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EPA Office of Compliance Sector Notebook Project

Profile of the Rubber and Plastic Industry

2nd Edition

Chapters IV., V. and VI.

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http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/rubber.html

IV. CHEMICAL RELEASE AND OTHER WASTE MANAGEMENT PROFILE

This section provides background information on the pollutant releases that are reported by this industry in correlation with other industries. The best source of comparative pollutant release and other waste management information is the TRI. Pursuant to the Emergency Planning and Community Right-to-Know Act (EPCRA), TRI includes self-reported facility release and other waste management data for over 650 toxic chemicals and chemical categories. Facilities within SIC codes 10 (except 1011, 1081, and 1094); 12 (except 1241); 20-39; 4911, 4931, and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce); 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act (RCRA) Subtitle C, 42 U.S.C. section 6921 *et seq*.); 5169; 5171; and 7389 (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis) that have more than 10 employees, and that manufacture, process or otherwise use listed chemicals in quantities greater than the established threshold in the course of a calendar year are required to report to TRI release and other waste management quantities (on and off site) annually. The information presented in this Sector Notebook is derived from the most recently available (2002) TRI reporting year (which includes over 650 chemicals and chemical categories), and focuses primarily on the on-site releases reported by each sector. Because TRI requires consistent reporting regardless of sector, it is an excellent tool for drawing comparisons across industries.

Although this Sector Notebook does not present historical information regarding TRI chemical releases over time, note that, in general, toxic chemical releases have been declining. According to the 2000 Toxic Release Inventory Public Data Release, reported on-site and off-site releases of toxic chemicals to the environment from original TRI reporting industries (SIC codes 20-39) decreased by more than 8 percent (644 million pounds) between 1999 and 2000 (not including chemicals added and removed from the TRI chemical list during this period). Reported on-site releases dropped by almost 57 percent between 1988 and 2000. Reported transfers of TRI chemicals to off-site locations for disposal increased by almost 7 percent (28 million pounds) between 1988 and 2000. More detailed information is available in EPA's annual Toxics Release Inventory Public Data Release Report (which is available through the EPCRA Call Center at (800) 424-9346) or from the Internet at http://www.epa.gov/tri.

Wherever possible, the sector notebooks present TRI data as the primary indicator of chemical release within each industrial category. TRI data provide the type, amount, and media receptor of each chemical released or otherwise managed as waste. When other sources of pollutant release data have been obtained, EPA included the data to augment the TRI information.

TRI Data Limitations

Certain limitations exist regarding TRI data. Within some sectors (e.g., printing and transportation equipment cleaning), the majority of facilities are not subject to TRI reporting either because they do not fall under covered SIC codes, or because they are below the TRI reporting threshold amounts. However, EPA lowered threshold amounts for persistent bioaccumulative toxic (PBT) chemicals starting in reporting year 2000. For these chemicals,

EPA included release information from other sources. In addition, many facilities report to TRI under more than one SIC code, reflecting the multiple operations carried out on site whether or not the operations are the facilities' primary area of business as reported to the U.S. Census Bureau. Reported chemicals are limited to the approximately 650 TRI chemicals and chemical categories. A portion of the emissions from the RMPP industry, therefore, are not captured by TRI. Also, reported releases and other waste management quantities may or may not all be associated with the industrial operations described in this Sector Notebook.

Note that TRI "pounds released" data presented within the sector notebooks are not equivalent to a "risk" ranking for each industry. Weighting each pound of release equally does not factor in the relative toxicity of each chemical that is released. EPA has assigned toxicological weightings and population exposure levels to chemicals so that one can differentiate between pollutants with significant differences in toxicity. This project, the Risk Screening Environmental Indicators Model, is discussed at http://www.epa.gov/opptintr/rsei/.

As a preliminary indication of the environmental impact of the industry's most commonly released chemicals, this Sector Notebook briefly summarizes the toxicological properties of the top five chemicals (by weight) reported by this sector.

Definitions Associated With Section IV Data Tables

General Definitions

SIC Code -- A statistical classification standard used for all establishment-based federal economic statistics. The SIC codes facilitate comparisons between facility and industry data. (See Section II.)

TRI Facilities -- Facilities that are within specified SIC codes that have 10 or more full-time employees and are above established threshold amounts for manufacture or process or otherwise use activities in the course of a calendar year. These facilities are in SIC codes 10 (except 1011, 1081, and 1094), 12 (except 1241), 20-39, 4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4953 (limited to facilities regulated under the RCRA Subtitle C, 42 U.S.C. section 6921 *et seq.*), 5169, 5171, and 7389 (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis), and federal facilities. Facilities must submit release and other waste management estimates for all chemicals that are on the EPA's defined list and are above manufacturing or processing or otherwise use thresholds.

