletown Works	Nickel compounds	3.58E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-01
3109	US Steel Great Lakes Works	Arsenic compounds	2.45E-01	9.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-01
3062	Global Tungsten & Powders Corp.	Manganese compounds	1.50E-03	3.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-02	3.29E-01
1011	Phelps-Dodge Morenci	Polycyclic aromatic compounds	8.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-01	3.16E-01
3223	Amarillo Copper Refinery	Zinc compounds	3.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-01
95	AK Steel Corp. Mansfield	Copper compounds	1.49E-01	1.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.89E-01
3109	US Steel Great Lakes Works	Antimony compounds	2.82E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-01

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3062	Global Tungsten & Powders Corp.	Lead compounds	1.50E-03	2.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-01
3230	Elkem Metals Company?	Lead compounds	2.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-01
34	Arcelor Mittal Riverdale	Copper compounds	1.60E-01	8.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01
3105	US Steel Birmingham (Fairfield)	Polycyclic aromatic compounds	1.00E-05	2.36E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-01
3047	Ormet Primary Aluminum Corp	Mercury compounds	1.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-01	0.00E+00	2.22E-01
3101	Severstal Dearborn	Mercury compounds	1.73E-01	7.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-01
34	Arcelor Mittal Riverdale	Cobalt compounds	1.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-01
3097	Severstal Wheeling	Manganese compounds	1.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-01
1013	Asarco, LLC - Hayden	Polycyclic aromatic compounds	1.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-01
33	US Steel Gary Works	Mercury compounds	2.24E-02	1.79E-03	3.30E-02	7.98E-02	0.00E+00	0.00E+00	0.00E+00	1.37E-01
95	AK Steel Corp. Mansfield	Nickel compounds	6.65E-02	5.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-01
3208	PCS Nitr Fert	Mercury compounds	0.00E+00	9.85E-03	0.00E+00	1.06E-01	0.00E+00	0.00E+00	1.50E-04	1.16E-01
3013	Eastalco Aluminum Company	Lead compounds	1.10E-01	1.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01
3201	Agrifos Fertilizer Pasadena	Mercury compounds	0.00E+00	5.00E-04	0.00E+00	0.00E+00	0.00E+00	9.30E-02	0.00E+00	9.35E-02
3176	Martin Marietta Magnesia Specialties LLC	Mercury compounds	6.01E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-02	8.58E-02
3184	Felman Production Inc.	Arsenic compounds	3.54E-02	4.44E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-02

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3109	US Steel Great Lakes Works	Nickel compounds	7.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-02
29	US Steel Braddock	Copper compounds	2.80E-02	3.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-02
3101	Severstal Dearborn	Nickel compounds	5.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-02
94	AK Middletown Works	Polycyclic aromatic compounds	5.25E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-02
30	Severstal Warren	Mercury compounds	4.17E-02	0.00E+00	0.00E+00	1.05E-03	0.00E+00	0.00E+00	0.00E+00	4.28E-02
3105	US Steel Birmingham (Fairfield)	Mercury compounds	7.65E-03	7.50E-03	0.00E+00	2.71E-02	0.00E+00	0.00E+00	0.00E+00	4.22E-02
34	Arcelor Mittal Riverdale	Nickel compounds	3.90E-02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-02
27	US Steel Granite City	Mercury compounds	6.17E-03	1.31E-02	0.00E+00	1.57E-02	0.00E+00	0.00E+00	0.00E+00	3.50E-02
3116	Edward C. Levy Co.	Manganese compounds	3.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-02
3231	Globe Metallurgical	Lead compounds	4.28E-03	0.00E+00	0.00E+00	2.38E-02	0.00E+00	0.00E+00	0.00E+00	2.80E-02
3130	MultiServ	Nickel Compounds	2.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-02
3231	Globe Metallurgical	Polycyclic aromatic compounds	2.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-02
29	US Steel Braddock	Antimony compounds	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-02
3062	Global Tungsten & Powders Corp.	Antimony compounds	0.00E+00	2.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-02	1.50E-02
3097	Severstal Wheeling	Lead compounds	6.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-03
3233	Globe Metallurgical Inc.	Polycyclic aromatic compounds	6.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-03

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3109	US Steel Great Lakes Works	Mercury compounds	4.50E-03	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-03
3186	Wilmington Plant	Lead compounds	3.53E-04	2.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-03
31	Republic Engineered Products Inc	Polycyclic aromatic compounds	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-03
3049	Brush Resources Inc	Mercury compounds	1.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.53E-04	0.00E+00	1.14E-03
29	US Steel Braddock	Mercury compounds	9.85E-04	1.45E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-03
3271	E.I. Dupont de Nemours	Mercury compounds	5.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04	1.04E-03
3010	Aluminum Co Of America Badin	Polycyclic aromatic compounds	0.00E+00	7.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-04
28	Eveready Battery Co. Inc.	Lead compounds	7.10E-04	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.20E-04
3101	Severstal Dearborn	Beryllium compounds	5.65E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E-04
3121	Lafarge North America Inc.	Lead compounds	4.45E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-04
3184	Felman Production Inc.	Mercury compounds	3.95E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-04
3130	MultiServ	Lead compounds	3.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-04
3186	Wilmington Plant	Nickel compounds	2.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-04
3182	Erachem Comilog Inc.	Lead compounds	1.52E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-04
3233	Globe Metallurgical Inc.	Lead compounds	1.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-04
3116	Edward C. Levy Co.	Lead compounds	8.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-05
3114	Edward C. Levy Co.	Lead compounds	6.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-05

Site ID	Site Name	TRI Chemical Name	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	[1]Total Onsite Releases
3121	Lafarge North America Inc.	Mercury compounds	5.00E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-11

[1]Note that the table is sorted (from largest to smallest) by total tons of onsite releases. Individual sites that are part of site groups are shown in the table, along with their contribution of pollutant releases, but individual grouped site are only considered as contributors to the total volume for the grouped site. Individual sites are shown in the table for clarity but only the "totaled" record for the site group is considered in the table order.

Table F2-2. Total Dioxin and Dioxin-Like Compounds Released to Air, Surface Water, and Land for Current Sites (grams)

SITE RNUM	MINE NAME	Site Type	Total Air Emissions	Total Surface Water Discharges	Total RCRA Subtitle C Landfills	Total Other Landfills	Total RCRA Subtitle C Surface Impoundments	Total Other Surface Impoundments	Total Other Disposal	Total Onsite Releases
107	US Steel Gary Works	Processor	38.79	0	0.06	0	0	0	0	38.85
176	Martin Marietta Magnesia Specialties LLC	Processor	3.87	0	0	0	0	0	14.40	18.27
7	Alcoa Warrick Operations	Processor	13.03	0	0	0	0	0	0	13.03
271	E.I. Dupont de Nemours	Processor	0.12	0.16	0	0	0	10.90	0	11.18
1007	Du Pont Florida Mine & Plant	Mine	0.12	0.16	0	0	0	10.90	0	11.18
4	Alcoa	Processor	7.37	0	0	0	0	0	0	7.37
2114	Cresson Project	Mine	2.36	0	0	0	0	0	0	2.36
199	Phelps-Dodge Morenci	Processor	0.96	0	0	0	0	0	0	0.96
1011	Freeport-McMoRan Morenci Inc.	Mine	0.96	0	0	0	0	0	0	0.96
2327	Smoky Valley Common Operations	Mine	0.81	0	0	0	0	0	0	0.81
2227	Lee Creek Mine	Mine	0.36	0	0	0	0	0	0	0.36
6	Alcoa Intalco Works	Processor	0.21	0	0	0	0	0	0	0.21
68	Kennecott Corp-Smelter & Refinery	Processor	0.01	0	0	0	0	0	0	0.01

Attachment F3
TRI Data on Releases from 2009 Current Sites: By Medium

Table F3-1 shows average of total air emissions; **Table F3-2** shows average total surface water releases; and **Table F3-3** shows average total on-site releases to land.

Table F3-1. Total Average Air Releases for 2009 Current Sites

Site ID	Mine Name	Site Type	[1,2]Average of Total Air Emissions (ton)
28	Elkem Metals Co.	Processor	134.08
28	Eveready Battery Co. Inc.	Processor	4.83
28	**Total**		138.91
21	Nyrstar NV	Processor	95.51
1013	Asarco, LLC - Hayden	Processor	60.84
33	US Steel Gary Works	Processor	59.49
33	Tube City IMS, LLC	Processor	0.23
33	Edward C. Levy Co.	Processor	0.19
33	The Levy Co., Inc.	Processor	0.07
33	**Total**		59.98
3184	Felman Production Inc.	Processor	42.53
1008	P4 Production LLC	Processor	42.33
3003	Alcan Primary Metal Sebree Works	Processor	37.97
3068	Kennecott Corp-Smelter & Refinery	Processor	36.71
3223	Amarillo Copper Refinery	Processor	27.19
3151	Doe Run Resources Corp.	Processor	25.42
3109	US Steel Great Lakes Works	Processor	24.90
3101	Severstal Dearborn	Processor	21.62
3093	AK Ashland	Processor	18.61
27	US Steel Granite City	Processor	15.79
3007	Alcoa Warrick Operations	Processor	14.36
2155	Buick Mine/Mill	Mine	13.49
3181	Erachem Comilog Inc.	Processor	8.54
2039	Balmat Mine No. 4 & Mill	Mine	8.23
34	Arcelor Mittal Riverdale	Processor	7.57
34	MultiServ	Processor	0.06
34	**Total**		7.63
2311	Stratcor, Inc.	Mine	6.29
3094	AK Middletown Works	Processor	5.80
3185	Tronox LLC	Processor	5.32
2154	Fletcher Mine and Mill	Mine	4.95
3105	US Steel Birmingham (Fairfield)	Processor	4.89
3011	Century Aluminum of Kentucky	Processor	4.59
2080	Ray	Mine	4.46
2153	Brushy Creek Mine/Mill	Mine	4.23
3004	ALCOA	Processor	4.13
3095	AK Steel Corp. Mansfield	Processor	3.96
30	Severstal Warren	Processor	3.53

Site ID	Mine Name	Site Type	[1,2]Average of Total Air Emissions (ton)
30	MultiServ Plt 6	Processor	0.14
30	**Total**		3.67
3182	Erachem Comilog Inc.	Processor	3.07
3009	Alumax of SC Incorporated	Processor	2.57
29	US Steel Braddock	Processor	2.38
29	Tube City IMS, LLC	Processor	0.05
29	**Total**		2.43
3012	Columbia Falls Aluminum Company, LLC	Processor	2.16
2156	Sweetwater Mine/Mill	Mine	1.95
3014	Noranda Aluminum Incorporated	Processor	1.93
2029	Montana Tunnels Mining Inc	Mine	1.91
1022	Mission/San Xavier/Eisenhower	Mine	1.80
2267	Pend Oreille Mine	Mine	1.23
2079	Freeport-McMoRan Bagdad Inc	Mine	1.19
1011	[1] Phelps-Dodge Morenci	Processor	1.15
1011	[1] Freeport-McMoRan Morenci Inc.	Mine	1.15
3050	Brush Wellman Inc	Processor	1.03
1018	Twin Creeks Mine	Mine	0.95
3006	Alcoa Intalco Works	Processor	0.94
3005	Alcoa Inc Wenatchee Works	Processor	0.77
3232	Globe Metallurgical Inc.	Processor	0.76
31	Republic Engineered Products Inc	Processor	0.75
2240	The Wharf Mine	Mine	0.72
2185	Jerritt Canyon Mill	Mine	0.58
15	Alcoa World Alumina Atlantic	Processor	0.53
3186	Wilmington Plant	Processor	0.48
3013	Eastalco Aluminum Company	Processor	0.48
1006	Chino Mines Co Mine	Mine	0.42
3064	Chino mine - Hurley Facility	Processor	0.42
2083	Freeport-McMoRan Sierrita Inc	Mine	0.38
3230	Elkem Metals Company?	Processor	0.36
2186	Lone Tree Mine	Mine	0.33
3099	Arcelor Mittal Weirton	Processor	0.32
3063	Umicore Cobalt & Energy Products	Processor	0.25
3130	MultiServ	Processor	0.18
2159	Continental Mine	Mine	0.18
2163	Golden Sunlight Mine Inc	Mine	0.17
3201	Agrifos Fertilizer Pasadena	Processor	0.16
2215	Tyrone Mine	Mine	0.13
2187	Bald Mountain Mine	Mine	0.13
2126	Lucky Friday	Mine	0.12
3062	Global Tungsten & Powders Corp.	Processor	0.11
2114	Cresson Project	Mine	0.11
2101	Mt Pass Mine & Mill	Mine	0.11
2125	Galena	Mine	0.10
2313	Henderson Operations	Mine	0.10
2164	Stillwater Mine	Mine	0.06
2253	Brush Mine	Mine	0.05

Site ID	Mine Name	Site Type	[1,2]Average of Total Air Emissions (ton)
3049	Brush Resources Inc	Processor	0.05
3097	Severstal Wheeling	Processor	0.05
2227	Lee Creek Mine	Mine	0.05
2182	Denton-Rawhide Mine	Mine	0.04
2262	Lisbon Valley Mining Co	Mine	0.03
2204	Hycroft Mine	Mine	0.03
2091	Freeport-McMoRan Safford Inc	Mine	0.03
2309	Silver Bell Mining LLC	Mine	0.03
7	Turquoise Ridge Mine	Mine	0.02
2327	Smoky Valley Common Operations	Mine	0.02
2192	Midas Mine	Mine	0.02
2280	Fort Knox Mine	Mine	0.02
3116	Edward C. Levy Co.	Processor	0.01
3198	Climax Molybdenum Co. Henderson Mill	Processor	0.008
1007	Du Pont Florida Mine & Plant	Mine	0.004
1007	E.I. Dupont de Nemours	Processor	0.004
[3]1007	**Total**		0.008
3233	Globe Metallurgical Inc.	Processor	0.007
3231	Globe Metallurgical	Processor	0.006
2103	Mesquite	Mine	0.003
14	Sherwin Alumina	Processor	0.003
3203	J R Simplot Co Pocatello	Processor	0.003
2124	Thompson Creek Mining Co	Mine	0.003
2242	CF & I PIT	Mine	0.002
2271	Kettle River Mill Site	Mine	0.002
3047	Ormet Primary Aluminum Corp	Processor	0.002
3176	Martin Marietta Magnesia Specialties LLC	Processor	0.001
3206	Mosaic Fertilizer, LLC - Uncle Sam Plant	Processor	0.0007
2104	CR Briggs	Mine	0.0002
3121	Lafarge North America Inc.	Processor	0.00009
3204	Mississippi Phosphates Corp.	Processor	0.00006
3114	Edward C. Levy Co.	Processor	0.00003
2118	Swift Creek Mine	Mine	0.000004
3210	PCS Phosphate White Springs	Processor	0.000004
3211	SF Phosphates Limited Company	Processor	0.0000007

[1]TRI data for total air releases at currently active sites averaged from 2005-2009; Note that some sites did not have recorded values for the full five year period

[2]Note that table is sorted (from largest to smallest) by total tons of onsite releases. Individual sites that are part of site groups are shown in the table, along with their contribution of pollutant releases, but individual grouped site are only considered as contributors to the total volume for the grouped site. Individual sites are shown in the table for clarity but only the “totaled” record for the site group is considered in the table order.

[3]The two sites in SITE ID 1007 are listed as both a mine and a processor; the average total air emissions values are identical

Table F3-2. Total Average Surface Water Releases for 2009 Current Sites

Site ID	Mine Name	Site Type	[2]Average of Total Surface Water Discharges (tons)
33	US Steel Gary Works	Processor	775.91
3050	Brush Wellman Inc	Processor	727.22
3062	Global Tungsten & Powders Corp.	Processor	643.20
3208	PCS Nitr Fert	Processor	304.47
3182	Erachem Comilog Inc.	Processor	299.57
27	US Steel Granite City	Processor	133.00
2311	Stratcor, Inc.	Mine	74.77
3094	AK Middletown Works	Processor	63.10
28	Elkem Metals Co.	Processor	53.29
28	Eveready Battery Co. Inc.	Processor	0.10
28	**Total**		53.39
3105	US Steel Birmingham (Fairfield)	Processor	42.03
31	Republic Engineered Products Inc	Processor	32.93
3099	Arcelor Mittal Weirton	Processor	30.58
2313	Henderson Operations	Mine	28.60
21	Nyrstar NV	Processor	26.33
3109	US Steel Great Lakes Works	Processor	25.15
2186	Lone Tree Mine	Mine	19.91
2155	Buick Mine/Mill	Mine	14.51
2240	The Wharf Mine	Mine	11.29
29	US Steel Braddock	Processor	11.18
3093	AK Ashland	Processor	9.41
1011	Freeport-McMoRan Morenci Inc.	Mine	5.73
1011	Phelps-Dodge Morenci	Processor	5.73
3007	Alcoa Warrick Operations	Processor	4.57
1007	Du Pont Florida Mine & Plant	Mine	4.11
2153	Brushy Creek Mine/Mill	Mine	3.57
3068	Kennecott Corp-Smelter & Refinery	Processor	2.84
2154	Fletcher Mine and Mill	Mine	2.52
2126	Lucky Friday	Mine	2.52
3095	AK Steel Corp. Mansfield	Processor	1.83
34	Arcelor Mittal Riverdale	Processor	1.49
3181	Erachem Comilog Inc.	Processor	1.38
2156	Sweetwater Mine/Mill	Mine	1.38
2039	Balmat Mine No. 4 & Mill	Mine	1.21
1008	P4 Production LLC	Processor	0.76
3101	Severstal Dearborn	Processor	0.64
2125	Galena	Mine	0.54
30	Severstal Warren	Processor	0.50
3151	Doe Run Resources Corp.	Processor	0.34
2309	Silver Bell Mining LLC	Mine	0.34
1006	Chino Mines Co Mine	Mine	0.25
3064	Chino Mine - Hurley Facility	Processor	0.25
2267	Pend Oreille Mine	Mine	0.16
3184	Felman Production Inc.	Processor	0.12
3201	Agrifos Fertilizer Pasadena	Processor	0.12
2215	Tyrone Mine	Mine	0.08

Site ID	Mine Name	Site Type	[2]Average of Total Surface Water Discharges (tons)
3003	Alcan Primary Metal Sebree Works	Processor	0.08
1018	Twin Creeks Mine	Mine	0.07
2079	Freeport-McMoRan Bagdad Inc	Mine	0.06
3186	Wilmington Plant	Processor	0.06
3206	Mosaic Fertilizer, LLC - Uncle Sam Plant	Processor	0.05
3063	Umicore Cobalt & Energy Products	Processor	0.04
2080	Ray	Mine	0.03
2124	Thompson Creek Mining Co	Mine	0.02
3232	Globe Metallurgical Inc.	Processor	0.01
2104	CR Briggs	Mine	0.005
15	Alcoa World Alumina Atlantic	Processor	0.003
3010	Aluminum Co of America Badin	Processor	0.0008
3013	Eastalco Aluminum Company	Processor	0.000003
3006	Alcoa Intalco Works	Processor	0.000001

[1]TRI data for total water discharges at currently active sites, averaged from 2005-2009; Note that some sites did not have recorded values for the full five year period

[2]Note that table Table F.3-2 is sorted (from largest to smallest) by total tons of onsite releases. Individual sites that are part of site groups are shown in the table, along with their contribution of pollutant releases, but individual grouped site are only considered as contributors to the total volume for the grouped site. Individual sites are shown in the table for clarity but only the “totaled” record for the site group is considered in the table order.

Table F3-3. Total Average Releases to Land for 2009 Current Sites

Site ID	Mine Name	Site Type	[1,2]Average of Total Land Placement* (tons)
1018	Twin Creeks Mine	Mine	26000
2155	Buick Mine/Mill	Mine	12000
21	Nyrstar NV	Processor	11000
3068	Kennecott Corp-Smelter & Refinery	Processor	10000
2159	Continental Mine	Mine	10000
1013	Asarco, LLC - Hayden	Processor	9400
2126	Lucky Friday	Mine	8300
2186	Lone Tree Mine	Mine	6700
2154	Fletcher Mine and Mill	Mine	6400
2153	Brushy Creek Mine/Mill	Mine	6200
2267	Pend Oreille Mine	Mine	4700
33	US Steel Gary Works	Processor	4600
33	Edward C. Levy Co.	Processor	0.32
33	Total		4600
3151	Doe Run Resources Corp.	Processor	4300
2029	Montana Tunnels Mining Inc	Mine	3600
27	US Steel Granite City	Processor	2600
1008	P4 Production LLC	Processor	2600
2215	Tyrone Mine	Mine	2500
1011	Freeport-McMoRan Morenci Inc.	Mine	2400
2125	Galena	Mine	2300
2156	Sweetwater Mine/Mill	Mine	1900
28	Elkem Metals Co.	Processor	1600
2280	Fort Knox Mine	Mine	1500
3105	US Steel Birmingham (Fairfield)	Processor	1500
2114	Cresson Project	Mine	1500
3181	Erachem Comilog Inc.	Processor	1400
3198	Climax Molybdenum Co. Henderson Mill	Processor	1400
2039	Balmat Mine No. 4 & Mill	Mine	1200
2103	Mesquite	Mine	1100
2185	Jerritt Canyon Mill	Mine	1000
1022	Mission/San Xavier/Eisenhower	Mine	1000
2124	Thompson Creek Mining Co	Mine	990
2327	Smoky Valley Common Operations	Mine	860
2311	Stratcor, Inc.	Mine	820
2240	The Wharf Mine	Mine	810
2083	Freeport-McMoRan Sierrita Inc	Mine	800
14	Sherwin Alumina	Processor	720
2079	Freeport-McMoRan Bagdad Inc	Mine	690
30	Severstal Warren	Processor	660
3007	Alcoa Warrick Operations	Processor	590
2163	Golden Sunlight Mine Inc	Mine	590
2192	Midas Mine	Mine	530
2187	Bald Mountain Mine	Mine	470
1006	Chino Mines Co Mine	Mine	460
3064	Chino Mine - Hurley Facility	Processor	460
7	Turquoise Ridge Mine	Mine	360

Site ID	Mine Name	Site Type	[1,2]Average of Total Land Placement* (tons)
2091	Freeport-McMoRan Safford Inc	Mine	310
3201	Agrifos Fertilizer Pasadena	Processor	290
3004	Alcoa	Processor	230
2313	Henderson Operations	Mine	230
1007	Du Pont Florida Mine & Plant	Mine	210
2080	Ray	Mine	210
2227	Lee Creek Mine	Mine	160
15	Alcoa World Alumina Atlantic	Processor	110
2271	Kettle River Mill Site	Mine	93
2253	Brush Mine	Mine	68
3049	Brush Resources Inc	Processor	68
3050	Brush Wellman Inc	Processor	61
2164	Stillwater Mine	Mine	28
3206	Mosaic Fertilizer, LLC - Uncle Sam Plant	Processor	27
1	Copper Queen Branch	Mine	25
3185	Tronox LLC	Processor	19
3208	PCS Nitr Fert	Processor	14
3203	J R Simplot Co Pocatello	Processor	11
3211	SF Phosphates Limited Company	Processor	9.6
2118	Swift Creek Mine	Mine	9.5
3210	PCS Phosphate White Springs	Processor	9.5
2196	Hollister Mine	Mine	6.2
3182	Erachem Comilog Inc.	Processor	5.9
3204	Mississippi Phosphates Corp.	Processor	3.1
3012	Columbia Falls Aluminum Company, LLC	Processor	2.2
3047	Ormet Primary Aluminum Corp	Processor	1.9
2309	Silver Bell Mining LLC	Mine	1.4
3093	AK Ashland	Processor	1.3
3176	Martin Marietta Magnesia Specialties LLC	Processor	1.1
2204	Hycroft Mine	Mine	0.20
2262	Lisbon Valley Mining Co	Mine	0.06
3006	Alcoa Intalco Works	Processor	0.02
3062	Global Tungsten & Powders Corp.	Processor	0.02
3231	Globe Metallurgical	Processor	0.005
3003	Alcan Primary Metal Sebree Works	Processor	0.0002

*Footnote = Values rounded to 2 significant figures.

[1]TRI data for total release to land at currently active sites, averaged from 2005-2009; Note that some sites did not have recorded values for the full five year period

[2]Note that table Table F.3-3 is sorted (from largest to smallest) by total tons of onsite releases. Individual sites that are part of site groups are shown in the table, along with their contribution of pollutant releases, but individual grouped site are only considered as contributors to the total volume for the grouped site. Individual sites are shown in the table for clarity but only the “totaled” record for the site group is considered in the table order.

Attachment F4
DMR Data on Releases from 2009 Current Sites: By COC

Table F4-1 shows DMR data for all COCs. **Table F4-2** shows DMR data for phosphorus, ammonia, and cyanide.

Table F4-1. Summary of Collected DMR Data by 2009 Current Site and COC

Fac ID	Mine ID	Mine Name	Pollutant	Release (pounds)
0	13	Sunshine Mine	Antimony	47.1
0	13	Sunshine Mine	Arsenic	9.59
0	13	Sunshine Mine	Copper	66.6
0	13	Sunshine Mine	Lead	42.06
0	13	Sunshine Mine	Manganese	1303
0	13	Sunshine Mine	Nickel	4.43
0	13	Sunshine Mine	Silver	1.26
0	13	Sunshine Mine	Zinc	54.6
0	124	Thompson Creek Mining Co	Cadmium	0.36
0	124	Thompson Creek Mining Co	Copper	0.706
0	124	Thompson Creek Mining Co	Lead	1.043
0	124	Thompson Creek Mining Co	Mercury	0.0011
0	124	Thompson Creek Mining Co	Zinc	51.3
0	125	Galena	Cadmium	0.025
0	125	Galena	Copper	0.53
0	125	Galena	Copper	83.1
0	125	Galena	Lead	1.31
0	125	Galena	Lead	26.01
0	125	Galena	Manganese	1687
0	125	Galena	Zinc	7.709
0	153	Brushy Creek Mine/Mill	Cadmium	58.5
0	153	Brushy Creek Mine/Mill	Copper	44.5
0	153	Brushy Creek Mine/Mill	Lead	701
0	153	Brushy Creek Mine/Mill	Mercury	0.65
0	153	Brushy Creek Mine/Mill	Zinc	3320
0	154	Fletcher Mine and Mill	Cadmium	77
0	154	Fletcher Mine and Mill	Copper	138
0	154	Fletcher Mine and Mill	Lead	1417
0	154	Fletcher Mine and Mill	Zinc	590
0	155	Buick Mine/Mill	Antimony	829
0	155	Buick Mine/Mill	Arsenic	164
0	155	Buick Mine/Mill	Cadmium	134
0	155	Buick Mine/Mill	Copper	17.9
0	155	Buick Mine/Mill	Copper	181
0	155	Buick Mine/Mill	Lead	517
0	155	Buick Mine/Mill	Lead	647
0	155	Buick Mine/Mill	Mercury	1.14
0	155	Buick Mine/Mill	Selenium	288

Fac ID	Mine ID	Mine Name	Pollutant	Release (pounds)
0	155	Buick Mine/Mill	Silver	1240
0	155	Buick Mine/Mill	Zinc	31.5
0	155	Buick Mine/Mill	Zinc	8305
0	163	Golden Sunlight Mine Inc	Arsenic	14.8
0	163	Golden Sunlight Mine Inc	Arsenic	28.8
0	163	Golden Sunlight Mine Inc	Copper	20.9
0	163	Golden Sunlight Mine Inc	Copper	693
0	163	Golden Sunlight Mine Inc	Lead	7.63
0	163	Golden Sunlight Mine Inc	Lead	669
0	163	Golden Sunlight Mine Inc	Manganese	67.8
0	163	Golden Sunlight Mine Inc	Manganese	3412
0	163	Golden Sunlight Mine Inc	Zinc	21.8
0	163	Golden Sunlight Mine Inc	Zinc	2031
0	190	TWIN CREEKS MINE	Antimony	157
0	190	TWIN CREEKS MINE	Fluoride	4150
0	240	THE WHARF MINE	Arsenic	229
0	240	THE WHARF MINE	Copper	11.7
0	240	THE WHARF MINE	Selenium	8.033
0	240	THE WHARF MINE	Zinc	116
0	267	Pend Oreille Mine	Lead	145
0	267	Pend Oreille Mine	Zinc	171
0	291	Red Dog	Copper	1.19
0	291	Red Dog	Manganese	11.1
0	291	Red Dog	Selenium	0.58
0	291	Red Dog	Zinc	14.9
0	313	HENDERSON OPERATIONS	Cadmium	3.19
0	313	HENDERSON OPERATIONS	Copper	39.7
0	313	HENDERSON OPERATIONS	Lead	0.83
0	313	HENDERSON OPERATIONS	Mercury	0.0045
0	313	HENDERSON OPERATIONS	Zinc	316
210	118	Swift Creek Mine	Fluoride	2655
3	0	ALCAN PRIMARY METAL SEBREE WORKS	Fluoride	871
3	0	ALCAN PRIMARY METAL SEBREE WORKS	Nickel	36.9
3	0	ALCAN PRIMARY METAL SEBREE WORKS	Zinc	145
4	0	ALCOA	Fluoride	18043
6	0	ALCOA INTALCO WORKS	Fluoride	9768
7	0	ALCOA WARRICK OPERATIONS	Antimony	560
7	0	ALCOA WARRICK OPERATIONS	Copper	527
7	0	ALCOA WARRICK OPERATIONS	Fluoride	34461
7	0	ALCOA WARRICK OPERATIONS	Nickel	448
7	0	ALCOA WARRICK OPERATIONS	Zinc	1309
13	0	EASTALCO ALUMINUM COMPANY	Fluoride	23759
14	0	NORANDA ALUMINUM INCORPORATED	Antimony	4.51
14	0	NORANDA ALUMINUM INCORPORATED	Fluoride	57279
14	0	NORANDA ALUMINUM INCORPORATED	Nickel	42.7
35	0	Corpus Christi Grinding Plant	Copper	40.7

Fac ID	Mine ID	Mine Name	Pollutant	Release (pounds)
35	0	Corpus Christi Grinding Plant	Zinc	67.1
48	0	ALCOA WORLD ALUMINA ATLANTIC	Copper	195
48	0	ALCOA WORLD ALUMINA ATLANTIC	Fluoride	21413
48	0	ALCOA WORLD ALUMINA ATLANTIC	Mercury	0.79
48	0	ALCOA WORLD ALUMINA ATLANTIC	Zinc	60.1
50	0	Brush Wellman Inc	Beryllium	46.4
50	0	Brush Wellman Inc	Copper	66.5
50	0	Brush Wellman Inc	Fluoride	372
50	0	Brush Wellman Inc	Nickel	18.04
50	0	Brush Wellman Inc	Silver	0.81
50	0	Brush Wellman Inc	Zinc	16.7
56	0	Chemtura	Lead	2.28
62	0	Global Tungsten & Powders Corp.	Fluoride	6410
62	0	Global Tungsten & Powders Corp.	Zinc	2375
68	0	KENNECOTT CORP-SMELTER & REFINERY	Arsenic	746
68	0	KENNECOTT CORP-SMELTER & REFINERY	Cadmium	106
68	0	KENNECOTT CORP-SMELTER & REFINERY	Copper	752
68	0	KENNECOTT CORP-SMELTER & REFINERY	Mercury	0.00029
68	0	KENNECOTT CORP-SMELTER & REFINERY	Selenium	395
68	0	KENNECOTT CORP-SMELTER & REFINERY	Zinc	708
74	0	UMICORE OPTICAL MATERIALS USA	Zinc	2.81
87	0	Indium Corp of America	Nickel	260
92	0	Arcelor Mittal Burns Harbor	Copper	5108
92	0	Arcelor Mittal Burns Harbor	Mercury	113
93	0	AK Ashland	Lead	8.98
93	0	AK Ashland	Manganese	1.53
93	0	AK Ashland	Zinc	451
94	0	AK Middletown Works	Chromium, Hexavalent	0.55
94	0	AK Middletown Works	Copper	11.3
94	0	AK Middletown Works	Lead	6.99
94	0	AK Middletown Works	Selenium	0.25
94	0	AK Middletown Works	Zinc	1574
95	0	AK Steel Corp. Mansfield	Cadmium	0.0000061
95	0	AK Steel Corp. Mansfield	Copper	0.27
95	0	AK Steel Corp. Mansfield	Lead	0.00022
95	0	AK Steel Corp. Mansfield	Silver	0.32
97	0	Severstal Wheeling	Lead	0.26
97	0	Severstal Wheeling	Lead	1.43
97	0	Severstal Wheeling	Zinc	4.56
97	0	Severstal Wheeling	Zinc	5.901
103	0	Severstal Warren	Lead	29.06
103	0	Severstal Warren	Mercury	0.000041
103	0	Severstal Warren	Zinc	396
104	0	US Steel (ET Works)	Lead	215
104	0	US Steel (ET Works)	Nickel	8.46
104	0	US Steel (ET Works)	Zinc	56.8

Fac ID	Mine ID	Mine Name	Pollutant	Release (pounds)
105	0	US Steel Birmingham (Fairfield)	Lead	200
105	0	US Steel Birmingham (Fairfield)	Manganese	446
105	0	US Steel Birmingham (Fairfield)	Zinc	8416
106	0	US Steel Braddock	Lead	37.08
106	0	US Steel Braddock	Manganese	619502
106	0	US Steel Braddock	Zinc	2094737
107	0	US Steel Gary Works	Chromium	1.26
107	0	US Steel Gary Works	Copper	0.98
107	0	US Steel Gary Works	Fluoride	78467
107	0	US Steel Gary Works	Manganese	15.5
107	0	US Steel Gary Works	Nickel	5.53
107	0	US Steel Gary Works	Thallium	5.52
107	0	US Steel Gary Works	Zinc	80.3
108	0	US Steel Granite City	Lead	222
108	0	US Steel Granite City	Zinc	1103
109	0	US Steel Great Lakes Works	Copper	158
109	0	US Steel Great Lakes Works	Lead	0.44
109	0	US Steel Great Lakes Works	Zinc	159
113	0	Edward C. Levy Co.	Lead	1406
113	0	Edward C. Levy Co.	Zinc	5729
116	0	Edward C. Levy Co.	Cadmium	24.4
116	0	Edward C. Levy Co.	Copper	820
116	0	Edward C. Levy Co.	Lead	44.3
116	0	Edward C. Levy Co.	Mercury	1.707
116	0	Edward C. Levy Co.	Zinc	4028
126	0	Lafarge North America Inc./Maryland Slag Company	Zinc	11250
151	0	Doe Run Resources Corp.	Arsenic	71.8
151	0	Doe Run Resources Corp.	Cadmium	284
151	0	Doe Run Resources Corp.	Copper	5.63
151	0	Doe Run Resources Corp.	Lead	250
151	0	Doe Run Resources Corp.	Silver	76.1
151	0	Doe Run Resources Corp.	Zinc	797
181	0	Erachem Comilog Inc.	Manganese	2837
182	0	Erachem Comilog Inc.	Copper	2.43
182	0	Erachem Comilog Inc.	Nickel	2.4007
184	0	Felman Production Inc.	Manganese	845
184	0	Felman Production Inc.	Zinc	1579
201	0	Agrifos Fertilizer Pasadena	Arsenic	33.5
201	0	Agrifos Fertilizer Pasadena	Cadmium	0.29
201	0	Agrifos Fertilizer Pasadena	Copper	26.4
201	0	Agrifos Fertilizer Pasadena	Fluoride	51518
201	0	Agrifos Fertilizer Pasadena	Lead	35.1
201	0	Agrifos Fertilizer Pasadena	Lead	474
201	0	Agrifos Fertilizer Pasadena	Nickel	52.04
201	0	Agrifos Fertilizer Pasadena	Zinc	94.05
201	0	Agrifos Fertilizer Pasadena	Zinc	606

