5. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

5.1 PRODUCTION

Tables 5-1 and 5-2 list the facilities in each state that manufacture or process chromium, the intended use, and the range of maximum amounts of chromium that are stored on site. The data listed in Tables 5-1 and 5-2 are derived from the Toxics Release Inventory (TRI) (TRI09 2011). The data presented in Table 5-1 are for chromium metal and the data from Table 5-2 are for all chromium compounds. Only certain types of facilities were required to report. Therefore, this is not an exhaustive list.

Chromium metal is commercially produced in the United States by the reduction of chromite ore with carbon, aluminum, or silicon, and subsequent purification. Sodium chromate and dichromate are produced by roasting chromite ore with soda ash. Most other chromium compounds are produced from sodium chromate and dichromate (Hartford 1979; Papp and Lipin 2001; Westbrook 1979). For example, basic chromic sulfate ($Cr(OH)SO_4$), commonly used in tanning, is commercially produced by the reduction of sodium dichromate with organic compounds (e.g., molasses) in the presence of sulfuric acid or by the reduction of dichromate with sulfur dioxide. Lead chromate, commonly used as a pigment, is produced by the reaction of sodium chromate with lead nitrate or by reaction of lead monoxide with chromic acid solution (IARC 1990).

The major manufacturers of chromium compounds in 2007 are summarized in Table 5-3 (SRI 2007).

Tables 5-1 and 5-2 report the number of facilities in each state that manufacture and process chromium, the intended use of the products, and the range of maximum amounts of chromium products that are stored on site. The data reported in Tables 5-1 and 5-2 are derived from TRI of EPA (TRI09 2011). The TRI data should be used with caution since only certain types of facilities were required to report. Hence, this is not an exhaustive list.

5.2 IMPORT/EXPORT

Chromite ore and foundry sand; chromium chemicals, ferroalloys, and metal; and stainless steel represent the bulk of the market for chromium. In 2006, the United States produced chromium ferroalloys, metal, chemicals, and stainless steel. The United States is a major producer of the end products of chromium, which include chromium chemicals, metal, and stainless steel, but until recently, the United States had not mined chromium (Stokinger 1981; USGS 2008b). Oregon Resources Corporation (ORC), a subsidiary of

Table 5-1. Facilities that Produce, Process, or Use Metallic Chromium

State[a]	Number of facilities	Minimum amount on site in pounds[b]	Maximum amount on site in pounds[b]	Activities and uses[c]
AK	2	10,000	999,999	12
AL	106	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
AR	63	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
AZ	68	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
CA	190	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
CO	60	0	99,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14
CT	83	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
DE	12	100	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12
FL	55	0	499,999,999	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14
GA	103	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
HI	2	0	99,999	1, 5, 8, 9
IA	96	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14
ID	16	0	999,999	1, 3, 5, 8, 9, 10, 12, 13
IL	148	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
IN	176	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
KS	60	0	9,999,999	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
KY	118	0	999,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
LA	77	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MA	75	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MD	54	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ME	23	0	9,999,999	1, 2, 3, 5, 8, 9, 11, 12
MI	177	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MN	83	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MO	77	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MS	40	0	499,999,999	1, 2, 3, 5, 7, 8, 10, 11, 12, 14
MT	14	100	999,999	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 14
NC	94	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ND	14	1,000	999,999	1, 2, 3, 5, 7, 8, 9, 12, 13
NE	41	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
NH	28	0	49,999,999	2, 3, 4, 6, 7, 8, 9, 11, 12
NJ	101	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NM	22	0	999,999	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 14
NV	48	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NY	130	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
OH	251	0	10,000,000,000	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
OK	91	0	99,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

Table 5-1. Facilities that Produce, Process, or Use Metallic Chromium

State[a]	Number of facilities	Minimum amount on site in pounds[b]	Maximum amount on site in pounds[b]	Activities and uses[c]
OR	74	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
PA	264	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
PR	15	0	99,999,999	1, 2, 3, 5, 7, 8, 9, 11, 12
RI	22	0	999,999	1, 2, 3, 6, 7, 8, 9, 11, 12
SC	108	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
SD	18	100	999,999	1, 5, 7, 8, 9, 11, 12, 13, 14
TN	109	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
TX	214	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
UT	60	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
VA	66	0	99,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
VT	16	100	999,999	2, 3, 4, 6, 8, 9, 11
WA	75	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
WI	134	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
WV	51	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14
WY	10	0	999,999	1, 8, 9, 11, 12, 13

