Releases of Hazardous Constituents Associated With Mixture and Derived-From Wastes

The mixture and derived-from rules are a part of the RCRA regulations that define which wastes are considered to be hazardous and therefore subject to RCRA Subtitle C regulations. The mixture rule discussed in the Hazardous Waste Identification Rule (HWIR) proposed on November 19, 1999, refers specifically to 40 CFR 261.3(a)(2)(iii) and (iv). Under the mixture rule, a solid waste becomes regulated as a hazardous waste if it is mixed with one or more listed hazardous wastes. The derived-from rule refers specifically to 40 CFR 261.3(c)(2)(i). Under the derived-from rule, any solid waste generated from the treatment, storage, or disposal of a hazardous waste remains regulated as a hazardous waste. These derived-from wastes include wastes such as sludges, spill residues, ash, emission control dust, and leachate.

The Agency has identified many damage cases associated with derived-from and mixture wastes. For example, in an appendix of the preamble to the January 4, 1985 final rule on the definition of solid waste, EPA identified 67 damage incidents resulting from the recycling of hazardous wastes. Although the summaries provided by EPA do not specifically identify mixture and derived-from wastes, many of the damage incidents involve the handling and recycling of listed hazardous wastes. In these cases, the resulting site contamination and hazards may be attributed to mixture and derived-from wastes (e.g., residues from the recycling of listed hazardous wastes [50 Fed. Reg. 614, 658]). However, in many cases it is difficult to determine at what point in time the environmental damage occurs on a site.

As part of a more recent investigation, the Agency has identified additional sites (listed in Table 1 of this document) for which the likely cause of contamination are derived-from or mixture wastes. For certain sites, the environmental damage consists of soil and groundwater contamination with leachate produced by mixtures of hazardous and solid waste (e.g., Volney Landfill Site, NY, Lowry Landfill, CO, and Organic Chemical, Inc., MI). Other sites exhibit soils that have been contaminated by direct contact with hazardous wastes or by indirect contact like spills (e.g., Continental Steel Corp, IN, and American Cyanamid, NJ). Soil contamination at other sites was due to wind dispersion (e.g., Bunker Hill Mining & Metallurgical , ID, and Hranica Landfill, PA). Several sites have surface impoundments containing mixtures of solid and hazardous wastes that have been the source of soils and groundwater contamination (e.g., Saltville Waste Disposal Ponds, VA). Finally, it should be noted that for most of the sites presented in this document there may be more than one pathway by which either mixture or derived-from wastes have contaminated the site. A more detailed summary of the damage cases listed in the Table 1 is provided in the Appendix to this document.

Table 1. Releases of Hazardous Constituents Associated With Derived-From and Mixture Wastes

(The description presents the date the ROD was issued)

Site	Waste	Description
Kerr McGee Chemical Corp, ID	Derived-From	Superfund National Priority List (NPL) site that utilizes the by-product from ferrous-phosphate solids. Groundwater contaminated with vanadium, arsenic, copper, and silver. 8/30/90
Lorentz Barrel & Drum Co., CA	Mixture, Derived-From,	Superfund site with contaminated ground water resulting from incinerator ash, residual liquids and sludges. Contamination includes metals, organics, and polychlorinated biphenyls (PCBs). 10/4/89
Marine Shale Processors, LA	Mixture, Derived-From	Incineration of hazardous wastes resulting in a hazardous residual. Aggregate sold found to leach high concentrations of heavy metals. Ash piles and surrounding area contaminated with toluene, benzene, cadmium and lead. 4/18/96
General Electric Co., Bridgeport Facility, CT	Derived-From	Closure Plan for sludge drying beds presents evidence of release. Soils contaminated with oil and grease, polychlorinated biphenyls (PCBs), volatile organic compounds, cadmium, chromium; groundwater contaminated with lead. 2/88
Raymark Industries, Stratford, CT	Mixture, Derived-From	Corrective action at hazardous waste management facility. Groundwater contaminated above health based standards for cadmium, chromium, lead, cyanide, barium, copper and high concentrations of organics. 3/22/91
Contract plating Co., CT	Derived-From, Mixture	Closure plan for hazardous waste areas presents evidence of high levels of cyanide and metals in soils from waste treatment and waste piles. 12/1/88
IT Vine Hill Complex, CA	Derived-From	Sludges disposed in impoundments resulting in release of organics into soil and groundwater. 1/21/91
Tennessee Eastman, TN	Derived-From	Facility has on-site hazardous waste landfill that accepts incinerator ash resulting in groundwater contamination. 1/91
International Paper, TX	Derived-From, Mixture	Soil contaminated with constituents from K001 waste; polynuclear aromatic hydrocarbons (PAHs) range from 100 – 10,000 parts per million. 1/15/92

Site	Waste	Description
Pester Refinery Co., El Dorado, KS	Derived-From, Mixture	Slop oil emulsion solids (K049), heat exchanger bundle cleaning sludge (K050) and API separator sludge (K051) were burned and disposed in an onsite pond. Soil and sludge from pond contaminated with VOCs and metals. 9/30/92
Bunker Hill Mining & Metallurgical, Kellogg, ID	Derived-From	Hazardous airborne particulates (lead, arsenic, and metals) and solid and liquid residue from lead (K069) and zinc smeltering deposited throughout region. Primary source of elevated blood lead levels in local children. 8/30/91
Hranica Landfill, Buffalo TWP, PA	Mixture, Derived-From	Plating wastes (F006-F009), along with several characteristic hazardous wastes (paint, solvent wastes, metal sludges, and waste oils) were incinerated and/or stored in onsite surface impoundments. The wastes were then openly burned. Residual ash was stored onsite in unprotected piles. 6/29/90
Organic Chemical Inc., Grandville, MI	Mixture	Process wastes and cooling water (RCRA hazardous wastes, possibly solvent recovery sludge (F001-F005)) discharged to seepage lagoon. Spilled laquer thinner (F003) also disposed in seepage lagoon. Groundwater contaminated with benzene, toluene, xylene, PAHs and pesticides. 9/30/91
Hercules, Brunswick, GA	Mixture	Toxaphene (P123 and K041), pesticides process wastes, were disposed of. The primary contaminants of concern are: VOCs, including benzene, TCE, toluene, and xylenes (F001-F005); other organics, including dioxin and pesticides. Groundwater contaminated with organics including pesticides. 3/25/93
Saltville Waste Disposal Ponds, Saltville, VA	Mixture	Mercury-contaminated wastewater (K106) disposed of in settling ponds. Groundwater and sediments in the nearby river contaminated with mercury. 9/29/95.
Volney Landfill Site, Volney NY	Mixture	RCRA hazardous waste incinerator liquid waste disposed of at landfill. RCRA-listed (F001- F005) hazardous waste disposed of at the landfill. Hazardous substances detected in ground water, surface water, sediments, and leachate (F039). Explanation of Significant Differences 8/97; original ROD 1987.
Lowry Landfill Aurora, CO	Mixture	Liquid waste seeped out of on-site pits and mixed with surrounding refuse and groundwater (F039, F001 -F005, F006). 3/10/94

