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National Priority Chemicals Trends Report (2005-2007)

Section 4 Trends Analyses for Specific Priority Chemicals (2005-2007): Lead and Lead Compounds (Lead)

Program Implementation and Information Division
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Lead and Lead Compounds (Lead)

Chemical Information

General Uses: Lead is a heavy, silver-white metal in its pure (elemental) form. Lead is often obtained by primary production through mining of ores or by secondary production through recycling. Lead exists in either one of two forms: as the pure metal (i.e., lead metal) or as a compound, in which lead is combined with some other element or elements. Lead metal and lead compounds are widely used in a variety of products and applications, including lead-acid batteries, ammunition, construction materials, solder, metal castings, glass and ceramic products, plastics, electrical cable coverings, lubricating oils and greases, and certain paints. (Source: EPA 2000/2001 TRI Public Data Release Report)

How Much Lead Was Generated?

For 2007, 4,413 facilities reported approximately 34.5 million pounds of lead being generated. Five facilities accounted for 25 percent of the national total quantity of this PC, while 65 facilities accounted for approximately 75 percent of the lead being generated (please refer to Exhibit 3.4 to see the number of facilities that reported this PC within various quantity ranges). Compared to the total quantities of lead reported for 2005 and 2006, the quantity decreased by approximately 2.3 million pounds and decreased by approximately 2.1 million pounds, respectively (Exhibit 4.37).

Exhibit 4.37. National Generation of Lead (2005–2007)

TRI Reporting Year	2005	2006	2007
Total Quantity of Lead (pounds)	36,789,827	36,538,601	34,467,769
Number of TRI Facilities Reporting Lead	4,694	4,560	4,413

Where Was Lead Generated?

Since 2004, facilities in every state and territory reported generating lead (Exhibit 4.38). Exhibit 4.39 shows the counties in which facilities reported approximately 80 percent of the total quantity of lead being generated. From 2005 to 2007, facilities in the top ten counties accounted for at least 35 percent of the total quantity of lead generated.

Exhibit 4.38. Location of Facilities that Generated Lead (2007)