[a]Post office state abbreviations used.
[b]Amounts on site reported by facilities in each state.
[c]Activities/Uses:

1. Produce
2. Import
3. Onsite use/processing
4. Sale/Distribution
5. Byproduct
6. Impurity
7. Reactant
8. Formulation Component
9. Article Component
10. Repackaging
11. Chemical Processing Aid
12. Manufacturing Aid
13. Ancillary/Other Uses
14. Process Impurity

Source: TRI09 2011 (Data are from 2009)

Table 5-2. Facilities that Produce, Process, or Use Chromium Compounds

State[a]	Number of facilities	Minimum amount on site in pounds[b]	Maximum amount on site in pounds[b]	Activities and uses[c]
AK	22	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
AL	140	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
AR	87	0	99,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
AZ	102	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
CA	198	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
CO	38	100	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
CT	62	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
DE	32	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
FL	91	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
GA	128	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
HI	10	1,000	999,999	1, 5, 6, 7, 8, 9, 12, 13, 14
IA	70	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ID	25	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
IL	241	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
IN	212	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
KS	70	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
KY	121	0	999,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
LA	88	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MA	71	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MD	83	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ME	34	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14
MI	216	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MN	80	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MO	98	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MS	80	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
MT	21	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14
NC	134	0	999,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
ND	17	1,000	999,999	1, 2, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14
NE	44	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NH	17	0	99,999	1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13
NJ	129	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NM	38	0	10,000,000,000	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NV	47	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
NY	154	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
OH	330	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
OK	75	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

Table 5-2. Facilities that Produce, Process, or Use Chromium Compounds

State[a]	Number of facilities	Minimum amount on site in pounds[b]	Maximum amount on site in pounds[b]	Activities and uses[c]
OR	63	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
PA	293	0	999,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
PR	27	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
RI	23	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
SC	115	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
SD	17	0	999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13
TN	142	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
TX	319	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
UT	76	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
VA	78	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
VT	9	100	999,999	1, 2, 3, 4, 5, 6, 7, 8, 10, 11
WA	86	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
WI	141	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
WV	85	0	499,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
WY	25	0	9,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

[a]Post office state abbreviations used.
[b]Amounts on site reported by facilities in each state.
[c]Activities/Uses:

1. Produce
2. Import
3. Onsite use/processing
4. Sale/Distribution
5. Byproduct
6. Impurity
7. Reactant
8. Formulation Component
9. Article Component
10. Repackaging
11. Chemical Processing Aid
12. Manufacturing Aid
13. Ancillary/Other Uses
14. Process Impurity

Source: TRI09 2011 (Data are from 2009)