Site	Waste	Description
Saegertown Industrial Area, Saegertown, PA	Mixture and Derived-from	Wastes consisting of phenols, unknown solvents and degreasers (F001), benzene and sludges(F003) were disposed of in on-site sludge bed, lagoon, and pond. Wash water from cleaning railcars containing the aforementioned wastes was also disposed of in the sludge bed, lagoon and pond. 1/29/93
Continental Steel Corp, Kokomo, IN	Mixture	The main plant area (including flooded basements) was contaminated with TCE-sludge (F001) baghouse dust (listed waste containing chromium and lead), and lead contaminated soils and dust. 8/16/96
American Cyanamid, Bound Brook, NJ	Mixture	Group I Impoundments - four on-site surface impoundments contain sludge believed to have originated from wastewaer treatment operations. Soil, sludge and debris are contaminated with toluene, xylene and VOCs (F001 - F005). 9/28/93

The damage incidents cited above are indicative of the risks posed to human health and the environment by mismanagement of mixture and derived-from wastes. Many hazardous wastes, including those identified in Table 1, continue to be toxic after they have been mixed with other wastes or have been treated. Without the mixture and derived-from rules, such wastes may no longer be covered by RCRA Subtitle C regulations, while nevertheless having the potential to cause harm to human health and the environment.

APPENDIX

Case Studies on Releases of Hazardous Constituents Associated with Mixture and Derived-From Wastes

Site name - Kerr McGee Chemical Corp. (KMCC), ID
Wastes – The derived-from waste in ponds and the groundwater indicated the presence of arsenic, cadmium, chromium, lead and vanadium as well as three organic compounds.
Waste code(s) - P120 - Vanadium
Description- The 332 acre site owned by KMCC, includes a vanadium production plant on 80 acres of land. Ferrophosphorous (FeP) ore and limestone were the principal raw materials used. Production process by-products and waste materials were stored in three unlined surface impoundments: the solvent extraction pond, scrubber pond, and the calcine tailings pond. Roaster (used for producing water soluble sodium vanadine) reject materials stored above ground and the migration of windblown calcine tailings to surrounding land were cause for potential human exposure concerns. Industrial wastewater generated by the production process was stored in unlined ponds in various locations at the site. A maximum of 210 gallons per minute of excess water was discharged to an unlined scrubber pond, which accumulated an estimated 300 tons per year of scrubber residuals. After leaching, the solids were sluiced to a calcine tailings pond, where approximately 55,000 tons of leached calcine tailings were stored per year. However, two ponds on the property were reported to have holes in the bottom, resulting in the loss of 650,000 gallons of raffinate from the settling pond into the groundwater and 2.5 million gallons from the S-X pond.

This site was listed on the Superfund National Priorities List (NPL) on October 4, 1989 after a site investigation was conducted in April 1988.
Source - Kerr-McGee Chemical Corp. (Soda Springs), Record of Decision Abstract.
http://www.epa.gov/superfund/sites/rodsites/1000190.htm

Site name - Lorentz Barrel & Drum Co.(LB&D), CA
Waste - Groundwater contamination with volatile organic compounds (VOCs) resulting from incinerator ash, sludge and residual liquids (Derived-from waste). Soil contains polychlorinated biphenyl (PCBs), heavy metals including arsenic and lead, pesticides and VOCs (Mixture waste).
Waste code(s) - F001 - Tetrachloroethylene; F002 - Trichloroethane; F024 - 1,1, Dichloroethylene
Description – The LB&D site, a drum recycling facility was located directly above a major source of potable ground water in the South San Francisco Bay area with three public water supply well fields within 1 mile of the site. The drum recycling process used various methods involving caustic and acid washes, incineration, blasting with steel shot, steam cleaning, phenolic epoxy resins and rust inhibitors. Between 1950 and 1978, a drainage ditch from the processing facility was utilized to drain wastes to a large sump, which in turn discharged into a storm water drainage system and from 1968 to 1971, the discharge was diverted to a sanitary sewer which stopped in 1984. Thereafter, liquid wastes were evaporated, drummed and disposed off as

hazardous waste along with incinerator ash, residual liquids and sludge. Surface runoff was collected and recycled in hot caustic wash cycle. The treatment residues from the recycling operations contaminated soil, structures, and shallow ground water. The plant was closed in 1987.

The facility has been listed in the Superfund NPL since October 9, 1989. This site is being addressed in three stages: immediate actions and two long-term remedial phases focusing on cleanup of the entire site and groundwater

Source- Lorentz Barrel & Drum Co. (LB&D), CA, Record of Decision (ROD) Abstracts http://www.epa.gov/superfund/sites/rodsites/0901287.htm

Site name- Raymark Industries, Inc., CT

Waste – The derived-from and mixed wastes generated and stored at this facility caused soil and groundwater contamination with hazardous substances, above health-based standards, like asbestos, cadmium, chromium, lead, cyanide, barium, copper, arsenic, PCBs and high concentrations of organic compounds.