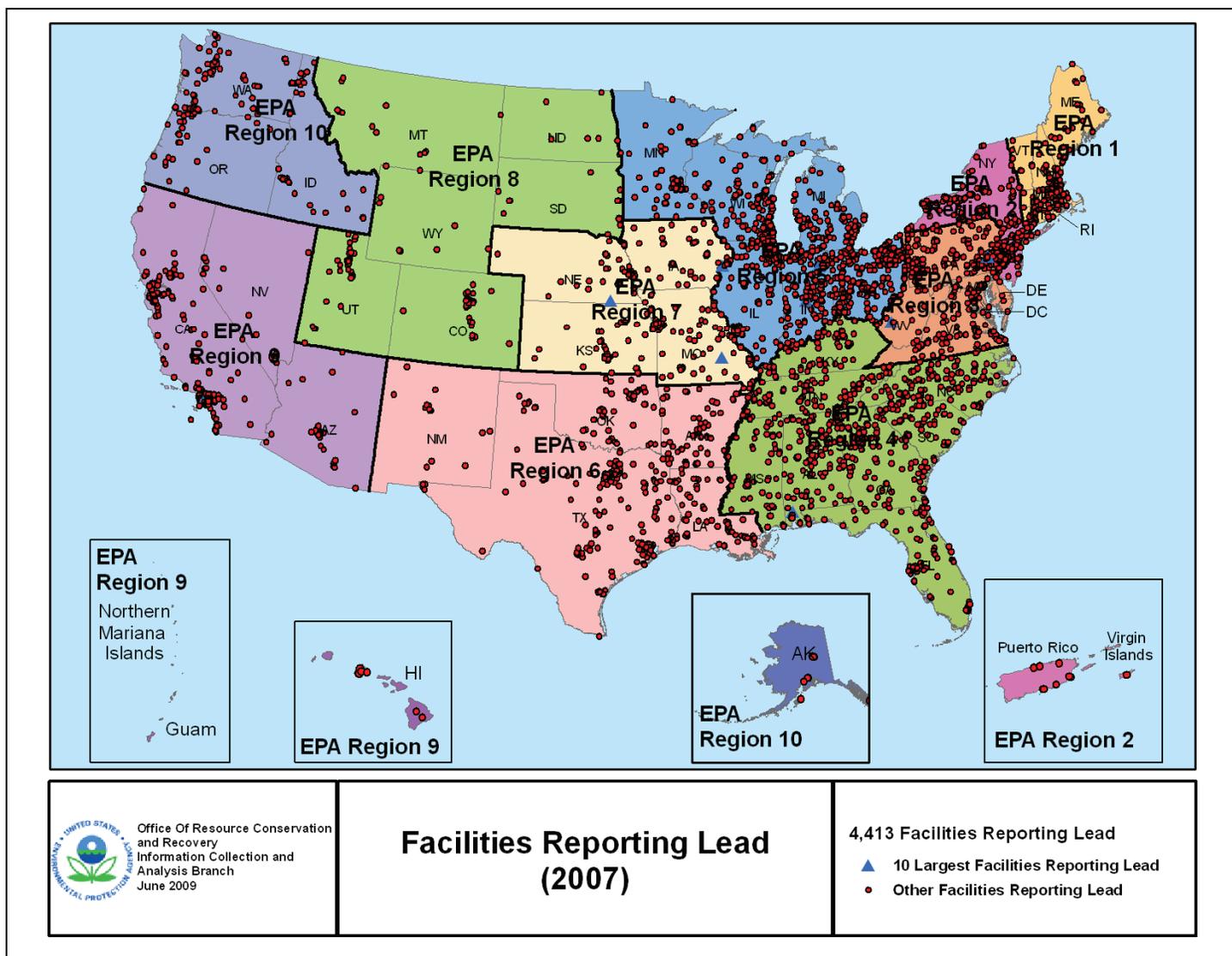


Exhibit 4.39. Quantity of Lead, for Facilities Reporting 80 Percent of Total Quantity, by County (2007)

EPA Region	State	County	Quantity (pounds) of Lead			Percent of Total Quantity (2007)
			2005	2006	2007	
4	AL	Pike	2,068,070	2,235,064	2,314,349	6.7%
9	CA	Los Angeles	2,015,396	2,058,796	2,147,115	6.2%
5	IN	Marion	2,108,246	1,961,280	2,030,439	5.9%
3	PA	Berks	1,451,712	1,506,630	1,796,112	5.2%
7	MO	Iron	1,691,895	1,499,007	1,776,655	5.2%
7	IA	Muscatine	865,639	974,784	967,865	2.8%
5	IN	Whitley	726,986	925,574	922,717	2.7%
4	AL	Mobile	1,020,760	1,079,100	812,733	2.4%
7	NE	Jefferson	668,244	893,845	808,399	2.3%
5	IL	Madison	262,147	334,884	604,985	1.8%
5	IN	Delaware	640,337	525,720	583,648	1.7%
7	NE	Stanton	301,660	564,381	583,147	1.7%
10	OR	Yamhill	456,972	517,176	538,700	1.6%
8	UT	Box Elder	731,310	511,213	537,222	1.6%

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Exhibit 4.39. Quantity of Lead, for Facilities Reporting 80 Percent of Total Quantity, by County (2007) (Continued)