Table 5-3. Major Manufacturers of Chromium Compounds in 2007

Chemical	Manufacturer	Location
Chromic anhydride	Johnson Matthey, Inc.; Alfa Aesar	Ward Hill, Massachusetts
Chromic hydrate	Elementis Chromium LP	Corpus Christi, Texas
Chromic sulfate	Blue Grass Chemical Specialties, LLC	New Albany, Indiana
	Elementis LTP L.P.	Amarillo, Texas
		Dakota City, Nebraska
		Milwaukee, Wisconsin
	Johnson Mathey, Inc.; Alfa Aesar	Ward Hill, Massachusetts
Chromium(III) acetate	Blue Grass Chemical Specialties, LLC	New Albany, Indiana
	McGean-Rohco, Inc.; McGean Speciality Chemical Division	Cleveland, Ohio
	The Shepherd Chemical Company	Cincinnati, Ohio
Chromium(III) acetylacetonate	MacKenzie Company	Bush, Louisiana
	The Shepherd Chemical Company	Cincinnati, Ohio
Chromium boride	CERAC, Inc.	Milwaukee, Wisconsin
	Johnson Mathey, Inc.; Alfa Aesar	Ward Hill, Massachusetts
Chromium carbonyl	Strem Chemicals Incorporated	Newburyport, Massachusetts
	McGean-Rohco, Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
Chromium(III) chloride	Blue Grass Chemical Specialties, LLC	New Albany, Indiana
	McGean-Rohco, Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
Chromium diboride	Johnson Matthey, Inc.; Alfa Aesar	Ward Hill, Massachusetts
Chromium difluoride	Atotech USA, Inc.	Rock Hill, South Carolina
Chromium 2-ethylhexanoate	OM Group, Inc.	Franklin, Pennsylvania
	The Shepherd Chemical Company	Cincinnati, Ohio
Chromium fluoride	Atotech USA	Rock Hill, South Carolina
Chromium hexacarbonyl	Strem Chemicals Incorporated	Newburyport, Massachusetts
Chromium hydroxide	Elementis Chromium LP	Corpus Christi, Texas
Chromium(III) hydroxide	Elementis Chromium LP	Corpus Christi, Texas
Chromium hydroxyl diacetate	McGean-Rohco, Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
Chromium hydroxyl dichloride	McGean-Rohco, Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
Chromium napthenate	OM Group, Inc.	Franklin, Pennsylvania
Chromium nitrate	Blue Grass Chemical Specialties, LLC	New Albany, Indiana
	McGean-Rohco Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
	The Shepherd Chemical Company	Cincinnati, Ohio
Chromium ocetenoate	OM Group, Inc.	Franklin, Pennsylvania
	The Shepherd Chemical Company	Cincinnati, Ohio
Chromium octoate	OM Group, Inc.	Franklin, Pennsylvania
	The Shepherd Chemical Company	Cincinnati, Ohio

Table 5-3. Major Manufacturers of Chromium Compounds in 2007

Chemical	Manufacturer	Location
Chromium oxide	Elementis Chromium LP	Corpus Christi, Texas
Chromium potassium sulfate	McGean-Rohco, Inc.; McGean Specialty Chemicals Division	Cleveland, Ohio
Chromium-silicon monoxide	CERAC, Inc.	Milwaukee, Wisconsin
Chromium(III) sulfate	Blue Grass Chemical Specialties, LLC	New Albany, Indiana
	Elementis LTP L.P.	Amarillo, Texas
		Dakota City, Nebraska
		Milwaukee, Wisconsin
	Johnson Mathey, Inc.; Alfa Aesar	Ward Hill, Massachusetts
Chromotropic acid, disodium salt	Johnson-Mathhey, Inc.; Alfa Aesar	Ward Hill, Massachusetts

Source: SRI 2007

Industrial Minerals Corporation (Australia), extracted bulk samples of chromite ore at its surface mine in Coos County, Oregon. ORC developed its material beneficiation process to recover chromite, garnet, and zircon minerals with production expected to start in 2008 (IMC 2007). Although chromium is currently mined in Oregon, the United States receives the majority of chromium ores from other countries. From 2003 to 2006, chromium contained in chromite ore and chromium ferroalloys and metal were imported from South Africa (34%), Kazakhstan (18%), Russia (7%), Zimbabwe (6%), and other (35%) (USGS 2008b).

U.S. imports and exports are summarized in Table 5-4 (USGS 2008a).