Waste code(s) - U052 - Cresol; U122 - Formaldehyde; U188 - Phenol; U220 - Toluene; K062 - Spent pickle liquor from steel finishing; F001 - Tetrachloroethylene; F005 - Spent halogenated solvents

Description – The Raymark Inc. site manufactured automotive and heavy vehicle friction parts as well as adhesives and resins from 1919 to 1989. In addition to generating asbestos, metals and phenol-formaldehyde from its production process, this facility was also a registered treatment, storage and disposal facility.

The manufacturing wastes, like waste lead and asbestos dust, were disposed of in several unlined lagoons located on the property. From time to time, the lagoons were dredged for fill-material used on site and in other parts of the city. Of the several spills that occurred at the site, the largest was the leakage of an unknown amount of toluene from a 10,000 gallon underground tank in 1984. In the same year, 6,000 gallons of 1,1,1-trichloroethane spilled from an above ground tank. In addition, the facility handled hazardous wastes like cresol, formaldehyde, phenol, toluene, ignitable wastes, and corrosive wastes. The soils were contaminated with asbestos, lead, copper, PCBs, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) and others, as a result of mixture with the materials used. Analyses performed by Raymark indicated that the material in the lagoons contained as much as 75% asbestos and was hazardous for lead leachability (greater than 5 PPM - lead). The groundwater analysis found metals contamination at levels higher than prescribed health standards for cadmium, copper, chromium, lead, cyanide and barium. In addition there was potential for inhalation exposures to airborne asbestos and/or VOCs.

The manufacturing plant was closed in 1989, corrective actions suggested by EPA Region I officials on March 22, 1991 and the site thereafter listed in the Superfund NPL on April 25, 1995.

Source – (1) Raymark Industries, Inc., Record of Decision (ROD) Abstracts http://www.epa.gov/superfund/sites/rodsites/0100094.htm; (2) Julie Belaga. March 22, 1991. "Determination of Release of Hazardous Waste into the Environment form a RCRA Facility", United States EPA Region I.

Site name – Marine Shale Processors, LA
Wastes – The treatment residuals were contaminated with toluene, benzene, cadmium and lead (derived-from wastes). Also surrounding air and soil contaminated.
Waste code(s) - K035 - Wastewater treatment sludges generated in the production of creosote
Description - Marine Shale Processors (MSP), recycled hazardous wastes by using a rotary kiln. The company filed a permit application to run as a kiln and produce a commercial aggregate (or rock-like ash) which could be used as roadbed and construction fill. The company was recycling the hazardous waste by burning it at high temperatures (sometimes in excess of 2000 degrees Fahrenheit) in a rotary kiln using oxidizers and slag boxes, and producing ash (also called aggregate). The process generated substantial quantities of smoke, flue gases and air particles which incorporated carcinogenic heavy metals. Moreover, the aggregate sold was found to leach high levels of lead and calcium. The EPA required the ash or aggregate be put into a hazardous waste landfill instead of being accumulated on site. As a result of the treatment process, the residual ash piles and surrounding area were contaminated with toluene, benzene, cadmium, and lead.

Contamination at the site was discovered in October 1989 and a preliminary assessment was completed by January 1990. The facility was shut down in July 1996, but was not placed on the Superfund NPL. EPA filed an enforcement case against MSP and an out-of-court settlement was reached at in 1997.
Source- (1) Fed. Officials says Marine Shale, EPA closing in on deal. September 10, 1997. http://www.leanweb.org/Marine_Shale,_EPA_Closing_.html. (2) United States of America, et.al. vs. Marine Shale Processors, in the United States Court of Appeals for the 5th Circuit, no. 94-30664. http://www.ca5.uscourts.gov/opinions/pub/94/94-30664-cv0.htm.
(3) U.S. Department of Health and Human Services, Public Health Service Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Atlanta, Georgia
Petitioned Public Health Assessment Marine Shale Processors http://atsdr1.atsdr.cdc.gov/HAC/PHA/marinesp/msp_p1.html#_1_4

Site name - Contract Plating Co., Stratford, CT
Waste – High levels of cyanide and metals discovered in soils from waste treatment sludge and waste storage piles.
Waste code(s) - F006 - Wastewater treatment sludges from electroplating operations
Description – This Company stored their waste in four old sludge drying beds and sludge piles. The unlined sludge drying beds included under drainpipes, 1 foot each of gravel and sand, and sludge on top. The under drains returned to the wastewater treatment building adjacent to the drying beds. The sludge drying beds were cleaned by removing the sludge layer and the top one foot of sand layer which were then sent off to a facility in Canada. The sludge drying beds have not been in use since 1985. In spite of the removal, visible pockets and veins of sludge material were seen in the soil where the sludge waste pile had been. An EPA investigation in September 1988, found samples of derived-from sludge waste to be contaminated with high levels of cyanide and total metals. The cyanide levels ranged from 1.2 PPM to 672 PPM and metals up to 6 percent for zinc and 2 percent for nickel. Other metals discovered at harmful levels include cadmium, chromium, copper and lead. Though cyanide concentrations of 1 PPM were found in

clean sand just 3 foot into the ground, the sludge had also migrated into the more porous veins of soil indicating deeper cyanide contamination.

EPA suggested that additional steps need to be taken by Contract Plating as part of the closing of these hazardous waste areas to reduce contamination to background levels for metals and cyanide. EPA Superfund program completed the site Removal Assessment in February 1995 and determined that the site will not be on the NPL.

Source – (1) Memorandum by Daniel S. Granz, United States Environmental Protection Agency, Region I, Lexington, Massachusetts. December 1, 1988. (2) Archive NFRAP Sites, http://www.epa.gov/superfund/sites/arcsites/reg01/a0102775.htm

Site Name- IT Vine Hill Complex, CA

Waste – Both sections of the Complex managed primarily derived-from sludge waste and released organics into soil and groundwater.