Fac ID	Mine ID	Mine Name	Pollutant	Release (pounds)
204	0	Mississippi Phosphates Corp.	Fluoride	40108
205	0	Mosaic Fertilizer, LLC - Taft Plant	Copper	613
205	0	Mosaic Fertilizer, LLC - Taft Plant	Nickel	735
206	0	Mosaic Fertilizer, LLC - Uncle Sam Plant	Fluoride	27739729
210	118	PCS Phosphate White Springs	Fluoride	2655
221	0	W.R. Grace & Co. - Conn. Davison Catalysts	Copper	130
221	0	W.R. Grace & Co. - Conn. Davison Catalysts	Mercury	1.37
231	0	Globe Metallurgical	Chromium	0.98
231	0	Globe Metallurgical	Copper	7.22
231	0	Globe Metallurgical	Zinc	74.6
243	0	ATI Alldyne	Copper	15.1
243	0	ATI Alldyne	Nickel	363
243	0	ATI Alldyne	Zinc	113
249	0	Palmetto Vermiculite Co., Inc.	Zinc	29.1
265	0	Maintenance and Supply	Zinc	583
267	0	Plasminco (probably should be Pasminco)	Cadmium	0.22
267	0	Plasminco (probably should be Pasminco)	Copper	7.0702
267	0	Plasminco (probably should be Pasminco)	Lead	2.016
267	0	Plasminco (probably should be Pasminco)	Mercury	0.0201
267	0	Plasminco (probably should be Pasminco)	Zinc	44.3
268	0	ATI Wah Chang	Fluoride	2407
268	0	ATI Wah Chang	Nickel	481

Table F4-2. Summary of Collected DMR Phosphorus, Ammonia, and Cyanide Data by 2009 Current Site and by CERCLA Hazardous Substance

Fac ID	Mine ID	Mine Name	Pollutant	Released (pounds)
0	81	Mineral Park Inc	Ammonia	9322
0	93	Saint-Gobain Proppants	Ammonia	38.01
0	163	Golden Sunlight Mine Inc	Phosphorus	123
0	163	Golden Sunlight Mine Inc	Phosphorus	185
0	164	STILLWATER MINE	Ammonia	419
0	164	STILLWATER MINE	Phosphorus	17.5
0	190	TWIN CREEKS MINE	Ammonia	242
0	190	TWIN CREEKS MINE	Phosphorus	120
0	240	THE WHARF MINE	Ammonia	242
0	240	THE WHARF MINE	Phosphorus	523
0	267	Pend Oreille Mine	Ammonia	7147
0	291	Red Dog	Ammonia	1033
0	311	Stratcor, Inc.	Ammonia	246375
0	311	Stratcor, Inc.	Phosphorus	6335
210	118	Swift Creek Mine	Ammonia	4719
11	0	CENTURY ALUMINUM OF KENTUCKY	Cyanide	157
13	0	EASTALCO ALUMINUM COMPANY	Cyanide	1.808
26	0	Halliburton Energy Services	Ammonia	41.2
35	0	Corpus Christi Grinding Plant	Ammonia	1609
48	0	ALCOA WORLD ALUMINA ATLANTIC	Cyanide	0.00077
50	0	Brush Wellman Inc	Ammonia	2879
50	0	Brush Wellman Inc	Phosphorus	272
56	0	Chemtura	Ammonia	50.6
62	0	Global Tungsten & Powders Corp.	Ammonia	170998
62	0	Global Tungsten & Powders Corp.	Phosphorus	2028
68	0	KENNECOTT CORP-SMELTER & REFINERY	Cyanide	69.4
93	0	AK Ashland	Ammonia	14258
93	0	AK Ashland	Ammonia	23152
93	0	AK Ashland	Cyanide	63.9
93	0	AK Ashland	Cyanide	672
94	0	AK Middletown Works	Ammonia	2117
103	0	Severstal Warren	Ammonia	15020
105	0	US Steel Birmingham (Fairfield)	Ammonia	8525
105	0	US Steel Birmingham (Fairfield)	Cyanide	2.73
105	0	US Steel Birmingham (Fairfield)	Cyanide	40.5
107	0	US Steel Gary Works	Ammonia	4072
107	0	US Steel Gary Works	Ammonia	49848
108	0	US Steel Granite City	Ammonia	49286
108	0	US Steel Granite City	Cyanide	449
109	0	US Steel Great Lakes Works	Phosphorus	215
112	0	Beemsterboer Slag Corp.	Ammonia	14.9
113	0	Edward C. Levy Co.	Cyanide	571
116	0	Edward C. Levy Co.	Ammonia	4625
126	0	Lafarge North America Inc./Maryland Slag Co.	Ammonia	151159
126	0	Lafarge North America Inc./Maryland Slag Co.	Phosphorus	30839

Fac ID	Mine ID	Mine Name	Pollutant	Released (pounds)
145	0	Quality Magnetite LLC	Ammonia	64.3
181	0	Erachem Comilog Inc.	Ammonia	81.9
182	0	Erachem Comilog Inc.	Ammonia	380
182	0	Erachem Comilog Inc.	Phosphorus	11.3
184	0	Felman Production Inc.	Ammonia	7652
184	0	Felman Production Inc.	Phosphorus	557
185	0	Tronox LLC	Ammonia	17.1
185	0	Tronox LLC	Phosphorus	2.37
201	0	Agrifos Fertilizer Pasadena	Ammonia	5928
201	0	Agrifos Fertilizer Pasadena	Ammonia	26356
201	0	Agrifos Fertilizer Pasadena	Phosphorus	65769
204	0	Mississippi Phosphates Corp.	Ammonia	30888
204	0	Mississippi Phosphates Corp.	Phosphorus	205278
205	0	Mosaic Fertilizer, LLC - Taft Plant	Ammonia	12841
205	0	Mosaic Fertilizer, LLC - Taft Plant	Phosphorus	5751
205	0	Mosaic Fertilizer, LLC - Taft Plant	Phosphorus	384345
206	0	Mosaic Fertilizer, LLC - Uncle Sam Plant	Phosphorus	1374931
208	0	PCS NITR FERT	Phosphorus	3955
210	118	PCS Phosphate White Springs	Ammonia	4719
221	0	W.R. Grace & Co. - Conn. Davison Catalysts	Ammonia	283721
243	0	ATI Alldyne	Ammonia	380
249	0	Palmetto Vermiculite Co., Inc.	Ammonia	649
249	0	Palmetto Vermiculite Co., Inc.	Phosphorus	85.9
268	0	ATI Wah Chang	Ammonia	107888

Appendix G
Potential for Human Drinking Water Exposures from 2009 Current Sites

For security reasons data on the locations of drinking water intakes are not publically available. However, source protection areas (SPAs) can be used to estimate potential impacts of mining and mineral processing CERCLA hazardous substance releases on drinking water supplies. SPAs encompass areas around drinking water intakes and are used to approximate locations of intakes without specifying their precise locations. In this report, surface drinking water intake locations are represented by SPA polygons rather than as individual, explicit points. SPAs are separated into those around surface water intakes (i.e., on lakes and streams) and those around ground water intakes (i.e., wells). EPA analyzed the locations of drinking water and ground water SPAs to estimate the 2009 Current sites' potential to impact drinking water supplies. To do this EPA estimated a 24-hour downstream travel distance from each 2009 Current site, and the 12-digit watershed boundary dataset hydrologic unit codes (National Geospatial Management Center, *12-Digit HUC Subwatershed Lists*[1]) for watershed areas encompassed by the estimated 24-hour downstream travel distance. The *Drinking Water HUC 12-Based Indicators* database maintained by EPA Office of Ground Water and Drinking Water was the source for the SPA data.

Of the 2009 Current sites with verifiable locations, 208 have surface drinking water SPAs that intersect with their estimated 24-hour downstream travel distance. **Figures G-1** and **G-2** show the geographic distribution of the sites where surface drinking water supplies might be affected by hazardous substance releases from 2009 Current mining and mineral processing sites, respectively.

A small number of the 2009 Current sites (3%) have tribal drinking water SPAs intersecting with their estimated 24-hour downstream travel distance. (Tribal drinking water SPAs are not included within the other surface water and groundwater drinking water SPA data, but are identified as a separate category within the database that contains the SPA information.)

Groundwater SPAs are areas that protect drinking water wells. In some instances, the aquifer from which a drinking water well is supplied is located near a surface water body (and may be recharged by the surface water body). In these instances, discharges from 2009 Current sites into surface water could affect the aquifers from which the drinking water wells draw their water. Of the 2009 Current sites with verifiable locations, 295 (71%) have groundwater drinking water SPAs that intersect with their 24-hour estimated downstream travel distance. Of these, 149 are associated with mines, 160 are associated with processors, and 16 are associated with sites containing combined mines and processors. **Figures G-3** and **G-4** show the geographic distribution of the sites where groundwater drinking water supplies might be impacted by CERCLA hazardous substance releases from 2009 Current mines, and 2009 Current processors, respectively.

[1] Available at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?&cid=nrcsdev11_024117.

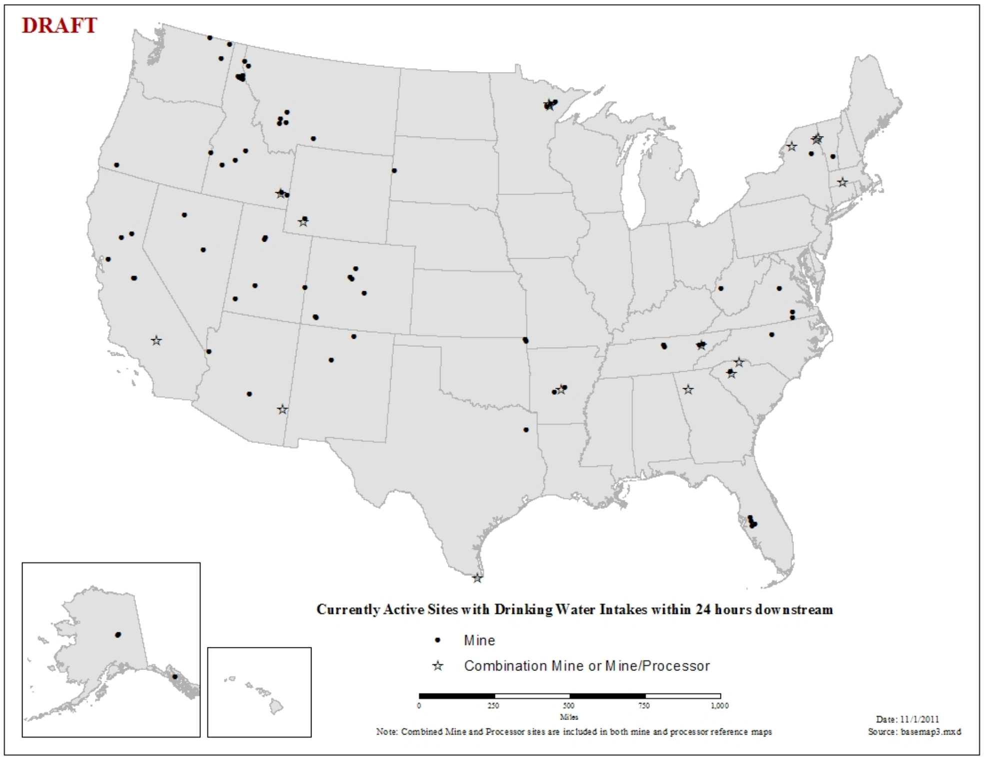


Figure G-1. 2009 Current Mines with Surface Drinking Water SPAs within 24 Hours Downstream

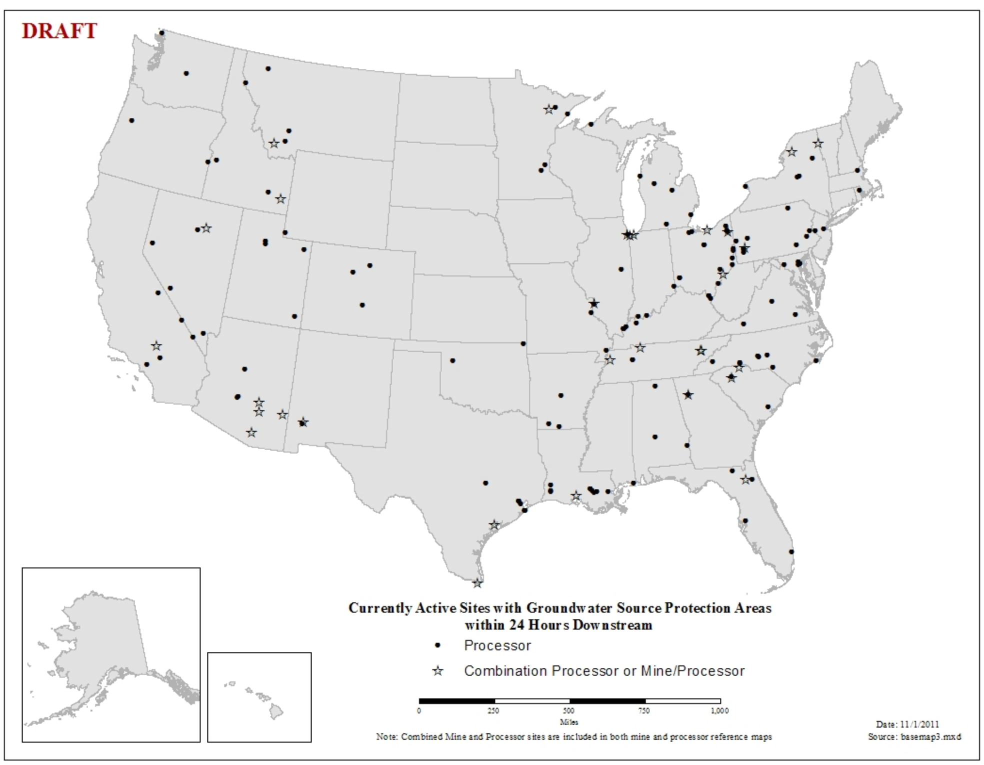


Figure G-2. 2009 Current Processors with Surface Drinking Water SPAs within 24 Hours Downstream

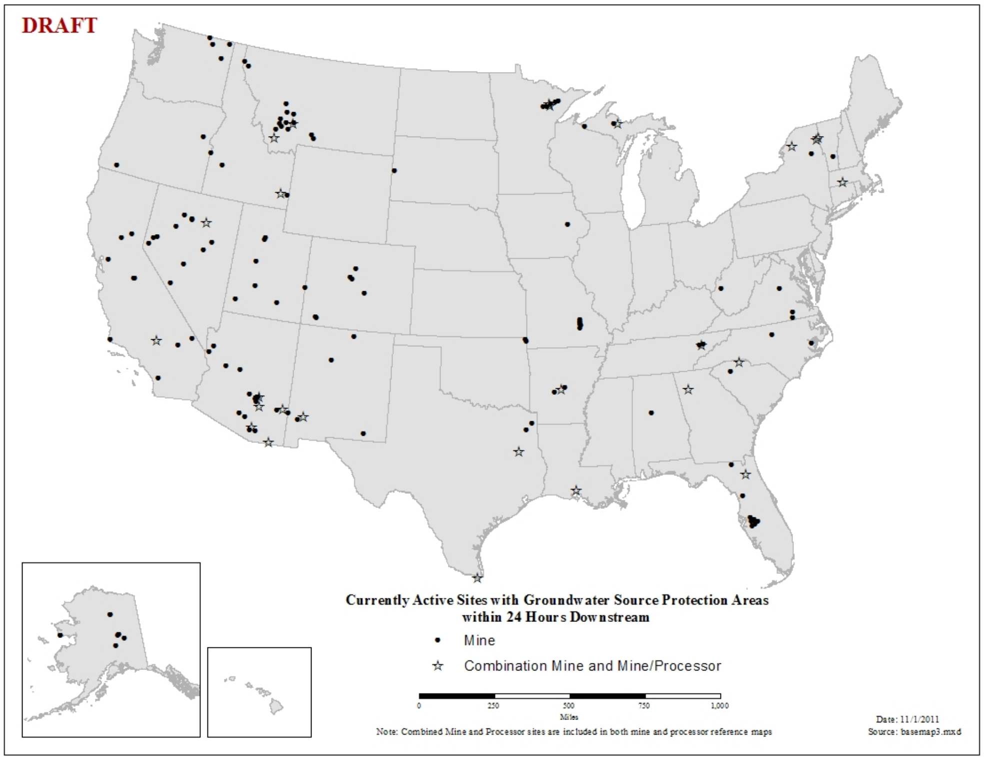


Figure G-3. 2009 Current Mines with Ground Water SPAs within 24 Hours Downstream

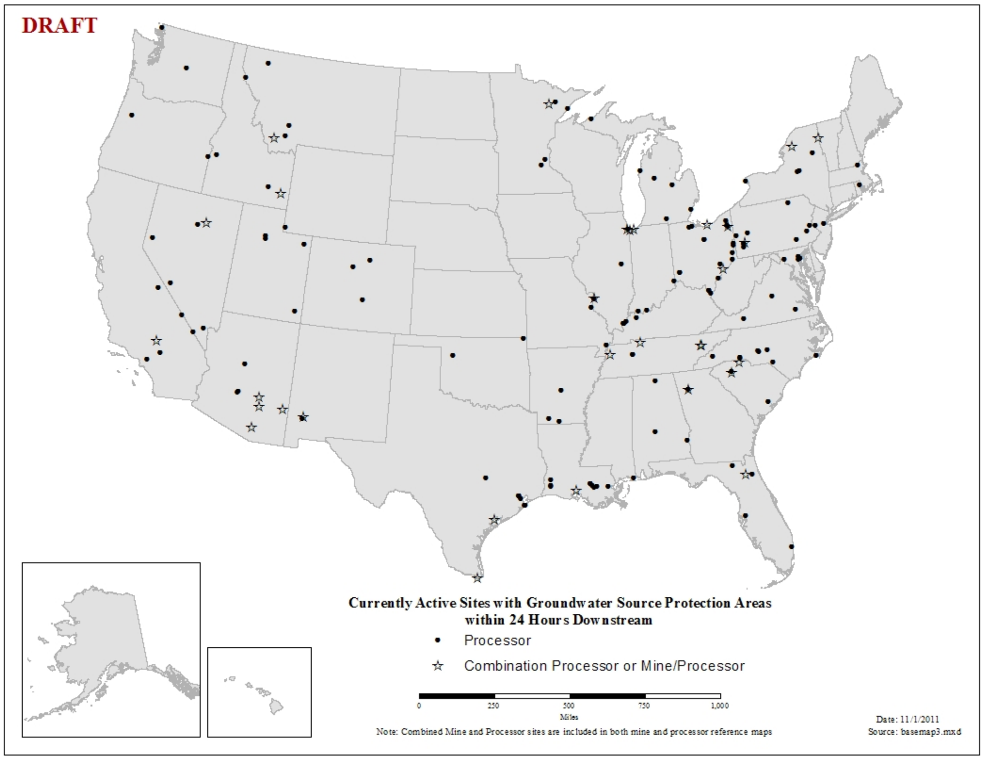


Figure G-4. 2009 Current Processors with Groundwater SPAs within 24 Hours Downstream

Appendix H
Presence of Ecological Receptors near Case Study Historical and 2009 Current Sites

EPA studied the potential presence of ecological receptors near the Case Study Historical sites and 2009 Current sites. For the Case Study Historical sites, EPA evaluated the site's proximity to "sensitive environments," including critical habitat for federally designated threatened or endangered species (U.S. EPA 1989b).

This study used the 12-digit Hydrologic Unit Code (HUC12) polygon within which each site exists as the starting point to determine watershed catchments that are within 24-hours downstream of the HUC12. All individual catchments within the HUC12s were used as initial starting points and the total set of resulting catchments was established as the Aquatic Area of Review (AqAoR) for each site. **Figure H-1** provides an example of an Aquatic Area of Review (AqAoR) developed for this analysis. The AqAoR, in summary, encompasses the HUC12, and sometimes more than one HUC12 if the site has drainage into multiple HUC12 subbasins, as well as downstream catchments within an estimated 24-hour travel distance from the site. EPA then performed a geographic information system analysis of the AqAoR for each site, together with other data layers, to determine which sites have AqAoRs that intersect with habitat for various potential receptors such as threatened and endangered species, wild and scenic rivers, communities or populations of aquatic organisms, etc.

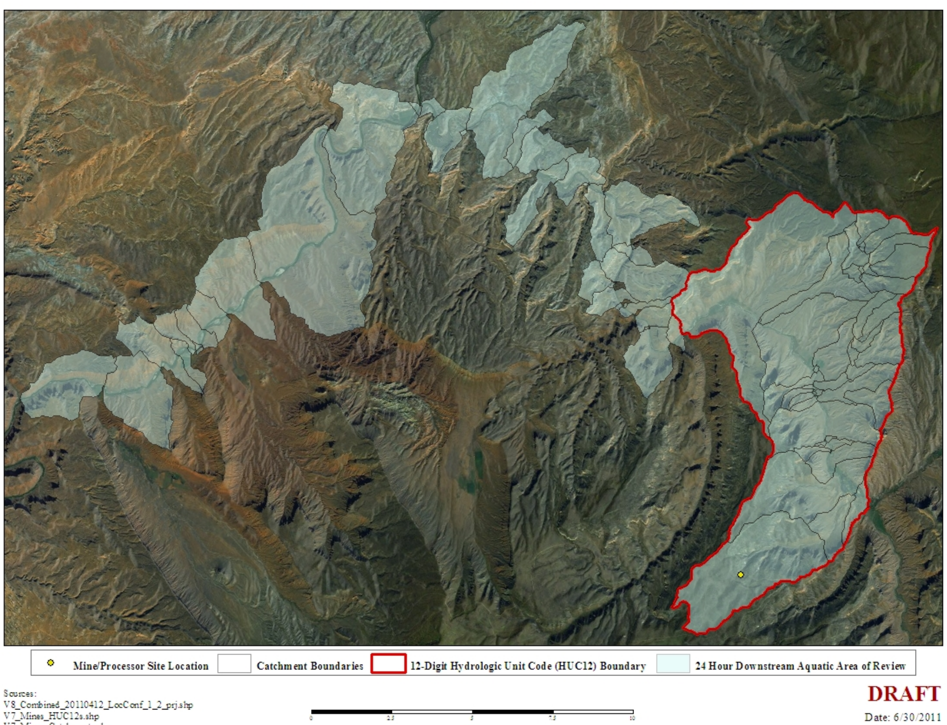


Figure H-1. Example Aquatic Area of Review Showing Portions with Significant Aquatic Beneficial Uses

H.1 Case Study Historical Sites

Figure H-2 relates the sources, pathways, exposure routes, and ecological receptors (e.g., red-tailed hawk, raccoon) considered in Superfund risk assessments of the Case Study Historical sites.

Ecological receptors at the Case Study Historical sites included species identified as federally designated threatened or endangered species at the time the site was investigated, as well as state-designated threatened or endangered, and federal and/or state-designated species of concern. The identified federally designated endangered species included birds (e.g., Bald Eagle), mammals (e.g., Gray Wolf), and one reptile species (i.e., Bog turtles). The identified federally designated threatened species included birds (e.g., Upland Sandpiper), fish (e.g., Bull Trout), mammals (e.g., Lynx), and plants (e.g, Ute Ladies'-Tresses). **Attachment H1** shows the federally listed threatened/endangered species identified in Case Study Historical site documents; the species' status listed in the table reflects what their status was at the time the site documents were prepared and not necessarily their status at the time of this evaluation.

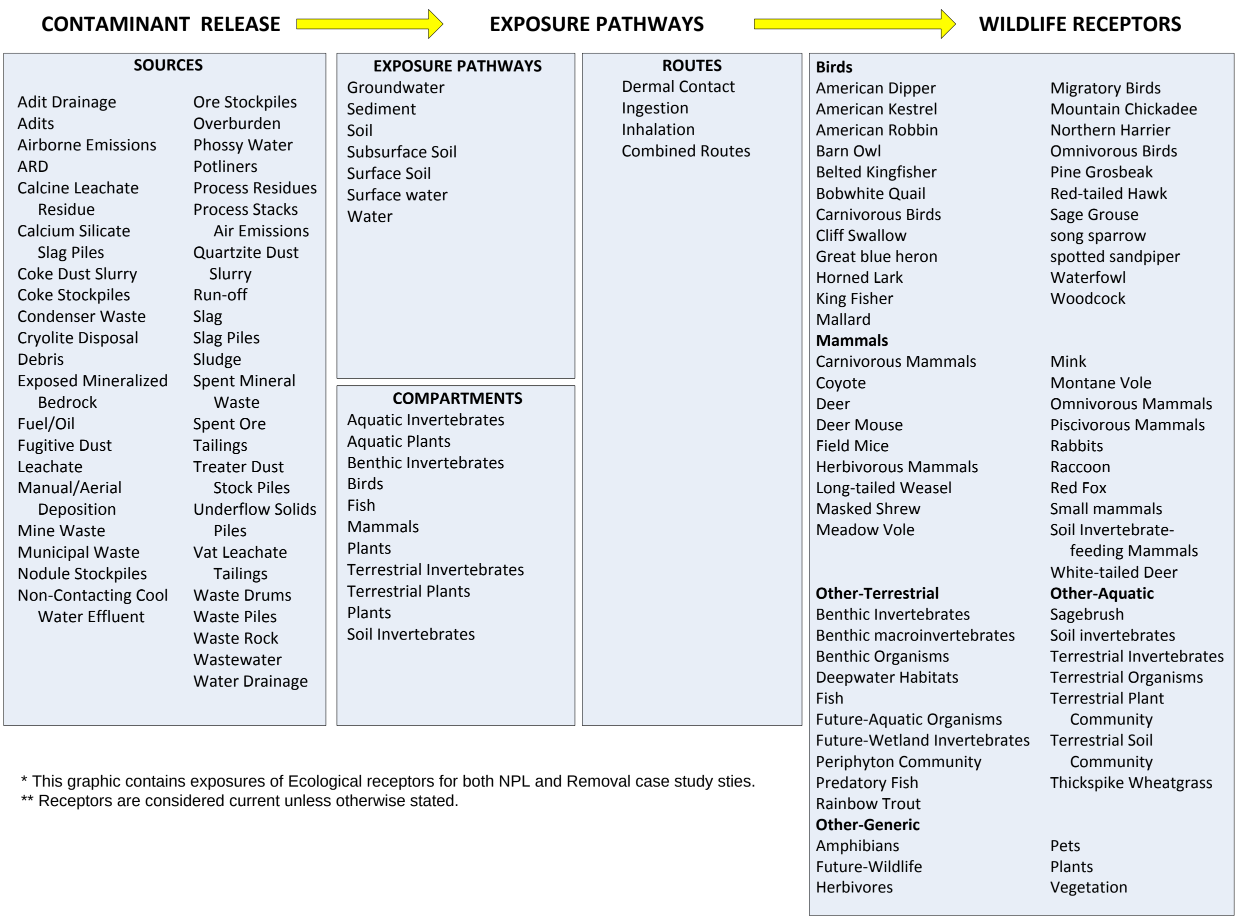


Figure H-2. Exposures of Current and Future Ecological Receptors for Case Study Historical Sites

For the nine Case Study Historical sites that had natural resource damage assessments performed as part of CERCLA natural resource damage cases that resulted in finalized settlements as of 2013, there were various types of ecological receptors and natural resource injuries. **Attachment H2** indicates the specific injuries.

H.2 2009 Current Sites

To understand the relationship between the locations of 2009 Current sites and sensitive environmental areas, EPA analyzed the 2009 Current sites' proximity to various kinds of sensitive environments. These data are in the form of GIS layers and were used to assess the spatial relationships (proximity and overlap) between the 2009 Current sites and potentially sensitive environmental areas. Descriptions of the data used in identifying potential ecological receptors are presented below, as well as in **Appendix E**:

1. **Major Dams:** This geospatial datalayer from the USGS National Atlas portrays major dams of the United States, including Puerto Rico and the U.S. Virgin Islands. The map layer was created by extracting dams 50 feet or more in height, or with a normal storage capacity of 5,000 acre-feet or more, or with a maximum storage capacity of 25,000 acre-feet or more, from the 79,777 dams in the U.S. Army Corps of Engineers National Inventory of Dams. Descriptive information includes the dam name and location, the risk level associated with the dam, the purposes (beneficial uses) for which the dam was constructed. Purpose codes include the following "beneficial uses" which will correlate with Clean Water Act Water Quality Standards designated uses: 'F' Fish and Wildlife; 'R' Recreation; and 'S' Water Supply. Data are available from https://www2.usgs.gov/science/cite-view.php?cite=244

2. **Federal Lands of the United States:** a publicly available GIS layer providing polygons for various federally-owned and managed public lands. These lands include National Parks, National Forests, and National Wildlife Refuges. This layer is included in the EPA Office of Water's Reach Address Database ancillary National Atlas GIS layers. Data are available from https://www.arcgis.com/home/item.html?id=26c2a38f94c54ad880ff877f884ff931.

3. **Indian/Tribal Lands for Native American Groups:** From the USGS National Atlas layer on Indian (Tribal) Lands. Suggests areas where habitat may be relied upon for tribal lifeways.

4. **Critical Habitat Polygons:** These data identify, in general, the areas where final critical habitat exist for species listed as endangered or threatened. Data are available from https://www.fws.gov/gis/data/national/index.html

5. **Marine Sanctuaries:** The National Marine Sanctuary Program manages a system of sanctuaries and other managed areas around the country. The legal boundaries of these sanctuaries are defined within the Code of Federal Regulations, at 15 C.F.R. Part 922 and the subparts for each national marine sanctuary. The GIS compatible digital boundary files for each national marine sanctuary are representations of those legal boundaries and are based on the best available data. Data are available from http://sanctuaries.noaa.gov/library/imast_gis.html

6. **Coastal Barrier Resources System:** This data set contains areas designated as undeveloped coastal barriers in accordance with the Coastal Barrier Resources Act, as amended. This boundary data set was digitized between 04/01/2007 and 04/01/2010 from the official John H. Chafee Coastal Barrier Resources System (CBRS) maps enacted by law. This data set complies with the National Spatial Data Infrastructure (NSDI) and other standards established by the Federal Geographic Data Committee (FGDC). The U.S. Fish and Wildlife Service (FWS) endorses this data set as having been compiled to meet forty feet horizontal accuracy at the ninety-five percent confidence level relative to the boundaries shown on the official CBRS maps. However, these digital boundaries are only representations of the official CBRS boundaries and are not to be considered authoritative.

7. **Fish and Wildlife Service (FWS) Areas:** There are three individual datasets that comprise the designated Fish and Wildlife Service Areas (FWS Approved areas, FWS Interest areas and FWS Special Designation areas). Some examples of lands that fall under these three FWS Areas designations include National Wildlife Refuges, National Fish Hatcheries, Wildlife Management Areas and Waterfowl Production Areas. A brief description of the information included in each of these datasets is included here:

   - **FWS Approved:** This data layer depicts the external boundaries of lands and waters that are approved for acquisition by the U.S. Fish and Wildlife Service (USFWS) in North America, U.S. Trust Territories and Possessions. The primary source for this information is the USFWS Realty program.
   - **Interest:** This data layer depicts lands and waters administered by the U.S. Fish and Wildlife Service (USFWS) in North America, U.S. Trust Territories and Possessions. It may also include inholdings that are not administered by USFWS.
   - **Special Designation** This data layer depicts the Special Designations that have been placed upon the lands and waters administered by the U.S. Fish and Wildlife Service (USFWS) in North America, U.S. Trust Territories and Possessions. These special areas, such as wilderness, are primarily designated by the U.S. Congress.

- **Protected Areas Database of the United States (version 1):** The Protected Areas Database of the United States (PAD-US) is a digital map of steward boundaries that combines attributes of ownership, management, and a measure of intent to manage for biodiversity. The map includes (1) Geographic boundaries of public land ownership and voluntarily provided private conservation lands (e.g., Nature Conservancy Preserves); (2) Combination of land owner/ manager, management designation descriptor, parcel name, and source of geographic information of each mapped land unit; (3) GAP Status Code conservation measure of each parcel based on USGS National Gap Analysis Program (GAP) protection level categories which are intended to provide a measurement of management commitment for long-term biodiversity conservation derived from land management plans or land manager interviews; (4) IUCN category for a protected area's inclusion into UNEP-World Conservation Monitoring Centre's World Database for Protected Areas. IUCN protected areas are defined as, "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" and are categorized following a classification scheme available through USGS GAP.

Table H-1 lists the potentially sensitive environments and how many sites are near them.

Table H-1. Potential Sensitive Environments

Type	Count of Sites	Percent of All Sites	Total Sites
Major Dams of the United States	153	37	417
Federal Lands of the United States	230	55	417
FEMA Q3 Special Flood Hazard Areas	236	57%	417
Indian/Tribal Lands for Native American Groups	38	9%	417
RCRA large Quantity Generator Facilities	177	42%	417
NPDES Major Permitted Facilities	204	49%	417
Clean Water Act Section 303(d) Impaired Waters	133	32%	417
National Wild and Scenic Rivers System	19	5%	417
Coastal Barrier Resources System	1	<1%	417
Critical Habitat boundaries	24	6%	417
Fish and Wildlife Service (FWS) Approved Areas	32	8%	417
FWS Interest Areas	13	3.%	417
FWS Special Designation Areas	0	<1%	417
Protected Areas Database	294	70%	417

The AqAoRs of 19 sites overlap with a Wild and Scenic River polygon where releases to the aquatic environment might cause an impact to these downstream important habitat areas; see **Figures H-2** (mines and processors. Sites where there is critical habitat for federally listed threatened or endangered species within a radial distance of 3 miles, around the site point locations are shown in **Figures H-3** (mines) and **H-4** (processors). A listing of the threatened and endangered species located within a radial distance of 3 miles, 6 miles, and 10 miles of the mines and processors is presented in **Attachment H3**.

Figure H-2. 2009 Current Sites with Wild and Scenic Rivers within 24 Hours Downstream

Figure H-3. 2009 Current Mine Sites Within 3 Miles of Critical Habitat for Federally Listed Threatened or Endangered Species

Figure H-4. 2009 Current Processor Sites within 3 Miles of Critical Habitat for Federally Listed Threatened or Endangered Species

H3. References

National Oceanic and Atmospheric Administration *et al*. 2006. *FINAL Damage Assessment and Restoration Plan/Environmental Assessment for the DuPont Newport Superfund Site, Newport, Delaware*. National Oceanic and Atmospheric Administration/Delaware Department of Natural Resources and Environmental Control/The United States Fish and Wildlife Service on behalf of the U.S. Department of the Interior.

New Mexico Office of the Natural Resources Trustee *et al*.1996. *Final Natural Resource Restoration Plan for the Cleveland Mill Site, Grant County, New Mexico*. New Mexico Office of the Natural Resources Trustee/U.S. Department of Interior Fish and Wildlife Service/U.S. Department of Interior Bureau of Land Management/U.S. Department of Agriculture Forest Service.