EPA Region	State	County	Quantity (pounds) of Lead			Percent of Total Quantity (2007)
			2005	2006	2007	
4	GA	Lowndes	4,365	18,223	524,849	1.5%
3	PA	Beaver	359,698	640,200	510,066	1.5%
6	LA	East Baton Rouge	228,280	381,364	414,973	1.2%
5	OH	Stark	441,107	447,843	410,825	1.2%
5	MI	Wayne	467,436	424,570	407,883	1.2%
6	AR	Mississippi	284,401	423,350	407,498	1.2%
4	NC	Hertford	344,745	457,279	340,326	1.0%
6	AR	Lonoke	493,770	718,093	318,730	0.9%
4	AL	Tuscaloosa	231,492	221,644	317,264	0.9%
3	VA	Roanoke (city)	349,300	362,404	316,971	0.9%
5	IN	Hendricks	183,359	284,206	303,899	0.9%
5	MN	Dakota	271,253	261,814	291,125	0.8%
5	IN	De Kalb	267,282	305,033	287,980	0.8%
5	IL	Peoria	238,291	283,490	287,953	0.8%
2	NJ	Middlesex	166,241	146,168	259,396	0.8%
6	TX	Collin	241,722	332,175	258,454	0.7%
5	IN	Montgomery	295,070	292,668	252,174	0.7%
4	NC	Onslow	148,249	215,015	233,197	0.7%
4	TN	Sullivan	216,934	226,743	223,724	0.6%
4	AL	Jefferson	286,303	355,324	223,115	0.6%
6	TX	Harris	27,132	43,368	219,116	0.6%
5	OH	Lorain	90,059	107,506	197,460	0.6%
6	TX	El Paso	135,182	102,756	182,944	0.5%
4	NC	Cumberland	191,328	223,388	180,375	0.5%
6	LA	East Baton Rouge	228,280	381,364	414,973	1.2%
5	OH	Stark	441,107	447,843	410,825	1.2%
5	MI	Wayne	467,436	424,570	407,883	1.2%
6	AR	Mississippi	284,401	423,350	407,498	1.2%
4	NC	Hertford	344,745	457,279	340,326	1.0%
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6	TX	Harris	27,132	43,368	219,116	0.6%
5	OH	Lorain	90,059	107,506	197,460	0.6%
6	TX	El Paso	135,182	102,756	182,944	0.5%
4	NC	Cumberland	191,328	223,388	180,375	0.5%
5	OH	Marion	23	285,513	179,212	0.5%
4	GA	Liberty	45,682	92,007	172,641	0.5%
4	SC	Berkeley	183,075	95,545	172,080	0.5%

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Exhibit 4.39. Quantity of Lead, for Facilities Reporting 80 Percent of Total Quantity, by County (2007) (Continued)

EPA Region	State	County	Quantity (pounds) of Lead			Percent of Total Quantity (2007)
			2005	2006	2007	
4	SC	Aiken	234,400	211,778	167,513	0.5%
5	IL	Macon	127,483	130,117	165,652	0.5%
6	LA	St John The Baptist	163,795	191,892	161,408	0.5%
3	MD	Baltimore	174,738	109,545	156,734	0.5%
4	FL	Hillsborough	148,462	140,991	156,485	0.5%
4	SC	Richland	124,675	191,221	150,206	0.4%
8	UT	Salt Lake	90,750	140,902	149,449	0.4%
5	WI	Waupaca	202,766	178,350	142,600	0.4%
6	NM	Eddy	93,418	114,211	142,087	0.4%
7	MO	Pulaski	124,882	936,227	137,914	0.4%
3	PA	Luzerne	138,447	53,595	133,573	0.4%
4	TN	Madison	103,140	136,839	132,560	0.4%
10	WA	Pierce	118,612	132,809	130,709	0.4%
4	GA	Chattahoochee	152,019	190,546	130,224	0.4%
6	TX	Smith	136,301	110,957	129,086	0.4%
5	IL	Whiteside	160,245	151,403	121,138	0.4%
5	OH	Pickaway	141,102	140,013	120,009	0.3%
6	TX	Ellis	100,012	107,652	114,354	0.3%
5	IN	Perry	118,900	108,700	113,700	0.3%
4	KY	Hardin	91,302	101,411	112,974	0.3%
9	CA	San Diego	171,153	146,046	109,368	0.3%
2	NJ	Burlington	150,909	124,990	108,893	0.3%
6	TX	Bexar	69,198	58,905	107,545	0.3%
5	OH	Richland	92,283	105,989	102,123	0.3%
1	MA	Worcester	66,262	69,191	100,464	0.3%
Total			24,498,410	27,421,429	27,617,087	80.1%

Which Industries Generated Lead?

For 2007, facilities in 331 different NAICS codes reported generating lead. Facilities in three NAICS codes accounted for approximately 74 percent of the total quantity of lead generated (Exhibit 4.40): NAICS code 331492 (Secondary Smelting, Refining, and Alloying of Nonferrous Metal Except Copper and Aluminum), NAICS code 331111 (Iron and Steel Mills), and NAICS code 928110 (National Security).