Waste code(s) - K151 - Wastewater treatment sludges generated during the treatment of wastewaters from the production of alpha-chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides and compounds with mixtures of these functional groups

Description – The IT Vine Hill Complex has 2 sections – Vine Hill and Baker. The Vine Hill section of the site received wastes from off-site which were then treated in either a permitted tank system or frequently reconfigured surface impoundments. The surface impoundments have been inactive since 1988 and the 286,300 cubic yards of sludge has been drying. The tank system was also dismantled. The Baker section of the site received wastes derived from treatment processes at the Vine Hill section by pipeline. This section also contained surface impoundments containing 200,700 cubic yards of sludge. According to information available in 1991, the sludge was expected to fail the TC test. The facility also reportedly released organics into soil and groundwater.

According to archive information, the site was first identified as a potential Superfund site on November 1, 1979, preliminary investigation and first site assessment was completed on December 1, 1986 and final site inspection completed on June 24, 1992. The EPA, thereafter, decided not to add the site to the Superfund NPL.

Source – (1) Appendix MDIF 50004.K to Memo by Matthew Hale, January 21, 1991. "Data on Mixture and Derived-from Wastes from Closures and Corrective Actions at Hazardous Waste Management Facilities." United States EPA, Office of Solid Waste and Emergency Response, Washington DC. (2) Archive NFRAP Sites, http://www.epa.gov/superfund/sites/arcsites/reg09/a0900905.htm

Site name - Tennessee Eastman, TN

Wastes – Derived-from wastes - incinerator ash and fly ash and incinerator scrubber waste, sewage and sludge.

Waste code(s) - F002 - Spent halogenated solvents (Trichloroethylene, Tetrachloroethylene)

Description – This facility has three incinerators treating wastes from four Eastman Company locations. A very large wastewater treatment system treated significant quantities of incinerator scrubber waste and sewage, and generated between 500-600 tons of derived-from sludge per day. 3-4 large surface impoundments were used for treating the scrubber water. These units also managed only derived-from wastes. Groundwater contamination by the impoundments had been

documented. The sludge from the incinerator waste treatment were burned in 8 BIF units which were suspected of not meeting the BIF standards besides managing primarily derived-from wastes. The facility also had an on-site hazardous waste landfill, which accepted derived from wastes like incinerator ash and fly ash. Neither the wastewater nor the sludge was suspected of exhibiting the hazardous toxicity characteristic.
Source – Appendix MDIF 50004.K to Memo by Matthew Hale, January 21, 1991. "Data on Mixture and Derived-from Wastes from Closures and Corrective Actions at Hazardous Waste Management Facilities." United States EPA, Office of Solid Waste and Emergency Response, Washington DC.

Site name – General Electric Company, Bridgeport Facility, CT
Wastes – Derived-from wastes of treatment processes containing hazardous wastes like PCBs, VOCs, cadmium, chromium; Soils contaminated with oil and grease, PCBs, VOCs, cadmium, copper, nickel, zinc, etc; Groundwater contaminated with lead and VOCs.
Waste code(s) - F006 - Wastewater treatment sludges from electroplating operations
Description – This was a hazardous waste management facility. Drums containing unknown materials were stored in an area located at the north end of the property and southeast of the landfill belonging to this Company. Large cable reels and spools were also maintained and stored in this area. Aerial photographs from 1949-1985 show walled-pits with light and dark toned materials, which indicated the presence of such drums. Soils have shown contamination of oil and grease, PCBs and VOCs. Soil samples also indicated presence of high levels of cadmium, copper, nickel, lead and zinc. Groundwater samples collected from wells at the unit also indicated the presence of VOCs. PCB concentration range from 0.55 to 8.7 PPM in soil samples collected from the surface and at 5ft. below the surface. The same sample detected VOC presence at a range of 0.010 – 89 PPM.

In addition, the closure plan for sludge drying beds presented evidence of releases of hazardous waste from several other sites on this Company's property, such as an industrial solid waste landfill; the Stillman's Pond which received discharges from the wastewater treatment plant, drainage from sludge drying beds, contact cooling waters from wire and extrusion processes, NPDES discharges periodically exceeding permitted levels, and fuel oil possibly containing waste oil. This pond was dredged in 1938 and the sediment deposited in the landfill area.

This site was identified as a hazardous waste site in 1981 and a preliminary assessment was conducted on March 1, 1983.
Source – (1) "Closure Plan, Sludge Drying Beds" prepared by General Electric Company, Bridgeport Facility, February 1988 submitted as Appendix MDIF 50004.U to Memo by Matthew Hale, January 21, 1991. "Data on Mixture and Derived-from Wastes from Closures and Corrective Actions at Hazardous Waste Management Facilities." United States EPA, Office of Solid Waste and Emergency Response, Washington DC. (2) CERCLIS Hazardous Waste Sites, http://www.epa.gov/superfund/sites/cursites/c3ct/a0100009.htm

Site name – International Paper Company, TX
Wastes – Derived-from sludge wastes from treatment of wood treatment wastewaters.
Waste code(s) - K001 - Bottom sediment sludge from the treatment of wastewaters from wood

preserving processes that use creosote and/or pentachlorophenol
Description – This facility used six closed surface impoundments situated on-site to manage derived-from sludge wastes generated from wood treatment processes. This waste was the bottom sediment sludge from the treatment of wastewater from wood preserving processes which used creosote and/or pentachlorophenol. Soil in the facility was contaminated with constituents from K001 waste and polynuclear aromatic hydrocarbons (PAHs) ranged from 100-10,000 PPM.

The plant was closed in 1983. EPA inspected the site on December 1, 1984 and conducted a preliminary assessment on July 1, 1985. However, the site was not listed on the Superfund NPL.
Source – (1) "Fact Sheet for Issuance of RCRA Permit", International Paper Company submitted as Appendix MDIF 50004.G. to Memo by Matthew Hale, January 21, 1991. "Data on Mixture and Derived-from Wastes from Closures and Corrective Actions at Hazardous Waste Management Facilities." United States EPA, Office of Solid Waste and Emergency Response, Washington DC. (2) Archive NFRAP Sites,
http://www.epa.gov/superfund/sites/arcsites/reg06/a0602056.htm

Site name - Pester Refinery Co., KS
Wastes - The derived-from waste in ponds consisted of slop oil emulsion solids, heat exchanger bundle cleaning sludge, and API separator sludge. The site soil and pond sludge were contaminated with VOCs and metals.
Waste codes - K049 slop oil emulsion solids; K050 heat exchanger bundle cleaning sludge, K051 API separator sludge;
Description - The 10-acre Pester refinery site is a former petroleum facility. Petroleum refining operations began in the area in 1917. From 1955 to 1977 Fina Oil Company operated a petroleum refinery at the site. Process wastes, including slop-oil emulsion solids, API separator sludge, and heat exchanger bundle cleaning sludge were sent to a burn pond via a pipe. Gaseous waste products were ignited at the end of the pipe, with unburned substances sent to the pond. The primary contaminants of concern at the principal source of contamination -the burn pit - affecting the soil and pond sludge are: VOCs, (ethlybenzene, toluene, and xylenes); other organics, including PAHs and phenols; and metals, arsenic, chromium, and lead. Contaminated media are soils.