Texas Natural Resource Conservation Commission. 2001. *Restoration Plan and Environmental Assessment for the Tex Tin Corporation Superfund Site Texas City, Galveston County, Texas*. Texas Natural Resource Conservation Commission/Texas General Land Office/Texas Parks and Wildlife Department/U.S. Department of Commerce National Oceanic and Atmospheric Administration/U.S. Department of the Interior Fish and Wildlife Service.

Trustees of the Palmerton Zinc Pile Superfund Site. 2011. *Palmerton Zinc Pile Superfund Site Natural Resource Damage Assessment Final Restoration Plan and Environmental Assessment*. Trustees of the Palmerton Zinc Pile Superfund Site: U.S. Department of the Interior Fish and Wildlife Service/U.S. Department of the Interior National Park Service/U.S. Department of Commerce

National Oceanic and Atmospheric Administration/Pennsylvania Department of Conservation and Natural Resources/Pennsylvania Department of Environmental Protection/Pennsylvania Fish and Boat Commission/Pennsylvania Game Commission. March 31.

U.S. Department of Commerce. 2013. *Remedial/Injury Assessment Case: Macalloy, SC*. U.S. Department of Commerce National Oceanic and Atmospheric Administration website http://www.darrp.noaa.gov/southeast/macalloy/injury.html accessed November 7, 2013.

U.S. Department of Interior. 2009. *Trustee Resolution and Phase 1 Restoration Plan to Compensate for Past Lost Use of Groundwater Natural Resource*. United States of America and Tohono O'odham Nation v. Cyprus Tohono Corporation.

U.S. Department of Interior. 2012. Fact Sheet *Draft Wetland Restoration Plan/Environmental Assessment*. U.S. Fish and Wildlife Service, U.S. Department of Interior.

U.S. Department of Interior *et al*. 2007. *Coeur d'Alene Basin Final Interim Restoration Plan and Environmental Assessment*. U.S. Department of the Interior, Fish and Wildlife Service/U.S. Department of the Interior, Bureau of Land Management/U.S. Department of Agriculture, Forest Service/Coeur d'Alene Indian Tribe.

U.S. District Court District of Idaho, 1995. *Consolidated Case No. 83-4179(R), Consent Decree dated September 1, 1995, Appendix B Blackbird Mine Biological Restoration and Compensation Plan*.

U.S. EPA (Environmental Protection Agency). 1989. *CERCLA Compliance with Other Laws Manual, Part II. Clean Air Act and Other Environmental Statutes and State Requirements*. EPA 540/G-89/009. U.S. Environmental Protection Agency, Washington, DC. August.

U.S. EPA (Environmental Protection Agency). 1989. *Record of Decision: East Helena Smelter Site, Process Ponds Operable Unit, East Helena, Montana*. U.S. Environmental Protection Agency, Region 8, Helena, MT. November.

U.S. EPA (Environmental Protection Agency). 1990. *Volume 2: Comprehensive Remedial Investigation/Feasibility Study – ASARCO, Inc., East Helena, Montana*. Prepared by Hydrometrics, Inc., Helena, MT, for U.S. Environmental Protection Agency, Region 8, Helena, MT. March 30.

U.S. EPA (Environmental Protection Agency). 1994. *EPA Superfund Record of Decision: Ormet Corp., EPA ID: OHD004379970, OU 01, Hannibal, OH, 09/12/1994*. EPA/ROD/R05-94/259. U.S. Environmental Protection Agency, Region 5, Chicago, IL. September 12.

U.S. EPA (Environmental Protection Agency). 1995. *Ecological Risk Assessment, Eastern Michaud Flats, Pocatello, Idaho*. Prepared by Ecology and Environment, Inc., Lancaster, NY, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. July.

U.S. EPA (Environmental Protection Agency). 1995. *Revised Final Baseline Risk Assessment Part A and B for Stauffer Chemical Company, Tarpon Springs, Florida*. Prepared by Black & Veatch Waste Science, Inc., Atlanta, GA, for U.S. Environmental Protection Agency, Region 4, Waste Management Division, Atlanta, GA. July 21.

U.S. EPA (Environmental Protection Agency). 1997. *Record of Decision, Monsanto Chemical Company Superfund Site, Caribou County, Idaho*. U.S. Environmental Protection Agency Region 10, Seattle, WA. April.

U.S. EPA (Environmental Protection Agency). 1998. *Li Tungsten, Glen Cove, New York, Draft Final Remedial Investigation (Rl) Report, Volume II of IV (Tables, Figures, Plates)*. U.S. Environmental Protection Agency, Region 2, New York, NY. May.

U.S. EPA (Environmental Protection Agency). 1998. *Record of Decision: Declaration, Decision Summary, and Responsiveness Summary for Eastern Michaud Flats Superfund Site, Pocatello, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. June.

U.S. EPA (Environmental Protection Agency). 1999. *Record of Decision: Li Tungsten Corporation Superfund Site, EPA ID: NYD986882660, OU 01, 02, Glen Cove, Nassau County, New York*. EPA/ROD/R02-99/158. U.S. Environmental Protection Agency, Region 2, New York, NY. September 30.

U.S. EPA (Environmental Protection Agency). 2000. *EPA Superfund Record of Decision: National Southwire Aluminum Co. EPA ID: KYD049062375 OU 00 Hawesville, KY 07/06/2000*. EPA/ROD/R04-00/079. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. July.

U.S. EPA (Environmental Protection Agency). 2001. *Early Action – Interim Record of Decision, OU2 – Water Treatment Operations, Gilt Edge Mine NPL Site, Lawrence County, South Dakota*. EPA/ROD/R08-01/611. U.S. Environmental Protection Agency, Denver, CO. April 23.

U.S. EPA (Environmental Protection Agency). 2001. *Final Ecological Risk Assessment, Volume 1, Coeur d'Alene Basin Remedial Investigation/Feasibility Study*. Prepared by CH2M HILL, Bellevue, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. May 18.

U.S. EPA (Environmental Protection Agency). 2002. *EPA Superfund Record of Decision: Bunker Hill Mining & Metallurgical Complex EPA ID: IDD048340921 OU 3 Smelterville, ID*. EPA/ROD/R10-02/032. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 12.

U.S. EPA (Environmental Protection Agency). 2002. *Superfund Record of Decision: Macalloy Corporation, EPA ID: SCD003360476, OU 01, North Charleston, SC, 8/21/2002*. EPA/ROD/R04-02/084. U.S. Environmental Protection Agency, Region 4, Atlanta, GA. August 21.

U.S. EPA (Environmental Protection Agency). 2004. *EPA Superfund Record of Decision: Omaha Lead Site, EPA ID: NESFN0703481, OU 01, Omaha, NE, 12/15/2004*. EPA/ROD/R07-05/053. U.S. Environmental Protection Agency, Region 7, Kansas City, KS. December 15.

U.S. EPA (Environmental Protection Agency). 2005. *Final Remedial Investigation Report for Midnite Mine Stevens County, Washington*. Prepared by URS Corporation, Seattle, WA, for U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 30.

U.S. EPA (Environmental Protection Agency). 2006. *Reynolds Metals Company Superfund Site, Troutdale, Oregon, Record of Decision for Final Remedial Action*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. September 29.

U.S. EPA (Environmental Protection Agency). 2009. *Omaha Lead Site, Operable Unit 02, Final Record of Decision*. U.S. Environmental Protection Agency, Region 7, Kansas City, KS. May 13.

US EPA & Montana DEQ. 1998. U.S. Environmental Protection Agency and Montana Department of Environmental Quality. *EPA Superfund Record of Decision: Anaconda Regional Water, Waste, and Soils Operable Unit, Anaconda Smelter NPL Site, Anaconda, MT*. U.S. Environmental Protection Agency, Region 8, Helena, MT, and Montana Department of Environmental Quality, Helena, MT. September.

Attachment H1
Threatened and Endangered Species
Within 3 miles of Case Study Historical Sites

Species Common Name	Federal Status	State Status	Source Documents
Anaconda Co. Smelter, MT, Region 10, MTD093291656			
Birds			ROD 1998 OU4
Bald Eagle	Endangered		
Peregrine Falcon	Endangered		
Fish			
Bull Trout	Threatened	Species of special concern	
Mammals			
Gray Wolf	Endangered		
Bunker Hill Mining & Metallurgical Complex, ID, Region 10, IDD048340921			
Birds			*Ecological Risk Assessment Coeur d'Alene Basin RI/FS 2001; ROD 2002 OU-3*
Bald eagle	Threatened		
Upland sandpiper		S1B[1], SZ	
Fish			
Bull trout	Threatened		
Mammals			
Gray Wolf	Endangered		
Lynx	Threatened		
Merriam's shrew		S2[2]	
Plants			
Ute ladies' –tresses	Threatened		
Rush aster		S1	
Bourgeou's milkvetch		S1	
Deer-fern		S1	
Hall's lungwort		S1	
Many-fruit false-loosestrife		S1	
River bulrush			
Tuckermann's ball-bearing lichen			
Taper grass; wild celery			
Captain Jack Mill, Ward, CO, Region 8, COD981551427			
No data			
Cimarron Mining Corp., Carrizozo,NM, Region 6, NMD980749378			
No endangered species or habitats have been identified in the vicinity of the site			RI/FS VOL. 1990
Eagle Mine, Minturn/Redcliff, CO, Region 8, COD081961518			
No data			

Species Common Name	Federal Status	State Status	Source Documents
Eastern Michaud Flats Contamination, Pocatello, ID, Region 10, IDD984666610			
Birds			ROD 1998; Ecological Risk Assessment 1995
Bald eagle	Threatened		
Bald eagle (wintering population)	Endangered	Endangered	
Peregrine falcons	Endangered		
Trumpeter Swan	Candidate species for listing		
Black Tern	Candidate species for listing		
Townsend's western big eared bat			
Mammals			
Wolverine	Candidate species for listing		
Pygmy rabbit	Candidate species for listing		
Plants			
Ute Ladies–tresses	Threatened		
Slick spot peppergrass	Candidate Species for listing		
Birds			ROD 1990 OU 1; Comprehensive RI/FS Volume 2 1990
Bald Eagle	Endangered		
Peregrine falcons	Endangered		
Plants			
No endangered plants identified			
Foote Mineral Co., East Whiteland Township, PA, Region 3, PAD077087989			
Reptiles			Phase II Ecological Risk Assessment 2001
Bog turtles	Endangered	Endangered	
Gilt Edge Mine, Lead, SD, Region 8, SDD987673985			
Birds			ROD 2001 OU 2
American dipper		Species of concern	
Townsends big-eared bat		Species of concern	
Fish			
Long nose sucker		Species of concern	
Mountain sucker		Species of concern	
Longnose dace		Species of concern	
Reptiles			
Red-belly snake		Species of concern	
Homestake Mining Co., Milan, NM, Region 6, NMD007860935			
No Data			
Li Tungsten Corp., Glen Cove, NY, Region 2, NYD986882660			
No threatened or endangered birds, mammals, reptiles, amphibians, fish or invertebrates inhabit this area.			ROD 1998 OU-1, OU-2
Plants			Draft final RI 1998 vol. 1
Orange fringed orchis		Threatened	
White milkweed		Threatened	

Species Common Name	Federal Status	State Status	Source Documents
Macalloy Corporation, North Charleston, SC, Region 4, SCD003360476			
No Endangered/threatened species flagged in the area			Final RODs August 2002
Midnite Mine, Wellpinit, WA, Region 10, WAD980978753			
Amphibians			RI/FS 2005
Northern leopard frog		Endangered	
Oregon spotted frog		Endangered	
Birds			
Bald eagles	Threatened		ROD 2006
American white pelican		Endangered	RI/FS 2005
Peregrine falcon		Endangered	
Sandhill crane		Endangered	
Upland sandpiper		Endangered	
Fish			ROD 2006
Bull trout	Threatened		
Mammals			
Canada lynx	Threatened		ROD 2006
Gray wolf	Endangered	Endangered	
Grizzly bear	Threatened	Endangered	RI/FS 2005
Pygmy rabbit		Endangered	
Woodland caribou		Endangered	
Plants			
Ute-ladies-tresses	Threatened		ROD 2006
Other***:*** 25 plants and animals	Species of concern (U.S. FWS)		RI/FS 2005
Monsanto Chemical Co. (Soda Springs Plant), Soda Springs, ID, Region 10, IDD081830994			
Birds			
Bald eagle	Endangered	Endangered	ROD 1997
National Southwire Aluminum Co., Hawesville, KY, Region 4, KYD049062375			
No federal or state threatened or endangered species			ROD 2000
Bullhead Mussel	Species of concern		
Orange-footed drive pearly mussel	Species of concern		
Omaha Lead, Omaha, NE, Region 7, NESFN0703481			
No federal threatened and endangered species have been identified at the site			ROD 2005 OU-1; ROD 2009 OU-2
Ormet Corp., Hannibal, OH, Region 5, OHD004379970			
Fish			ROD 1994 OU-01
Ohio Lamprey		Endangered	
Channel Darter		Endangered	
Ghost Shiner		Special interest species	
Palmerton Zinc Pile, Palmerton, PA, Region 3, PAD002395887			
No Data			

Species Common Name	Federal Status	State Status	Source Documents
Reynolds Metals Company, Troutdale, OR, Region 10, ORD009412677			
Amphibians			ROD 2006
Northern red-legged frog	Species of concern	Sensitive (undetermined status)	
Birds			
Bald eagle	Threatened	Threatened	
American peregrine falcon	Endangered	Endangered	
Plants			
Columbia cress	Species of concern	Sensitive (undetermined)	
Reptiles			
Northwestern pond turtle	Species of concern		
Silver Mountain Mine, Loomis, WA, Region 10, WAD980722789			
No Data			
Stauffer Chemical Co. (Tarpon Springs), Tarpon Springs, FL, Region 4, FLD010596013			
Birds [3]			Baseline Risk Assessment Part A and B 1995
Brown pelican			
Reddish Egret			
Little blue heron			
Peregrine falcon			
American oystercatcher			
Piping plover			
Snowy Plover			
Roseate Tern			
American Kestrel			
Red-cocaded Woodpecker			
Bald eagle			
Snowy			
Mammals [4]			
Florida Black Bear		Threatened	
Florida Panther		Endangered	
Bobcats			
Florida Mouse			
Sherman’s Fox Squirrel			
West Indian Manatee River Otter	Threatened	Threatened	
Everglades Mink			
Reptiles			
Gopher Tortoise			
Short-tailed Snake		Threatened	
Eastern indigo snake			
Florida ribbon snake			

Species Common Name	Federal Status	State Status	Source Documents
Summitville Mine, Rio Grande County, CO, Region 8, COD983778432			
Birds			Interim ROD OU-4 1994
Bald eagle	Endangered		
Peregrine falcon	Endangered		
Whooping crane	Endangered	Endangered	
Teledyne Wah Chang, Albany, OR, Region 10, ORD050955848			
No threatened or endangered plants or animals indentified			RI/FS 1992
Tex-Tin Corp., Texas City, TX, Region 6, TXD062113329			
No data			

Attachment H2
Natural Resource Damages Found at Case Study Historical Sites

The following are Case Study Historical sites at which CERCLA natural resource trustees have claimed natural resource damages under CERCLA. The descriptions were developed based on case documents posted on the Interior Department's website at https://www.cerc.usgs.gov/orda_docs/ and on the Commerce Department's website at http://www.gc.noaa.gov/natural-office1.html as of Fall 2012. Additional natural resource damage sites were found via a search of the Westlaw® Federal Register database using the search terms 'QUERY - PR(JUSTICE) & "NATURAL RESOURCE DAMAGES" & MINE* MINING & SETTLEMENT' or from documents in EPA's Superfund Enterprise Management System (SEMS) or other sources.

- Coeur D'Alene Bunker Hill Mining and Metallurgical Complex [EPA Site Name: BUNKER HILL MINING CO INC]

  "widespread distribution of mining-related contamination throughout the Basin and resulting natural resource injuries"

  SOURCE: U.S. Department of Interior *et al*. 2007.

- BLACKBIRD MINE [EPA Site Name: BLACKBIRD MINE]

  Apparent degraded water quality and resulting habitat destruction for two threatened/endangered species, from mine drainage.

  SOURCE: U.S. District Court District of Idaho Consolidated Case No. 83-4179(R). 1995.

- CLEVELAND MILL [EPA Site Name: CLEVELAND MILL]

  "Natural resources for which the State of New Mexico, DOI, and USDA are trustee and which have been affected or potentially affected by releases of hazardous substances from the site include, but are not limited to, the following: wildlife including small mammals and big game species, birds, invertebrates, amphibians, and reptiles; state and federally-listed endangered and threatened species; vegetation including upland, riparian, and wetland vegetation; surface water including waters in Little Walnut Creek, the mill creek tributary to Little Walnut Creek, the creek near the Cleveland mine, the reservoir near the mill site, and sediments associated with these surface waters[;] ground water including the alluvial aquifer and bedrock aquifer; soils including lowland and floodplain soils, as well as upland areas affected by aerial deposition."

  SOURCE: New Mexico Office of the Natural Resources Trustee *et al*.1996.

- CYPRUS TOHONO MINE [EPA Site Name: CYPRUS TOHONO COPPER MINE]

  "Groundwater injury includes, but is not limited to, impairment of the North Komelik community and residential water distribution system, resulting in contamination and loss of groundwater natural resource services" "… primary resources affected were wetland migratory birds…which died as a result of alleged exposure to hazardous substances and low pH levels in ponds on the mine site."

SOURCE: U.S. Department of Interior 2009; U.S. Department of Interior 2012.

- DUPONT NEWPORT [EPA Site Name: EI DUPONT DE NEMOURS & CO.]

  "Several metals were historically used on-site in the manufacturing of pigments. Cadmium, lead, and zinc were found to be the most prevalent and the focus of post-ROD activities to delineate areas for sediment removal. The Trustees determined that these and others associated with the manufacturing activities might have potentially injured the trust natural resources at the DuPont Newport Superfund Site. These metals were found in the wetland and river sediments at or near the Site at elevated concentrations (i.e., exceeding ecological benchmark concentrations.)"

  SOURCE**:** National Oceanic and Atmospheric Administration *et al*. 2006.

- MACALLOY SITE [EPA Site Name: MACALLOY CORPORATION]

  "Waste materials generated during ferrochromium alloy production (slag, ash, dust, sludge and wastewater) were stored on-site in landfills and storage piles. These wastes were contaminated with heavy metals such as chromium, lead, nickel and zinc. Surface water infiltrated through these waste materials into underlying soils and groundwater and/or flowed overland discharging to Shipyard Creek, a tidal creek flowing into the Cooper River, Charleston, SC….The trustees have determined that the following resources have potential natural resource injuries: Benthic resources and their habitat. Benthic species in Shipyard Creek and the Cooper River were likely adversely impacted due to the chronic release of heavy metals from the Macalloy site. Surface water resources. Fish inhabiting surface waters were potentially impacted by the contamination."

  SOURCE: U.S. Department of Commerce 2013.

- REYNOLDS METALS [EPA Site Name: REYNOLDS METALS COMPANY]

  "Large quantities of wastes were produced at the Reynolds facility during the production of aluminum….Soil in areas of the site are contaminated with polynuclear aromatic hydrocarbons (PAHs), trace elements, fluoride, and cyanide at concentrations several orders of magnitude above local background concentrations. Waste streams were treated on site at a wastewater treatment plant and discharged to…South Ditch…which flows to…Company Lake…[that] discharges…to the Columbia River. Sediments within South Ditch and Company Lake are contaminated with PAHs and trace elements at concentrations several orders of magnitude above NOAA screening guidelines, and…substantially above those shown to elicit toxic responses in aquatic organisms. Such sediments have also been detected in the outfall ditch just prior to discharge to the Columbia, and in the Sandy River….The primary threat posed by the Reynolds Metals Company site to NOAA trust resources is the potential for site releases to cause adverse ecological impacts to anadromous species that utilize the Columbia and Sandy Rivers and to their supporting habitat. The Columbia River watershed is the most important anadromous salmonid basin on the west coast of the United States. The Columbia and Sandy Rivers near the site provide nursery and foraging habitat as well as a migratory corridor for five anadromous salmonid species (including three runs which are threatened and/or endangered), plus American shad and white sturgeon."

SOURCE: U.S. Department of Commerce 1996.

- TEX-TIN [EPA Site Name: TEX-TIN CORP]

  "The trace metals aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, tin, vanadium, and zinc and polycyclic aromatic hydrocarbons (PAHs) detected at the Site are hazardous substances covered by…CERCLA….[C]ontamination, originating from the Site, has been detected or is predicted to occur in [local surface water bodies]. Subsequent to construction of the HPL, Site contaminants only reach the Swan Lake system by aerial deposition and through storm events, floods, and extreme tidal excursions. Existing data indicate that trace metals are the primary contaminants at this Site. PAHs were frequently encountered; however, the levels of PAHs were not as high relative to levels of concern as the trace metals….1.2 Natural Resource Injuries Trace metals, particularly chromium, copper, lead, tin, and zinc, are the primary contaminants of concern at the Site…..The Swan Lake ecosystem, part of the greater Galveston Bay ecosystem, is an important habitat for numerous recreational and commercial fish and shellfish species….Trustees were able to identify the types of habitats, their component resources, and the habitat or resources services with the greatest potential to have been injured by historic and ongoing releases of metals from the Site. These include subtidal unvegetated soft-bottom benthic habitats….Some animals living in these habitats, such as shellfish, fish, and birds, may have suffered lethal effects (increased mortality) or sublethal effects (reduced growth, reduced fecundity, etc.) as a result of exposure to metals."

  SOURCE: Texas Natural Resource Conservation Commission 2001.

- PALMERTON ZINC [EPA Site Name: ZINC CORPORATION OF AMERICA]

  "The East and West Plants of the former New Jersey Zinc Company, a primary zinc smelting facility, discharged metals to the surrounding environment via air emissions and through the release of liquid and solid wastes. A secondary metals processing and reclamation facility has operated in the East Plant area since the shutdown of the primary zinc smelting facility in 1980. Metals, including arsenic, cadmium, chromium, copper, lead, manganese, and zinc were released to the environment from these facilities, adversely affecting Aquashicola Creek, the Lehigh River, Blue Mountain, and Stony Ridge."

  SOURCE: Trustees of the Palmerton Zinc Pile Superfund Site 2011.

Attachment H3
Threatened and Endangered Species Found Near 2009 Current Sites

Table H3-1. Threatened and Endangered Species Found within 3 Miles of 2009 Current Sites

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
1	1005	Mine/Processor Combination	Freeport McMoRan Miami Inc.	Strix occidentalis lucida	Mexican spotted owl	T
2			Copper Cities Unit	Strix occidentalis lucida	Mexican spotted owl	T
3	1010	Mine/Processor Combination	Excalibar Minerals	Ursus americanus luteolus	Louisiana black bear	T
4			Excalibar Minerals of Louisiana LLC	Ursus americanus luteolus	Louisiana black bear	T
5	1013	Mine/Processor Combination	Hayden Concentrator	Empidonax traillii extimus	Southwestern willow flycatcher	E
6			ASARCO LLC - Hayden	Empidonax traillii extimus	Southwestern willow flycatcher	E
7	2100	Mine	Baxter Mine	Gopherus agassizii	Desert tortoise	T
8	2103	Mine	Mesquite	Gopherus agassizii	Desert tortoise	T
9	2105	Mine	Jerico Products Incorporated	Hypomesus transpacificus	Delta smelt	T
10	2106	Mine	Silverlake Mine	Gopherus agassizii	Desert tortoise	T
11	2109	Mine	Ocean View Mine	Bufo californicus (=microscaphus)	Arroyo toad	E
12	2109	Mine	Ocean View Mine	Polioptila californica californica	Coastal California gnatcatcher	T
13	2109	Mine	Ocean View Mine	Vireo bellii pusillus	Least Bell's vireo	E
14	2109	Mine	Ocean View Mine	Empidonax traillii extimus	Southwestern willow flycatcher	E
15	2141	Mine	Northshore Mine	Canis lupus	Gray wolf	E
16	2158	Mine	Genesis IncTroy Mine	Salvelinus confluentus	Bull Trout	T
17	2272	Mine	D D One	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
18	2312	Mine	Lompoc Plant	Rana aurora draytonii	California red-legged frog	T
19	2312	Mine	Lompoc Plant	Empidonax traillii extimus	Southwestern willow flycatcher	E
20	2324	Mine	PolyMet	Canis lupus	Gray wolf	E
21	3006	Processor	ALCOA INTALCO Works	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
22	3027	Processor	M-I LLC	Charadrius melodus	Piping Plover	T

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
23	3037	Processor	Morgan City Grinding Plant	Ursus americanus luteolus	Louisiana black bear	T
24	3042	Processor	Halliburton	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
25	3083	Processor	Clarkdale Metals Corp	Xyrauchen texanus	Razorback sucker	E
26	3148	Processor	Mesabi Nugget Delaware, LLC	Canis lupus	Gray wolf	E
27	3204	Processor	Mississippi Phosphates Corp.	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
28	3209	Processor	PCS Phosphate Co. Inc. - Morehead City	Charadrius melodus	Piping Plover	T
29	3212	Processor	Moab Salt/Salt & Potash Production Facility	Ptychocheilus lucius	Colorado pikeminnow	E
30	3212	Processor	Moab Salt/Salt & Potash Production Facility	Strix occidentalis lucida	Mexican spotted owl	T
31	3212	Processor	Moab Salt/Salt & Potash Production Facility	Xyrauchen texanus	Razorback sucker	E
32	3234	Processor	American Soda, LLP / Solvay Chemicals, Inc.	Ptychocheilus lucius	Colorado pikeminnow	E
33	3234	Processor	American Soda, LLP / Solvay Chemicals, Inc.	Xyrauchen texanus	Razorback sucker	E
34	3238	Processor	Laws Mill	Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	T
35	3272	Processor	Protech Minerals, Inc	Empidonax traillii extimus	Southwestern willow flycatcher	E
36	3276	Processor	COTTER MILL	Strix occidentalis lucida	Mexican spotted owl	T

* T = Threatened, E = Endangered

Table H3-2. Threatened and Endangered Species Found within 6 Miles of 2009 Curent Sites

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
1	13	Processor Combination	Corpus Christi Grounding Plant	Charadrius melodus	Piping Plover	T
2			Battle Mountain Grinding Plant	Charadrius melodus	Piping Plover	T
3	14	Processor Combination	Sherwin Alumina Co.	Charadrius melodus	Piping Plover	T
4			Sherwin Alumina	Charadrius melodus	Piping Plover	T
5	18	Processor Combination	Searles Valley Minerals Inc.	Pipilo crissalis eremophilus	Inyo California towhee	T
6			IMC Chemicals Incorporated	Pipilo crissalis eremophilus	Inyo California towhee	T
7	1003	Mine Processor Combination	Boron Operations	Gopherus agassizii	Desert tortoise	T
8			US Borax waste pile from Boron Operations	Gopherus agassizii	Desert tortoise	T
9	1005	Mine Processor Combination	Freeport McMoRan Miami Inc.	Strix occidentalis lucida	Mexican spotted owl	T
10			Copper Cities Unit	Strix occidentalis lucida	Mexican spotted owl	T
11	1010	Mine Processor Combination	Excalibar Minerals	Ursus americanus luteolus	Louisiana black bear	T
12			Excalibar Minerals of Louisiana LLC	Ursus americanus luteolus	Louisiana black bear	T
13	1011	Mine Processor Combination	Freeport McMoRan Morenci Inc.	Xyrauchen texanus	Razorback sucker	E
14			Phelps-Dodge Morenci Inc.	Xyrauchen texanus	Razorback sucker	E
15	1013	Mine Processor Combination	Hayden Concentrator	Empidonax traillii extimus	Southwestern willow flycatcher	E
16			ASARCO LLC - Hayden	Empidonax traillii extimus	Southwestern willow flycatcher	E
17	2003	Mine	Pinenut	Strix occidentalis lucida	Mexican spotted owl	T
18	2004	Mine	North American Industries	Strix occidentalis lucida	Mexican spotted owl	T
19	2005	Mine	Rosemont Copper Project	Strix occidentalis lucida	Mexican spotted owl	T
20	2052	Mine	Resolution Mine	Strix occidentalis lucida	Mexican spotted owl	T
21	2052	Mine	Resolution Mine	Gila intermedia	Gila chub	E
22	2080	Mine	Ray	Gila intermedia	Gila chub	E
23	2080	Mine	Ray	Empidonax traillii extimus	Southwestern willow flycatcher	E
24	2082	Mine	Pinto Valley Operations	Strix occidentalis lucida	Mexican spotted owl	T
25	2086	Mine	Carlota Copper Company	Strix occidentalis lucida	Mexican spotted owl	T
26	2099	Mine	Dredge 17	Branchinecta lynchi	Vernal pool fairy shrimp	T
27	2099	Mine	Dredge 17	Lepidurus packardi	Vernal pool tadpole shrimp	E

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
28	2100	Mine	Baxter Mine	Gopherus agassizii	Desert tortoise	T
29	2101	Mine	Mt Pass Mine & Mill	Gopherus agassizii	Desert tortoise	T
30	2103	Mine	Mesquite	Gopherus agassizii	Desert tortoise	T
31	2105	Mine	Jerico Products Incorporated	Hypomesus transpacificus	Delta smelt	T
32	2106	Mine	Silverlake Mine	Gopherus agassizii	Desert tortoise	T
33	2109	Mine	Ocean View Mine	Vireo bellii pusillus	Least Bell's vireo	E
34	2109	Mine	Ocean View Mine	Bufo californicus (=microscaphus)	Arroyo toad	E
35	2109	Mine	Ocean View Mine	Empidonax traillii extimus	Southwestern willow flycatcher	E
36	2109	Mine	Ocean View Mine	Polioptila californica californica	Coastal California gnatcatcher	T
37	2109	Mine	Ocean View Mine	Ceanothus ophiochilus	Vail Lake ceanothus	T
38	2114	Mine	Cresson Project	Strix occidentalis lucida	Mexican spotted owl	T
39	2141	Mine	Northshore Mine	Canis lupus	Gray wolf	E
40	2158	Mine	Genesis IncTroy Mine	Salvelinus confluentus	Bull Trout	T
51	2217	Mine	St Cloud Surface	Strix occidentalis lucida	Mexican spotted owl	T
52	2272	Mine	D D One	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
53	2312	Mine	Lompoc Plant	Deinandra increscens ssp. villosa	Gaviota Tarplant	E
54	2312	Mine	Lompoc Plant	Rana aurora draytonii	California red-legged frog	T
55	2312	Mine	Lompoc Plant	Empidonax traillii extimus	Southwestern willow flycatcher	E
56	2324	Mine	PolyMet	Canis lupus	Gray wolf	E
57	3006	Processor	ALCOA INTALCO Works	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
58	3025	Processor	Halliburton Energy Services	Charadrius melodus	Piping Plover	T
59	3027	Processor	M-I LLC	Charadrius melodus	Piping Plover	T
60	3037	Processor	Morgan City Grinding Plant	Ursus americanus luteolus	Louisiana black bear	T
61	3042	Processor	Halliburton	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
62	3043	Processor	Galveston GBT Barite Grinding Plant	Charadrius melodus	Piping Plover	T
63	3083	Processor	Clarkdale Metals Corp	Xyrauchen texanus	Razorback sucker	E
64	3083	Processor	Clarkdale Metals Corp	Empidonax traillii extimus	Southwestern willow flycatcher	E

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
65	3148	Processor	Mesabi Nugget Delaware, LLC	Canis lupus	Gray wolf	E
66	3149	Processor	Northshore Mining Company	Canis lupus	Gray wolf	E
67	3174	Processor	Giles Chemical	Alasmidonta raveneliana	Appalachian elktoe	E
68	3191	Processor	A-1 Grit Co	Astragalus brauntonii	Braunton's milk-vetch	E
69	3195	Processor	ZEOX Corp. - Ash Meadows Plant & Mine	Grindelia fraxino-pratensis	Ash Meadows gumplant	T
70	3195	Processor	ZEOX Corp. - Ash Meadows Plant & Mine	Centaurium namophilum	Spring-loving centaury	T
71	3204	Processor	Mississippi Phosphates Corp.	Charadrius melodus	Piping Plover	T
72	3204	Processor	Mississippi Phosphates Corp.	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
73	3209	Processor	PCS Phosphate Co. Inc. - Morehead City	Charadrius melodus	Piping Plover	T
74	3212	Processor	Moab Salt/Salt & Potash Production Facility	Strix occidentalis lucida	Mexican spotted owl	T
75	3212	Processor	Moab Salt/Salt & Potash Production Facility	Ptychocheilus lucius	Colorado pikeminnow	E
76	3212	Processor	Moab Salt/Salt & Potash Production Facility	Xyrauchen texanus	Razorback sucker	E
77	3234	Processor	AMERICAN SODA, LLP / SOLVAY CHEMICALS, INC.	Ptychocheilus lucius	Colorado pikeminnow	E
78	3234	Processor	AMERICAN SODA, LLP / SOLVAY CHEMICALS, INC.	Xyrauchen texanus	Razorback sucker	E
79	3238	Processor	Laws Mill	Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	T
80	3272	Processor	Protech Minerals, Inc	Empidonax traillii extimus	Southwestern willow flycatcher	E
81	3276	Processor	COTTER MILL	Strix occidentalis lucida	Mexican spotted owl	T
82	3292	Processor	Standard Mineral Co., Inc.	Notropis mekistocholas	Cape Fear shiner	E

* T = Threatened, E = Endangered

Table H3-3. Threatened and Endangered Species Found within 20 Miles of 2009 Current Sites

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
1	13	Processor Combination	Corpus Christi Grounding Plant	Charadrius melodus	Piping Plover	T
2			Battle Mountain Grinding Plant	Charadrius melodus	Piping Plover	T
3	14	Processor Combination	Sherwin Alumina Co.	Charadrius melodus	Piping Plover	T
4			Sherwin Alumina	Charadrius melodus	Piping Plover	T
5	18	Processor Combination	Searles Valley Minerals Inc.	Pipilo crissalis eremophilus	Inyo California towhee	T
6			IMC Chemicals Incorporated	Pipilo crissalis eremophilus	Inyo California towhee	T
7	1003	Mine Processor Combination	Boron Operations	Gopherus agassizii	Desert tortoise	T
8			US Borax waste pile from Boron Operations	Gopherus agassizii	Desert tortoise	T
9	1005	Mine Processor Combination	Freeport McMoRan Miami Inc.	Strix occidentalis lucida	Mexican spotted owl	T
10			Copper Cities Unit	Strix occidentalis lucida	Mexican spotted owl	T
11	1010	Mine Processor Combination	Excalibar Minerals	Ursus americanus luteolus	Louisiana black bear	T
12			Excalibar Minerals of Louisiana LLC	Ursus americanus luteolus	Louisiana black bear	T
13	1011	Mine Processor Combination	Freeport McMoRan Morenci Inc.	Xyrauchen texanus	Razorback sucker	E
14			Phelps-Dodge Morenci Inc.	Xyrauchen texanus	Razorback sucker	E
15	1013	Mine Processor Combination	Hayden Concentrator	Empidonax traillii extimus	Southwestern willow flycatcher	E
16			ASARCO LLC - Hayden	Empidonax traillii extimus	Southwestern willow flycatcher	E
17	2003	Mine	Pinenut	Strix occidentalis lucida	Mexican spotted owl	T
18	2004	Mine	North American Industries	Strix occidentalis lucida	Mexican spotted owl	T
19	2005	Mine	Rosemont Copper Project	Strix occidentalis lucida	Mexican spotted owl	T
20	2052	Mine	Resolution Mine	Strix occidentalis lucida	Mexican spotted owl	T
21	2052	Mine	Resolution Mine	Gila intermedia	Gila chub	E
22	2080	Mine	Ray	Gila intermedia	Gila chub	E
23	2080	Mine	Ray	Empidonax traillii extimus	Southwestern willow flycatcher	E
24	2082	Mine	Pinto Valley Operations	Strix occidentalis lucida	Mexican spotted owl	T
25	2086	Mine	Carlota Copper Company	Strix occidentalis lucida	Mexican spotted owl	T
26	2099	Mine	Dredge 17	Branchinecta lynchi	Vernal pool fairy shrimp	T
27	2099	Mine	Dredge 17	Lepidurus packardi	Vernal pool tadpole shrimp	E