Exhibit 4.40. Industry Sectors Quantities of Lead, for Facilities Reporting 90 Percent of Total Quantity (2007)

Primary NAICS code	NAICS Code Description	Facilities Reporting (2007)	Quantity (pounds) of Lead			Percent of Total Quantity (2007)
			2005	2006	2007	
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	31	10,662,347	11,065,070	11,824,698	34.3%
331111	Iron and Steel Mills	89	9,153,830	10,176,317	9,782,585	28.4%
928110	National Security	223	2,584,919	4,402,185	3,988,024	11.6%
331511	Iron Foundries	141	1,583,090	1,557,505	1,126,770	3.3%
325188	All Other Basic Inorganic Chemical Manufacturing	54	875,796	1,074,512	1,125,045	3.3%
332992	Small Arms Ammunition Manufacturing	13	564,995	790,921	673,598	2.0%
335912	Primary Battery Manufacturing	13	422,155	426,683	597,534	1.7%
335911	Storage Battery Manufacturing	41	315,397	319,797	331,883	1.0%
325312	Phosphatic Fertilizer Manufacturing	10	277,598	250,132	247,033	0.7%
324110	Petroleum Refineries	124	184,007	183,999	242,033	0.7%
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	31	541,322	197,987	235,492	0.7%
335110	Electric Lamp Bulb and Part Manufacturing	11	561,251	607,990	219,892	0.6%
327212	Other Pressed and Blown Glass and Glassware Manufacturing	25	3,303,455	315,205	206,279	0.6%
331525	Copper Foundries (except Die-Casting)	27	182,333	171,345	202,731	0.6%
331222	Steel Wire Drawing	21	375,907	409,519	155,203	0.5%
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	25	95,554	176,938	153,031	0.4%
Total		879	31,683,958	32,126,103	31,111,830	90.3%

Some observations regarding trends for facilities reporting lead within NAICS codes include:

NAICS Code 331492 (Secondary Smelting, Refining, and Alloying of Nonferrous Metal Except Copper and Aluminum)

- Facilities in this NAICS code reported increases of approximately 423,000 pounds for 2006 and 760,000 pounds for 2007.
- A facility in Beaver County, Pennsylvania reported an increase of approximately 261,000 pounds for 2006 followed by a decrease of approximately 121,000 pounds for 2007. This facility extracts zinc from steel mill dust melted into slag from outside companies. The quantity of lead reported depends on the percentage of lead contained in the slag.
- A facility in Harris County, Texas reported an increase of approximately 163,000 pounds for 2007.
- A facility in Los Angeles County, California reported an increase of approximately 240,000 pounds for 2006 due to a furnace re-build from which contaminated waste refractory materials were disposed of.

NAICS Code 331111 (Iron and Steel Mills)

- Facilities in this NAICS code reported an overall increase of approximately 1 million pounds for 2006 but a decrease of approximately 394,000 pounds for 2007.
- A facility in Hertford County, North Carolina reported an increase of approximately 113,000 pounds for 2006 followed by a decrease of approximately 117,000 pounds for 2007, due to fluctuating production. The lead is in the electric arc furnace dust and slag.
- A facility in Mobile County, Alabama reported a decrease of approximately 267,000 pounds for 2007.
- A facility in Marion County, Ohio reported an increase of approximately 285,000 pounds for 2006.
- A facility in Whitley County, Indiana reported an increase of approximately 198,000 pounds for 2006.
- A facility in Wayne County, Michigan reported a decrease of approximately 183,000 pounds for 2007.
- Another facility in Wayne County, Michigan reported an increase of approximately 164,000 pounds for 2007.

- A facility in Muscatine County, Iowa reported an increase of approximately 167,000 pounds for 2007.
- A facility in Stanton County, Nebraska reported an increase of approximately 263,000 pounds for 2006. In addition to fluctuations in production, the facility noted that it updated its analyses of the electric arc furnace dusts containing the lead compounds.
- A facility in Guadalupe County, Texas reported a decrease of approximately 167,000 pounds for 2006.