This site was listed on the Superfund NPL on March 29, 1989; ROD issued September 30, 1992.
Source - Pester Refinery , El Dorado, KS, Record of Decision Abstract, Site Narrative, Site Fact Sheet.
http://www.epa.gov/superfund/sites/rodsites/0700447.htm

Site name - Bunker Hill Mining & Metallurgical, ID
Wastes: Lead, arsenic, metals
Waste code(s) - K069 emission control dust from secondary lead smelting
Description - the Bunker Hill Mining and Metallurgical complex site is a 21 square-mile area centered around an inactive industrial mining and smelting site, the inactive industrial complex includes the bunker hill mine and mill, a lead smelter, a zinc smelter and a phosphoric acid fertilizer plant, all totaling several hundred acres. Furthermore, the site includes the south fork of

the Coeur D'alene river, an alluvial floodplain bordered by mountains, numerous valleys and gulches, and vegetated residential areas. In 1886, the first mill for processing lead and silver ore was constructed at the site. Operations were expanded in later years with the addition of a lead smelter; a blast furnace; and electrolytic zinc, sulfuric acid, phosphoric acid, and fertilizer plants. Onsite operational and disposal practices have caused the deposition of hazardous substances (e.g., metals) throughout the valley via airborne particulate deposition, alluvial deposition of tailings dumped in the river, and migration from onsite sources. Thousands of tons of sludge, tailings, flue dust, and other wastes still remain onsite. Contamination at the site is a result of tailings deposition in the floodplain, and airborne deposition from smelter and mill complex emissions.

This site was listed on the Superfund NPL in September 1983; ROD issued 8/30/91.
Source - Bunker Hill Mining & Metallurgical (Kellogg, ID) ROD abstract and text.
http://www.epa.gov/superfund/sites/rodsites/1000195.htm

Site name - Hranica Landfill, PA
Waste - Paint and solvent wastes, plating wastes, metal sludges and waste oils
Waste code(s) - F003 - solvent wastes; F006 - plating wastes
Description - the 15-acre Hranica Landfill site is an inactive landfill 21 miles north of Pittsburgh, in butler county, Pennsylvania. Between 1966 and 1974, both municipal and industrial wastes were accepted onsite including paint and solvent wastes, plating wastes, metal sludges, and waste oils. The wastes were incinerated and/or stored onsite in surface impoundments until 1981. Liquid wastes were then directly discharged into surface impoundments causing ground, surface, and soil cover contamination. The residual ash from the incineration process was stored onsite in unprotected piles. Numerous drums of unprocessed wastes were also staged onsite. The surface impoundments were subsequently abandoned and the wastes were then openly burned. In 1983, removal activities were performed, which included: removing and disposing of more than 19,000 drums and 4,000 cubic yards of contaminated soil; incinerating oil and paint sludges and consolidating the incinerator ash onsite; and capping the site. The primary contaminant of concern affecting the soil is lead.

This site was placed on the Superfund NPL, but deleted from the Final NPL; the ROD was issued on June 29, 1990.
Source - Hranica Landfill, Buffalo Township, PA, Record of Decision Abstract; and text of ROD.
http://www.epa.gov/superfund/sites/rodsites/0301218.htm

Site name - Organic Chemical Inc., Grandville, MI
Wastes - VOCs, benzene, toluene, xylenes, other organics, PAHs, and pesticides
Waste code(s) - F001- F005 - benzene, toluene, xylene and other organics, P004 - aldrin
Description - the 5-acre organic chemicals site is an inactive solvent reclamation and chemicals manufacturing facility in Grandville, Kent County, Michigan. The site includes buildings, above-ground storage tanks, drum storage areas, a boiler facility, a wastewater treatment facility, and a seepage lagoon. A succession of petroleum-related industries leased the land for petroleum refining from 1941 to 1945, followed by transport and storage operations from 1945 to 1966. Organic Chemicals Inc., (OCI) began site operations in 1968. Company records show that

between 1968 and 1980, process waste and cooling water, including RCRA hazardous wastes, were discharged to the onsite seepage lagoon. In 1979, 2,200 gallons of lacquer thinner were spilled onto the ground onsite and subsequently, some of the spilled thinner was recovered and disposed of onsite in the seepage lagoon. In 1980, discharges to the lagoon ceased, and the company installed a wastewater pretreatment system, which discharged the effluent to the sanitary sewer system. In 1983, EPA documented onsite soil and potential ground water contamination resulting from the solvent-contaminated seepage lagoon. Federal and state investigations have determined that site contamination has resulted from past operation of the seepage lagoon by OCI, chemical spills at the site and past oil-related activities.

This site is not on the NPL; ROD issued September 30, 1991.