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
28	2100	Mine	Baxter Mine	Gopherus agassizii	Desert tortoise	T
29	2101	Mine	Mt Pass Mine & Mill	Gopherus agassizii	Desert tortoise	T
30	2103	Mine	Mesquite	Gopherus agassizii	Desert tortoise	T
31	2105	Mine	Jerico Products Incorporated	Hypomesus transpacificus	Delta smelt	T
32	2106	Mine	Silverlake Mine	Gopherus agassizii	Desert tortoise	T
33	2109	Mine	Ocean View Mine	Vireo bellii pusillus	Least Bell's vireo	E
34	2109	Mine	Ocean View Mine	Bufo californicus (=microscaphus)	Arroyo toad	E
35	2109	Mine	Ocean View Mine	Empidonax traillii extimus	Southwestern willow flycatcher	E
36	2109	Mine	Ocean View Mine	Polioptila californica californica	Coastal California gnatcatcher	T
37	2109	Mine	Ocean View Mine	Ceanothus ophiochilus	Vail Lake ceanothus	T
38	2114	Mine	Cresson Project	Strix occidentalis lucida	Mexican spotted owl	T
39	2141	Mine	Northshore Mine	Canis lupus	Gray wolf	E
40	2158	Mine	Genesis IncTroy Mine	Salvelinus confluentus	Bull Trout	T
51	2217	Mine	St Cloud Surface	Strix occidentalis lucida	Mexican spotted owl	T
52	2272	Mine	D D One	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
53	2312	Mine	Lompoc Plant	Deinandra increscens ssp. villosa	Gaviota Tarplant	E
54	2312	Mine	Lompoc Plant	Rana aurora draytonii	California red-legged frog	T
55	2312	Mine	Lompoc Plant	Empidonax traillii extimus	Southwestern willow flycatcher	E
56	2324	Mine	PolyMet	Canis lupus	Gray wolf	E
57	3006	Processor	ALCOA INTALCO Works	Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	T
58	3025	Processor	Halliburton Energy Services	Charadrius melodus	Piping Plover	T
59	3027	Processor	M-I LLC	Charadrius melodus	Piping Plover	T
60	3037	Processor	Morgan City Grinding Plant	Ursus americanus luteolus	Louisiana black bear	T
61	3042	Processor	Halliburton	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
62	3043	Processor	Galveston GBT Barite Grinding Plant	Charadrius melodus	Piping Plover	T
63	3083	Processor	Clarkdale Metals Corp	Xyrauchen texanus	Razorback sucker	E
64	3083	Processor	Clarkdale Metals Corp	Empidonax traillii extimus	Southwestern willow flycatcher	E

Row	Site ID	Type	Site Name	Scientific Name	Common Name	Species Status*
65	3148	Processor	Mesabi Nugget Delaware, LLC	Canis lupus	Gray wolf	E
66	3149	Processor	Northshore Mining Company	Canis lupus	Gray wolf	E
67	3174	Processor	Giles Chemical	Alasmidonta raveneliana	Appalachian elktoe	E
68	3191	Processor	A-1 Grit Co	Astragalus brauntonii	Braunton's milk-vetch	E
69	3195	Processor	ZEOX Corp. - Ash Meadows Plant & Mine	Grindelia fraxino-pratensis	Ash Meadows gumplant	T
70	3195	Processor	ZEOX Corp. - Ash Meadows Plant & Mine	Centaurium namophilum	Spring-loving centaury	T
71	3204	Processor	Mississippi Phosphates Corp.	Charadrius melodus	Piping Plover	T
72	3204	Processor	Mississippi Phosphates Corp.	Acipenser oxyrinchus desotoi	Gulf sturgeon	T
73	3209	Processor	PCS Phosphate Co. Inc. - Morehead City	Charadrius melodus	Piping Plover	T
74	3212	Processor	Moab Salt/Salt & Potash Production Facility	Strix occidentalis lucida	Mexican spotted owl	T
75	3212	Processor	Moab Salt/Salt & Potash Production Facility	Ptychocheilus lucius	Colorado pikeminnow	E
76	3212	Processor	Moab Salt/Salt & Potash Production Facility	Xyrauchen texanus	Razorback sucker	E
77	3234	Processor	American Soda, LLP / SOLVAY Chemicals, INC.	Ptychocheilus lucius	Colorado pikeminnow	E
78	3234	Processor	American Soda, LLP / SOLVAY Chemicals, INC.	Xyrauchen texanus	Razorback sucker	E
79	3238	Processor	Laws Mill	Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	T
80	3272	Processor	Protech Minerals, Inc	Empidonax traillii extimus	Southwestern willow flycatcher	E
81	3276	Processor	Cotter Mill	Strix occidentalis lucida	Mexican spotted owl	T
82	3292	Processor	Standard Mineral Co., Inc.	Notropis mekistocholas	Cape Fear shiner	E

* T = Threatened, E = Endangered

Appendix I
Flooding and Runoff Potential for 108(b) Historical CERCLA and 2009 Current Sites

I.1 108(b) Historical CERCLA Sites

Table I-1 lists the 108(b) Historical CERCLA sites with documented flooding or erosion (of soil or sediment) impacts. Those sites that are also Case Study Historical sites are bolded. **Table I-2** lists details of flooding and erosion at the 108(b) Historical CERCLA sites.

Table I-1. 108(b) Historical CERCLA Sites with Flooding or Erosion/Runoff Impacts

Row	Site	Cause of Contamination	Additional Flood Data
1	**Anaconda Co. Smelter**	**Flood**	**100 year**
2	**Bunker Hill Mining & Metallurical Complex**	**Flood**	
3	Calahan Mining Corp.		
4	Carson River Mercury	Sediment Erosion	
5	Flat Creek IMM	Flood	
6	**Gilt-Edge**	**Sediment Erosion**	
7	Iron Mountain	Flood	
8	**Maccalloy Corp**	**Flood**	**100 year**
9	Milltown Reservoir	Flood	
10	**National Southwire Aluminum Co.**	**Flood**	
11	**Ormet Corp**	**Flood**	**100 year**
12	**Palmerton Zinc Pile**	**Soil Erosion**	
13	**Reynolds Metals Company**	**Flood**	**100 year**
14	**Silver Mountain Mine**	**Erosion**	
15	**Stauffer Chemical Co.**	**Soil Erosion**	
16	**Summitville Mine**	**Sediment Erosion**	
17	**Teledyne Wah Chang**	**Sediment Erosion**	
18		**Flood**	**100 year, 500 year**
19	**Tex-Tin Corp.**	**Erosion**	

Table I-2. Flooding and Erosion at or near CERCLA Cleanup Site

ANACONDA CO. SMELTER	**ANACONDA**	**MT**	**REGION 8**	**MTD093291656**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	Potential loading sources for metals to Warm Springs Creek include runoff of contaminated storm water from poorly vegetated areas of contaminated soils, and erosion of floodplain wastes. Potential loading sources for metals to surface water and bed sediment of Willow Creek include runoff of contaminated storm water from areas of contaminated soil, and runoff of contaminated storm water and erosion of floodplain tailings adjacent to Willow Creek. Remedial actions are required within the 100-year floodplain due to source pathways from fluvially deposited tailings found within the stream banks on Warm Springs and Willow Creeks			ROD 1998 OU4 (page 24-25, & page 75)
BUNKER HILL MINING & METALLURGICAL COMPLEX	**SMELTERVILLE**	**ID**	**REGION 10**	**IDD048340921**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	In the Lower Basin, erosion of river banks and beds is a major source of metals, particularly lead, entering the Coeur d'Alene River. A 100-year flood event in February 1996, an estimated 1,400,000 pounds of lead were discharged to Coeur d'Alene Lake in a single day.			ROD 2002 OU-3 (page 65)
CAPTAIN JACK MILL	**WARD**	**CO**	**REGION 8**	**COD981551427**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	No mentioning of surface contamination resulting from erosion process or flood events.			
CIMARRON MINING CORP.	**CARRIZOZO**	**NM**	**REGION 6**	**NMD980749378**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			
	RODs did not mention the dispersion of site-related contaminants due to floods or erosion.			
EAGLE MINE	**MINTURN/ REDCLIFF**	**CO**	**REGION 8**	**COD081961518**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	Over the last 100 years, zinc mining resulted in the deposition of about 8 to 10 million tons of mine wastes and mill tailings along the Eagle River.			ROD 1993 page 11
	Prior to the 1940's Rex Flats was a wetland in the Eagle River flood plain, (CH2M Hill, 1984b). After the old tailings pond was filled in 1942, Rex Flats was used for tailings disposal of 75,000 tons of tailings (Kelly, 1979) while the new tailings pond was being constructed.			RI 1985 page 1-5

	The Cross Creek wetland and Rex Flats contains high levels of metals due to mining activities. These metals could become mobilized during flood conditions since the areas are located in the 100-year flood plain (Federal Emergency Management Agency, 1983).			RI 1985 page 3-35
EASTERN MICHAUD FLATS CONTAMINATION	**POCATELLO**	**ID**	**REGION 10**	**IDD984666610**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	RODs/RI did not mention the dispersion of site-related contaminants due to floods or erosion.			
EAST HELENA SITE	**EAST HELENA**	**MT**	**REGION 8**	**MTD006230346**
	Excerpt from RODs regarding floods/erosion and waste disposal practices			Sources
	Two historic flood channels of Prickly Pear Creek, north of East Helena, were cleaned up to prevent recontamination of adjacent properties during flood events. Periodic flooding and overflow of Prickly Pear Creek also caused contaminants in sediments to be carried away from the smelter site, and deposited in areas within East Helena and downstream to the north Ditches and channels, which extend 2 to 3 miles to the north of East Helena, have elevated levels of lead and arsenic in their surface soils and sediments. This contamination is thought to have been transported from outdoor piles of concentrates on the smelter grounds during flood events. Numerous irrigation channels that extend into the Grandview area, many of which were known to have transported concentrates from the plant site during floods, had recently been cleaned up.			ROD 1990 OU 1; Comprehensive RI/FS Volume 2 1990 ROD 2009 page 5-1 ROD 2009 page 5-20 ROD 2009 page 7-7
FOOTE MINERAL CO.	**EAST WHITELAND TOWNSHIP**	**PA**	**REGION 3**	**PAD077087989**
	Excerpt from RODs and RI/FS regarding floods/waste disposal practices			Sources
	RODs did not mention the dispersion of site-related contaminants due to floods or erosion.			
GILT EDGE MINE	**LEAD**	**SD**	**REGION 8**	**SDD987673985**
	Excerpt from RODs and RI/FS regarding floods/waste disposal practices			Sources
	The remaining tailings are present in over bank deposits located adjacent to Strawberry Creek. The overbank deposits are a mixture of tailings and alluvial sediments. The tailings are fine sand-sized particles of rock that were treated to remove gold in the late 1930s and early 1940s. The estimated volume of the tailings in Strawberry Creek is 44,000 cy. This volume includes tailings and tailings-impacted alluvial sediments located along the banks of Strawberry Creek between Cabin Creek and Hoodoo Gulch. BMC(Brohm Mining Compay) utilized heavy equipment to excavate a slot through the tailings to the approximate depth of the alluvium-bedrock interface. Tailings excavated from this slot were hauled to the site, amended with fly ash, and placed into repositories. Tailings that were located along the banks of this slot were not disturbed. These tailings represent a potential source of acidity and metals to Strawberry Creek.			Final RI 2008 pg. 3-24 Final RI page 4-94

HOMESTAKE MINING CO.	**MILAN**		**NM**	**REGION 6**	**NMD007860935**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Flood plain determinations were calculated using the U.S. Army Corps of Engineer's water surface profile computer program (HEC-2). The calculated 100-year flood of 5,981 cfs will reach the current flood protection berm that protects the west end of the tailing embankment. The berm is at such an elevation that it is high enough to prevent water from encroaching upon the tailing embankment.				RI 1989 page 14
LI TUNGSTEN CORP.		**GLEN COVE**	**NY**	**REGION 2**	**NYD986882660**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The southernmost portions of the site are located within both the 100-year and 500-year floodplains associated with Glen Cove Creek.				RI 1998 PAGE 3-15
MACALLOY CORPORATION	**NORTH CHARLESTON**		**SC**	**REGION 4**	**SCD003360476**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The Macalloy site is located within a 100-year floodplain and abuts wetlands areas. Surface water samples collected pursuant to the NPDES permit indicated the chromium (VI) limit was exceeded in three surface water sampling locations associated with the storm water management system. Other metals including arsenic, copper, lead, and zinc were identified as being a concern due to offsite discharge to Shipyard Creek.				Final RODs August 2002 page 10-29 and 5-13
MIDNITE MINE	**WELLPINIT**		**WA**	**REGION 10**	**WAD980978753**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Contaminants are transported away from the MA (Mining Area) and into the PIA via overland surface water flow, sediment migration, interflow (shallow groundwater flow) in unconsolidated waste rock piles and subsurface material, and in groundwater flow through deeper rock fractures. The drainage areas surrounding the MA receive the contaminated surface water, groundwater, and sediment.				Final RI 2005 page 5-1
MONSANTO CHEMICAL CO. (SODA SPRINGS PLANT)	**SODA SPRINGS**		**ID**	**REGION 10**	**IDD081830994**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	RODs did not mention the dispersion of site-related contaminants due to floods or erosion.				
NATIONAL SOUTHWIRE ALUMINUM CO.	**HAWESVILLE**		**KY**	**REGION 4**	**KYD049062375**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The Site is an active facility located in Hancock County, Kentucky, on the floodplain of the south side of the Ohio River. Much of the Site lies within the 100-year floodplain of the Ohio River.				ROD 2000 page 1. ROD 1993

	Flooding up to the predicted level of the 100 year flood, would affect low-lying areas of the site, particularly the Refractory Brick Disposal Area. However, the ground surface elevations of waste disposal units are generally above flood level. An exception to this is the eastern portions of Taylors Wash, outside of the clay barrier, which would be exposed to fast moving waters in the floodway.				RI 1994 – page 6-4
OMAHA LEAD	**OMAHA**	**NE**	**REGION 7**		**NESFN0703481**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The Omaha Lead Site is located outside the 500-year flood plain of the Missouri River Modification of residential yards resulting from filling, grading, or other activities can either cover or dilute surface lead contamination. Erosion of surface soils during rain events can relocate lead-contaminated soils. Flood events can cover surface contamination with silt or transport contaminated material downstream. It is likely that a combination of factors has resulted in the observed distribution of contamination at the site. Historic events such as flooding or earth working could have covered or transported contaminants at the Site.				RI 2009 PAGE 3-1 ROD 2004 OU-1 page 9 and page 38
ORMET CORP.	**HANNIBAL**	**OH**	**REGION 5**		**OHD004379970**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The Ormet Site is located in an area known as Buck Hill Bottom, a portion of the Ohio River Floodplain that formed as river sediments were deposited on the inside of a meander bend. From about 1966 until mid-1979, Ormet deposited waste construction materials and other miscellaneous plant debris, including capacitors and spent potliner, in the southeastern corner of the Site, adjacent to Pond 5 and the Ohio River. This 4 to 5 acre area is designated as the Construction Material Scrap Dump (CMSD). The CMSD shall be re-contoured to remove as much wasteas possible from below the 100-year flood level. Although RCRASubtitle C does not require a dual-barrier cap a priori, a dualbarrier cap shall be installed over the CMSD to ensure maximum protection from the effects of inundation in the event of a 100-year flood. Because a portion of the CMSD is located within a 100-year floodplain, design and construction of the final cover pursuant to OAC 3745-57-10 must include measures sufficient to meet the above requirements, and prevent transport of hazardous materials away from the landfill, during a 100-year flood.				ROD 1994 OU-01
PALMERTON ZINC PILE	**PALMERTON**	**PA**	**REGION 3**		**PAD002395887**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	The Palmerton Zinc Site is located within a floodplain and contains several wetland area. Water flowing across the defoliated portions of blue mountain has eroded the surface and become contaminated with metals contained in the soil. The runoff and erosion has carried the metal laden soil into Aquashicola creek.				ROD 0U2 1988-page 5 ROD OU1 1987 PAGE 3
REYNOLDS METALS COMPANY	**TROUTDALE**	**OR**	**REGION 10**		**ORD009412677**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources

	The area Outside the Dike refers to the portion of the RMC site that is to the north and east outside of the US Army Corps of Engineers dike. This area is within the flood plain of the Columbia River, and includes Company Lake, East Lake and the western portion of the north landfill. The areas north and east of the COE dike are within the 100 year floodplain of the Columbia and Sandy Rivers North landfill is located in a wooded area north of the U.S. Army Corps of Engineers dike... Most of the landfill lies within the 10-year floodplain of the Columbia River. For north landfill and Company Lake there would be a greater likelihood of washout of contaminants during severe flooding events The Preferred Alternative adds another measure of long-term protectiveness by removing additional north landfill waste material from the floodplain of the Columbia and Sandy Rivers.				ROD 2006 page 2 RI 2006 page 2-1 Interim ROD Remedial action 2002 page 18 Interim ROD Remedial action 2002 page 18
SILVER MOUNTAIN MINE	**LOOMIS**		**WA**	**REGION 10**	**WAD980722789**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Prevention of erosion mentioned during a discussion of remedial action required the placement of contaminated material in one designated location.				
STAUFFER CHEMICAL CO. (TARPON SPRINGS)	**TARPON SPRINGS**		**FL**	**REGION 4**	**FLD010596013**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Potential Migration Pathway---Once in the surface soils, these constituents are mobilized by several primary release mechanisms including rainwater infiltration and percolation, surface water runoff and erosion, as well as the tidal action from the Anclote River.				Final RI 1993 page 6-3
SUMMITVILLE MINE	**RIO GRANDE COUNTY**		**CO**	**REGION 8**	**COD983778432**
	Excerpt from RODs/RI regarding floods and erosions near NPL sites				Sources
	RODs/RI did not mention the dispersion of site-related contaminants due to floods or erosion.				
TELEDYNE WAH CHANG	**ALBANY**		**OR**	**REGION 10**	**ORD050955848**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Portions of the TWCA site, including the sludge ponds, are in the 100-year and 500-year flood plains of the Willamette River. The ground surface in the vicinity of TWCA slopes westward towards the river with agradient of approximately 11 feet per mile. (sludge is within floodplain) The LRSP and Schmidt Lake are unlined impoundments constructed on native soils in the Willamette River flood plain; thus, flooding is one potential cause of contaminant migration. Because the ponds are unlined, they could also be a source of groundwater contamination.				ROD 1989 Page 1 ROD 1989 Page 13

	According to an investigation by a THCA contractor (Dames and Moore) in1981, the existing LRSP dikes would be unstable during a major flood. Therefore, this alternative incorporates measures for stabilizing the dikes. This work would be accomplished by conventional earth-moving and compacting equipment… Dike stabilization will reduce the risk of contaminant dispersal by flooding.				ROD 1989 Page 21-22
TEX-TIN CORP.		**TEXAS CITY**	**TX**	**REGION 6**	**TXD062113329**
	Excerpt from RODs regarding floods and erosions near NPL sites				Sources
	Past incidents of flood or the presence of waste materials in a floodplain were not mentioned in the ROD documents.				

I.2 2009 Current Sites

Table I-3 lists the 199 individual 2009 Current sites that are located within catchments that include a FEMA Q3 designated flood area.

Table I-3. 2009 Current Sites within FEMA 100-year Flood Areas

Row	Mine Name	Site ID	Mine ID	Processor ID
1	A-1 Grit Co	3191	--	191
2	Ak Ashland	3094	--	93
3	Ak Middletown Works	3094	--	94
4	Alabama Mine	2095	95	--
5	Albemarle	3057	--	57
6	Alberene Soapstone Co.	3257	--	275
7	Alcan Primary Metal Sebree Works	3003	--	3
8	Alcoa	3004	--	4
9	Alcoa Inc Wenatchee Works	3005	--	5
10	Alcoa Intalco Works	3006	--	6
11	Alcoa Warrick Operations	3007	--	7
12	Alumax Of Sc Incorporated	3009	--	9
13	Amarillo Copper Refinery	3223	--	223
14	Ambar Drilling Fluids	3029	--	29
15	Amelia Barite Plant	3036	--	36
16	American Tripoli Inc.	2343	343	--
17	Arcelor Mittal Minorca Mine Inc	2144	144	--
18	Arcelor Mittal Weirton	3099	--	99
19	Arkansas Operations Mill	3281	--	281
20	ATI Alldyne	3243	--	243
21	ATI Wah Chang	3268	--	268
22	Baxter Mine	2100	100	--
23	Bethlehem Apparatus Co. Inc.	3187	--	187
24	Big Island Mine & Refinery	2337	337	--
25	Bingham Canyon Mine	2255	255	--
26	Black Butte Mine	2172	172	--
27	Boulder Scientific Co.	3218	--	218
28	Brown # 2	2239	239	--
29	Brush Wellman Inc	3050	--	50
30	Buckhorn Mine	2274	274	--
31	Bunker Hill Mine	2014	14	--
32	Cabot	3060	--	60
33	Carlota Copper Company	2086	86	--
34	Century Aluminum Of Kentucky	3011	--	11
35	Chemetall Foote	3168	--	168
36	Chemetall Foote	3169	--	169
37	Chemtura	3056	--	56
38	Clark Mill	3290	--	290
39	Clark Mine	2328	328	--
40	Clarkdale Metals Corp	3083	--	83
41	Colorado Quartz	2098	98	--
42	Columbia Falls Aluminum Company, LLC	3012	--	12
43	Copperton Concentrator	3069	--	69
44	Corpus Christi Grinding Plant	3035	--	35
45	Corpus Christi Plant	3039	--	39
46	Cotter Mill	3276	--	276
47	CR Briggs	2104	104	--
48	Cyprus Tohono Corporation	2049	49	--
49	De Quincy Plant	3040	--	40

Row	Mine Name	Site ID	Mine ID	Processor ID
50	Doe Run Resources Corp.	3151	--	151
51	Dredge 17	2099	99	--
52	East Boulder Mine	2166	166	--
53	Eastalco Aluminum Company	3013	--	13
54	Edward C. Levy Co.	3114	--	114
55	Edward C. Levy Co.	3115	--	115
56	Edward C. Levy Co.	3115	--	116
57	Electron Energy Magnet Mfg	3219	--	219
58	Elementis Pigments	3023	--	23
59	Elkem Metals Company?	3230	--	230
60	Erachem Comilog Inc.	3181	--	181
61	Erachem Comilog Inc.	3182	--	182
62	Eufaula Plant	3280	--	280
63	Excalibar Minerals LLC	3020	--	20
64	Felman Production Inc.	3184	--	184
65	Fmc Corp. Lithium Division	3170	--	170
66	FMC Corp. Lithium Division Bayport Texas Facility	3171	--	171
67	Four Corners	2119	119	--
68	Freeport-Mcmoran Bagdad Inc	2079	79	--
69	Freeport-Mcmoran Sierrita Inc	2083	83	--
70	Fritz Enterprises, Inc.	3117	--	117
71	Fritz Enterprises, Inc.	3118	--	118
72	Galena	2125	125	--
73	Galveston GBT Barite Grinding Plant	3043	--	43
74	Genesis Inc. Troy Mine	2158	158	--
75	Germanium Corporation Of America	3073	--	73
76	Giles Chemical	3172	--	172
77	Giles Chemical	3174	--	174
78	Global Tungsten & Powders Corp.	3062	--	62
79	Globe Metallurgical	3231	--	231
80	Globe Metallurgical Inc.	3232	--	232
81	Globe Metallurgical Inc.	3233	--	233
82	Gold Road Mine	2087	87	--
83	Golden Chest Project	2016	16	--
84	Golden Eagle	2135	135	--
85	Golden Sunlight Mine Inc	2163	163	--
86	Gramercy Facility	3002	--	2
87	Granusol, Inc.	3283	--	83
88	Halliburton	3042	--	42
89	Hardee Phosphate Complex	2117	117	--
90	Hastie Mining And Trucking Co	3072	--	72
91	Hemlock Semiconductor Corp.	3229	--	229
92	Hillsborough Mine	2331	331	--
93	Holcim (US) Inc./Vulcan Construction Materials	3120	--	120
94	Hookers Prairie Mine	2116	116	--
95	Hopewell	2123	123	--
96	Iluka Resources Inc	3277	--	277
97	IMI FABI Benwood Plant	3237	--	237
98	Indian Creek	2169	169	--
99	Indium Corp Of America	3087	--	87
100	Innophos - Rhodia Geismar Facility	3202	--	202
101	J R Simplot Co Pocatello	3203	--	203
102	J.P. Austin Associates, Inc.	3250	--	250
103	Jerico Products Incorporated	2105	105	--
104	Johnson Camp Mine	2088	88	--
105	Keewatin Taconite	2150	150	--
106	Kennecott Corp-Smelter & Refinery	3068	--	68
107	Kettle River Mill Site	2271	271	--

Row	Mine Name	Site ID	Mine ID	Processor ID
108	Kittanning Plant	3193	--	193
109	Lafarge North America Inc.	3121	--	121
110	Lafarge North America Inc./Maryland Slag Company	3126	--	126
111	Lake Charles Plant	3194	--	194
112	Laws Mill	3238	--	238
113	Lee Creek Mine	2227	227	--
114	Lompoc Plant	2312	312	--
115	Little Rock Plant	3282	--	282
116	Lucky Friday	2126	126	--
117	Luzenac America Inc	2265	265	--
118	Magnesium Elektron	3269	--	269
119	Manko Co Sec 5 Mine/Phos	2120	120	--
120	Martin Marietta Chemical Corp	2175	--	175
121	Martin Marietta Magnesia Specialties LLC	3176	--	176
122	Mesabi Nugget Delaware, LLC	3148	--	148
123	M-I LLC	3027	--	27
124	Mineral Park Inc	2081	81	--
125	Mississippi Phosphates Corp.	3204	--	204
126	Mockingbird Mine	2108	108	--
127	Montanore Project	2031	31	--
128	Morgan City Grinding Plant	3037	--	37
129	Mosaic Fertilizer, LLC - Taft Plant	3205	--	205
130	Mosaic Fertilizer, LLC - Uncle Sam Plant	3206	--	206
131	Multiserv	3129	--	129
132	Multiserv	3130	--	130
133	Multiserv Plt 4	3131	--	131
134	New Acers	2131	131	--
135	New Jersey Mine & Mill	2317	317	--
136	New Riverside Ochre	3028	--	28
137	North American Industries	2004	4	--
138	Northshore Mine	2141	141	--
139	Norweigen	2161	161	--
140	Oregon Belle Mine	2232	232	--
141	Ormet Aluminum Mill Products Corp	3015	--	15
142	Ormet Primary Aluminum Corp	3047	--	47
143	P.V.P. Industries, Inc.	3251	--	251
144	Palmetto Vermiculite Co., Inc.	3249	--	249
145	Pcs Nitr Fert	3208	--	208
146	Pcs Phosphate Co. Inc. - Morehead City	3209	--	209
147	Pcs Phosphate White Springs	3210	--	210
148	Pend Oreille Mine	2267	267	--
149	Phoenix Services LLC	3133	--	133
150	Pinto Valley Operations	2082	82	--
151	PolyMet	2324	324	--
152	Protech Minerals, Inc	3272	--	272
153	Quality Magnetite LLC	3145	--	145
154	R. E. Sansom Mine & Mill	2266	266	--
155	Reiss Viking Div Of C Reiss Coal	2275	275	--
156	Robins Shop	2137	137	--
157	Rosemont Copper Project	2005	5	--
158	Rosiclare Facility Hastie Mining	3071	--	71
159	Santoku America	3220	--	220
160	Sappington Mill	3273	--	273
161	Savage Plant	3061	--	61
162	Schundler Co., The	3258	--	258
163	Severstal Dearborn	3101	--	101
164	Severstal Sparrows Point	3102	--	102
165	Severstal Wheeling	3097	--	97

Row	Mine Name	Site ID	Mine ID	Processor ID
166	Sf Phosphates Limited Company	3211	--	211
167	Silver Bell Mining LLC	2309	309	--
168	Sixteen To One Mine	2007	7	--
169	South Fort Meade Mine	2121	121	--
170	Standard Mineral Co., Inc.	3292	--	292
171	Stein, Inc.	3137	--	137
172	Sterling Mine	2032	32	--
173	Summit Mine Site	2219	219	--
174	Sunshine Mine	2013	13	--
175	Swift Creek Mine	2118	118	--
176	Teague Mineral Products	3190	--	190
177	The Wharf Mine	2240	240	--
178	Therm-O-Rock East, Inc.	3252	--	252
179	Thompson Creek Mining Co	2124	124	--
180	Tripoli	2229	229	--
181	Tronox LLC	3185	--	185
182	Tube City IMS, LLC Dba Olympic Mill Service	3143	--	143
183	Tungsten Joint Venture	3242	--	242
184	Umicore Cobalt & Energy Products	3063	--	63
185	Umicore Indium Products	3086	--	86
186	Umicore Optical Materials Usa	3074	--	74
187	Unimin Corporation-Emmett Plant	3196	--	196
188	United State Antimony Corporation	3016	--	16
189	US Steel (ES Works)	3104	--	104
190	US Steel Birmingham (Fairfield)	3105	--	105
191	US Steel Great Lakes Works	3109	--	109
192	Verlite Co.	3259	--	259
193	W.R. Grace & Co.	3261	--	261
194	W.R. Grace & Co.	3262	--	262
195	W.R. Grace & Co. - Conn. Davison Catalysts	3221	--	221
196	White Rock Quarry	2273	273	--
197	Whittemore Co., Inc.	3256	--	256
198	Wingate Creek Mine	2122	122	--
199	Zeox Corp. - Ash Meadows Plant & Mine	3195	--	195

In addition to the individual mines and processors listed above there are approximately 31 combination sites (comprising 50 total mines and processors) which are located at least partially within catchments that include a FEMA Q3 designated flood area. The list of 50 individual mines and processors from these 31 combination sites are listed below:

Table I-3. 2009 Current Combined Site Members within FEMA 100-year Flood Areas

Row	Mine Name	Site ID	Mine ID	Processor ID
1	Alcoa World Alumina Atlantic	15	--	48
2	Arcelor Mittal Burns Harbor	32	--	92
3	Arcelor Mittal Riverdale	34	--	96
4	Arcelor Mittal Usa Indiana Harbor	33	--	98
5	Asarco LLC Mission Complex	1022	--	197
6	Asarco, LLC - Hayden	1013		66
7	Baroid Drilling Fluids	1015	--	22
8	Battle Mountain Grinding Plant	13	--	45
9	Bayer Alumina Plant	15	--	1
10	Beelman Truck Co.	27	--	110

Row	Mine Name	Site ID	Mine ID	Processor ID
11	Beemsterboer Slag Corp.	33	--	111, 112
12	Copper Cities Unit	1005	36	--
13	Corpus Christi Grinding Plant	13	--	38
14	Dyersburg Plant	19	--	41
15	E.I. Dupont De Nemours	1007		271
16	Edward C. Levy Co.	33	--	113
17	Elkem Metals Co.	3230	--	230
18	Eveready Battery Co. Inc.	28	--	183
19	Excalibar Minerals	19	--	24
20	Excalibar Minerals Of Louisiana LLC	1010	139	30
21	Holcim (Us) Inc./Mercier Corp.?	33	--	119
22	IMC Chemicals Incorporated	18	--	235
23	Lafarge North America Inc.	30	--	124
24	Lafarge North America Inc.	33	--	122
25	Milwhite	1004	--	32
26	Minntac Plant	1014	--	146
27	Multiserv	34	--	127
28	Multiserv Plt 6	30	--	132
29	Nyrstar NV	21	--	59
30	Phelps-Dodge Morenci	1011	--	199
31	Phoenix Services LLC/Listed As Harsco Multiserv Plt 27?	34	--	134
32	Plasminco (Probably Should Be Pasminco)	21	--	267
33	R.T.Vanderbilt Company	1001	--	263
34	Searles Valley Minerals Inc	18	--	55
35	Severstal Warren	30	--	124
36	Sherwin Alumina	14	--	291
37	Sherwin Alumina Co.	14	--	46
38	Stein, Inc.	27	--	135
39	Stein, Inc.	31	--	138
40	Strategic Resource Acquisition Corp	21	--	75
41	The Levy Co., Inc.	32	--	139
42	The Levy Co., Inc.	33	--	140
43	Tube City IMS, LLC	33	--	141
44	Tube City IMS, LLC	29	--	142
45	U.S. Aggregates, Inc.	33	--	144
46	US Borax Waste Pile From Boron CA Operations	1003	--	53
47	Us Steel Braddock	29	--	106
48	Us Steel Gary Works	33	--	107
49	Us Steel Granite City	27	--	108
50	W.R. Grace & Co.	17	--	260

In the aquatic area of review studies, point locations for sites that are not identified in a catchment area (e.g., initial catchment) are either

- in Alaska (no NHD catchment or HUC data were available for Alaska) and have a location confidence of 0 (many of these are listed as Lat/Long 0/0 thus in the middle of the ocean), or

- are located in a catchment that has no flow direction associated with it.

For catchments that have no flow direction associated with them, the following conditions were assumed: (1) there are no flow lines running in or out of the catchment and it is considered to be a topographic basin or ‘contained’ catchment; (2) in some very arid regions, no water associated with the catchment (e.g., streams, irrigation ditches and any rain water) would leave the catchment area; (3) all drainage in many of these areas is channeled to irrigation, resulting in no downstream flow lines; or (4) the catchments are located along a Coastline and since these flowlines merge with a large waterbody within a short distance there is no associated downstream flow.

Appendix J
Toxicity of Priority Contaminants of Concern (COCs)

This appendix presents the estimated magnitudes of the toxic effects for those COCs for which toxicity data are available. Human health benchmarks are used to quantify and characterize potential hazards and risks resulting from exposures to chemical substances. Superfund risk assessments use reference doses (RfDs) and reference concentrations (RfCs) to evaluate noncancer risk from oral and inhalation exposures, respectively. Oral cancer slope factors (CSFos) and inhalation unit risk factors (URFs) are used to evaluate risk for carcinogens.