NAICS Code 928110 (National Security)

- Facilities in this NAICS code reported an increase of approximately 1.8 million pounds for 2006 followed by a decrease of approximately 414,000 pounds for 2007.
- Department of Defense (DOD) facilities, primarily military installations, reported most of the lead (e.g., spent lead bullets) in this NAICS code. These quantities were likely linked to the level of training and other activities conducted at Federal facilities in support of military and security operations to counter terrorism worldwide.

NAICS Code 331511 (Iron Foundries)

- Facilities in this NAICS code reported a decrease of approximately 431,000 pounds for 2007.
- A facility in Jefferson County, Alabama reported a decrease of approximately 119,000 pounds for 2007.
- A facility in Winnebago County, Illinois reported a decrease of approximately 59,000 pounds for 2007.

NAICS Code 325188 (All Other Basic Inorganic Chemical Manufacturing)

- Facilities in this NAICS code reported an overall increase of approximately 199,000 pounds for 2006.
- A facility in Jefferson County, Nebraska reported an increase of approximately 226,000 pounds for 2006. The lead is contained in zinc hydroxide which is generated from the production of zinc sulfate for use in animal feeds. The lead content is not sufficient to justify recovery.

NAICS Code 332992 (Small Arms Ammunition Manufacturing)

- Facilities in this NAICS code reported an increase of approximately 226,000 pounds for 2006 followed by a decrease of approximately 117,000 pounds for 2007.
- A facility in Madison County, Illinois reported an increase of approximately 282,000 pounds for 2007.
- A facility in Lonoke County, Arkansas reported increase of approximately 224,000 pounds for 2006 followed by a decrease of approximately 399,000 pounds for 2007, due to changes in production.

NAICS Code 325998 (All Other Miscellaneous Chemical Product and Preparation Manufacturing)

- Facilities in this NAICS code reported an overall decrease of approximately 343,000 pounds for 2006.
- A facility in Plaquemines County, Louisiana that had reported approximately 178,000 pounds for 2005 did not report lead for either 2006 or 2007.
- A facility in Aiken County, South Carolina that had reported approximately 222,000 pounds for 2005 did not report lead for either 2006 or 2007.

How Did Facilities Manage Lead?

Exhibit 4.41 shows how facilities, by industry, managed lead in 2007.

Disposal: Facilities disposed of nearly 100 percent of the lead, including approximately 74 percent off site.

Energy Recovery: Energy recovery is not applicable to this PC.

Treatment: Facilities reported treating only 98 pounds of this PC.

In 2007, facilities also recycled approximately 558 million pounds of lead. See Exhibit C.3 in Appendix C for additional information about the recycling of lead. Facilities also released approximately 600,000 pounds of lead as air emissions and surface water discharges in 2007. See Appendix D for additional information about releases of lead.

Exhibit 4.41. Management Methods for Lead, by Industry (NAICS Code) in 2007

Primary NAICS Code	NAICS Code Description	Total PC Quantity Reported	Quantity (pounds) of Lead					
			Disposal		Energy Recovery		Treatment	
			On-site	Off-site	On-site	Off-site	On-site	Off-site
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	11,824,698	3,051,780	8,772,918	0	0	0	0
331111	Iron and Steel Mills	9,782,585	504,794	9,277,791	0	0	0	0
928110	National Security	3,988,024	3,809,365	178,659	0	0	0	0
331511	Iron Foundries	1,126,770	232,650	894,115	0	0	0	5
325188	All Other Basic Inorganic Chemical Manufacturing	1,125,045	87,061	1,037,984	0	0	0	0
332992	Small Arms Ammunition Manufacturing	673,598	0	673,598	0	0	0	0
335912	Primary Battery Manufacturing	597,534	2,253	595,281	0	0	0	0
335911	Storage Battery Manufacturing	331,883	170	331,712	0	0	0	0
325312	Phosphatic Fertilizer Manufacturing	247,033	247,033	0	0	0	0	0
324110	Petroleum Refineries	242,033	8,740	233,293	0	0	0	0
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	235,492	3,690	231,802	0	0	0	0
335110	Electric Lamp Bulb and Part Manufacturing	219,892	0	219,892	0	0	0	0
327212	Other Pressed and Blown Glass and Glassware Manufacturing	206,279	0	206,279	0	0	0	0
331525	Copper Foundries (except Die-Casting)	202,731	18,240	184,491	0	0	0	0
331222	Steel Wire Drawing	155,203	14	155,096	0	0	93	0
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	153,031	160	152,871	0	0	0	0
Total		31,111,830	7,965,950	23,145,782	0	0	93	5