Source - Organic Chemicals, Inc., record of Decision Abstract and ROD text.
http://www.epa.gov/superfund/sites/rodsites/0503649.htm

Site name - Hercules 009 Landfill, Brunswick, GA
Wastes - Toxaphene, pesticide wastes, VOCs including: benzene, TCE, toluene, xylenes, other organics including: dioxin and pesticides, metals including: arsenic, chromium, lead, glass, rubble and trash
Waste code(s) - P123 - toxaphene; K041 - wastewater treatment sludge from the production of toxaphene; F001-F005 - TCE, toluene, and xylene
Description - The 16.5-acre Hercules 009 Landfill site is an inactive industrial landfill located in Brunswick, Glynn County, Georgia. Land use in the area is predominantly commercial and residential, with a shopping mall, bank, and restaurant located approximately 1,000 feet north of the site. From 1948 to 1980, Hercules manufactured toxaphene, an agricultural pesticide used to control boll weevils, ticks, and mites on cattle. Under a State permit, Hercules used seven acres at the northern end of the site, known as the 009 Landfill, to dispose of approximately 33,000 yd^3 of wastewater sludge from the production of toxaphene, empty toxaphene product drums, and toxaphene-contaminated glassware, rubble, and trash. The landfill was constructed as six cells, which reportedly were lined with a soil bentonite clay mixture across the bottom and along the bermed walls. The thickness of the toxaphene sludge disposed of in these cells was reported to be six to seven feet. Typically, the wastewater sludge was disposed of directly in the landfill; however, occasionally it was staged near the southeast corner of the landfill prior to disposal. In 1980, as a result of a State investigation which revealed toxaphene in soil and water samples from the drainage ditches around the site, Hercules' permit was canceled, and the State ordered the landfill to be closed.

This site was listed on the Superfund NPL in 1984; the ROD was issued on March 25, 1993.

Source - Hercules 009, Brunswick, GA Record of Decision Abstract and ROD text.
http://www.epa.gov/superfund/sites/rodsites/0401699.htm

Site name - Saltville Waste Disposal Ponds, Saltville, VA
Wastes - mercury contaminated wastewater
Waste code(s) - K106 - wastewater treatment sludge from the mercury cell process in chlorine production
Description - The Saltville Waste Disposal Ponds 5 and 6 site is part of Olin Corporation's

former Saltville facility. The site is located along the north bank of the North Fork of the Holston River, between the towns of Saltville and Allison Gap, in western Smyth and eastern Washington Counties, Virginia. The river forms the southern border of the site, and Virginia State Route 611 runs along the northern border at the foot of Little Mountain. The site consists of the Former Chlorine Plant site and two waste ponds, Ponds 5 and 6, and areas to which contamination has migrated, including the river. Pond 5 and its dikes cover about 76 acres. Pond 6 is immediately west and downstream of Pond 5. Pond 6 and its dikes cover about 45 acres.

From approximately 1895 to 1972, the Saltville site was used as the location for various chemical manufacturing operations. Mathieson Chemical Corporation constructed a mercury cell chlor-alkali plant (chlorine plant) in 1950. The plant produced chlorine gas and sodium hydroxide by passing brine, obtained by solution mining salt deposits in the area between electrodes. The cathode used in this process contained mercury and leakage from the electrode is considered to be the source of mercury in the pond wastes. The electrical current passing through the brine caused the formation of chlorine gas at the anode through electrolytic oxidation. At the same time, a sodium amalgam was formed at the cathode. The amalgam was passed into a decomposing tower where the sodium was separated by flushing the water from the sodium hydroxide. Some of the mercury was lost in the production process and was solubilized and passed into Pond 5 in the wastewater.

Pond 5 was operated from approximately 1925 to 1971, and Pond 6 was put into service in 1964. The ponds were primarily used for the containment of ammonia soda and ash wastes. In 1951, Pond 5 began receiving mercury-contaminated wastewater from the mercury cell chlor-alkali plant. Pond 6 also shows evidence of receiving mercury contaminated wastewater but not to the extent believed to be in Pond 5. The intent of the settling ponds was to allow wastewater to percolate into the pond solids and allow mercury to adsorb onto the fine alkaline particles of the ammonia soda ash waste.

The dikes containing the ponds were constructed of rockfill cores and built up with accumulations of slaker wastes. The slaker wastes were primarily composed of spent coke and roasted limestone waste. Surface water discharge from Pond 5 was controlled by a decant structure located at the southwest corner of the pond. The decant structure consists of a concrete riser and a pipe culvert which extends from the riser through the bottom of the dike to the river. A similar decant structure exists for Pond 6 at its southeastern end. Since 1978, discharge from these structures have kept the water level in the ponds beneath the surface of the settled solids.

The chlorine plant began operations in 1951 and continued operations through 1972. In order to control discharge to the river, Olin redirected most mercury-contaminated wastewater from the chlorine plant to Pond 5.

The process and washdown wastewater was conveyed to the eastern end of Pond 5 separately from the ammonia soda ash waste slurry. The wastewater was discharged on the surface to Pond 5 near the eastern edge and directed around the northern perimeter by berms built on the surface of the pond.

Pond 6 began operating in 1964 and was used to settle ammonia soda ash waste. Mercury contamination has been detected in Pond 6. Based on current knowledge of the chlorine plant operation, it is possible that the mercury contaminated weak brine purge water from the chlorine plant may have been used to help slurry the ammonia soda ash waste generated from another process independent of the chlorine plant and pumped to Pond 6. This would account for the

mercury contamination in Pond 6.

After Olin shut down the Saltville facility in 1972, Olin began demolition activities at the chlorine plant. Some of the debris from the demolition of the plant was placed at the eastern edge of Pond 6. It was placed on the lower bench of the dike between Pond 5 and Pond 6. The debris consisted mostly of brick, concrete, and steel from the buildings at the former chlorine plant. No sampling of the debris was conducted prior to disposal. The debris was covered with locally obtained soil. The demolition of the process equipment was completed in June 1973. Process mercury was removed from the equipment and shipped to Olin plants in Georgia and Alabama for re-use. The equipment was cleaned with wash water, which was allowed to percolate into the soils at the Former Chlorine Plant site. The process equipment was then buried in the easternmost end of Pond 6 and covered with clean fill.

A Task Force formed in 1978 required Olin to conduct studies to identify the sources of mercury contamination at the site, and negotiated cleanup measures with Olin to reduce mercury input to the river. Olin dredged contaminated sediments from a 1,000 foot section of the river adjacent to the former Chlorine Plant site. The excavated sediments were placed on the Former Chlorine Plant site and covered with 2 feet of clay and 6 inches of topsoil. This project was supplemented by the construction of a diversion ditch around the western, upstream side of Pond 5 to reduce surface water flow onto the pond.