RfDs and RfCs are the primary benchmarks used to evaluate noncarcinogenic hazards posed by environmental exposures to chemical constituents. RfDs and RfCs are estimates (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. However, an average lifetime exposure above the RfD (or RfC) does not imply that an adverse health effect would necessarily occur.

The CSF is an upper bound estimate (approximating a 95 percent confidence limit) of the increased human cancer risk from a lifetime exposure to an agent. This estimate is usually expressed in units of proportion (of a population) affected per milligram of agent per kilogram body weight per day (mg/kg-d). The URF is the preferred cancer benchmark for inhalation exposures, where the air concentrations inhaled are used as the measure of dose. The unit risk is the upper bound lifetime excess cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air. That is, if the unit risk = 1.5×10^{-6} per $\mu g/m^3$, then 1.5 excess cancer cases would be expected to develop per 1,000,000 people if exposed daily to a concentration of 1 µg of the chemical agent in 1 m^3 of air for a lifetime. Unlike RfDs and RfCs, CSFs and URFs do not represent “safe” exposure levels; rather, they relate levels of exposure to a probability of developing cancer.

To identify human health benchmarks, Superfund risk assessments use the hierarchy of sources as described in the Office of Solid Waste and Emergency Response 2003 Directive 9285.7-53. This heirarchy encourages priority to those sources that are most current, those for which the basis is transparent and publicly available, and those that have been peer reviewed. To make best use of the currently available health benchmark data, this report used the following order of preference for sources of human health benchmarks:

- EPA’s Integrated Risk Information System (IRIS)
- Superfund Provisional Peer-Reviewed Toxicity Values (PPRTVs)
- Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs)
- California EPA (CalEPA) reference exposure levels (RELs) and cancer potency factors
- Various other health benchmark sources (e.g., other State sources)
- EPA’s 1997 Health Effects Assessment Summary Tables (HEAST).

The highest priority chronic human health benchmarks available for the Selected COCs are summarized in **Table J-1**, which provides the constituent name, CASRN, CSFo, inhalation

URF, reference for each benchmark, RfD, and RfC. These human health benchmarks represent the highest quality benchmark currently available (2011). However, these values may or may not differ from those used in Superfund risk assessments at NPL sites for two main reasons. Human health benchmarks may be revised over time as new toxicological data become available. Also, the Superfund risk assessor may have used a different source hierarchy (e.g., HEAST instead of ATSDR).

Radionuclide slope factors were obtained from the HEAST—Radionuclides Table (formerly Table 4). EPA, other Federal agencies, States, and contractors who are responsible for identifying, characterizing, and remediating sites contaminated with radioactive materials use radionuclide slope factors in risk assessments to calculate potential risks to the general public. EPA calculates radionuclide slope factors to assist risk assessors with risk-related evaluations and decision making at various stages of the remediation process. **Table J-2** presents the ingestion, inhalation, and external exposure cancer slope factors for radionuclide Priority COCs predominantly in units of picocuries (pCi). The cancer slope factors may differ from those used to assess risk at NPL sites because this table has changed over time; it was most recently updated in 2001.

Soil, water, and sediment ecological benchmarks are used to assess risks to ecological receptors. Ecological soil screening levels (Eco-SSLs) for avian, mammalian, plant, and soil invertebrate receptors and acute and chronic freshwater Ambient Water Quality Criteria (AWQC) are presented in **Table J-3** for Priority COCs. These ecological benchmarks represent the highest quality benchmark currently available (2011). However, these values may or may not differ from those used to assess ecological hazard at NPL sites because values may have changed since the Superfund risk assessment or the Superfund risk assessor may have used an alternative source.

References

ATSDR (Agency for Toxic Substances and Disease Registry). 2011. Minimal Risk Levels. Agency for Toxic Substances and Disease Registry. Atlanta, Georgia. Available at https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf. Last updated March 3, 2011, and accessed July 2011.

CalEPA (California Environmental Protection Agency). 2011. Air Toxics Hot Spots Program Risk Assessment Guidelines: OEHHA Acute, 8-hour, and Chronic Reference Exposure Levels (RELs). Office of Environmental Health Hazard Assessment, Berkeley, CA. Available at http://oehha.ca.gov/air/allrels.html. Accessed July 2011.

NOAA (National Oceanic and Atmospheric Administration). 2008. Screening Quick Reference Tables. National Oceanic and Atmospheric Administration, Office of Response and Restoration. Silver Spring, Maryland. Available at http://response.restoration.noaa.gov/sites/default/files/SQuiRTs.pdf updated November 13, 2008 and accessed July 2011.

NJDEP (New Jersey Department of Environmental Protection). 2009. Derivation of Ingestion-Based Soil Remediation Criterion for Cr+6 Based on the NTP Chronic Bioassay Data for Sodium Dichromate Dihydrate. New Jersey Department of Environmental Protection, Trenton, NJ. Available online at www.state.nj.us/dep/dsr/chromium/soil-cleanupderivation.pdf.

U.S. EPA, 2011a. US EPA. Integrated Risk Information System. U.S. Environmental Protection Agency, Office of Research and Development. Washington, D.C. Available at https://www.epa.gov/iris last updated July 26, 2011 and accessed July 2011.

- 2011a1- IRIS Chemical Assessment Summary - Antimony
- 2011a2- IRIS Chemical Assessment Summary - Arsenic
- 2011a3- IRIS Chemical Assessment Summary - Benz[a]anthracene
- 2011a4- IRIS Chemical Assessment Summary - Benzo[a]pyrene
- 2011a5- IRIS Chemical Assessment Summary - Benzo[b]fluoranthene
- 2011a6- IRIS Chemical Assessment Summary - Beryllium
- 2011a7- IRIS Chemical Assessment Summary - Cadmium
- 2011a8- IRIS Chemical Assessment Summary – Chromium III
- 2011a9- IRIS Chemical Assessment Summary – Chromium VI
- 2011a10- IRIS Chemical Assessment Summary - Dibenz[a,h]anthracene
- 2011a11- IRIS Chemical Assessment Summary - Fluorine
- 2011a12- IRIS Chemical Assessment Summary - Manganese
- 2011a13- IRIS Chemical Assessment Summary - Mercury
- 2011a14- IRIS Chemical Assessment Summary - Nickel
- 2011a15- IRIS Chemical Assessment Summary - Polychlorinated Biphenyls (PCBs)
- 2011a16- IRIS Chemical Assessment Summary - Selenium
- 2011a17- IRIS Chemical Assessment Summary - Silver
- 2011a18- IRIS Chemical Assessment Summary - Uranium
- 2011a19- IRIS Chemical Assessment Summary - Zinc

U.S. EPA, 2011b. US EPA. Interim Ecological Soil Screening Levels. U.S. Environmental Protection Agency, Office of Research and Development. Washington, D.C. Available at https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents.

- 2011b1- Eco Soil Screening Levels – Antimony
- 2011b2- Eco Soil Screening Levels - Arsenic
- 2011b3- Eco Soil Screening Levels - Beryllium
- 2011b4- Eco Soil Screening Levels - Cadmium
- 2011b5- Eco Soil Screening Levels – Chromium III and VI
- 2011b6- Eco Soil Screening Levels - Cobalt
- 2011b7- Eco Soil Screening Levels - Copper
- 2011b8- Eco Soil Screening Levels - Lead
- 2011b9- Eco Soil Screening Levels - Manganese
- 2011b10- Eco Soil Screening Levels - Nickel
- 2011b11- Eco Soil Screening Levels - Polycyclic Aromatic Hydrocarbons (PAHs)
- 2011b12- Eco Soil Screening Levels - Selenium
- 2011b13- Eco Soil Screening Levels - Silver
- 2011b14- Eco Soil Screening Levels - Zinc

Table J-1. Chronic Human Health Benchmarks for the Priority COCs

Priority COC	CASRN	CSF$_o$ (per mg/kg-day)	CSF$_o$ Ref	URF (per ug/m^3)	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	General Comments
Antimony	7440-36-0	--	--	--	--	4.0E-04	IRIS	--	--	--
Arsenic	7440-38-2	1.5E+00	IRIS	4.3E-03	IRIS	3.0E-04	IRIS	1.5E-05	CalEPA	--
Benz[a]anthracene	56-55-3	7.3E-01	IRIS	1.1E-04	CalEPA	--	--	--	--	Benzo(a)pyrene cancer potency values with TEF applied
Benzo[a]pyrene	50-32-8	7.3E+00	IRIS	1.1E-03	CalEPA	--	--	--	--	--
Benzo[b]fluoranthene	205-99-2	7.3E-01	IRIS	1.1E-04	CalEPA	--	--	--	--	Benzo(a)pyrene cancer potency values with TEF applied
Beryllium	7440-41-7	--	--	2.4E-03	IRIS	2.0E-03	IRIS	2.0E-05	IRIS	--
Cadmium	7440-43-9	--	--	1.8E-03	IRIS	1.0E-03	IRIS	1.0E-05	ATSDR	RfD for food and soil; RfD for H_2O = 5E-4 mg/kg-day
Chromium (III)	16065-83-1	--	--	--	--	1.5E+00	IRIS	--	--	--
Chromium (VI)	7440-47-3	5.0E-01	NJDEP	1.2E-02	IRIS	3.0E-03	IRIS	1.0E-04	IRIS	--
Cobalt	7440-48-4	--	--	9.0E-03	PPRTV	3.0E-04	PPRTV	6.0E-06	PPRTV	--
Copper	7440-50-8	--	--	--	--	4.0E-02	HEAST			--
Dibenz[a,h]anthracene	53-70-3	7.3E+00	IRIS	1.2E-03	CalEPA	--	--	--	--	Benzo(a)pyrene cancer potency values with TEF applied
Fluorine (soluble fluoride)	7782-41-4	--	--	--	--	6.0E-02	IRIS	--	--	--
Lead	7439-92-1	--	--	--	--	--	--	--	--	Blood lead level = 10 µg/dL
Manganese	7439-96-5	--	--	--	--	1.4E-01	IRIS	5.0E-05	IRIS	RfD for food; H_2O and soil = 4.7E-2 mg/kg-day
Mercury	7439-97-6	--	--	--	--	3.0E-04	IRIS	3.0E-04	IRIS	RfD is for mercuric chloride
Nickel soluble salts	7440-02-0	--	--	2.6E-04	CalEPA	2.0E-02	IRIS	9.0E-05	ATSDR	
Polychlorinated biphenyls (high risk)	1336-36-3	2.0E+00	IRIS	5.7E-04	IRIS	--	--	--	--	--
Polychlorinated biphenyls (low risk)	1336-36-3	4.0E-01	IRIS	1.0E-04	IRIS	--	--	--	--	--
Polychlorinated biphenyls (lowest risk)	1336-36-3	7.0E-02	IRIS	5.7E-04	IRIS	--	--	--	--	--
Selenium	7782-49-2	--	--	--	--	5.0E-03	IRIS	2.0E-02	CalEPA	--

Priority COC	CASRN	CSF_o (per mg/kg-day)	CSF_o Ref	URF (per ug/m^3)	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	General Comments
Silver	7440-22-4	--	--	--	--	5.0E-03	IRIS	--	--	--
Thallium	7440-28-0	--	--	--	--	1.0E-05	PPRTV	--	--	--
Uranium	7440-61-1	--	--	--	--	3.0E-03	IRIS	3.0E-04	IRIS	--
Zinc	7440-66-6	--	--	--	--	3.0E-01	IRIS	--	--	--

Table J-2. Ingestion, Inhalation, and External Exposure Cancer Slope Factors for Radionuclide COCs

302_4 List	ICRP_LungType	WaterIngestion (Risk/pCi)	FoodIngestion (Risk/pCi)	SoilIngestion (Risk/pCi)	Inhalation (Risk/pCi)	ExternalExposure (Risk/y per pCi/g)
Lead-210	M	8.81E-10	1.18E-09	1.84E-09	2.77E-09	1.41E-09
Radium-226Φ	M	3.86E-10	5.15E-10	7.30E-10	1.16E-08	8.49E-06
Radon-222	--	--	--	--	--	1.74E-09
Thorium-228	S	1.07E-10	1.48E-10	2.89E-10	1.32E-07	5.59E-09
Uranium-238φ	M	8.71E-11	1.21E-10	2.10E-10	9.35E-09	1.14E-07

Table J-3. Ecological Soil Screening Levels (Eco-SSLs) and Acute and Chronic Freshwater Ambient Water Quality Criteria (AWQC)

Priority COC	CASRN	Eco-SSL Avian (mg/kg dry wt soil)	Eco-SSL Mammalian (mg/kg dry wt soil)	Eco-SSL Plant (mg/kg dry wt soil)	Eco-SSL Soil Invertebrates (mg/kg dry wt soil)	Freshwater Criteria Maximum Concentration (CMC) - Acute (ug/L)	Freshwater Criterion Continuous Concentration (CCC) - Chronic (ug/L)
Antimony and compounds	7440-36-0	--	0.27	--	78	--	--
Arsenic and compounds	7440-38-2	43	46	18		340	150
Benz[a]anthracene	56-55-3	--	--	--	--	--	--
Benzo[a]pyrene	50-32-8	--	--	--	--	--	--
Benzo[b]fluoranthene	205-99-2	--	--	--	--	--	--
Beryllium and compounds	7440-41-7	--	21	--	40	--	--
Cadmium and compounds	7440-43-9	0.77	0.36	32	140	2	0.25
Chromium (III)	16065-83-1	26	34	--	--	570	74
Chromium (VI)	18540-29-9	--	130	--	--	16	11

Priority COC	CASRN	Eco-SSL Avian (mg/kg dry wt soil)	Eco-SSL Mammalian (mg/kg dry wt soil)	Eco-SSL Plant (mg/kg dry wt soil)	Eco-SSL Soil Invertebrates (mg/kg dry wt soil)	Freshwater Criteria Maximum Concentration (CMC) - Acute (ug/L)	Freshwater Criterion Continuous Concentration (CCC) - Chronic (ug/L)
Chromium and compounds	7440-47-3	--	--	--	--	--	--
Cobalt compounds	7440-48-4	120	230	13	--	--	--
Copper and compounds	7440-50-8	28	49	70	80	Freshwater criteria calculated using the BLM mm - See Document	
Dibenz[a,h]anthracene	53-70-3	--	--	--	--	--	--
Fluorine	7782-41-4	--	--	--	--	--	--
Lead and compounds	7439-92-1	11	56	120	1700	65	2.5
Lead-210	14255-04-0	--	--	--	--	--	--
Manganese and compounds	7439-96-5	4300	4000	220	450	--	--
Nickel and compounds	7440-02-0	210	130	38	280	470	52
PAHs (high molecular weight)	NA	--	1.1	--	18	--	--
PAHs (low molecular weight)	NA	--	100	--	29	--	--
Polychlorinated biphenyls	1336-36-3	--	--	--	--		0.014
Radionuclides	NA	--	--	--	--	--	--
Radium-226	13982-63-3	--	--	--	--	--	--
Radon-222	14859-67-7	--	--	--	--	--	--
Selenium and compounds	7782-49-2	1.2	0.63	0.52	4.1	--	5
Silver and compounds	7440-22-4	4.2	14	560		3.2	--
Thallium and compounds	7440-28-0	--	--	--	--	--	--
Thorium-228	14274-82-9	--	--	--	--	--	--
Uranium-238	7440-61-1	--	--	--	--	--	--
Zinc and compounds	7440-66-6	46	79	160	120	120	120

Appendix K
Conceptual Site Model for Mining or Mineral Processing Sites

The purpose of a conceptual site model (CSM) is to provide perspective on what is known about the release, transport, and fate of contaminants at a mine or processor site to support various stages of the Superfund risk assessment process. It describes contaminant sources, contaminant release mechanisms, pathways for contaminant transport, and the resulting potential for human and ecological exposure. Sources, exposure routes, and receptors that were reported for the Historical sites are provided in other appendices.

The CSM provided in **Figure K-1**, adapted from a CSM prepared for a mining NPL site, shows a generic mining and ore processing site of nonspecific location, climate, or physical setting. Site-specific conditions, ore geochemistry, geologic, physiographic and hydrogeologic settings where the mine or mineral processor is located define many of the factors that influence the likelihood and potential severity of Superfund ecological risks associated with a specific site. The main part of the figure shows the site, and the individual receptor types are shown in smaller boxes, connected to the general location where they would be exposed. These smaller receptor boxes show the specific pathways (e.g., inhalation of particulates and vapors) by which each type of receptor might be exposed. This CSM is provided for general perspective and to orient the reader who is unfamiliar with the site features and conditions that could be found at a mining or mineral processing site. The features illustrated in the CSM include mine pits, leach piles, other processing areas (e.g., milling operation), tailings and waste piles. Some of the common wastes from a mine site are generally discussed in the sections that follow.

Mineral processing operations that do not occur at mining sites frequently take place in a more urban or densely populated setting. A CSM for a mineral processing operation in an urban setting would show site features, contaminant sources, receptors, and likely transport pathways from contaminant source to receptor. Mineral processing that takes place within enclosed buildings may present a different potential contaminant transport setting, although outdoor waste management practices could be similar to those found at mineral processing operations located at mining sites.

K.1 Surface Water and Groundwater Pathways

Water is an important environmental pathway for contaminant releases from mines and processors (for example, in Figure K-1, contaminants leach from surface water to groundwater, and the on-site resident has contact with or ingests contaminated surface or ground water). Transport of hazardous substances may occur by surface water movement, or by infiltration into the subsoil and ensuing groundwater movement. Human exposure to contaminated groundwater and surface water can occur from ingestion and dermal contact. Ecological receptor exposure can occur from direct contact with contaminated surface water bodies or contaminated groundwater.

A discussion of EPA's National Pollutant Discharge Elimination System (NPDES) program that regulates point source discharges (including discharges from mines and mineral processors) to surface water bodies is provided in **Section 2.4.2** and **Appendix F**, along with data from EPA's water discharges databases regarding hazardous substance releases to surface water from currently active mining and mineral processing sites.

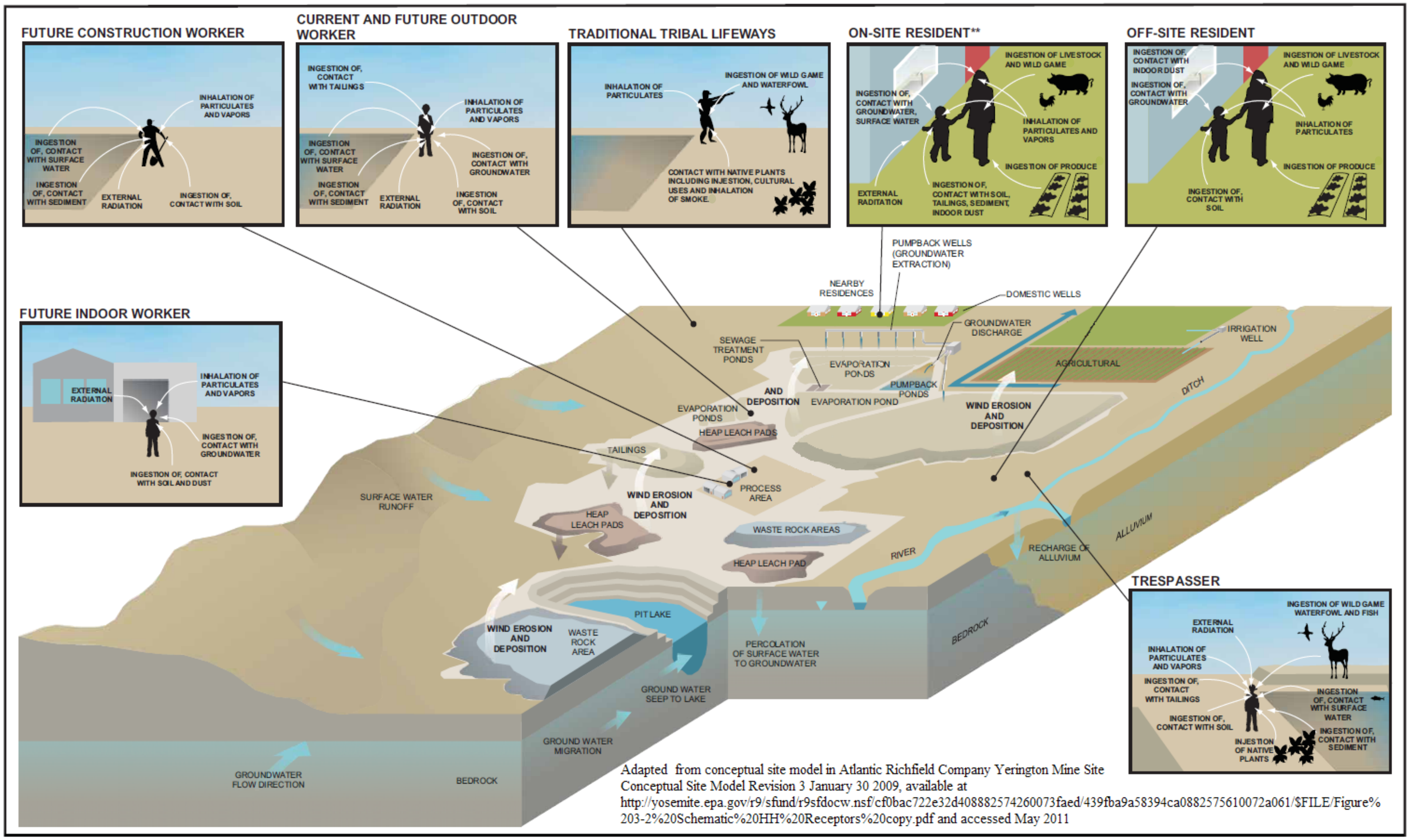


Figure K-1. Generic Hardrock Mine Conceptual Site Model and Exposure Pathways

K.2 Stormwater Runoff

Hazardous substances released directly to surface soils may be transported by surface water runoff to other areas of a site. Erosion of surface mine units (e.g., stockpiles, leach piles, waste rock piles, mine slope, etc.) by surface water runoff may result in transfer and deposition of acidic water, metals, and other chemicals onto exposed surface soil in down-gradient areas (see, for example, runoff in Figure K-1 from hills on left onto site and then back off to surface water). Organic chemicals and other hazardous substances that are used in maintenance and process areas at the mine site can also be transported by precipitation runoff. Local anthropogenic topographic features such as steep slopes in waste rock or tailings piles may cause increased rates of stormwater runoff and therefore increase the amounts of material transported. However, the presence of berms or ditches around mine units or interior collection areas such as ponds and topographically low areas will reduce the potential for stormwater to leave a site. Stormwater runoff control is generally required to prevent direct discharge of contaminants from mine sites into creeks and streams where aquatic habitat or downstream drinking water quality can be impacted.

K.3 Groundwater

Groundwater can flow into mining pit lakes or evaporation ponds, or recharge from surface mine units (see, for example, percolation of surface water to groundwater in Figure K-1). Pit water is generally removed to evaporation ponds or treated and discharged to surface waters or injected into the aquifer. It is often used in milling processes. Water may flow out of, and transport chemicals from, pit lakes into alluvial and bedrock groundwater flow systems, particularly during periods of high precipitation. Groundwater inflow to pit lakes, streams, buried trenches, or surface ditches may also result in the transport of chemicals from subsurface environments to surface waters, including the transfer of chemicals into sediments.

Pumpback Well Systems (PWS) are sometimes used to extract a portion of mineralized groundwater or pit seepage water that could migrate off-site and impact neighboring or nearby human or ecological receptors. The effluent is then pumped and released to evaporation ponds, resulting in an accumulation of potentially contaminated sediment as the water evaporates. Chemical precipitate accumulations can also occur in active PWS and evaporation ponds. Losses of dewatering effluent from leaking pipelines carrying water from mine pits, holding ponds, or from PWS can also be a potential source of soil and groundwater contamination.

K.4 Air Pathway

K.4.1 Fugitive Dust

Direct human exposure can occur from inhalation of fine dusts (i.e., particulates) or by ingestion or dermal contact of contaminated dusts (see, for example, wind erosion and exposure to on-site worker in Figure K-1). Particulates or fugitive dust from waste rock or tailings piles, conveyor systems, site roads, or other areas can be transported by wind and deposited and accumulated in downwind areas including surface soils, surface water bodies (e.g., ponds, pit lakes), or be inhaled by site workers and nearby residents. Dust can be an irritant, toxic, or a carcinogen depending on the particle’s properties. However, the presence of physical barriers, such as vegetation or structural foundations, may reduce wind-blown transport of particles. Accumulated mine sediments or dust may become secondary sources of chemicals transported to groundwater via leaching and percolation.

K.4.2 Aerosols and Chemical Vapors

Mine workers can be exposed to aerosols from numerous processes including comminution, re-entrainment, and combustion sources. Aerosols are airborne mixtures of dust and/or chemicals sometimes referred to as gases, mists or vapors. Cutting, drilling, and blasting of the parent rock, and ore crushing and beneficiation processes creates aerosols with a composition similar to the parent rock, particularly if comminuting the ore underground is practiced for efficient transport out of the mine. Aeration ponds are sometimes used to treat waste waters on a mine site, and the aerators used to disturb the surface of the water can create aerosols; the problem can become worse if surfactants are used and not managed properly.

K.5 Radioactivity

Naturally occurring radioactive materials (NORMs) such as thorium and uranium can be present in ore materials. As target commodities are removed from ores, and waste rock or gangue materials are produced, NORMs can concentrate in dusts and sediments. Transport of NORMs may occur by any of the transport pathways described above. Acidic groundwater and surface water and low concentrations of organic material in soils can contribute to the mobility and transport of radioactive materials. Accumulations of sediments deposited by runoff and dusts can also concentrate radioactive materials. External exposure to naturally occurring radiation is often limited to soil or waste materials that are within several inches of the ground or pile surface; radioactive materials found deeper in the soil column or accumulated sediments are generally shielded by the top layer of soil. Geometric attenuation generally limits the external radiation from unshielded NORMs to within a few meters (i.e., less than 5 meters and often less than 1 to 2 meters from the source). Radioactivity can become concentrated in mineral scales that develop in PWS, holding tanks, aeration ponds, and milling process areas. Inhalation of contaminated dusts is generally of greatest concern for NORMs.

EPA’s NEI data is described in **Appendix F**. Data on hazardous substance releases to air from the 2009 Current sites is provided in **Section 2.4.2** and **Appendix F**; data for historical sites is provided in **Section 2.4.1**.

K.6 Direct Exposure

Direct exposure can occur as a result of direct contact with solid phase mine or process wastes (see, for example, the on-site worker in Figure K-1). It can also occur under a future residential use scenario where housing is built directly on top of waste rock piles (as has been documented at one site in Colorado). In that scenario, direct exposure may be both to direct contact with or ingestion of soil, or to radiation if the waste rock had elevated radionuclide levels (see, for example, the on-site resident in Figure K-1).

K.7 Indirect Exposure

Indirect exposure to humans encompasses a variety of pathways that can occur when contaminants are transported off the site before exposure occurs. Transport may be via air (e.g., particulates may become airborne and disperse off site, where they then redeposit on agricultural or residential land, or via runoff and soil erosion to either land or surface water. Contaminants that reach surface water can bioaccumulate in the aquatic foodchain, or leach to groundwater. Once off-site, whether in water or on land, contaminants may accumulate in the food chain, either in vegetables or grazing farm animals used for food (e.g., meat, dairy products). Residents may then ingest contaminated soil or food products. Other food chain examples include consumption of contaminated fish, shellfish, and wild game (see on- and off-site resident receptors in Figure K-1).

Appendix L
Potential Human Receptors for 2009 Current Sites

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
1	1	567	2,249	3,633	4,855	5,475	8,480	13,290	23,440
2	3	1,385	5,950	14,492	25,991	38,439	87,338	197,818	324,377
3	4	2,547	3,708	4,280	5,051	6,002	12,601	32,871	47,062
4	5	1	5	10	19	29	115	276	496
5	7	4	14	33	58	90	361	750	1,404
6	8	5	19	43	76	118	655	4,391	11,749
7	9	10,810	32,708	60,286	104,525	173,496	418,872	592,566	739,003
8	12	813	1,825	1,892	1,960	2,046	3,781	7,004	18,100
9	13	212	6,302	22,514	42,170	64,503	215,548	320,265	357,867
10	14	55	328	3,839	14,236	22,493	43,783	211,547	340,198
11	15	206	527	782	1,064	3,141	16,115	19,854	29,891
12	17	168	691	1,633	3,180	5,221	28,046	83,264	208,124
13	18	29	93	181	278	403	1,230	2,079	25,691
14	19	705	7,560	13,690	18,163	20,736	34,725	45,487	68,936
15	20	479	1,922	4,045	7,122	11,213	53,637	151,307	358,693
16	21	625	3,014	14,693	33,088	53,477	120,657	157,440	182,483
17	22	1,802	4,304	7,492	14,733	18,470	24,403	35,598	56,860
18	23	44	176	395	706	1,151	6,316	14,577	43,383
19	24	118	902	2,183	6,978	12,973	22,454	54,784	60,653
20	27	5,712	23,959	37,301	49,539	76,033	594,892	1,253,034	1,638,809
21	28	484	2,181	7,268	15,700	28,190	105,691	140,409	162,809
22	29	9,150	40,083	97,402	164,528	251,677	839,849	1,273,998	1,592,222
23	30	3,902	24,633	51,329	78,029	97,048	203,947	392,163	542,478
24	31	6,129	28,470	59,419	84,340	107,609	258,642	434,577	789,985
25	32	841	2,693	8,181	20,271	37,185	144,053	356,645	683,949
26	33	1,980	17,097	27,317	65,867	119,336	534,773	1,418,904	2,432,332
27	34	15,965	66,530	144,273	249,467	369,983	1,442,948	2,511,329	3,788,615
28	1001	72	338	800	1,451	2,278	11,684	18,398	30,126
29	1002	3	12	26	66	262	4,660	5,618	6,802
30	1003	173	550	967	1,615	2,558	4,696	9,561	18,480
31	1004	10,681	42,393	91,309	129,615	148,199	166,377	184,009	225,933
32	1005	225	1,610	2,840	5,177	8,575	16,846	20,700	23,928
33	1006	11	48	119	1,326	4,140	10,141	26,011	27,544
34	1007	100	708	2,087	3,994	6,278	26,630	59,820	107,234
35	1008	20	87	231	521	923	3,521	5,296	7,390
36	1009	110	442	1,037	2,432	4,730	36,282	83,296	166,572
37	1010	419	1,681	4,235	12,957	29,403	68,639	108,234	177,448
38	1011	29	1,470	2,778	3,294	3,746	4,808	6,264	8,127
39	1012	-	2	5	10	19	152	458	983
40	1013	467	1,319	1,464	1,547	1,655	4,294	5,659	9,026
41	1014	42	168	752	2,445	9,301	23,046	35,975	56,547
42	1015	314	6,280	12,559	19,592	26,442	91,993	263,260	508,712

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
43	1016	228	854	1,747	3,308	5,791	31,976	120,536	263,372
44	1017	1	4	16	37	66	1,664	2,140	4,836
45	1018	4	14	33	58	90	331	620	1,021
46	1019	96	356	777	1,377	2,118	11,936	95,659	153,244
47	1020	499	1,687	3,704	6,637	10,537	51,444	127,003	342,856
48	1021	4	16	35	62	97	376	777	1,317
49	1022	36	176	517	996	1,537	33,372	176,958	396,945
50	2003	1	4	9	17	26	86	169	334
51	2004	311	1,053	1,849	2,995	4,456	35,280	76,496	94,183
52	2005	30	119	289	564	901	4,269	29,083	49,088
53	2007	6	25	61	119	199	1,230	6,342	24,616
54	2009	16	82	212	397	657	2,944	9,734	32,083
55	2012	5	23	55	101	160	661	1,440	2,384
56	2013	92	730	1,659	3,267	4,905	10,790	12,912	14,636
57	2014	295	1,253	2,204	3,075	5,283	10,431	12,715	15,055
58	2015	4	14	32	58	93	467	958	1,641
59	2016	3	11	25	44	78	1,961	8,157	13,461
60	2025	43	165	344	563	857	7,248	20,725	25,747
61	2029	9	38	85	151	230	2,536	9,044	43,054
62	2031	16	63	138	217	306	1,005	2,132	5,252
63	2032	4	17	40	75	120	458	844	1,169
64	2033	2	10	22	40	64	261	557	930
65	2037	5	22	49	88	138	820	2,122	26,924
66	2042	759	2,455	3,916	5,566	6,901	16,185	33,820	76,015
67	2044	1	4	8	14	22	88	197	343
68	2048	4	17	35	54	78	216	402	651
69	2049	6	21	45	78	119	502	1,212	3,033
70	2050	1	3	5	8	12	52	104	171
71	2052	36	763	2,665	3,214	3,359	4,057	9,205	26,529
72	2068	4	14	32	58	88	281	565	1,219
73	2077	511	1,826	3,616	5,895	8,436	24,734	64,629	220,013
74	2079	11	43	97	173	271	983	1,819	2,508
75	2080	5	18	39	67	118	3,041	8,538	22,673
76	2081	8	31	70	129	283	8,927	40,850	44,614
77	2082	4	17	44	308	590	11,105	21,727	23,361
78	2083	113	364	701	1,162	1,916	23,017	32,570	70,083
79	2085	1	4	9	17	26	101	201	354
80	2086	4	26	71	202	467	11,290	21,681	23,281
81	2087	12	48	143	380	675	10,199	51,614	67,789
82	2088	19	83	203	379	613	2,514	5,970	16,791
83	2089	592	1,691	3,822	7,902	20,059	97,835	245,625	554,896
84	2091	19	75	165	286	429	7,566	21,208	25,402
85	2095	518	2,482	11,657	31,958	61,052	246,314	345,408	431,187
86	2098	77	371	989	1,619	2,414	7,461	11,597	17,887
87	2099	48	301	761	1,419	2,237	44,496	139,929	194,490
88	2100	1	5	14	28	50	261	828	2,028