Data Derived From Hazardous Waste Biennial Reports for Lead

In this section, we present data about lead contained in hazardous wastes, derived from information submitted by facilities in Biennial Reports under RCRA. We derived these data by applying a methodology to estimate the quantity of lead contained in BR waste streams. The estimates of lead contained in hazardous wastes supplement the data reported to TRI, providing a broader perspective regarding the industries that generate and manage wastes that contain lead. Based on applying our methodology to the 2007 BR data, we estimate that 5,627 facilities in 569 NAICS codes reported hazardous wastes containing approximately 80 million pounds of lead. Facilities in NAICS code 331111 (Iron and Steel Mills and Ferroalloy Manufacturing) accounted for approximately 82 percent of the total estimated quantity of lead in the hazardous waste streams (Exhibit 4.42).

Exhibit 4.42. Estimated Quantity of Lead in Primary Generation Hazardous Waste for Facilities Reporting 95 Percent of the Total Priority Chemical Quantity, by NAICS Code (2007)

Primary NAICS Code	NAICS Code Description	Number of Facilities	Quantity (pounds) of Lead			Percent of Total Quantity
			Wastewaters	Non-Wastewaters	Total Quantity	
331111	Iron and Steel Mills and Ferroalloy Manufacturing	100	440	65,419,468	65,419,907	81.8%
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	14	129	4,624,564	4,624,692	5.8%
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	26	16,148	1,423,990	1,440,138	1.8%
325131	Inorganic Dye and Pigment Manufacturing	6	999,761	2,821	1,002,582	1.3%
928110	National Security	234	614	685,820	686,434	0.9%
334413	Semiconductor and Related Device Manufacturing	68	511,813	44,702	556,515	0.7%
331221	Rolled Steel Shape Manufacturing	17	96	542,728	542,824	0.7%
235930	Excavation Contractors	1	0	502,557	502,557	0.6%

Exhibit 4.42. Estimated Quantity of Lead in Primary Generation Hazardous Waste for Facilities Reporting 95 Percent of the Total Priority Chemical Quantity, by NAICS Code (2007) (Continued)

Primary NAICS Code	NAICS Code Description	Number of Facilities	Quantity (pounds) of Lead			Percent of Total Quantity
			Wastewaters	Non-Wastewaters	Total Quantity	
331410	Nonferrous Metal (except Aluminum) Smelting and Refining	3	0	407,315	407,315	0.5%
325199	All Other Basic Organic Chemical Manufacturing	89	183	361,917	362,099	0.5%
335911	Storage Battery Manufacturing	42	277	345,490	345,767	0.4%
325510	Paint and Coating Manufacturing	89	756	311,157	311,913	0.4%
Total		689	1,530,217	74,672,529	76,202,746	95.2%

In 2007, facilities generated hazardous waste containing lead in more than 1,200 counties within 56 states and territories. Exhibit 4.43 shows the counties in which facilities generated an estimated one million or more pounds of lead contained in hazardous wastes.