5.3 USE

The metallurgical, refractory, and chemical industries are the fundamental users of chromium. In the metallurgical industry, chromium is used to produce stainless steels, alloy cast irons, nonferrous alloys, and other miscellaneous materials. In 1988, the U.S. chemical and metallurgical industries accounted for 83.9% and the refractory industry for 16.1% of the total domestic consumption of chromite (USDI 1988a). The stainless steel industry is the leading consumer of chromium materials. A significant amount of chromium is imported and exported in stainless steel mill products and scrap, with ferrochromiums as the main components used by the metallurgical industry. Typical weight percent of chromium in stainless steel and chromium alloys ranges from 11.5 to 30%. In the refractory industry, chromium is a component in chrome and chrome-magnesite, magnesite-chrome bricks, and granular chrome-bearing and granular chromite, which are used as linings for high temperature industrial furnaces. In the chemical industry, both chromium(III) and chromium(VI) are used primarily in pigments. Other uses include chromium(VI) in metal finishing, chromium(III) in leather tanning, and chromium(VI) in wood preservatives. Table 5-5 lists the approximate distribution of use for chromium chemicals in the major applications in the United States and Western world in 1996 with a comparison to use in the United States for 1951 (Barnhart 1997). Smaller amounts of chromium are used as catalysts and in miscellaneous applications, such as drilling muds, chemical manufacturing, textiles, toners for copying machines, magnetic tapes, and dietary supplements (Carlton 2003; CMR 1988a, 1988b; Davis and Vincent 1997; EPA 1984a; IARC 1990; Papp and Lipin 2001; Radivojevic and Cooper 2008; USDI 1988a). Chromium alloys are also used in metal joint prostheses (Sunderman et al. 1989). Chromium picolinate, a trivalent form of chromium complexed with picolinic acid, is used as a dietary supplement, with the claim that it reduces symptoms of type II diabetes and hypoglycemia (Broadhurst et al. 1997), although a recent meta-review concludes that the results are still inconclusive (Althuis et al. 2002).

Table 5-4. U.S. Chromium Imports and Exports

Year	Imports (thousands of metric tons gross weight)	Exports (in thousands of metric tons gross weight)
2003	441	188
2004	489	171
2005	503	220
2006	520	212
2007	510	210

Source: USGS 2008a

Table 5-5. Historical Use of Chromium in the United States and Western World

Use	1996 Western world	1996 United States	1951 United States
Wood preservation	15%	52%	2%
Leather tanning	40%	13%	20%
Metals finishing	17%	13%	25%
Pigments	15%	12%	35%
Refractory	3%	3%	1%
Other	10%	7%	17%

Source: Barnhart 1997

5.4 DISPOSAL

Information regarding the disposal of finished products and wastes produced during the manufacturing of consumable items that contain chromium is limited. In 1987, 25% of the chromium demand in the United States was supplied by recycled stainless steel scrap. Although a large portion of the chromium wastes from plating operations is also recovered, large amounts of chromium-containing waste waters from plating, finishing, and textile industries are discharged into surface waters. A substantial amount of chromium enters sewage treatment plants from industrial and residential sources (Klein et al. 1974; TRI06 2008). Presently, slag from roasting/leaching of chromite ore is one of the materials excluded from regulation under the Resource Conservation and Recovery Act by the 1980 Bevill Amendment. However, emission control dust or sludge from ferrochromium and ferrochromium-silicon production is listed as hazardous waste by EPA (1988b). Land filling appears to be the most important method for the disposal of chromium wastes generated by chemical industries. Of the total chromium released in the environment by chemical industries, approximately 82.3% is released on land. An equally large amount of chromium waste is transferred off-site (see Section 5.2). It is anticipated that most of this off-site waste will be disposed of in landfills after proper treatment. It is important to convert chromium wastes into forms of chromium that have low mobilities in soils and low availabilities to plants and animals before land disposal. Chromium(III) oxide is one such form. Chromium in chemical industry wastes occurs predominantly in the hexavalent form. The treatment of chromium(VI) waste often involves reduction to chromium(III) and precipitation as the hydrous oxide with lime or caustic soda. Chromium(III) waste can also be converted into hydrous oxide or may be incinerated to form the oxide before land disposal. There is not much known about the disposal method of waste refractory materials used as lining for metallurgical furnaces or the disposal practices for the finished products containing chromium, such as chromium-containing pigments (Fishbein 1981; Komori et al. 1990a; NRCC 1976; Polprasert and Charnpratheep 1989; Westbrook 1979).

Chromium is listed as a toxic substance under Section 313 of the Emergency Planning and Community Right to Know Act (EPCRA) under Title III of the Superfund Amendments and Reauthorization Act (SARA) (EPA 1995). Disposal of wastes containing chromium is controlled by a number of federal regulations (see Chapter 8).