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
89	2101	1	3	7	12	18	65	259	814
90	2103	1	4	8	15	23	91	205	579
91	2104	-	2	5	10	15	66	167	665
92	2105	70	285	652	1,366	6,044	149,693	549,959	937,352
93	2107	1	3	7	13	20	76	362	2,218
94	2108	77	418	981	1,609	2,385	7,181	11,442	17,515
95	2109	215	915	1,840	4,100	7,785	74,816	182,575	592,049
96	2111	19	72	192	408	720	5,513	16,592	26,779
97	2113	36	144	329	592	923	4,293	25,364	33,118
98	2114	23	102	299	618	1,019	4,112	15,091	166,368
99	2115	61	240	481	783	1,137	2,979	12,670	18,654
100	2116	18	105	668	878	1,236	23,903	106,196	298,906
101	2117	79	321	736	1,320	2,040	20,290	29,730	42,022
102	2118	20	79	175	364	835	6,314	20,263	46,068
103	2119	50	199	461	824	1,297	6,768	73,219	277,550
104	2120	759	3,011	8,295	17,278	24,537	65,859	132,978	191,576
105	2121	56	287	844	1,596	4,260	24,531	53,516	121,652
106	2122	19	75	177	380	726	3,896	11,566	51,415
107	2123	300	1,315	4,352	10,239	21,418	190,571	424,012	706,511
108	2124	1	4	8	15	24	109	360	817
109	2125	359	1,312	2,139	2,936	3,732	9,143	12,900	14,128
110	2126	71	284	632	1,032	1,488	4,100	7,479	11,567
111	2127	1	4	9	16	25	456	1,466	3,814
112	2128	32	112	238	413	636	2,425	4,551	6,260
113	2129	1	4	9	17	124	2,859	6,270	9,039
114	2131	67	277	639	2,021	5,066	26,982	50,774	81,401
115	2133	1	3	7	13	23	135	459	1,063
116	2134	-	2	4	8	12	49	152	346
117	2135	106	355	709	1,174	1,722	8,592	87,465	224,081
118	2136	1	4	9	16	36	556	1,712	3,358
119	2137	1,864	5,428	14,097	27,815	50,988	159,882	187,758	219,983
120	2141	22	89	196	854	1,420	2,874	5,886	15,069
121	2144	72	2,235	7,686	10,803	12,351	23,802	32,712	45,932
122	2146	484	1,756	3,552	6,902	11,182	16,708	18,829	20,966
123	2150	235	1,210	1,579	2,201	3,150	23,563	31,408	38,810
124	2152	58	222	436	703	997	3,230	6,632	13,614
125	2153	20	81	183	336	581	2,905	6,476	11,024
126	2154	24	96	210	366	564	2,533	6,249	10,748
127	2155	58	208	408	672	999	3,210	6,270	11,955
128	2156	25	96	196	325	534	2,668	5,258	9,688
129	2157	58	226	483	827	1,253	3,239	6,330	12,818
130	2158	15	58	131	231	352	1,376	4,422	13,010
131	2159	90	7,380	22,979	28,657	30,386	32,880	34,554	37,330
132	2160	3	13	29	51	79	464	4,715	8,147
133	2161	7	26	59	104	163	650	1,444	3,739
134	2162	8	32	71	127	198	2,024	14,913	47,061

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
135	2163	4	17	93	422	870	2,083	3,108	5,137
136	2164	7	26	58	99	150	531	1,140	1,970
137	2166	4	14	32	56	88	359	984	1,926
138	2167	3	13	29	51	80	3,114	6,076	7,259
139	2168	9	36	80	139	215	1,457	18,087	36,281
140	2169	7	28	62	456	1,398	2,646	3,429	5,763
141	2171	4	18	40	72	120	797	2,954	6,673
142	2172	10	39	88	157	1,053	4,454	7,354	18,133
143	2173	1	2	5	9	13	54	120	208
144	2176	2	7	16	28	44	208	4,398	4,883
145	2177	38	281	680	1,231	2,063	8,862	10,584	11,581
146	2179	1	4	10	17	27	390	1,886	2,539
147	2180	1	3	7	12	19	76	180	387
148	2181	1	3	7	13	20	78	173	306
149	2182	1	3	6	11	20	274	727	1,383
150	2184	4	17	38	66	100	375	754	3,323
151	2185	-	1	3	5	8	112	416	820
152	2186	4	14	33	58	90	361	793	5,286
153	2187	1	3	7	13	20	79	190	523
154	2191	8	33	74	132	206	840	2,125	5,149
155	2192	-	1	3	5	8	31	100	339
156	2193	4	14	33	58	90	347	4,617	5,151
157	2194	591	2,155	3,688	4,988	6,522	59,057	88,214	153,909
158	2196	-	1	3	5	8	40	183	498
159	2197	-	1	3	5	8	131	373	835
160	2199	2	7	15	26	40	143	296	508
161	2200	205	701	1,374	2,109	2,946	9,630	10,723	11,753
162	2201	1	16	93	214	348	5,182	5,389	6,707
163	2202	2	9	19	32	48	176	383	687
164	2204	1	2	6	11	18	83	191	339
165	2206	1	3	6	12	23	141	387	747
166	2208	36	180	657	1,747	3,246	9,004	11,315	15,382
167	2209	-	1	6	20	40	253	602	1,021
168	2214	19	78	175	310	467	1,616	4,071	30,930
169	2215	19	75	150	246	365	4,258	19,328	26,364
170	2216	2	25	81	269	559	2,808	4,724	14,258
171	2217	5	19	43	77	121	483	1,057	1,723
172	2218	23	91	273	1,131	1,882	4,976	7,601	12,095
173	2219	3	13	30	55	110	739	2,267	3,937
174	2220	13	52	116	206	322	1,291	2,915	4,677
175	2224	37	144	319	540	829	3,230	7,445	12,973
176	2227	45	182	532	1,126	1,729	6,079	19,698	51,758
177	2229	93	373	1,149	2,463	3,931	22,595	91,890	154,298
178	2230	9	35	81	144	223	797	1,610	9,180
179	2232	84	322	735	1,381	2,545	52,835	140,619	208,462
180	2235	4	15	33	61	104	521	1,244	3,292

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
181	2239	486	1,777	4,953	8,256	10,812	33,228	125,807	322,580
182	2240	57	229	505	2,552	4,195	9,821	22,470	30,729
183	2243	3,446	7,188	10,211	14,092	18,650	53,310	121,086	201,830
184	2245	462	2,050	4,903	9,028	14,047	62,039	238,959	397,115
185	2246	332	1,045	2,132	3,563	5,950	17,356	33,436	82,466
186	2253	9	37	82	146	229	1,273	5,723	7,221
187	2254	671	1,636	2,360	3,427	4,884	14,260	34,716	103,568
188	2255	62	249	586	1,689	3,361	92,254	459,278	800,733
189	2256	4	14	32	58	103	582	1,468	4,411
190	2257	2	7	15	27	42	174	511	1,242
191	2258	8	31	116	317	602	3,266	11,860	26,024
192	2259	29	133	346	832	4,940	259,201	613,357	938,834
193	2261	1	3	6	11	23	1,424	1,665	1,842
194	2262	2	7	15	27	43	240	609	1,180
195	2263	1	3	7	13	20	80	179	319
196	2265	130	569	1,733	2,636	3,665	15,472	37,489	71,286
197	2266	129	518	1,169	2,158	3,556	17,431	51,533	161,949
198	2267	32	147	328	531	708	1,474	2,365	3,481
199	2268	49	188	475	1,025	1,892	9,220	24,455	47,430
201	2269	126	463	994	1,673	2,398	17,064	55,221	80,419
202	2271	12	49	125	322	762	2,611	4,087	5,608
203	2273	71	235	502	841	1,241	6,311	11,553	23,929
204	2274	6	25	57	99	144	704	1,994	5,607
205	2275	580	2,943	6,104	9,396	14,456	75,285	153,867	233,545
206	2278	-	3	8	16	25	109	220	350
207	2280	1	54	117	199	306	3,867	34,840	74,270
208	2281	1	4	10	17	27	234	1,342	18,769
209	2282	10	42	310	2,031	2,094	2,485	3,116	3,782
210	2283	-	1	2	4	7	26	63	138
211	2284	9	30	58	93	129	285	611	19,550
212	2285	-	1	2	4	7	26	59	105
213	2286	2	6	14	24	38	312	9,133	60,444
214	2287	-	1	1	3	4	16	35	63
215	2291	2	8	18	33	51	204	434	650
216	2293	-	1	2	4	7	26	59	108
217	2294	185	1,135	2,956	5,611	7,745	56,388	67,390	76,008
218	2295	-	-	1	1	2	8	17	30
219	2296	1	5	11	20	34	233	668	2,136
220	2298	2,563	13,739	23,600	34,563	46,817	59,165	67,731	76,295
221	2299	1	3	6	10	15	44	91	174
222	2300	10	42	311	2,031	2,094	2,485	3,116	3,782
223	2301	4	89	364	923	2,844	40,985	58,061	67,406
224	2302	-	-	1	1	2	8	17	30
225	2304	-	1	3	5	8	31	70	126
226	2309	8	30	64	101	149	1,675	8,565	18,077
227	2311	357	1,640	4,396	8,055	12,970	61,238	101,358	126,215

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
228	2312	15	364	6,801	28,259	37,718	53,734	62,440	89,667
229	2313	32	128	290	509	806	3,950	16,309	32,175
230	2317	447	1,705	2,423	4,211	5,364	10,088	12,584	15,053
231	2323	66	352	969	3,301	11,866	24,713	46,216	55,280
232	2324	71	284	602	931	1,309	6,247	11,489	24,350
233	2327	1	4	9	15	24	95	213	372
234	2328	20	79	167	296	481	7,564	15,017	146,077
235	2329	3	11	26	47	86	596	1,488	2,690
236	2330	6	26	61	166	415	16,476	29,719	31,494
237	2331	2,240	6,194	10,611	14,714	18,701	100,173	340,714	472,436
238	2334	50	199	556	1,198	2,088	8,747	22,360	38,337
239	2337	5	19	43	76	119	477	1,370	8,607
240	2340	1	3	7	13	20	81	186	337
241	2343	249	848	1,836	3,186	4,744	15,236	64,592	143,895
242	2344	7	41	73	118	177	749	1,862	3,292
243	3002	112	2,869	8,280	11,961	14,990	41,335	75,937	143,042
244	3003	121	444	1,018	1,855	3,099	12,789	46,814	89,075
245	3004	40	163	369	658	1,033	11,615	18,916	36,285
246	3005	76	461	1,379	2,616	3,923	41,706	65,034	77,136
247	3006	189	682	1,893	3,777	11,669	44,213	135,248	161,588
248	3007	170	788	2,531	7,859	15,941	78,955	220,130	344,549
249	3009	193	6,506	20,195	37,465	56,902	174,618	277,929	401,973
250	3010	717	2,136	3,774	6,513	11,137	36,186	62,535	112,992
251	3011	915	6,114	8,755	10,933	12,972	22,420	38,897	70,097
252	3012	225	1,105	4,013	6,569	8,445	22,566	37,942	61,583
253	3013	439	2,093	4,548	10,989	22,252	120,119	221,046	486,071
254	3014	30	159	778	1,427	2,060	12,436	20,369	30,691
255	3015	242	2,014	3,698	5,449	7,787	18,185	37,097	72,522
256	3016	10	41	92	164	258	1,596	4,623	9,036
257	3020	890	5,529	15,136	32,474	59,190	204,932	313,057	354,428
258	3023	6,545	24,628	36,686	58,548	100,617	637,844	1,228,931	1,667,439
259	3026	711	10,420	47,578	121,594	188,859	708,492	1,440,197	2,276,585
260	3027	2,550	15,302	27,907	39,546	46,978	80,246	126,327	172,891
261	3028	381	6,306	12,570	19,588	26,435	92,136	263,505	509,657
262	3029	524	3,232	13,238	30,434	44,307	89,526	122,989	164,020
263	3033	1	4	10	18	33	177	438	1,990
264	3034	24	283	765	2,682	6,005	11,507	12,771	14,187
265	3035	506	2,080	6,018	11,567	22,693	197,017	295,476	341,573
266	3036	438	1,827	2,438	3,118	4,917	27,551	45,458	98,748
267	3037	4,668	13,508	17,644	21,580	23,006	33,255	40,854	63,943
268	3039	8	31	63	102	149	518	2,668	42,351
269	3040	76	291	653	1,242	2,130	13,354	34,350	98,210
270	3042	6,817	37,829	83,190	148,298	228,116	698,433	999,860	1,038,104
271	3043	1,697	19,763	41,160	50,625	55,206	102,289	133,116	184,778
272	3044	4	14	32	57	88	328	4,499	4,888
273	3047	145	701	1,808	3,844	8,345	48,885	108,293	193,016

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
274	3049	9	39	89	153	232	1,503	6,084	6,960
275	3050	273	1,102	2,593	5,562	8,856	31,513	92,879	225,754
276	3056	259	1,035	2,638	7,306	15,263	31,340	39,328	48,979
277	3057	70	314	1,410	3,404	9,805	19,672	27,220	35,479
278	3060	1,748	10,740	19,326	26,888	36,541	148,107	397,572	911,856
279	3061	2,246	14,538	45,224	83,814	129,410	502,222	1,064,587	1,691,337
280	3062	1,524	3,759	5,134	6,498	8,004	17,780	39,175	71,790
281	3063	114	739	2,059	4,805	10,897	43,294	84,762	140,688
282	3064	1,434	1,452	1,500	2,018	4,087	14,353	25,627	27,395
283	3065	98	357	619	783	900	1,547	4,005	5,965
284	3068	2,011	9,164	19,553	28,506	40,197	244,235	689,136	988,594
285	3069	45	192	2,362	6,374	15,716	322,148	709,567	964,409
286	3071	745	1,292	1,705	2,232	2,804	6,097	13,486	25,616
287	3072	50	207	503	943	1,476	6,872	17,753	31,140
288	3073	19,068	49,026	75,049	92,374	103,256	142,239	222,978	274,555
289	3074	199	1,010	2,449	5,893	9,321	34,170	70,440	138,349
290	3076	3	13	29	51	79	315	1,776	3,255
291	3080	468	1,873	4,525	8,078	12,829	36,785	68,863	135,165
292	3083	310	1,390	2,925	6,787	10,491	25,273	38,646	77,413
293	3084	19	78	175	311	480	1,630	4,524	31,096
294	3085	20	80	169	273	397	1,324	2,565	4,203
295	3086	37,780	130,908	214,215	307,845	384,964	665,091	959,245	1,284,862
296	3087	1,272	7,020	13,389	23,172	40,930	141,174	218,416	285,899
297	3088	13	51	130	268	444	1,682	3,156	7,291
298	3089	3	14	31	55	86	335	738	1,325
299	3093	3,515	14,934	32,943	51,807	65,330	110,274	187,554	257,412
300	3094	4,523	23,041	44,868	61,211	76,404	214,875	518,194	900,667
301	3095	2,371	14,393	34,815	55,389	68,803	114,412	179,962	217,290
302	3097	4,664	16,924	27,956	39,173	50,514	99,129	137,911	219,101
303	3099	3,599	12,673	21,832	35,504	50,993	97,060	144,695	246,644
304	3101	4,713	42,205	123,373	225,467	349,195	1,219,773	2,159,479	2,871,609
305	3102	412	7,624	23,626	49,712	73,339	648,867	1,386,411	1,926,536
306	3104	5,687	21,246	51,120	105,120	163,683	739,299	1,214,634	1,539,265
307	3105	3,912	24,089	57,798	96,350	128,184	357,196	562,971	702,528
308	3109	6,301	32,892	66,222	128,951	196,504	799,802	1,725,957	2,528,660
309	3114	18,340	75,366	146,969	232,554	360,351	1,274,564	2,235,021	2,937,615
310	3115	6,792	41,240	106,652	201,915	315,175	1,121,036	2,064,370	2,799,737
311	3116	18,340	75,366	146,969	232,554	360,351	1,274,564	2,235,021	2,937,615
312	3117	2,222	15,062	42,479	76,041	115,255	327,883	544,537	693,287
313	3118	11,039	43,635	105,028	214,767	320,609	1,020,692	1,518,138	1,975,129
314	3120	6,848	30,895	62,748	103,050	140,665	374,805	575,878	711,948
315	3121	3,960	17,473	69,971	191,698	320,866	1,234,825	2,339,266	3,544,804
316	3123	7,474	43,350	121,133	245,688	386,128	1,045,514	1,451,241	1,712,967
317	3125	5,524	22,522	66,485	136,642	221,101	854,369	1,253,348	1,574,810
318	3126	1,349	6,463	11,500	28,329	61,145	530,874	1,314,038	1,875,142
319	3129	3,961	8,723	10,059	24,043	49,010	418,288	1,234,197	1,791,223

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
320	3130	2,371	14,393	34,815	55,389	68,803	114,412	179,962	217,290
321	3131	2,989	14,278	33,129	53,126	69,059	154,764	269,137	497,885
322	3133	4,350	9,581	30,884	53,312	77,663	607,101	1,359,126	1,882,192
323	3136	3,812	15,895	33,746	51,304	65,516	114,177	194,145	257,975
324	3137	8,085	52,884	140,164	263,712	398,905	1,040,345	1,443,005	1,700,191
325	3143	1,308	10,759	31,923	55,222	73,274	237,568	534,888	926,148
326	3145	386	1,430	3,482	6,872	14,262	96,779	196,540	267,011
327	3147	907	18,031	59,402	118,717	181,289	725,499	1,451,565	2,317,148
328	3148	71	282	579	955	1,360	6,527	12,213	30,507
329	3149	817	1,095	1,371	1,653	1,942	2,930	3,392	4,144
330	3150	96	418	1,070	2,035	3,461	25,929	58,717	105,450
331	3151	1,396	6,472	13,757	21,798	26,497	66,947	181,353	359,267
332	3167	1	3	7	13	20	81	184	334
333	3168	359	1,526	2,280	3,347	4,546	15,209	27,019	41,164
334	3169	1,540	6,875	12,719	17,913	24,522	114,290	240,578	379,051
335	3170	907	5,518	12,377	20,989	31,679	143,704	274,173	387,377
336	3171	701	4,922	16,162	39,492	66,606	345,160	782,967	1,245,787
337	3172	3,704	7,575	10,589	14,623	19,985	75,702	324,038	776,626
338	3173	1,228	2,257	3,208	4,422	5,434	11,353	24,568	48,467
339	3174	3,567	8,584	12,465	15,945	19,641	45,469	72,609	115,635
340	3175	716	4,006	8,519	9,882	11,023	15,200	21,831	34,480
341	3176	554	2,033	3,874	6,467	9,633	34,921	153,572	459,627
342	3181	344	3,073	26,548	75,342	136,615	802,037	1,583,566	2,090,506
343	3182	261	1,520	2,263	3,310	4,474	15,112	26,956	41,131
344	3184	251	1,141	2,748	4,819	6,547	28,407	54,102	84,813
345	3185	2,096	25,763	59,166	107,487	161,301	501,313	951,593	1,283,293
346	3186	4,472	14,520	63,273	135,284	169,489	424,137	712,105	1,086,923
347	3187	6,026	11,607	32,845	67,164	99,393	394,374	604,704	769,225
348	3189	21	118	287	544	883	3,611	8,334	13,844
349	3190	16	120	313	686	1,222	9,904	22,670	54,088
350	3191	4,237	53,446	150,298	307,238	474,982	1,383,085	2,886,732	5,643,565
351	3193	1,966	8,430	15,905	19,452	22,379	40,502	94,659	215,979
352	3194	90	1,181	9,903	24,078	47,681	138,717	162,441	183,184
353	3195	4	16	35	61	95	372	912	1,751
354	3196	436	2,797	7,013	10,304	11,940	19,183	42,150	160,155
355	3198	3	13	31	55	88	973	7,483	22,789
356	3200	7	33	86	162	261	3,370	16,179	18,755
357	3201	722	5,932	53,434	129,890	213,229	767,159	1,490,452	2,374,962
358	3202	125	625	1,900	4,939	9,052	73,884	233,403	444,773
359	3203	427	4,139	11,922	25,226	45,910	66,679	72,913	85,236
360	3204	57	2,099	10,160	22,835	30,603	54,007	83,845	133,731
361	3205	277	1,250	5,337	9,407	16,176	81,123	240,760	449,924
362	3206	63	271	716	1,667	3,070	24,660	70,551	165,156
363	3208	147	826	2,624	6,610	9,539	83,777	255,877	461,134
364	3209	1,154	4,413	10,352	14,979	18,202	34,021	54,821	79,307
365	3210	22	87	196	348	550	5,265	17,491	54,169

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
366	3211	2,752	20,937	48,993	76,391	95,939	205,355	392,665	542,889
367	3212	2	6	14	25	39	4,707	6,010	6,445
368	3213	4	18	39	390	2,678	3,702	4,222	4,917
369	3214	23	94	205	334	479	15,656	195,619	300,479
370	3215	19	78	175	311	477	1,631	4,697	31,159
371	3216	176	656	1,373	2,428	3,919	17,842	44,025	64,803
372	3217	3,352	24,547	67,488	92,963	111,672	140,981	170,893	190,034
373	3218	300	1,007	2,138	3,719	7,322	102,160	194,059	385,090
374	3219	3,205	15,882	27,507	43,118	71,390	272,416	427,825	743,452
375	3220	1,436	11,891	42,140	99,087	172,252	674,370	1,318,057	2,081,747
376	3221	199	1,311	3,731	8,362	19,455	114,803	158,600	176,908
377	3223	6	304	1,485	4,198	13,795	97,706	186,636	201,513
378	3229	398	1,639	4,791	9,907	16,809	111,647	217,680	344,697
379	3230	345	1,322	3,021	5,848	7,902	21,225	53,887	90,522
380	3231	924	3,417	7,429	16,694	23,581	37,137	44,406	51,932
381	3232	8,074	24,856	43,506	55,773	72,874	127,596	302,101	705,205
382	3233	208	737	1,554	2,916	4,241	13,076	37,252	82,118
383	3234	3	12	27	206	576	3,818	5,094	14,097
384	3237	4,515	12,090	21,464	40,248	59,598	110,656	145,468	178,987
385	3238	88	278	809	3,651	6,348	10,196	11,455	14,501
386	3239	1	5	10	18	28	1,269	2,453	2,960
387	3240	52	236	574	1,047	1,662	7,834	24,857	101,078
388	3242	5,575	24,921	56,465	95,677	141,691	593,722	1,301,017	1,920,588
389	3243	1,198	8,307	18,548	36,062	64,710	195,805	266,487	375,221
390	3244	1	3	25	209	602	3,542	4,423	5,061
391	3249	378	1,493	3,263	6,739	10,290	30,588	110,424	300,273
392	3250	8,936	20,811	31,550	40,992	54,236	137,376	270,270	473,685
393	3251	139	775	1,897	3,266	4,969	23,691	75,417	205,739
394	3252	4,306	8,629	12,983	19,574	37,981	194,998	607,963	1,215,649
395	3253	273	1,087	2,485	4,380	6,508	37,317	67,491	103,376
396	3254	266	11,503	42,164	84,036	132,207	555,108	1,107,149	1,682,996
397	3256	16,180	55,139	116,057	142,694	167,045	498,713	881,955	1,592,770
398	3257	1,775	2,185	3,059	5,133	6,949	13,250	34,600	57,689
399	3258	11,535	46,858	95,550	157,139	276,566	993,826	1,971,396	3,404,560
400	3259	5,753	31,940	71,586	126,594	195,940	604,905	924,329	1,181,737
401	3261	18,053	88,136	210,332	348,867	479,674	1,144,650	1,908,297	2,427,831
402	3262	10,168	43,091	107,292	198,165	301,438	1,014,495	1,377,378	1,912,970
403	3268	448	5,061	18,004	35,737	43,787	68,143	155,963	274,023
404	3269	352	1,405	3,513	6,497	11,852	79,439	210,891	653,322
405	3270	23	94	211	360	527	20,262	216,417	311,522
406	3272	4,839	14,920	32,945	53,772	78,656	187,836	225,445	247,350
407	3273	8	29	60	105	166	685	3,474	6,950
408	3275	64	267	640	1,206	1,961	8,998	21,806	62,512
409	3276	55	1,491	6,511	14,533	22,446	35,930	42,496	47,088
410	3277	82	329	719	1,268	1,994	15,074	49,653	160,503
411	3280	75	670	2,352	4,095	5,725	17,654	24,734	35,372

Row	Site ID[1]	1 Mile Buffer	2 Mile Buffer	3 Mile Buffer	4 Mile Buffer	5 Mile Buffer	10 Mile Buffer	15 Mile Buffer	20 Mile Buffer
412	3281	1,558	7,336	16,780	28,173	38,667	78,997	171,454	310,673
413	3282	1,581	9,396	23,595	38,255	53,887	220,406	342,138	425,451
414	3283	97	324	782	1,922	2,543	5,745	11,547	26,798
415	3287	25	99	214	368	561	2,321	18,191	26,061
416	3290	16	63	140	243	369	3,096	110,017	294,578
417	3292	389	1,132	2,681	4,277	5,589	17,307	43,553	92,682

[1] The Site ID is not an EPA or Superfund site identifier but was used solely for this report. The Site ID is synonymous with the Site RNUM used in the 108(b) database.Three sets of RNUM site identifiers were used, including (1) Processor IDs for individual processors, (2) Mine IDs for individual mines, and (3) RNUMs for combination sites where one site can include combinations of mines, processors, or mines and processors.

Appendix M
ATSDR Public Health Findings for 108(b) Historical CERCLA Sites

M.1 Introduction

Because little information is available on currently active mining and mineral processing sites, this section will use public health-related information associated with 108(b) Historical CERCLA sites to illustrate that the 2009 Current sites might pose adverse health effects.

M.2 Data Sources

Public health-related information was obtained from the Agency for Toxic Substances and Disease Registry (ATSDR) for historical mining and mineral processing sites that would fit into the scope of the 108(b) mining and mineral processing sector. Created by the 1980 CERCLA statute, ATSDR is mandated to conduct Public Health Assessment (PHA) for every site on or proposed for the NPL. The documentation of ATSDR Public Health Assessments began about 1986-87. An ATSDR Public Health Assessment reviews available information about hazardous substances at a site and evaluates if exposure to them might adversely affect human health.

Upon request from concerned citizens and/or organizations, ATSDR also conducts and issues other types of public health evaluations. For example, a **Public Health Advisory** (PHA) allows ATSDR to respond quickly when CERCLA hazardous substances released into the environment pose an immediate and significant danger to human health. A PHA notice is sent directly from the ATSDR Administrator to EPA's Administrator, which alerts EPA to a public health threat. A PHA reports information available about a release of toxic material, if people might be exposed to it, and what harm exposure might cause. A **Health Consultation** (HC) provides advice on a specific public health issue related to actual or potential human exposure to a toxic material. Anyone can request a HC. ATSDR receives the most requests from EPA and state and local health and environmental departments, and provides about 1,000 HCs per year.

Upon completion of a PHA or a HC for a site, ATSDR makes a public health determination using the following five public health hazard categories:[1]

1. Urgent Public Health Hazard

   Applies to sites that have certain physical hazards or evidence of short-term (less than 1 year), site-related *exposure to hazardous substances that could result in adverse health effects and require* *quick* *intervention to stop people from being exposed*.

[1] SOURCE: ATSDR Public Health Assessment Guidance Manual, Table 9-1 (“Summary of Conclusion Categories”), available at http://www.atsdr.cdc.gov/HAC/PHAManual/ch9.html.

2. Public Health Hazard

   Applies to sites that have certain physical hazards or evidence of chronic (more than 1 year), site-related *exposure to hazardous substances that could result in adverse health effects*.

3. Indeterminate Public Health Hazard

   Applies to sites *where critical information is lacking* (missing or has not yet been gathered) to support a judgment regarding the level of public health hazard.

4. No Apparent Public Health Hazard

   Applies to sites where exposure to site-related chemicals might have occurred in the past or is still occurring, *but the exposures are not at levels likely to cause adverse health effects*.

5. No Public Health Hazard

   Applies to sites where no exposure to site-related hazardous substances exists.

M.3 Methodology for ATSDR Public Health Finding Analysis of 108(b) Historical CERCLA Sites

M.3.1 Initial Inquiry to ATSDR

In order to access the ATSDR public health determinations related to the historical mining and mineral processing site, EPA requested that ATSDR conduct a query of its HazDat and Sequoia databases for any findings by ATSDR that a site may have posed a public health hazard to humans. Specifically, the EPA asked ATSDR to query using the following criteria:

a) Any PHAs or HCs that concluded either a **public health hazard** or an **urgent public health hazard**, or

b) A **public health advisory** was issued.

On April 12, 2010, ATSDR responded to EPA with the query results, including 1,317 records having either a public health hazard or urgent public health hazard associated with them. The results included mines and mineral processors as well as other sectors. The results were sorted manually to find ATSDR findings for the 251 sites in the 108(b) Historical Sites universe. **Attachment M1** lists the 108(b) Historical CERCLA sites that ATSDR classified as a public health hazard or an urgent public health hazard.

M.3.2 Additional Inquiry for Missing NPL Sites

A comparison of ATSDR’s April, 2010 query results (as listed in Attachment M1) to the universe of 108(b) Historical CERCLA sites (as listed in **Appendix B, Attachment B1**) identified 59 NPL sites from the 108(b) Historical CERCLA Sites universe that were not included in ATSDR’s April 2010 query results.

EPA conducted a web search of ATSDR's website to find any information on these 108(b) Historical NPL sites. EPA also requested that ATSDR query their databases specifically for information on the 59 missing 108(b) Historical NPL sites. In this second query ATSDR used EPA's site identification number for each 108(b) Historical NPL site. EPA recieved the query results on September 2, 2010. **Attachment M2** lists the 108(b) Historical NPL sites missing from the April 2010 query results, as well as the results from EPA's web search and ATSDR's September 2010 query. The additional inquiry identified ATSDR public health findings for an additional 44 sites.

The two inquiries (i.e., ATSDR's April 2010 and September 2010 database queries, and EPA's web search) identified ATSDR public health findings for a total of 115 sites in the 108(b) Historical CERCLA Sites universe.

M.3.3 ATSDR Public Health Findings for Historical Case Study Sites

In addition to the public health hazard findings information received from ATSDR, available ATSDR documents (i.e. PHAs and HCs) for the subset of randomly selected 24 Case Study sites were closely reviewed. **Attachment M3** includes more detailed information about each site from ATSDR reports, including information about contaminants of concern, exposure pathways, potential receptors and potential health effects.

M.3.4 Additional Mining and Mineral Processing Sites from ATSDR Databases (HazDat and Sequoia)

Further examination of the ATSDR's April 2010 query results identified nine additional mining and mineral processing sites that were not included in, but may qualify for, the 108(b) Historical CERCLA Sites universe. These nine sites were identified based on the North America Industrial Classification System (NAICS) code for the mining and processing sector. These additional sites were included in this analysis to illustrate that mining and mineral processing sites that are not listed as NPL sites may also present a public health hazard. **Table M-1** shows the nine additional sites from April 2010 query and the corresponding ATSDR findings. To further investigate the relevance of these sites to 108(b) rule making, available ATSDR (e.g., PHAs and HC) and EPA documents were reviewed and findings were summarized in **Attachment M4**.

Table M-1. ATSDR Public Health Findings for Mines & Mineral Processors not in the 108(b) Historical CERCLA Sites Universe

Row	Site Name	City	State	EPA Facility ID	NAICS Code	ATSDR Public Health Finding	NPL Status	Source ATSDR Document
1	Akzo Salt Inc	Retsof	NY	NYD002205607	212393	Public Health Hazard	Non NPL - Never on the NPL	HC (1996)
2	Alaska Gold	Nome	AK	AKD038526620		Public Health Hazard	Non NPL - Never on the NPL	PHA (1987)
3	Alcoa (Point Comfort)/Lavaca Bay	Point Comfort	TX	TXD008123168	331312	Urgent Public Health Hazard	Final - Currently on the Final NPL	PHA (1995)
4	Cabot-Wrought Prod - Div Of Cabot Corp	Muhlenberg Township	PA	PAD044540136	331419	Public Health Hazard	Non NPL - Never on the NPL	PHA (1995)
5	Master Metals Incorporation #2	Detroit	MI	MID039108824	331419	Public Health Hazard	Non NPL - Never on the NPL	HC (1997)
6	Phelps Dodge Corp Douglas Reduction Wrks	Douglas	AZ	AZD008397143	331411	Public Health Hazard	Non NPL - Never on the NPL	PHA (1995)
7	Remacor, Inc.	West Pittsburg	PA	PAD074965096	331112	Public Health Hazard	Non NPL - Never on the NPL	HC (2007)
8	Scott O M & Sons Co	Marysville	OH	OHD990834483	212399	Public Health Hazard	Non NPL - Never on the NPL	HC (2005)
9	St. Louis Smelting & Refining Co	Collinsville	IL	ILD980607006		Public Health Hazard	Non NPL - Never on the NPL	HA (2006)

M.4 Discussion of Public Health Hazard Findings by ATSDR for 108(b) Historical CERCLA Sites

This section discusses the ATSDR public health hazard findings for 108(b) Historical CERCLA sites. More detailed discussions of the public health hazard determinations by ATSDR for the Case Study sites are also presented. Finally, this section discusses the public health hazard findings for nine additional mining and mineral processing sites obtained from ATSDR databases, as well as their relevance to the 108(b) rule.

M.4.1 Public Health Findings Identified by the April 2010 Query

Figure M-1 presents public health hazard finding for the 108(b) Historical CERCLA sites based on the results of the April 2010 query. The figure presents the results in terms of subsets of NPL sites and non-NPL sites. As shown in Figure M-1, a total number of 71 mining and mineral processing sites (60 NPLs and 11 removals sites) showed up in the April 2010 query having been classified as a public health hazard. This category indicates that either long-term (greater than 1 year) or short-term (less than 1 year) exposures to sufficiently high levels of hazardous substances could result in adverse health effects. Of the 60 NPLs, two sites (Bunker Hill Mining and Metallurgical Complex and Glen Ridge Radium Site) were also designated as an urgent public health hazard. A total of 180 sites (59 NPLs and 121 removals) out the 251 sites did not show up in the April 2010 query of ATSDR HazDat and Sequoia databases.

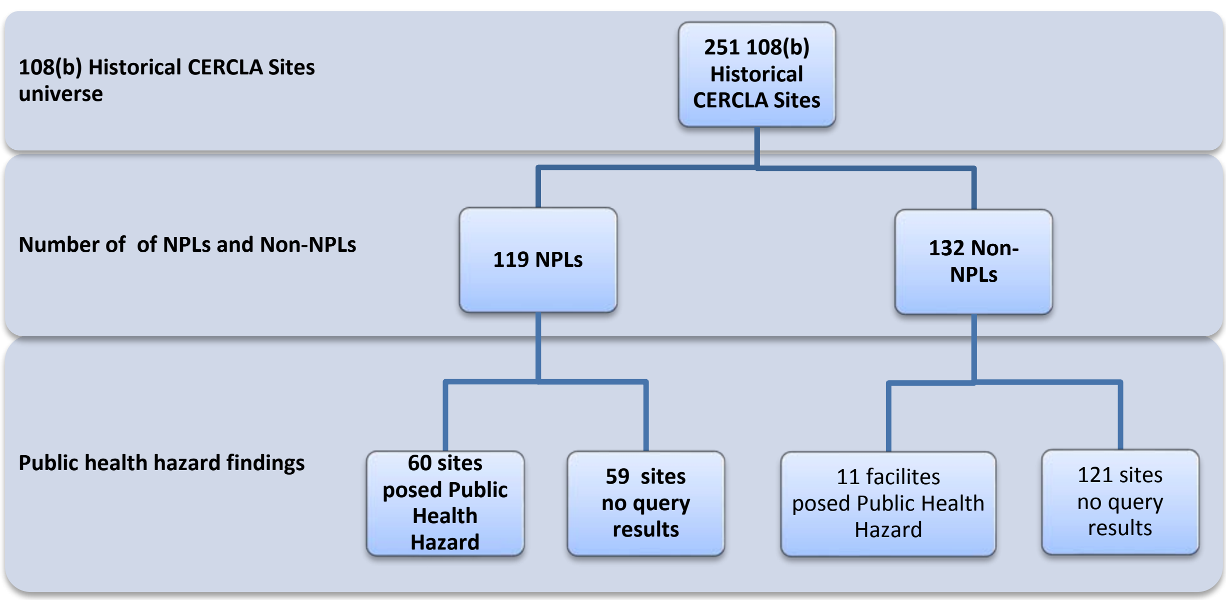


Figure M-1: Public health findings for 108(b) Historical CERCLA sites identified by April 2010 query

There are several reasons why NPL sites on the CERCLIS list were not documented as posing a public health hazard by ATSDR. There are differences in timing and scope between ATSDR and Superfund risk and hazard assessments. First, although the ATSDR program started in 1980, it wasn't until 1986 - 1987 that the documentation process was standardized. Therefore, for many of the earliest sites, ATSDR may not have done a public health assessment or health consultation. Second, ATSDR may investigate a site too early in the NPL process for sufficient data to have been collected. Without sufficient data, they can't conclude an immediate significant public health threat exists. On the other hand, sometimes ATSDR investigates a site after remediation, so the hazard no longer exists. Third, ATSDR is not mandated to conduct public health assessment for non-NPL sites, which might expain why many of the non-NPLs did not appear in the April 2010 query results. The next section will discuss ATSDR's findings for NPL sites that did not appear in the April 2010 query results.