This site was listed on the Superfund NPL on December 1982; the ROD was issued on September 29, 1995.
Source: Saltville Waste Disposal Ponds Record of Decision Abstract and ROD text.
http://www.epa.gov/superfund/sites/rodsites/0302526.htm

Site name - Volney Landfill Site,
Wastes - vinyl chloride, benzene, arsenic, VOCs, metals, leachate
Waste code(s) - F001-F005 - benzene and VOCs; F039 leachate
Description - The Volney Landfill Site, located in the town of Volney, Oswego County, New York, is a 55-acre, unlined municipal landfill. From 1969 until 1983 municipal waste disposal operations occurred at the site. Most of the waste disposed of at the site consisted of typical residential, commercial, institutional and light industrial waste. However, between March 1974 and January 1975, Pollution Abatement Services, a hazardous waste incineration facility, was permitted to dispose of approximately 8,000 drums containing only residue coatings. Allegedly, 50 - 200 of these drums contained unidentified liquid waste. The condition of these drums is unknown, as is their location within the landfill. Because the landfill is unlined and has a leachate collection system only in its newer (northern) section, leachate migration is occurring in both horizontal and vertical directions.

This site was listed on the NPL in October 1984; ROD issued in 1987, Explanation of Significant Differences issued in August 1997.
Source: Volney Landfill Site Explanation of Significant Differences.
http://www.epa.gov/superfund/sites/rodsites/0201836.htm

Site name - Lowry Landfill
Wastes - acid and alkaline sludge, caustic liquid and solids, brines, plating wastes and other water-based sludge, laboratory wastes, organics, chlorinated solvents, waste solvents, pesticides,

water-soluble chemicals, sludge and thinners, industrial solvents, and metallic wastes
Waste code(s) - F001, F002 - chlorinated solvents; F006 - plating wastes; F039 - leachate;
Description - The Lowry Landfill Superfund Site is located in Township 5 South, Colorado. From 1940 until 1962, the U.S. Air Force used the site as a bombing range. In 1962, the site was declared a surplus property by the Federal government and was reclaimed by the city of Denver. Soon after reclamation, the city began preparations to utilize the site as a landfill. The landfill began operation in 1966, and accepted liquid and solid municipal wastes as well as over 8 million used tires. From 1966 to until the landfill's closure in 1980, approximately 138 million gallons of waste were disposed of at the site, primarily through a disposal practice known as "co-disposal." Approximately 75 unlined waste pits or trenches were excavated to accommodate the incoming flow of liquids, industrial wastes, and municipal waste. No measures are known to have been implemented to prevent leakage. Consequently, over time, the liquid seeped out of the pits and mixed with the surrounding refuse and groundwater. The total volume of liquid wastes disposed of at the landfill is estimated to be 138 million gallons.

This site was listed on the NPL on October 21, 1984; the ROD was issued March 10, 1994.
Source: Lowry Landfill Record of Decision Abstract and ROD text.
http://www.epa.gov/superfund/sites/rodsites/0800186.htm

Site name - Saegertown Industrial Area
Wastes - VOCs: PCE, TCE, and xylenes, other organics: PAHs, PCBs, and phenols
Waste code(s) - F001-F005 - PCE, TCE, xylenes, toluene, and other organics
Description - The 100-acre Saegertown Industrial Area is an industrial park located in Saegertown Borough, Crawford County, Pennsylvania. Land use in the area is mixed rural, residential, and agricultural. Woodcock Creek borders the site to the south, and French Creek runs from north to south on the western side of the Borough of Saegertown. Portions of the industrial park lie within the 100-year floodplain of French Creek or Woodcock Creek. The estimated 1,050 people who reside in the Borough of Saegertown use groundwater from 4 wells, 3 of which are located within a one-mile radius of the site to obtain their sole source of drinking water. The industrial park consists of four main areas: the Lord Corporation (Lord) property; the Saegertown Manufacturing Corporation (SMC) property; the Spectrum Controls Incorporated (SCI) property; and the properties that formerly were owned by the General American Transportation Corporation (GATX). From approximately 1951 until 1967, GATX operated a facility for the cleaning, painting, and repairing of railroad tank cars on 55 acres of the site property. GATX operated a wastewater treatment plant onsite, and disposed of wash water and solvents used to clean the railroad cars in a sludge bed, a lagoon, and a pond. Wastes that were contained in the cars also were disposed of onsite and consisted of fuel oils, sludge, phenols, caustic soda, unknown solvents and degreasers, paint and tar residues, anhydrous ammonia, benzene, chlorphene, and scrap iron barrels of old paint. Since 1962, Lord produced adhesives, urethane coatings, and rubber chemicals on approximately 30 acres of the site. Lord currently uses solvents, including TCE, TCA, xylene, and methyl isobutyl ketone (MIBK), in its manufacturing process. From 1968 until approximately 1987, Lord discharged non-contact cooling water to a shallow impoundment on its property. Since 1987, Lord has been discharging non-contact cooling water via a pipeline to French Creek under a NPDES permit. In 1965, SMC

began cold metal forming and metal cutting/machining operations on approximately 15 acres of the site. SMC currently uses a variety of oils and solvents for degreasing. Cutting oil mixed with metal chips is collected and stored onsite in a pit prior to offsite disposal; the metal chips are separated from the oil and recycled onsite. Prior to 1974, a milk plant operated on the current SCI property. In 1974, SCI began manufacturing ceramic capacitors and electroplating silver, nickel, and tin on approximately 6 acres of the site. Since 1981, SCI has had a NPDES permit for the pretreatment and discharge of waste and cooling water. SCI wastes include liquid and solid acid and caustic waste associated with the electroplating operations, and waste containing MIBK and acetone produced in the manufacturing of capacitors. In 1989, plating operations were discontinued, and, in 1990, SCI began gasket forming operations on the property. A 1979 release of waste oil on the SMC property resulted in the removal of 778 yd^3 of waste/soil from the site. In 1980, routine sampling of the Borough of Saegertown's municipal wells revealed elevated levels of TCE, and one of the wells (#2) subsequently was removed from service. Test pits dug in the vicinity of the pond, on the former GATX property, revealed deteriorating barrels containing TCE-contaminated sludge. In 1984, EPA investigated the site and confirmed the presence of TCE and TCA in onsite ground water. Soil and sludge samples taken from the GATX pond area revealed the presence of TCE, PCE, PAHs, and 1,4-dichlorobenzene. EPA has determined that remedial action is required at the former GATX-and Lord properties due to improper waste disposal practices.