Exhibit 4.43. Counties in Which Facilities Generated at Least 1 Million Pounds of Lead Contained in Primary Generation Hazardous Waste (2007)

EPA Region	State	County	Estimated Quantity of Lead Contained in Hazardous Wastes (pounds)	Percent of Total Quantity of Lead Contained in Hazardous Wastes
6	AR	Mississippi	6,708,170	8.4%
5	IN	Dekalb	4,418,432	5.5%
4	SC	Berkeley	3,934,490	4.9%
5	IN	Montgomery	3,412,657	4.3%
5	OH	Stark	2,924,573	3.7%
5	MI	Monroe	2,296,377	2.9%
5	OH	Fulton	2,216,770	2.8%
4	NC	Hertford	2,073,570	2.6%
7	IA	Muscatine	2,037,166	2.5%
4	AL	Mobile	2,022,583	2.5%
4	KY	Carroll	1,963,819	2.5%
7	NE	Stanton	1,824,702	2.3%
6	TX	Leon	1,607,301	2.0%
4	AL	Tuscaloosa	1,601,710	2.0%
6	TX	Ellis	1,437,990	1.8%
3	PA	Butler	1,386,260	1.7%
5	IN	Whitley	1,376,366	1.7%
4	SC	Darlington	1,214,673	1.5%
6	TX	Guadalupe	1,195,674	1.5%
10	OR	Yamhill	1,180,161	1.5%
4	KY	Boone	1,154,000	1.4%
5	OH	Jefferson	1,145,887	1.4%
5	IL	Peoria	1,030,218	1.3%
8	UT	Box Elder	1,020,904	1.3%
5	IL	Kankakee	1,019,098	1.3%
4	MS	Harrison	1,000,146	1.3%
Total			53,203,697	66.5%

Exhibit 4.44 shows how facilities reported managing hazardous wastes that contain lead. For example, facilities used metals recovery for hazardous wastes containing approximately 27 million pounds of lead; hazardous wastes containing an estimated 22 million pounds of lead were disposed of in landfills or surface impoundments. See Appendix E for a full list of the BR management codes and their descriptions.

Exhibit 4.44. Methods Used to Manage Hazardous Wastes Containing Lead (2007)

Management Method Group	Management Method Code Description	Quantity of Lead Managed (2007)	Percent of Total Estimated Quantity of Lead
Reclamation and Recovery	Metals recovery	27,146,084	34.0%
	Other recovery or reclamation for reuse	1,717,282	2.2%
	Energy recovery at this site	366,104	0.5%
	Solvents recovery	341,302	0.4%
	Fuel blending prior to energy recovery at another site	264,316	0.3%
Reclamation and Recovery Total		29,835,088	37.4%
Disposal	Landfill or surface impoundment that will be closed as landfill	21,716,519	27.2%
	Deepwell or underground injection	1,043,883	1.3%
	Land treatment or application	976,219	1.2%
	Discharge to sewer/POTW or NPDES	3,392	<0.1%
Disposal Total		23,740,013	29.8%
Destruction or Treatment Prior to Disposal at Another Site	Stabilization or chemical fixation prior to disposal at another site	14,627,961	18.3%
	Other chemical precipitation with or without pre-treatment	554,341	0.7%
	Incineration	534,210	0.7%
	Other treatment	220,216	0.3%
	Macro-encapsulation prior to disposal at another site	101,708	0.1%
	Neutralization only	15,815	<0.1%
	Sludge treatment and/or dewatering	12,959	<0.1%
	Biological treatment with or without precipitation	2,671	<0.1%
	Chemical reduction with or without precipitation	2,670	<0.1%
	Evaporation	799	<0.1%
	Phase separation	613	<0.1%
	Adsorption	162	<0.1%
	Settling or clarification	81	<0.1%
	Cyanide destruction with or without precipitation	54	<0.1%
	Chemical oxidation	52	<0.1%
	Absorption	7	<0.1%
Wet air oxidation	7	<0.1%	
Destruction or Treatment Prior to Disposal at Another Site Total		16,074,326	20.2%
Reclamation and Recovery	Metals recovery	36,927,075	10.7%
	Other recovery or reclamation for reuse	5,888,900	1.7%
	Energy recovery at this site	5,357,763	1.5%
	Solvents recovery	5,012,160	1.4%
	Fuel blending prior to energy recovery at another site	3,892,022	1.1%
Reclamation and Recovery Total		57,077,921	16.5%
Transfer Off Site	Storage, bulking, and/or transfer off site	6,754,776	8.5%
Transfer Off Site Total		6,754,776	8.5%
NA	NA	3,355,449	4.2%
NA Total		3,355,449	4.2%
Grand Total		79,759,652	100.0%

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