M.4.2 Public Health Findings identified by additional inquiry

As discussed above, the April 2010 query did not identify records for 59 NPL sites in the 108(b) Historical CERCLA Sites universe. Further inquiry, including the September 2010 query of ATSDR databases and manual searching of the ATSDR web site, located public health findings documentation for 44 of the 59 NPL sites missing from the April query results.

The September query of ATSDR databases identified 1 site having an ATSDR classification of a public health hazard. In addition, the query results showed 22 sites having "indeterminate public health hazard." This category is used by ATSDR when the available information is insufficient to determine the level of health hazard (see Section M1 for ATSDR definitions). Six sites were classified as a "no apparent public health hazard," which indicates that based on the available data at the time of the PHA or HC, receptors may have been exposed to hazardous substance in the past, at the present time or in the future, but ATSDR concluded that exposures are not expected to cause adverse public health effects. The September 2010 query did not identify records for the remaining 30 sites.

Manual searching of the ATSDR web site for public health findings on the remaining 30 sites was able to locate ATSDR documents for 15 sites. **Table M-2** presents the combined results of the April 2010 and September 2010 ATSDR database queries, as well as the manual search of the ATSDR web site.

Table M-2. ATSDR Public Health Findings for 108(b) Historical CERCLA Sites, by Finding Type

	Public Health Hazard	Indeterminate Public Health Hazard	No Apparent Public Health Hazard	ATSDR Query Showed not records	Total
NPL Sites	70	24	11	14	119
Non-NPL Sites	11	N/A	N/A	121	132
Total	81	24	11	135	251

M.4.3 Discussion of ATSDR Public Health Hazard Findings for Historical Case Study Sites

Based on the information from the ATSDR query results and the review of PHA and HC documents from ATSDR for the 24 Historical Case Study sites, the following analysis was performed.

Figure M-2 presents graphically the findings of ATSDR public health hazard for the Case Study sites. As illustrated in the chart, 16 of 24 sites (i.e., 67%) were categorized as Public Health Hazards, which means either long-term (greater than one year) or short-term (less than one year) exposures are to sufficiently high levels of hazardous substances that adverse health effects could result. In addition, ATSDR categorized six sites (i.e., 25%) as Indeterminate Public Health Hazards, indicating that insufficient information was available to make a health effect determination for past, present or future exposure. ATSDR categorized one site as a No Apparent Public Health Hazard, indicating that at the time of the health assessment, human exposure to contaminated media might be occurring, might have occur in the past or might occur in the future, but the exposures are not expected to cause adverse health effects. Records of ATSDR public health findings for one site were not located. In conclusion, the results indicate that over 2/3 of the randomly selected Historical Case Study sites could pose adverse health hazards to humans.

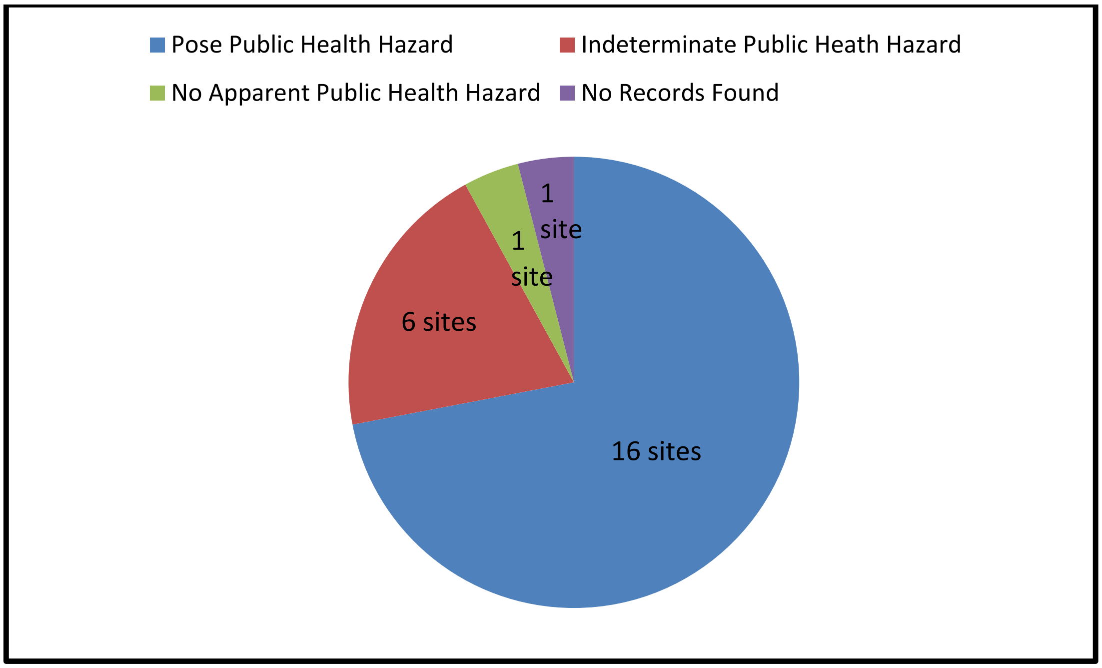


Figure M-2. ATSDR Public Health Findings for Historical Case Study Sites

The 16 Historical Case Study sites were categorized as public health hazards by ATSDR due to human exposures to site-related contaminants, which may have occurred in the past, may be occurring in the present or might occur in the future. Sites such as Bunker Hill Mining & Metallurgical Complex, Eastern Michaud Flats and National Southwire Aluminum Co, were categorized as public health hazards based on past, present (at the time of the ATSDR evaluation) and future exposure to site related contaminants. A PHA categorized the Foote Mineral Co. site as a public health hazard due to past exposure. In addition, sites such as East Helena and Stauffer Chemical Co. in Florida were categorized as public health hazards because of future exposures – exposures due to the potential for future residential developments on contaminated areas or the potential for future domestic uses of contaminated groundwater.

According to the PHA and HC documents reviewed, the most common type of exposure route for the case study sites are ingestion of soil and groundwater contaminated with site related contaminants. Other common exposure routes indicated in these documents are inhalation of dust; dermal contact to contaminated soils, surface waters and groundwater; consumption fish and other biota; and radiation exposure (alpha, beta and gamma rays) from slags and gypsum.

At the Historical Case Study sites, ATSDR found a public health hazard for receptors including children and adult residents, recreationalists, on-site and off-site construction and maintenance workers, trespassers, and consumers of aquatic and terrestrial animals and plants. For example, the Omaha Lead site and the Palmerton Zinc Pile site were classified as a public health hazard because resident children were exposed to such high levels of lead (Omaha lead), and Zinc (Palmerton Zinc Pile) in the surface soils, that the exposures could result in adverse health effects. Several of the Historical Case Study sites also posed a public health hazard for both current and future residents living in the vicinity. For example, sites such as Bunker Hill, Capitan Jack Mill, Cimarron Mining Corp, Eastern Michaud Flats, Midnite Mine and Monsanto Chemical posed a health hazard for current or future residents. ATSDR also concluded some sites posed health hazards to recreational users of surface waters on or near the sites, including Capitan Jack Mill, Li Tungsten Corp and Reynolds Metals Company.

As of 2011 (i.e., when this analysis was conducted), 7 NPLs are active, while 17 sites are inactive. Of the 7 active sites, 5 sites were classified as a public health hazard, while 1 site is classified as an indeterminate health hazard. Ormet Co. is also an active site, but EPA was unable to locate documentation of a public health finding for this site. The presence of 5 active sites classified as public health hazards may suggest that other currently active sites may pose a public health hazard.

M.4.4 Results for Nine Additional NPL Sites Identified by April 2010 Query

As discussed above, the April 2010 query results included nine mining or mineral processing sites (identified based on their NAICS code) that were not part of the 108(b) Historical CERCLA Sites universe. Of these nine sites, eight were non-NPL sites and one was an NPL site. In addition, three of the nine sites are currently active. **Figure M-3** summarizes the NPL status and active/inactive status of the nine additional sites.

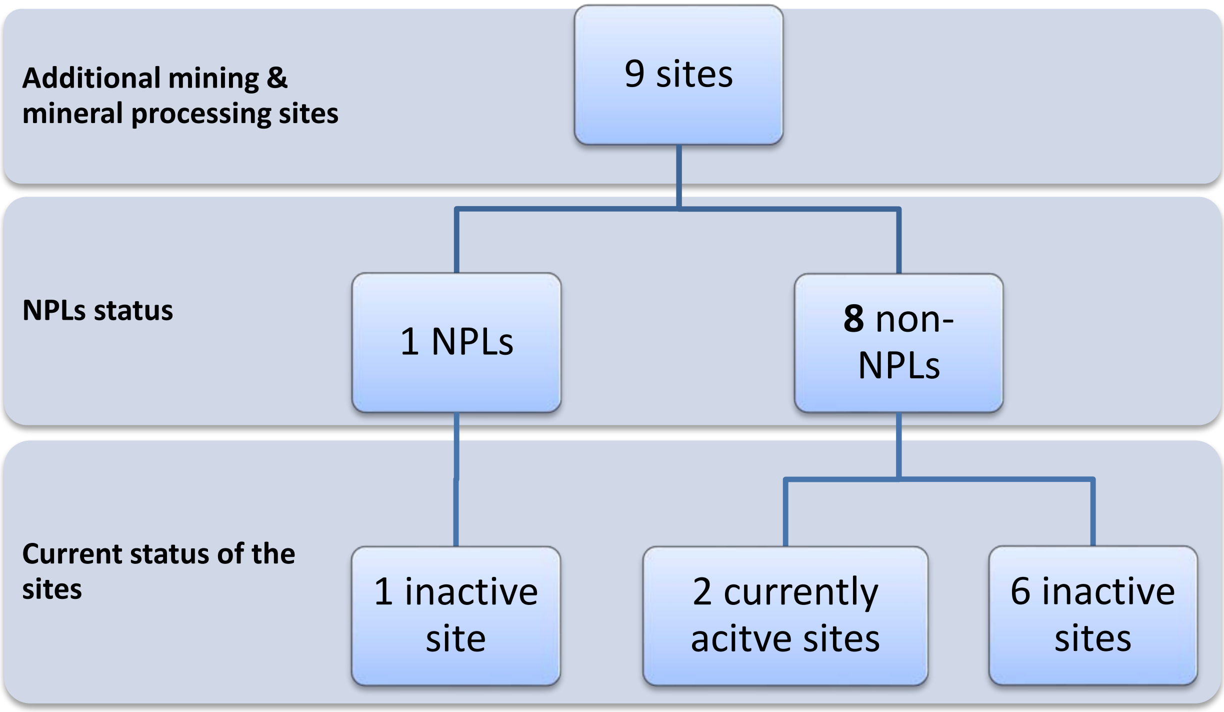


Figure M-3. NPL and operational status for 9 additional mining and mineral processing sites identified by April 2010 query

For the nine additional sites within the scope of the 108(b) rule, all posed a public health hazard, which was expected as the April 2010 query was structured to find any site that posed a public health hazard. Seven of nine sites are currently inactive, while two sites are operational at the time of this report. Although this is a small and not necessariloy representative sample, this may suggest that historical and current mining and mineral sites pose a public health hazard. Furthermore, eight of the nine sites are non-NPL sites, suggesting that a site need not be on the NPL to pose a public health hazard.

Attachment M1. ATSDR Public Health Findings for 108(b) Historical CERCLA Sites (from April 12, 2010 query)

Row	Site Name	City	State	EPA ID	NPL Status	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
1	Anaconda Co. Smelter	Anaconda	MT	MTD093291656	Final	Poses Public Health Hazard	HC (1987)
2	Anaconda Copper Company	Yerrington	NV	NVD083917252	Non-NPL	Poses Public Health Hazard	HC (2006)
3	Annapolis Lead Mine	Annapolis	MO	MO0000958611	Final	Poses Public Health Hazard	PHA (2006)
4	Asarco Hayden Plant	Hayden	AZ	AZD008397127	Non-NPL	Poses Public Health Hazard	PHA (2002)
5	Asarco Taylor Springs	Taylor Springs	IL	ILN000508170	Final	Poses Public Health Hazard	PHA (2005)
6	Asarco, Inc. (Globe Plant)	Denver	CO	COD007063530	Proposed	Poses Public Health Hazard	PHA (1995)
7	Barker Hughesville Mining District	Great Falls	MT	MT6122307485	Final	Poses Public Health Hazard	PHA (2004)
8	Basin Mining Area	Basin	MT	MTD982572562	Final	Poses Public Health Hazard	PHA (2001)
9	Big River Mine Tailings/St. Joe Minerals Corp.	Desloge	MO	MOD981126899	Non-NPL	Poses Public Health Hazard	PHA (1996)
10	Blackbird Mine	Lemhi County	ID	IDD980725832	Proposed	Poses Public Health Hazard	PHA (1995)
11	Bunker Hill Mining & Metallurgical Complex	Smelterville	ID	IDD048340921	Final	Poses Urgent Public Health Hazard; Public Health Hazard	PHA (1989); HC (2000)
12	Captain Jack Mill	Ward	CO	COD981551427	Final	Poses Public Health Hazard	HC (2006)
13	Carpenter Snow Creek Mining District	Neihart	MT	MT0001096353	Final	Poses Public Health Hazard	PHA (2004)
14	Carson River Mercury Site	Dayton	NV	NVD980813646	Final	Poses Public Health Hazard	PHA (1993)
15	Celtor Chemical Works	Hoopa	CA	CAD980638860	Proposed	Poses Public Health Hazard	PHA (1987)
16	Central City, Clear Creek	Idaho Springs	CO	COD980717557	Final	Poses Public Health Hazard	PHA (1988)
17	Cherokee County	Galena	KS	KSD980741862	Final	Poses Public Health Hazard	PHA (1989); HC (1994)
18	Circle Smelting Corp.	Beckemeyer	IL	ILD050231976	Proposed	Poses Public Health Hazard	PHA (2003)
19	Commencement Bay, Near Shore/Tide Flats	Tacoma	WA	WAD980726368	Final	Poses Public Health Hazard	PHA (1993)
20	Copper Basin Mining District	Copperhill	TN	TN0001890839	Non-NPL	Poses Public Health Hazard	HC (1998)
21	Davenport And Flagstaff Smelters	Sandy	UT	UTD988075719	Final	Poses Public Health Hazard	PHA (2005)
22	Depue/New Jersey Zinc/Mobil Chemical Corp.	Depue	IL	ILD062340641	Final	Poses Public Health Hazard	PHA (1999)
23	East Helena Site	East Helena	MT	MTD006230346	Final	Poses Public Health Hazard	HC (2002)

Row	Site Name	City	State	EPA ID	NPL Status	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
24	Eastern Michaud Flats Contamination	Pocatello	ID	IDD984666610	Final	Poses Public Health Hazard	HC (1998); HC (2001)
25	Elizabeth Mine	Strafford	VT	VTD988366621	Final	Poses Public Health Hazard	PHA (2004); HC (2000)
26	Eureka Mills	Eureka	UT	UT0002240158	Final	Poses Public Health Hazard	PHA (2005)
27	Glen Ridge Radium Site	Glen Ridge	NJ	NJD980785646	Proposed	Poses Urgent Public Health Hazard	PHA (1985); HC (2000)
28	Hegeler Zinc	Danville	IL	ILN000508134	Final	Poses Public Health Hazard	PHA (2003)
29	Herculaneum Lead Smelter Site	Herculaneum	MO	MOD006266373	Non-NPL	Poses Urgent Public Health Hazard	HC (2001); (2002); (2003)
30	International Smelting And Refining	Tooele	UT	UTD093120921	Final	Poses Public Health Hazard	PHA (2001)
31	Jacobs Smelter	Stockton	UT	UT0002391472	Final	Poses Public Health Hazard	HC (1999); PHA (2001)
32	Kennecott (South Zone) (SA)	Copperton	UT	UTD000826404	Non-NPL	Poses Public Health Hazard	PHA (1997)
33	Klau/Buena Vista Mine	Paso Robles	CA	CA1141190578	Final	Poses Public Health Hazard	HC (2005); (2007)
34	Lava Cap Mine	Nevada City	CA	CAD983618893	Final	Poses Public Health Hazard	PHA (2001)
35	Le Roi Co. Smelter	Northport	WA	WAD988507323	Non-NPL	Poses Public Health Hazard	HC (2005)
36	Leviathan Mine	Markleeville	CA	CAD980673685	Final	Poses Public Health Hazard	PHA (2003)
37	Li Tungsten Corp.	Glen Cove	NY	NYD986882660	Final	Poses Public Health Hazard	PHA (1994); (2001)
38	Libby Asbestos Site	Libby	MT	MT0009083840	Final	Poses Public Health Hazard	HC (2000); (2003)
39	Macalloy Corporation	North Charleston	SC	SCD003360476	Final	Poses Public Health Hazard	HC (1998)
40	Madison County Mines	Fredericktown	MO	MOD098633415	Final	Poses Public Health Hazard	PHA (2005)
41	Matthiessen And Hegeler Zinc Company	La Salle	IL	IL0000064782	Final	Poses Public Health Hazard	PHA (1999)
42	Midvale Slag	Midvale	UT	UTD081834277	Final	Poses Public Health Hazard	PHA (1988); HC (1993)
43	Milltown Reservoir Sediments	Milltown	MT	MTD980717565	Final	Poses Public Health Hazard	HC (2001)
44	Montclair/West Orange Radium Site	Montclair/ West Orange	NJ	NJD980785653	Deleted	Poses Public Health Hazard	PHA (1985); (1995)
45	Monticello Mill Tailings (USDOE)	Monticello	UT	UT3890090035	Final	Poses Public Health Hazard	PHA (1989), (1997); HC (2006)

Row	Site Name	City	State	EPA ID	NPL Status	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
46	Monticello Radioactively Contaminated Properties	Monticello	UT	UTD980667208	Deleted	Poses Public Health Hazard	PHA (1989), (1997); HC (2006)
47	Mouat Industries	Columbus	MT	MTD021997689	Final	Poses Public Health Hazard	PHA (1989)
48	National Mine Tailings	Park Hills	MO	MOD985818228	Non-NPL	Poses Public Health Hazard	HC (2001)
49	National Southwire Aluminum Co.	Hawesville	KY	KYD049062375	Final	Poses Public Health Hazard	PHA (1994)
50	National Zinc Corp.	Bartlesville	OK	OKD000829440	Proposed	Poses Public Health Hazard	PHA (1995)
51	Newton County Mine Tailings	Granby	MO	MOD981507585	Final	Poses Public Health Hazard	PHA (1999), (2006); HC (2000)
52	Omaha Lead	Omaha	NE	NESFN0703481	Final	Poses Public Health Hazard	PHA (2005); HC (2004), (2005)
53	Oronogo-Duenweg Mining Belt	Joplin	MO	MOD980686281	Final	Poses Public Health Hazard	PHA(1990); HC(1994)
54	Palmerton Zinc Pile	Palmerton	PA	PAD002395887	Final	Poses Public Health Hazard	PHA (1994)
55	Reynolds Metals Company	Troutdale	OR	ORD009412677	Final	Poses Public Health Hazard	PHA (1997)
56	RSR Corporation	Dallas	TX	TXD079348397	Final	Poses Public Health Hazard	HC (2001)
57	Sharon Steel Corp. (Farrell Works)	Hickory Township	PA	PAD001933175	Final	Poses Public Health Hazard	PHA (1999);HC (1997)
58	Smeltertown Site	Salida	CO	COD983769738	Proposed	Poses Public Health Hazard	PHA (1995)
59	Smuggler Mountain	Aspen	CO	COD980806277	Deleted	Poses Public Health Hazard	PHA (1991)
60	Stauffer Chemical Co. (Tarpon Springs)	Tarpon Springs	FL	FLD010596013	Final	Poses Public Health Hazard	PHA(1993)
61	Stephenson – Bennett Mine	Organ	NM	NMD986684231	Non-NPL	Poses Public Health Hazard	HC (1997),(1998)
62	Sulphur Bank Mercury Mine	Clearlake Oaks	CA	CAD980893275	Final	Poses Public Health Hazard	PHA (1992)
63	Tex-Tin Corp.	Texas City	TX	TXD062113329	Final	Poses Public Health Hazard	HC (2000)
64	Tooele Valley Railroad	Tooele	UT	UT0011980278	Non-NPL	Poses Public Health Hazard	HC (2006)
65	Torch Lake	Houghton County	MI	MID980901946	Final	Poses Public Health Hazard	HC (2006)
66	U.S. Radium Corp.	Orange	NJ	NJD980654172	Final	Poses Public Health Hazard	HC (1997)
67	U.S. Smelter And Lead Refinery, Inc.	East Chicago	IN	IND047030226	Final	Poses Public Health Hazard	PHA (1994)
68	Upper Tenmile Creek Mining Area	Helena	MT	MTSFN7578012	Final	Poses Public Health Hazard	PHA (2001)

Row	Site Name	City	State	EPA ID	NPL Status	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
69	V & V Mining PCB Site	Big Stone Gap	VA	VAN000305626	Non-NPL	Poses Public Health Hazard	HC (2001)
70	Vasquez Boulevard And I-70	Denver	CO	CO0002259588	Final	Poses Public Health Hazard	PHA (2003)
71	WR Grace Hamilton Twp	Hamilton Township	NJ	NJD067387472	Non-NPL	Poses Public Health Hazard	HC (2005)

Attachment M2. ATSDR Public Health Findings from Additional Inquiry for 108(b) Historical NPL Sites

Row	Site Name	City	State	EPA ID	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
1	Alcoa (Vancouver Smelter)	Vancouver	WA	WAD009045279	No documents found	
2	Atlas Asbestos Mine	Coalinga	CA	CAD980496863	Poses Indeterminate Public Health Hazard	PHA (1988)
3	Barite Hill/Nevada Goldfields	Mccormick	SC	SCN000407714	Poses Indeterminate Public Health Hazard	PHA (2011)
4	Black Butte Mine	Cotton Grove	OR	OR0000515759	No documents found	
5	Brewer Gold Mine	Jefferson	SC	SCD987577913	No documents found	
6	California Gulch	Leadville	CO	COD980717938	Poses Indeterminate Public Health Hazard	PHA (1986)
7	Callahan Mining Corp	Brooksville (Cape Rosier)	ME	MED980524128	Poses Indeterminate Public Health Hazard	PHA (2003)
8	Chemet Co.	Moscow	TN	TND987768546	Poses No Public Health Hazard	PHA (2000)
9	Cimarron Mining Corp.	Carrizozo	NM	NMD980749378	Poses Indeterminate Public Health Hazard	PHA (1990)
10	Cleveland Mill	Silver City	NM	NMD981155930	Poses Indeterminate Public Health Hazard	PHA (1990)
11	Coalinga Asbestos Mine	Coalinga	CA	CAD980817217	Poses Indeterminate Public Health Hazard	PHA (1988)
12	Denver Radium Site	Denver	CO	COD980716955	No documents found	
13	Eagle Mine	Minturn/Redcliff	CO	COD081961518	Poses Indeterminate Public Health Hazard	PHA (1989)
14	Eagle Zinc Co Div T L Diamond	Hillsboro	IL	ILD980606941	Poses No Apparent Public Health Hazard	PHA (2002)
15	Ely Copper Mine	Vershire	VT	VTD988366571	Poses No Apparent Public Health Hazard	PHA (2008)
16	Flat Creek Imm	Superior	MT	MT0012694970	Poses Public Health Hazard	PHA (2010)
17	Foote Mineral Co.	East Whiteland Township	PA	PAD077087989	Past public health hazard; indeterminate public health hazard *	ATSDR (1994)
18	Formosa Mine	Riddle	OR	ORN001002616	Poses Public Health Hazard	PHA (2010)
19	Franklin Slag Pile (Mdc)	Philadelphia	PA	PASFN0305549	Poses Indeterminate Public Health Hazard	PHA (2005)
20	Fremont National Forest/White King And Lucky Lass Uranium Mines (Usda)	Lakeview	OR	OR7122307658	Poses No Apparent Public Health Hazard	HC (2007)
21	Gilt Edge Mine	Lead	SD	SDD987673985	Poses No Apparent Public Health Hazard	HC (2005)
22	Homestake Mining Co.	Milan	NM	NMD007860935	Poses Indeterminate Public Health Hazard	PHA (1988)
23	International Minerals (E. Plant)	Terre Haute	IN	INT190010876	No documents found	
24	Interstate Lead Co. (Ilco)	Leeds	AL	ALD041906173	No documents found	

Row	Site Name	City	State	EPA ID	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
25	Iron King Mine - Humboldt Smelter	Dewey-Humboldt	AZ	AZ0000309013	Poses Public Health Hazard	HC (2009)
26	Iron Mountain Mine	Redding	CA	CAD980498612	Poses Indeterminate Public Health Hazard	PHA (1986)
27	Jacks Creek/Sitkin Smelting & Refining, Inc.	Maitland	PA	PAD980829493	No documents found	HC (1991)
28	Kaiser Aluminum (Mead Works)	Mead	WA	WAD000065508	Poses Indeterminate Public Health Hazard	SR (1993)
29	Lincoln Park	Canon City	CO	COD042167858	Poses Indeterminate Public Health Hazard	PHA (2006)
30	Martin-Marietta Aluminum Co.	The Dalles	OR	ORD052221025	No documents found	
31	Midnite Mine	Wellpinit	WA	WAD980978753	Poses Indeterminate Public Health Hazard	PHA (2007)
32	Molycorp, Inc.	Questa	NM	NMD002899094	Poses No Apparent Public Health Hazard	PHA (2005)
33	Monsanto Chemical Co. (Soda Springs Plant)	Soda Springs	ID	IDD081830994	No documents found	
34	Murray Smelter	Murray City	UT	UTD980951420	Poses No Apparent Public Health Hazard	PHA (1997)
35	Nelson Tunnel/Commodore Waste Rock	Creede	CO	CON000802630	Poses Indeterminate Public Health Hazard	HC (2009); HC (2012)
36	Ore Knob Mine	Ashe County	NC	NCN000409895	No documents found	
37	Ormet Corp.	Hannibal	OH	OHD004379970	No documents found	
38	Pike Hill Copper Mine	Corinth	VT	VTD988366720	No documents found	
39	Richardson Flat Tailings	Park City	UT	UTD980952840	Poses Indeterminate Public Health Hazard	PHA (1990)
40	Sharon Steel Corp. (Midvale Tailings)	Midvale	UT	UTD980951388	Poses Indeterminate Public Health Hazard	PHA (1986)
41	Shieldalloy Corp.	Newfield Borough	NJ	NJD002365930	Poses No Apparent Public Health Hazard	HC (1997)
42	Silver Bow Creek/Butte Area	Butte	MT	MTD980502777	Poses Indeterminate Public Health Hazard	PHA (1987)
43	Silver Mountain Mine	Loomis	WA	WAD980722789	Poses Indeterminate Public Health Hazard	PHA (1988)
44					Poses Public Health Hazard	PHA (1991)
45	Southwest Jefferson County Mining	Jefferson County	MO	MON000705443	No documents found	
46	Standard Mine	Gunnison National Forrest	CO	CO0002378230	Poses Public Health Hazard	HC (2006); HC (2008)
47	Stibnite/Yellow Pine Mining Area	Stibnite	ID	IDD980665459	Poses No Apparent Public Health Hazard; Poses Indeterminate Public Health Hazard	PHA (2003)
48	Summitville Mine	Rio Grande County	CO	COD983778432	Poses No Apparent Public Health Hazard	PHA (1997)
49	Tar Creek (Ottawa County)	Ottawa County	OK	OKD980629844	Poses Indeterminate Public Health Hazard	PHA (2008)
50	Teledyne Wah Chang	Albany	OR	ORD050955848	Poses No Apparent Public Health Hazard	PHA (2009)

Row	Site Name	City	State	EPA ID	ATSDR Public Health Hazard Finding	Type of ATSDR Document Referenced
51	Tulsa Fuel And Manufacturing	Collinsville	OK	OKD987096195	Poses No Apparent Public Health Hazard	PHA (2000)
52	U.S. Magnesium	Tooele County	UT	UTN000802704	No documents found	
53	U.S. Titanium	Piney River	VA	VAD980705404	Poses No Apparent Public Health Hazard	PHA (1989)
54					Poses Indeterminate Public Health Hazard	PHA (1999)
55	United Nuclear Corp.	Church Rock	NM	NMD030443303	Poses Indeterminate Public Health Hazard	PHA (1988)
56	Uravan Uranium Project (Union Carbide Corp.)	Uravan	CO	COD007063274	Poses Indeterminate Public Health Hazard	PHA (1986)
57	W.R. Grace & Co., Inc./Wayne Interim Storage Site (USDOE)	Wayne Township	NJ	NJ1891837980	Poses Indeterminate Public Health Hazard	PHA (1990)
58	Washington County Lead District - Old Mines	Old Mines	MO	MON000705027	Poses Public Health Hazard	PHA (2010)
59	Washington County Lead District - Potosi	Potosi	MO	MON000705023	Poses Public Health Hazard	HC (2008); PHA (2010)
60	Washington County Lead District - Richwoods	Richwoods	MO	MON000705032	Poses Public Health Hazard	PHA (2010)
61	Whitewood Creek	Whitewood	SD	SDD980717136	No documents found	

* In a 1994 Preliminary PHA (ATSDR, 1994a), the ATSDR and the Pennsylvania Department of Health (PADOH) categorized the Foote Mineral Co. site as a “past public health hazard.” The PADOH subsequently classified the site as an “indeterminate public health hazard” due to concerns over long-term exposures to low levels of boron and lithium.

Attachment M3. Summary of ATSDR Findings for Case Study Historical Sites

Site Name	City	State	EPA ID
Anaconda Co. Smelter	*Anaconda*	*MT*	*MTD093291656*

The Anaconda Co. Smelter site was listed on the National Priorities List (NPL) in 1983, and categorized as a **public health hazard** in a 1987 Public Health Assessment (PHA). However, a copy of the 1987 report could not be located. EPA has conducted several cleanup activities on a number of areas of the Anaconda site. In a 1996 Record of Decision (ROD), EPA selected a remedial action for addressing arsenic contamination of residential surface soils (EPA, 1996). The ROD established a residential action level of 250 mg arsenic/ kg soil for remedial action. The remedial action was initiated in 2003 and is still ongoing.

In 2007, ATSDR issued a Health Consultation (HC) after a resident of Anaconda requested ATSDR evaluate the public health impacts of arsenic at residential action level of 250 mg arsenic/kg soil that EPA had determined in the 1996 ROD. After reviewing studies and decisions used to determine the action level, ATSDR concluded that chronic exposures to soil at the residential action level of 250 mg of arsenic/kg soil would not be expected to present any adverse health effects for resident children or adults. However, ATSDR indicated that children with pica behavior (who eat about a teaspoon of soil at a time) may experience adverse health effects if they ingested gram quantities of soil containing arsenic (ATSDR, 2007b).

Site Name	City	State	EPA ID
Bunker Hill Mining & Metallurgical Complex	*Smelterville*	*ID*	*IDD048340921*

In a 1989 PHA, ATSDR categorized the Bunker Hill Mining site as an **Urgent Public Health Hazard**. However, a copy of the 1989 PHA could not be located. In 2000, in response to an EPA request, ATSDR conducted an HC for an unpopulated and undeveloped area of the Bunker Hill site (Hillsides property) based on sampling data obtained from EPA. The HC indicated that, while the contaminant of concern was lead, mining and smelting activities also contaminated the property with other metals including arsenic, cadmium and zinc (ATSDR, 2000a). After reviewing the available data, ATSDR determined that the Hillsides site posed a **public health hazard** if the area were used for future development. Furthermore, residents who lived in the vicinity of the undeveloped hillsides of the Bunker Hill site, in the past, had been exposed to site-related metals that can result in adverse health effect in the long term.

In 2007, ATSDR conducted a PHA for the Bunker Hill OU3 area (Coeur d’Alene river basin), which includes areas to the east and west of Bunker Hill Mining site. ATSDR indicated that lead was the contaminant of greatest concern for human health effect in the Bunker Hill OU 3 area. In addition, ATSDR identified seven other contaminants of potential human health concern, including aluminum, antimony, arsenic, cadmium, iron, manganese, and zinc (ATSDR, 2007d). After review of available data, ATSDR concluded that all past, present and future human exposures to high concentrations of lead and other metals in surface soil, household dust, and fish pose a **public health hazard** for residents who live in some areas of

Coeur d'Alene River Basin site (east of Lake Coeur d'Alene). ATSDR also concluded people who lived in the Coeur d'Alene River Basin and who used recreational areas (i.e. beaches, parks, campgrounds) were at a greater risk of exposures and possible cumulative health effects.

Site Name	City	State	EPA ID
Captain Jack Mill	*Ward*	*CO*	*COD981551427*

The Captain Jack Mill site was categorized as a **Public Health Hazard** in a 2006 HC. ATSDR prepared the 2006 HC in cooperation with the Colorado Department of Public Health and Environment (CDPHE). The HC examined the soil and groundwater pathways at the Captain Jack Mill site, and found a significant **public health hazard** to permanent residents and recreational users from exposures to arsenic, copper, lead, manganese and zinc in the soil and groundwater (ATSDR, 2006a). CDPHE's 2007 follow-up HC, which looked at exposure to site-related contaminants in surface water and sediments, also concluded that current and future chronic exposure to iron sediments poses a **public health hazard** to residential and recreational children in the areas of investigation (ATSDR, 2007b). Furthermore, although CDPHE was not able to determine if surface water near the Captain Jack Mill site is being used as a drinking water source, if residents were using surface water for potable purposes, the concentrations of copper, iron, and manganese would pose a **public health hazard**. In 2008, the EPA and CDPHE issued a Record of Decision (ROD) to remediate surface and subsurface contamination. Site cleanup activities were expected to start in the summer of 2010.

Site Name	City	State	EPA ID
Cimarron Mining Corp.	*Carrizozo*	*NM*	*NMD980749378*

The site was categorized as an **indeterminate public health hazard** in a1990 Preliminary PHA. Although a copy of the full report was not located, an abstract revealed that the site posed a potential public health concern because of possible human exposure to site related-contaminants (chromium, cyanide, lead, and nitrate) present in on-site groundwater (ATSDR, 1990). Cyanide and lead contamination of on-site surface soil, tailings, and wastes were also a concern. The abstract also indicated that the most likely pathways for contaminant transport to off-site areas were groundwater and soil. Humans may be exposed to site-related contaminants with ingestion of contaminated groundwater and soil and inhalation of contaminated dusts.