This site was listed on the Superfund NPL on June 24, 1988; ROD issued January 29, 1993.

Source - Saegertown Industrial Area Record of Decision Abstract and ROD text.
http://www.epa.gov/superfund/sites/rodsites/0301442.htm

Site name - Continental Steel Corp., Kokomo, IN
Wastes - TCE, baghouse dust, lead, chromium
Waste code(s) - U228 - TCE; K061 baghouse dust
Description - The Continental Steel Corporation site is located on West Markland Avenue in Kokomo, Indiana. The site encompasses about 183 acres and consists of an abandoned steel manufacturing facility (Main Plant), pickling liquor treatment lagoons (Lagoon Area), a former waste disposal area (Markland Avenue Quarry), and a former waste disposal and slag processing area (Slag Processing Area). The Main Plant is the portion of the facility south of West Markland Avenue and east of Wildcat Creek. The Main Plant includes 25 buildings, many of which are severely deteriorated. The Continental Steel Corporation was founded as the Kokomo Fence Machine Company in 1896. In 1899, the Kokomo Fence Machine Company was consolidated with other interests to form the Kokomo Nail & Wire Company. In 1900, the company was reorganized under the name of Kokomo Steel and Wire Company. Two 75-ton open-hearth furnaces were erected in 1914, and were put into service in 1917. In 1927, the Kokomo Steel & Wire Company merged with two other steel companies to form the Continental Steel Corporation. By 1947, the other two steel companies were divested, and the Continental Steel Corporation manufacturing facilities were centered in Kokomo. The site was acquired in 1969 and changed names. The company declared bankruptcy in 1980 and came out of bankruptcy in 1982 again as the Continental Steel Corporation, only to again file for bankruptcy in 1985. The facility soon closed in February 1986. Throughout its history, the plant produced

nails, wire, and wire fence from scrap metal. Operations included reheating, casting, rolling, drawing, pickling, annealing, hot-dip galvanizing, tinning, and oil tempering. The steel manufacturing operations at the plant included the use, handling, treatment, storage, and disposal of hazardous materials. Waste pickle liquor was used to remove by-products such as scale and rust from cooling steel. Investigations of the on-site groundwater identified chromium, cadmium, lead, and iron contamination. Water in the quarry contained traces of organic solvents, and low levels of copper, zinc, and mercury. The Main Plant area was contaminated with polychlorinated biphenyls (PCBs), baghouse dust (a listed waste containing chromium and lead), and sludge contaminated with trichloroethylene.

The Main Plant consists of about 94 acres and includes abandoned buildings. Many buildings have basements, some of which are flooded with groundwater. A network of underground sewers and utility lines are also located on site. Some processing equipment has been removed from the facility.

This site was listed on the Superfund NPL on March 31, 1989; ROD issued August 16, 1996.

Source - Continental Steel Record of Decision Abstract; Interim ROD; Site Fact Sheet??
http://www.epa.gov/superfund/sites/rodsites/0501228.htm

Site name - American Cyanamid, Bound Brook, NJ
Wastes - VOCs: toluene and xylenes; and metals, including: arsenic, chromium, and lead
Waste code(s) - F001 - F005 - toluene, xylene, and other solvents
Description - The 575-acre American Cyanamid site is a manufacturing facility located in the southwestern section of Bridgewater Township, Somerset County, New Jersey. Land use in the area is predominantly residential, commercial, and industrial. The entire site lies on the Raritan River, about 20 miles upstream from where the river discharges into the Atlantic Ocean. The estimated 30,000 people who reside within the 33-square miles of the township use the Elizabethtown Water Company's two water intakes, located approximately 1,800 feet upriver from the site, to obtain their drinking water.

Beginning in 1918, American Cyanamid has used the facility to produce rubber chemicals, pharmaceuticals, dyes, pigments, chemical intermediates, and petroleum-based products. In 1981, American Cyanamid conducted preliminary onsite studies which determined that contamination sources were confined to the main plant production area and around 27 onsite impoundments in the main plant area. As a result of reported spills and leakage of various plant wastes, a number of onsite investigations were conducted by the PRP and the State, which revealed PCB- and PAH- contaminated soil that could potentially affect ground water in the area. In 1988, 16 of the 27 onsite impoundments were determined to be potentially contributing to ground water contamination due to waste leakage; and RCRA closure procedures were implemented for four impoundments. These 16 impoundments, being addressed under the Superfund cleanup program, were taken out of service before the RCRA regulations were promulgated. Beginning in 1989, American Cyanamid has implemented several remedial actions at the site, including the removal of pumpable tars for use as an offsite fuel, and a berm stability evaluation program. In 1992, eight surface soil areas requiring removal action were identified under the 1992 Surface Soils Remedial/Removal Action (SSR/RA) Program, and included the excavation and offsite disposal of PCB-contaminated soil; excavation and disposal of PAH-

contaminated soil in the onsite RCRA permitted disposal facility; capping of another PAH-contaminated area; and the placement of a geotextile, soil, and vegetative cover over a chromium-contaminated area. In addition, tars from impoundments 4 and 5 are being removed and blended in an onsite RCRA permitted hazardous waste fuel blending facility and four onsite impoundments have been closed, to be replaced by the new RCRA permitted Impoundment 8 facility. The sludge contained in the Group 1 Impoundments is believed to have originated from onsite wastewater treatment operations, and was originally deposited into another impoundment before being dredged and/or pumped into these impoundments.

This site was listed on the NPL in September 1983; ROD issued September 28, 1993 Source - American Cyanamid Record of Decision Abstract; ROD Fact Sheet. http://www.epa.gov/superfund/sites/rodsites/0200144.htm