In 1990 and 1991, the EPA released two RODs for two operable units (OU1 and OU2). The1990 ROD required extraction of cyanide from the shallow ground water and discharge to the publicly owned treatment works (EPA 1990). The 1991 ROD required solidification and stabilization of contaminated soil and waste pile exceeding 500 ppm lead (EPA, 1991). In 2010, OU-2 was deleted from the NPL list, while OU-1was partially deleted.

Site Name	City	State	EPA ID
Eagle Mine	*Minturn/Redcliff*	*CO*	*COD081961518*

The Eagle Mine site was categorized as an I**ndeterminate Public Health Hazard** in a 1989 PHA. However, a copy of the1989 PHA could not be located. According to the Colorado Department of Public Health (CDPHE), the major contaminants of concern were arsenic, cadmium, lead, manganese and zinc (CDPHE, n.d). The major pathways of concern for public health were surface water contamination of the Eagle River, groundwater contamination, and ingestion/inhalation of mining wastes.

Beginning in 1988, in cooperation with EPA, the CDPHE implemented several remedial actions. The remediation projects ended in 2001, and in 2008, EPA and CDPHE conducted a third five-year review at the Eagle Mine site. Results of this five-year review showed that the remedies implemented continue to be protective of human health and the environment (EPA, n.d).

Site Name	City	State	EPA ID
Eastern Michaud Flats Contamination	*Pocatello*	*ID*	*IDD984666610*

The Eastern Michaud Flats site was designated a P**ublic Health Hazard** in HCs conducted from 1997 to 2001. ATSDR conducted these HCs to examine the potential for human exposures (past, present, and future) to site-related contaminants, which included arsenic, nitrate/nitrite in groundwater, surface water and sediment; cadmium in surface soil; and particulate matter in ambient air. ATSDR designated the Eastern Michaud Flats (EMF) site as a **public health hazard** because residents and local employees near the site were exposed to arsenic and nitrate/nitrite in groundwater (ATSDR, 1998a); workers at the EMF site were exposed to cadmium in surface soil (ATSDR,1997a and ATSDR 1998c); slag and gypsum workers were exposed to alpha, beta, and gamma radiation (ATSDR, 1997a); and the general public in the nearby area were exposed to airborne particulate matter and sulfate in the air (ATSDR, 2001). During this period, the EPA issued a ROD to clean up contaminated groundwater and contaminated soils at the EMF site. Since 2006, the EPA has been working with responsible parties to conduct cleanup activities at three Operable Units (OUs).

In 2005, the Idaho Bureau of Community and Environmental Health (BCEH), in cooperation with ATSDR, released a comprehensive PHA for the EMF site. The report classified the EMF site as a "N**o Apparent Public Health Hazard**" because 1) residents no longer receive drinking water from contaminated wells; 2) no workers are at contaminated sites; and 3) particulate matter concentrations in the air have gone down (ATSDR, 2005c). However, BCEH identified completed exposure pathways which included, surface soil, surface water and sediment, air and residential exposures to radiation from slag. BCEH also classified the site as an **Indeterminate Public Health Hazard** for future exposures to particulate matter in the air because at the time of the report, although the PM_{10} and $PM_{2.5}$ in the EMF area met EPA's health-based CVs, BCEH was uncertain about PM levels in the future.

Site Name	City	State	EPA ID
East Helena Site	*East Helena*	*MT*	*MTD006230346*

The East Helena site was classified as a P**ublic Health Hazard** in a 2002 HC. ATSDR conducted the HC after the EPA determined that a known arsenic groundwater plume had migrated off-site from the East Helena historic smelter operation site towards a residential area (ATSDR, 2002). Although at the time of the HC, sampling of residential wells indicated that the plume had not yet reached the residential area; ATSDR concluded that the site presented a potential future **public health hazard** for residents who would draw water from arsenic contaminated wells. Since the site was listed on the NPL, the EPA has issued two Records of

Decision: 1) to reduce groundwater pollution from process ponds at the site (EPA, 1989); and 2) to clean up East Helena residential soils and undeveloped lands (EPA, 2009).

Site Name	City	State	EPA ID
Foote Mineral Co.	*East Whiteland Township*	*PA*	*PAD077087989*

A 1994 Preliminary PHA, prepared by the Pennsylvania Department of Health (PADOH) in cooperation with ATSDR, classified the site as a P**ast Public Health Hazard**. The PADOH reached that conclusion based on past human exposures to elevated levels of boron and lithium through the use of off-site contaminated groundwater (ATSDR, 1994a). Since then, residents who had drawn water from contaminated private wells were connected to public water supply systems. In addition, contaminated water in the public water supply systems were connected to uncontaminated sources. These measures helped reduce the levels of boron and lithium in drinking water, but at the time of the report, PADOH categorized the site as **Indeterminate Public Health Hazard** due concerns of long-term exposures to low levels of boron and lithium. PADOH indicated that there was no toxicological information in the literature regarding adverse health effects to long-term exposures of low levels of boron and lithium.

Site Name	City	State	EPA ID
Gilt Edge Mine	*Lead*	*SD*	*SDD987673985*

The site was categorized as a N**o Apparent Public Health Hazard** in a 2005 HC. ATSDR found that levels of arsenic, cadmium, copper and manganese exceeded environmental comparison values for on-site soil and off-site stream sediments (ATSDR, 2005a). ATSDR also found cadmium levels exceeding environment comparisons values in off-site surface water. The Gilt Edge Mine site was nevertheless classified as a “no apparent public health hazard” because ATSDR did not find complete exposures to on-site soil and on-site surface water: public access to the area was restricted, and on-site surface water was not used for drinking water. In addition, although ATSDR found complete exposure pathways to off-site surface water and stream sediment, ATSDR determined “no apparent public health hazard” based on reasonably expected recreational activities. The Gilt Edge Mine site was classified as an **Indeterminate Public Health Hazard** for future exposures, as ATSDR was unable to determine what future human activities (e.g., residential, agricultural, recreational) could occur at the site, and the final outcome of site remediation.

Site Name	City	State	EPA ID
Homestake Mining Co.	*Milan*	*NM*	*NMD007860935*

The site was categorized as an **Indeterminate Public Health Hazard** in a 1988 PHA. In a 2009 HC, ATSDR reviewed the data from private well sampling conducted between September 2005 and May 2007 near the Homestake site. Although, “sampling results indicated several wells had uranium and/or selenium concentration above the Maximum Contaminant Level (MCL), ATSDR concluded no apparent public health hazard.” ATSDR made this determination after calculating exposure doses for the contaminants above ATSDR health comparison values and MCLs in well samples, and determined that the concentrations were not at levels to cause adverse health effects (ATSDR, 2009a). However, ATSDR advised owners of residential wells that have selenium or uranim concentrations above the MCL to refrain from using the wells for potable purposes. Furthermore, results of the well sampling showed that sulfates and total dissolved solids levels exceeded USEPA’s drinking water advisory. ATSDR indicated that they may present health problems to the very young, very old and those that are already ill.

Site Name	City	State	EPA ID
Li Tungsten Corp.	*Glen Cove*	*NY*	*NYD986882660*

The Li Tungsten site posed a P**ublic Health Hazard** according to a 1994 Preliminary PHA and a 2001 HC. The 1994 Preliminary PHA stated that trespassing onto site properties was occurring, and trespassers may be exposed to on-site surface soils, surface water, and sediments contaminated with elevated levels of site-related contaminants, including PCBs (Aroclors), metals (antimony, arsenic, cadmium, chromium, lead, manganese, mercury, nickel, iron) and gamma radiation from on-site drums and piles of low level radioactive slag/ore (ATSDR, 1994b). In addition, ATSDR indicated off-site surface water (Glen Cove Creek) was contaminated with volatile organic compounds such as tetrachlorethene and metals (iron and manganese) at levels exceeding surface water or drinking water standards. Therefore, people who used nearby surface water (Glen Cove Creek) for recreational purposes may also be exposed to these volatile organic compounds and metals. Sediment in off-site surface water was also contaminated with nickel and zinc at levels of concern for potential exposure pathways. A copy of the 2001 HC could not be located.

Site Name	City	State	EPA ID
Macalloy Corporation	*North Charleston*	*SC*	*SCD003360476*

The Macalloy Corporation site was categorized a P**ublic Health Hazard** in a 1998 HC. This HC reviewed EPA’s analytical data of contaminated shellfish (i.e., clams, oysters, shrimp and crabs) samples obtained from Shipyard Creek, North Charleston, South Carolina (ATSDR, 1998b). In the report, ATSDR indicated that the Macalloy Corporation facility situated at the headwaters of Shipyard Creek may have been the source of contamination through surface water runoff from the facility. Wastes generated by the facility during the ferro-chrome manufacturing process included arsenic, barium, chromium, lead, manganese, mercury, and zinc. ATSDR found that chromium concentrations detected in shrimp from Shipyard Creek presented a **public health hazard** if people consumed the contaminated shrimp on a frequent basis.

Site Name	City	State	EPA ID
Midnite Mine	*Wellpinit*	*WA*	*WAD980978753*

A 2010 PHA categorized the Midnite Mine site as a P**ublic Health Hazard**. According to the report, the Midnite Mine site was comprised of a mined area and a mine-affected area. The mined area contained more than 33 million tons of waste rock, unprocessed ore, and low-grade ore. Mine-affected environmental media include sediment, surface water (Blue Creek), soil, and groundwater. According to the report, past site investigations showed that contaminants such as arsenic, cadmium, manganese, uranium, and radioactive isotopes and decay products related to uranium, migrated from mining areas into local groundwater and surface waters as a result of mining activities and environmental processes. ATSDR classified the Midnite Mine site as a public health hazard based on exposures to site-related contaminants (metals and radionuclides) for people who use the mining-affected areas for traditional and subsistence activities (i.e. drinking water from drainage and seeps; breathing water vapor by heating water from drainage and seeps; accidentally ingesting sediments; eating terrestrial plants and roots from mine-affected areas; eating fish from Blue Creek). In addition, ATSDR categorized the site as an **Indeterminate Public Health Hazard** for exposure to site–related contaminants through consumption of meat from big game (i.e. deer, elk) that graze or live in mined or mine-affected areas. ATSDR also classified the site as an **indeterminate public health hazard** for future exposure to contaminated groundwater from private drinking water wells and to radon in indoor air because at the time of the report ATSDR was unable to determine if there would be a residential development in the mining-affected area or if future residences would use contaminated private wells as a source of drinking water (ATSDR, 2010).

Site Name	City	State	EPA ID
Monsanto Chemical Co. (Soda Springs Plant)	*Soda Springs*	*ID*	*IDD081830994*

In 1992, ATSDR released a Preliminary PHA for the Monsanto Chemical Co. site. A copy of this document could not be located. However, according to an ATSDR Ombudsman report, the 1992 Preliminary PHA classified the Monsanto site as a **public health hazard** because of public exposure to hazardous substances (radioactive slags) produced as a result of Monsanto phosphate ore processes, which were used as aggregate in building and roadbeds (ATSDR, 2000b). The Ombudsman's summary of the Preliminary PHA also indicated that exposure to inorganic compounds (not specified) may have also occurred or may still be occurring through ingestion and inhalation of or dermal contact with contaminated groundwater or plant air/site fugitive dust emissions. But due to limited exposure data, ATSDR did not make health effect determination.

Site Name	City	State	EPA ID
National Southwire Aluminum Co.	*Hawesville*	*KY*	*KYD049062375*

The National Southwire Aluminum Co. site was classified as a **public health hazard** in a 1994 Preliminary PHA. ATSDR reached that conclusion based on evidence that past, present and likely future exposures of on-site maintenance workers and workers at waste areas to elevated concentrations of aluminum, arsenic, cobalt, cyanide, fluoride manganese, and nickel (ATSDR, 1994c). The report also indicated that other on-site workers and nearby residents were exposed to these site-related contaminants, though the concentrations were not at levels to cause adverse health effects.

Site Name	City	State	EPA ID
Omaha Lead	*Omaha*	*NE*	*NESFN0703481*

The Omaha lead site was classified as a **public health hazard** in a 2004 HC and 2005 PHA. Acording to the 2005 PHA, the site included residential properties, child care sites, and school contaminated with lead from air emissions from lead refining and other sources. ATSDR found that there was an ongoing exposure to lead which put children 6 years old and younger in or near the Omaha Lead site at risk of lead-related health problems. ATSDR indicated children were exposed to surface soil contaminated with lead emitted from the operation of the ASARCO refinery and lead-based paint. In the report, ATSDR indicated that more than 1600 children in the area had elevated blood lead levels, defined as10 ug/dL or greater from blood sampling conducted from July 2000 through 2003. ATSDR concluded that these exposure levels would result in adverse health effects to children. ATSDR therefore classified the Omaha Lead site as a public health hazard (ATSDR, 2005d).

Site Name	City	State	EPA ID
Ormet Corp.	*Hannibal*	*OH*	*OHD004379970*

The ATSDR databases did not include any records for the Ormet Corp. site. In addition, at this time, no HC or PHA document by ATSDR could be located. According to EPA's Record of Decision (ROD) published in 1994, groundwater beneath the site was contaminated in excess of MCLs for contaminants including antimony, arsenic, beryllium, cyanide, fluoride, and teterachloroethene (TCE) (EPA, 1994a). Furthermore, soils and sediments in a backwater area were contaminated with cyanide, fluoride and PCBs.

Site Name	City	State	EPA ID
Palmerton Zinc Pile	*Palmerton*	*PA*	*PAD002395887*

A 1994 PHA classified the site as a **public health hazard**. However, a copy of this document could not be located. In a 1987 PHA by Pennsylvania Department of Health, in cooperation with ATSDR, concluded that the Palmerton area presented a **public health hazard** because people were exposed to site-related contaminates (arsenic, cadmium, lead, and zinc) at levels that may cause adverse health effects (ATSDR, 1987). Particularly, children with pica behavior may be exposed to zinc, if they came in contact to an area with high concentration of zinc. Exposure pathways included ingestion of contaminated surface soils, swallowing of particulates in the air, ingestion of contaminated surface water, groundwater, fish, game animals, and local vegetables.

Site Name	City	State	EPA ID
Reynalds Metals Company	*Troutdale*	*OR*	*ORD009412677*

The Reynolds Metals site posed a **public health hazard** according to a 1997 PHA. ATSDR concluded that the Reynolds Metals site posed a public health hazard to on-site workers due to exposures to fluoride in surface soils and sediments (ATSDR, 1997b). In addition to fluoride, the report also indicated the presence of metal contaminants such as aluminum, arsenic, and mercury, and organic contaminants such as PAHs and PCBs in on-site surface soils, sediments and shallow groundwater beneath the Reynolds Metals site. People who used nearby surface waters (Columbia river and Sandy river) for recreation purposes as well as those who entered the area near the site to pick blackberries may be exposed to contaminated sediments and soils. However, ATSDR indicated no adverse health effects to recreational users because of the infrequency of their visits.

Site Name	City	State	EPA ID
Silver Mountain Mine	*Loomis*	*WA*	*WAD980722789*

The site was classified as an **indeterminate public health hazard** in a 1988 PHA, and as a **public health hazard** in a 1991 PHA. However, copies of neither of these documents could be located. The Silver Mountain Mine site is abandoned silver and gold mine located in Horse Springs Coulee, Washington. According to EPA, during the early part of the 1980s, a sodium cyanide solution was used to extract metal from mine tailings. By 1983, the site was abandoned, and the mine tailings and holding basin containing cyanide contaminated water were left behind. EPA also indicated the presence of arsenic and cyanide in a leachate collection trench associated with ore extraction. Within three miles of this mining site, EPA reported the presence of private wells used for domestic purposes, irrigation and livestock watering. According to EPA, the contaminants of concerns were arsenic and cyanide and exposure pathways included, on-site soils, on-site surface water, on-site shallower groundwater, and off-site groundwater (EPA, 2010). The site was deleted from NPL in 1997 after EPA completed remedial activities in 1992.

Site Name	City	State	EPA ID
Stauffer Chemical Co. (Tarpon Springs)	*Tarpon Springs*	*FL*	*FLD01059601*

The Stauffer Chemical Co. posed a **public health hazard** in a 1993 Preliminary PHA. In 1993, ATSDR classified the Stauffer Chemical Co. as a **public health hazard** because on-site workers in the past and on-site workers at the time of report were exposed to arsenic in surface soils, sediments and dust at levels above ATSDR comparison values. Other contaminants of concern at this site were antimony, beryllium, boron, cadmium, chromium, fluoride, lead, radium, radon, sulfur dioxide, thallium, and vanadium. In addition, arsenic concentrations were also detected above EPA's reference dose (RfD) in one off-site drinking water well, in off-site shallow and deep groundwater and in a nearby river. Contaminants known or suspected to cause cancer (arsenic beryllium, cadmium and chromium were also detected in on-site soils and sediments, groundwater (on-site and off-site) and off-site surface water at levels above ATSDR comparison values (ATSDR, 1993).

From 1993 to 2005, ATSDR issued a number of PHAs and HCs for the Stauffer Chemical Co. site. Following a Final Site Remedial Investigation for the Stauffer site in 1998, EPA requested ATSDR conduct a HC to determine if the contamination at the site posed "imminent and substantial endangerment." ATSDR issued the HC in 1999 and after reviewing the data, ATSDR found no acute health hazard despite elevated levels of arsenic and radionuclide were found in the surface soil samples taken from the site. However, ATSDR concluded **public health hazard** for long-term exposures to site-related arsenic and radionuclides (ATSDR, 1999).

In 2005, ATSDR issued a final comprehensive PHA for the Stauffer site. At the time of the report, ATSDR classified the site as a "no apparent public health hazard". ATSDR made this determination because the Stauffer plant had not been in operation since 1981, and access to the site was restricted. In addition, ATSDR indicated buildings, process equipment and chemicals at the site – that posed a health and safety hazard – had been removed from the site. However, because of elevated levels of arsenic in on-site surface soils and gamma radiation from on-site slags, ATSDR concluded that the Stauffer site could pose a **future public health hazard** if the site is used for future residential developments (ATSDR, 2005e).

Site Name	City	State	EPA ID
Summitville Mine	*Rio Grande County*	*CO*	*COD983778432*

The site was classified as an **indeterminate public health hazard** in a 1997 PHA.

The Summitville Mine site was listed on the NPL in 1994. Since its listing, EPA and CDPHE have conducted several removal and remedial actions, which are still ongoing. In 1994, EPA and CDPHE conducted remedial actions for reducing or eliminating acid mine drainage and water containing cyanide from different areas of the site (EPA 1994b, EPA1994c, and EPA 1994d). In 2001, EPA issued a Record of Decision for site-wide remedial action (OU5) designed to address the threats to the environment that remain at the site after completion of emergency and interim remedial actions (EPA, 2001).

The 1997 PHA did not find any ongoing exposures which would result in adverse health effects; therefore, ATSDR classified the Summitville Mine site as “no apparent public health hazard.” However, the PHA reported that cyanide, metals (aluminum, arsenic, cadmium, copper, iron, lead, manganese, and zinc), and sulfate leached into local surface waters from acid mine drainage and release of heap leachate (ATSDR, 1997a). The report indicated potential human exposure to contaminants from the Summitville site could occur through surface water/sediment, groundwater, soil, crops, fish, livestock, and wild game. ATSDR recommended further studies be conducted to identify human exposure pathways.

Site Name	**City**	**State**	**EPA ID**
Teledyne Wah Chang	*Albany*	*OR*	*ORD050955848*

A 2009 PHA for the Teledyne Wah Chang site concluded that the site posed “**no apparent public health hazard**.” The report noted, however, that the surface soils and groundwater at the site were contaminated with volatile organic compounds, PAHs, PCBs and metals (arsenic, beryllium, cadmium, chromium, and nickel) (ATSDR, 2009b). In addition, solid sludges dumped in an unlined area of the plant were highly contaminated. The conclusion of “no public health hazard” was based on the assessment that the public would not have access to contaminated groundwater or surface water used as drinking water sources, and the public would not come in contact with contaminated media which included, surface water, surface soils and sediments. Since 1990, EPA has taken several cleanup actions, including removal of contaminated sludge from the site (completed1993); pumping and treating contaminated groundwater (ongoing); excavating and disposing contaminated creek sediments(completed 1999); and excavations of radium-contaminated soil which was completed in 1999. (EPA, 2010b)

Site Name	**City**	**State**	**EPA ID**
Tex-Tin Corp.	*Texas City*	*TX*	*TXD062113329*

The Tex-Tin Corp site posed a **public health hazard** based on a 2000 HC. A copy of this document could not be located. However, a copy of a 1998 HC prepared by the Texas Department of Health (TDH), in cooperation with ATSDR, was located. This HC evaluated the public health threat based on fish data from two off-site ponds near Tex-Tin Corporation site. Fish data included tests for semi-volatile organic compounds such as PCBs and metals which included aluminum, arsenic, barium, copper, lead, manganese, mercury, selenium and zinc. Based on the review of the available data, TDH concluded an **indeterminate public health hazard** from ingestion of fish from two ponds (ATSDR, 1998d). Although TDH concluded there is an **indeterminate public health hazard,** TDH expressed concerns with the concentrations of mercury found in fish, particularly in larger predator species.

Attachment M4. Summary of ATSDR Findings for Nine Additional Sites

Site Name	City	State	EPA ID
AKZO Salt Inc	*Retsof*	*NY*	*NYD002205607*
Summary: ***No report found***			
Site Name	**City**	**State**	**EPA ID**
Alaska Gold	*Nome*	*AK*	*AKD038526620*
Background The Alaska Gold Company site is located in Nome County, Alaska, approximately 1.5 miles north of the city of Nome. Since 1899, gold placer deposits have been mined around Nome, Alaska. Placer processing produced concentrated arsenic-bearing minerals, and generated arsenic and mercury containing dredge tailings, which were widely used for building foundations, fill, and roadways. In 1986, an EPA Technical Assessment Team conducted sampling of air, water, soil and sediment in the Alaska Gold Mine site area. Results of the sampling indicated that arsenic and mercury were found in air, water, soil and sediments which were directly linked to mining and gold extraction activities. ***Summary of ATSDR findings*** EPA requested that ATSDR conduct a PHA based on data obtained from sampling of air, water, soil and sediments in the Alaska Gold Mine site area. The resulting PHA reported potential exposure routes for arsenic and mercury contaminants associated with Alaska Gold Site for residents in the area included, drinking of water from contaminated groundwater and surface water; ingestion of contaminated sediments and soils; direct contact with contaminated sediments, soil, groundwater, and surface water; consumption of contaminated fish and other aquatic food species; and inhalation of contaminated vapors and particulate matters. After reviewing a number of reports and available data, ATSDR concluded exposure to site-related contaminants in drinking water sources pose **minimal impact on human health** because arsenic and mercury levels in drinking water were below Maximum Contaminant Levels. However, concentration of arsenic and mercury in surface soil were at elevated levels and exposures to soil, particularly, ingestion by small children may **pose health risks**. In addition, ATSDR also indicated mercury levels in particulate samples were high enough to **pose a health risk** to local residents.			
Site Name	**City**	**State**	**EPA ID**
ALCOA (Point Comfort)	*Point Comfort*	*TX*	*TXD008123168*
Background The ALCOA (Point Comfort)/ Lavaca Bay Plant is located near the city of Point Comfort, in Calhoun County, Texas. The site covers 3,500 acres, and includes the ALCOA Plant, a dredge spoil island associated with ALCOA, and portions of Lavaca Bay, Cox Bay, Cox Creek, Cox Lake and western Matagorda Bay. The site is surrounded by surface water bodies, agricultural area and industrial complex. According to 1990 census figures, approximately 1,100 people lived in the city of Point Comfort. Currently, the site operates as a bauxite refinery. In the past,			

ALCOA had operated an aluminum smelter at this site from 1948 until 1980. From 1965 to 1979, operations at the site also included a chlor-alkali production plant that produced chlorine gas and sodium hydroxide through an electrolytic process that used mercury. Operations associated with the chlor-alkali production process were responsible for mercury contamination of on-site surface soil, groundwater, air, sediments, fish and crabs. The contamination occurred as a result of mercury-containing wastewater (67 pounds of mercury per day) that was discharged into Lavaca Bay, and the disposing of dredge spoils contaminated with mercury in several areas of the site. Other contaminants of potential concern identified by EPA were volatile organic compounds and lead in shallow groundwater; polychlorinated biphenyls and polycyclic aromatic hydrocarbons in sediment fish and oysters. In April 1988, Texas Department of Health closed the area of Lavaca Bay contaminated with high levels of mercury for fishing. In April 2001, the EPA issued Record of Decision to conduct remedial actions.

Summary of ATSDR Finding

In 1995, the Texas Department of Health (TDH) published a PHA for the ALCOA (Point Comfort) site. Based on the elevated levels of mercury found in fish, TDH classified the site as an **Urgent Public Health Hazard** due to the potential health effects on women of childbearing age and developing fetuses (ATSDR, 1995c). The report also indicated that people who consumed fish and crabs from the portion of Lavaca Bay contaminated with mercury may have been exposed to excessive amounts of mercury.

Site Name	City	State	EPA ID
Cabot-Wrought Prop - Div of Cabot Cor, aka NGK Metal Site	Muhlenberg Township	*PA*	*PAD044540136*

Background

The NGK Metal site is located in Muhlenberg Township, Berks County, Pennsylvania. The 65-acre complex is surrounded by several light industries and residential land uses. From 1936 to 1965, manufacturing activities at the site included extraction of beryllium hydroxide from beryl ore, and production of beryllium salts and various types of beryllium metal and alloys. In 1965, the extraction of beryllium hydroxide from beryl ore was discontinued. From 1965 to 1992, the plant engaged in operations that included production of beryllium/aluminum, beryllium/copper, and beryllium/nickel alloys; casting, heat treatment, and rolling of beryllium alloys; and chemical and mechanical cleaning of beryllium alloys. During this period, the facility used a series of unlined ponds for sludge settling and wastewater treatment. More specifically, fluoride waste, spent acids, and acidic rinse waters were neutralized by a lime treatment process and allowed to settle in the pond. As the plant grew, a wastewater treatment facility was constructed, ending the use of the ponds for sludge settling and wastewater treatment. According to the 1990 census, a population of 4,927 lived within 1 mile of the site.

Summary of ATSDR Findings

According to a 1995 PHA, petitioned by communities surrounding the site, ATSDR found elevated concentrations in various environmental media, on-site and off-site, for contaminants including antimony, arsenic, barium, cadmium, copper, lead, manganese, nickel, nitrate, selenium, thallium, vanadium, and 1,1,1-trichloroethane (ATSDR, 1995a). However, ATSDR could not establish complete exposure pathways for these contaminants. ATSDR also found elevated levels of beryllium, chromium, and 1, 1 dichloroethene with completed exposure pathways. ATSDR reviewed the available environmental and exposure data, and determined that concentrations detected in the air, water, soil and sediment classified the NGK site as an indeterminate **public health hazard**.

Site Name	City	State	EPA ID
Master Metals Incorporation #2	*Detroit*	*MI*	*MID039108824*

Background

The Master Metals site is located at 4700 and 4740 East Nevada Street, Detroit, Wayne County, Michigan. The facility operated under several company names as lead smelters from 1955 to 1983. In 1984, Synergy Production Group, Inc. processed ferrous sulfate hyptahydrate on the site. The site is currently abandoned and owned by the state of Michigan. The land use surrounding the site includes industrial, commercial and residential use. The closest residential area is located 100 feet from the site. According a 1997 EPA action Memorandum (as cited in HC, 2005), within a 1-mile radius of the site, 86% of the population were minorities and the median income was $17,621.

Beginning in 1996, the EPA conducted Site Assessments, which showed levels of lead, antimony and arsenic exceeding the Michigan Department of Environmental Quality generic criteria for industrial, commercial and residential use. The EPA also discovered laboratory chemical and other hazardous waste on-site in marked containers.

Summary of ATSDR Findings

In 1997, EPA asked the Michigan Department of Community Health (MDCH) to evaluate the associated health risks. In a 1997 HC, MDCH and ATSDR indicated that the abandoned lead smelting site lacked effective restriction from trespassers. Therefore, the (MDCH) and ATSDR concluded the Master Metals site posed a **public health hazard** based on the high concentrations of lead found in the surface soil of the property (ATSDR, 1997). In addition, the report indicated that abandoned buildings on the property posed **physical hazards** from deterioration and partial collapse and from laboratory chemicals left when they were vacated. A follow-up HC published in 2005 concluded that the site poses **no apparent public health hazard** (ATSDR, 2005). MDCH reached that conclusion based on remedial actions taken by responsible parties working under an Administrative Order on Consent with EPA, which removed the lead contaminated soil from the residential properties and from the plant site.

Site Name	City	State	EPA ID
Phelps Dodge Corp Douglas Reduction Works (non-NPL)	Douglas	*AZ*	*AZD008397143*

Background

The Phelps-Dodge Corporation Douglas Reduction Works site is located in Cochise County, Arizona, about 1 mile west of Douglas. The site occupies approximately 2,000 acres of land. The site consisted of two copper smelters: The Calumet and Arizona Company smelter, built in 1902; and the Copper Queen smelter, which had operated from 1904 until 1931. The Calumet and Arizona Company was later purchased by Phelps-Dodge Corporation and operated as the Douglas Reduction Works until 1987. During its operation, copper and other metals were smelted at the facility. As a result of this process sulfur dioxide and particulate matter were released through two 600-foot stacks. Air quality monitoring done by the Arizona Department of Environmental Quality from 1967 to 1987, found elevate levels of sulfates, arsenic and lead particulate in outdoor air in Douglas. Due to the continued violations of EPA's National Ambient Air Quality Standards (NAAQS), the smelting operation was finally ceased in 1987.

Summary of ATSDR findings

This site contributed to lead-contaminated surface soils in residential areas of Douglas. ATSDR classified the Phelps Dodge Corp site as a **public health hazard** because of past and present long-term exposure of children to site-related lead contaminated soils (ATSDR, 1995b). Furthermore, ATSDR indicated chronic exposure to lead in the air was an additional source of lead exposure for children and may have resulted in respiratory problems in sensitive sub-populations, such as children and adults with respiratory ailments. The report also indicated that the site may have been responsible for past emissions of contaminants including arsenic, sulfur dioxide, inhalable particulate matter and other heavy metals. (ATSDR, 1995)

Site Name	City	State	EPA ID
REMACOR, INC.	*West Pittsburg*	*PA*	*PAD074965096*

Background

The Remacor site is located in West Pittsburg, Lawrence County, PA. The closest residential area is located 1/3 mile east of the site. Within a 1 mile radius of the site, the population is about 1,054. Currently the company uses magnesium scrap to produce powders and granules for the steel industry. As a result of this process, the plant generated magnesium and lime waste, magnesium oxide waste, and process wastewater. In 2005, magnesium materials at the plant ignited causing a fire which destroyed a building and processing equipment at the facility. Since then, the company was found in contempt of a court order for failing to perform remedial action outlined in a state consent decree.

In March 2006, results of an EPA site inspection demonstrated the presence of public and site-specific hazards, which include unsecured facility from trespassers, debris and spills widely dispersed on site, unsecured stored magnesium materials in drums or large super sack containers, chemical storage warehouses with leaky roofs or lacking doors, placarding of hazardous material storage areas was not evident, mislabeled drums, chemical runoff was observed in several locations, and surface runoff was openly entering storm drains. Further site inspection also identified the presence of radioactive materials cesium-137 and thorium-232 on site. EPA conducted removal actions and related actions including securing the Site with 24-hour security services, repairing the perimeter fence, establishing runoff controls, marking and covering or excavating areas of elevated radiation, and conducting limited excavations in spill areas.

Summary of ATSDR Findings

In a 2007 HC, ATSDR indicated that the Remacor site was unsecured, and trespasser or workers at facility would be exposed to radiation beyond the ATSDR Minimum Risk Level of 100 millirem per year in as few as 200 hours (ATSDR, 2007c). In addition to radiation exposures, ATSDR also identified other **public hazards**, including high potential for fire related to magnesium, potential inhalation of smoke containing radioactive material, contaminations of the stream with radioactive materials. Because the site is unsecured and the radiation levels exceed estimated background by as much 25 times, ATSDR concluded that the site posed a **health hazard** to the surrounding community.

Site Name	City	State	EPA ID
Scott OM & Sons Co	*Marysville*	*OH*	*OHD99083448*

Background

The Scotts Company (formerly O.M. Scott and Sons Company) was a Vermiculite beneficiation facility, which used an exfoliation process using vermiculite to produces consumer products. The site is located at Marysville, Union County, Ohio. The facility occupies 830 acres, which includes corporate offices, warehouses and an operating facility that manufactures fertilizers and pesticides. The facility began operation in1957. The area surrounding the facility includes open fields, wooded area, highways and residential area. According to the 1990 census, there were 58 housing units and a total population of 185 people within 1 mile of the site.

According to EPA records, from 1967 to 1980, the Scotts Company facility was the single largest consumer of vermiculite ore from the Libby mines in Montana. During this period receiver and exfoliated over 430,000 tons of Vermiculite from Libby. Vermiculite from Libby was found to contain several types of asbestos fibers, including the amphibole asbestos varieties tremolite and actinolite. After 1980 the facility switched from using Libby ore to using ore from Africa, South Carolina and Virginia, until the company phased-out the use of vermiculite from its products in 2001.

Summary of ATSDR Findings

According to a 2005 HC, ATSDR classified this site as **a public health hazard** because workers at the site were exposed to airborne levels of Libby asbestos above the existing occupational standard (OSHA PEL) at the time of the report (ATSDR, 2005). In addition, household members of former workers may have been exposed to elevated levels of Libby asbestos through asbestos carried home on workers' hair and clothing. Under these conditions ATDSR concluded **public health hazard** for households of former workers. Current workers at the site are not being exposed to Libby asbestos; therefore, it poses **no public health hazard**. However, current workers may be exposed to asbestos if future disturbances of on-site landfills that may contain asbestos occur.

Site Name	City	State	EPA ID
St. Louis Smelting & Refining Co	*Collinsville*	*IL*	*ILD980607006*

Background

The St. Louis Smelting and Refining site is located in a residential area of Collinsville, in Madison County, Illinois. The plant covered as many as 482 acres, with the primary operations covering approximately 40 acres. The Smelter and Refining Company operated a lead smelter at the site from 1904 to 1933. After the facility closed, all of the smelting and refining equipment was shipped to South America and the buildings were razed. The remaining slag and waste piles were either recycled for lead or otherwise moved off the site, with the remainder spread across the site. Residential areas (Pine Lake developments) were built on or near the site in the 1950s, and additional residential developments (Collinwoods subdivision) were built on the site in the 1970s and 1980s, where slags were still visible on the soil surface. Surface soil sample taken from Collinwoods division indicated the presence of contaminants including lead, cadmium, and antimony. Nearby surface water (Pine Lake), which was used by the smelting operations and its sediments, were also contaminated with lead.

Summary of ATSDR findings

After a request by Illinois Environmental Protection Agency, ATSDR conducted a PHA in 2006. The PHA concluded that the St. Louis Smelting and Refining site posed a **public health hazard** based on exposure to lead in residential soils. Although the public health hazard was only issued for lead contamination, the report indicated residential surfaces soils were also contaminated with elevated concentrations of arsenic, cadmium, and antimony. In addition, the report indicated that residents may be exposed to lead in sediments in nearby surface water (Pine lake), which was used by the smelting operation. (ATSDR, 2006b)