Data Table Column Heading Definitions

The following definitions are based upon standard definitions developed by EPA's TRI Program. The categories below represent the possible pollutant destinations that can be reported.

On-Site Releases (Table 9) -- An on-site discharge of a toxic chemical to the environment. This includes emissions to the air, discharges to bodies of water, releases at the facility to land, as well as contained disposal into underground injection wells.

Fugitive Air and Point Air Emissions -- All air emissions from industry activity. Point emissions occur through confined air streams as found in stacks, ducts, or pipes. Fugitive emissions include losses from equipment leaks or evaporative losses from impoundments, spills, or leaks.

Water (Surface Water) Discharges -- Any releases going directly to streams, rivers, lakes, oceans, or other bodies of water. Any estimates for stormwater runoff and nonpoint losses must also be included.

Underground Injection -- A contained release of a fluid into a subsurface well for the purpose of waste disposal.

Land Disposal -- Disposal of toxic chemicals in waste to on-site landfills, land treatment or incorporation into soil, surface impoundments, spills, leaks, or waste piles. These activities must occur within the facility's boundaries for inclusion in this category.

Transfers (Table 10) -- A transfer of toxic chemicals in wastes to a facility that is geographically or physically separate from the facility reporting under TRI. The quantities reported represent a movement of the chemical away from the reporting facility. Except for off-site transfers for disposal, these quantities do not necessarily represent entry of the chemical into the environment.

POTW Discharges -- Wastewaters transferred through pipes or sewers to a publicly owned treatments works (POTW). Treatment and chemical removal depend on the chemical's nature and treatment methods used. Chemicals not treated or destroyed by the POTW are generally released to surface waters or land filled within the sludge. Metals and metal compounds transferred to POTWs are considered as released to surface water.

Disposal -- Wastes taken to another facility for disposal, generally as a release to land or as an injection underground.

Recycling -- Wastes sent off site for the purposes of regenerating or recovering still valuable materials. Once these chemicals have been recycled, they may be returned to the originating facility or sold commercially.

Treatment -- Wastes moved off site for either neutralization, incineration, biological destruction, or physical separation. In some cases, the chemicals are not destroyed but prepared for further waste management.

Energy Recovery -- Wastes combusted off site in industrial furnaces for energy recovery. Treating a chemical by incineration is not considered to be energy recovery.

IV.A. EPA TRI for the RMPP Industry

This subsection provides TRI data for those facilities categorized under SIC code 30, the RMPP industry. According to the TRI data, the manufacture of rubber and miscellaneous plastics products results primarily in the release of solvents. Commonly released solvents include methanol, toluene, MEK, xylene, and dichloromethane. According to the TRI Public Data Release for 2002, the RMPP industry released over 71 million pounds of pollutants and transferred over 59 million pounds of pollutants. Of pollutants released, approximately 77 percent were released as point source air emissions, approximately 22 percent were released as fugitive air emissions, approximately 0.1 percent were released to water, and approximately 1 percent were disposed of on land.

The TRI database is a detailed compilation of self-reported, facility-specific chemical releases. The top reporting facilities for this sector are listed below. Table 6 presents data for facilities that have reported only the SIC codes covered under this Sector Notebook. Table 7 presents data for additional facilities that have reported the SIC code covered in this Sector Notebook, and one or more SIC codes that are not within the scope of this notebook. Therefore, Table 7 includes data for facilities that conduct multiple operations — some that are under the scope of this notebook, and some that are not. Currently, the facility-level data do not allow pollutant releases to be broken apart by industrial process. Table 8 lists the number of RMPP facilities by state.

The RMPP industry air releases can be traced primarily to the curing, mixing component preparation, and building/assembly stages of the rubber products manufacturing process and to the solvent cleaning and finishing stages of the plastics products manufacturing process. Major pollutants released to air include styrene, toluene, dichloromethane, and carbon disulfide. As discussed in Section III.B., releases of pollutants to water and transfers of pollutants to POTWs occur primarily from machinery cleaning and cooling in both the rubber and plastics products manufacturing processes and from rubber cooling and heating during the rubber products manufacturing process. Major pollutants released to water include nitrate compounds, zinc compounds, ethylene glycol, and ammonia. Major pollutants transferred to POTWs include nitrate compounds, formaldehyde, N,N-dimethylformamide, and methanol. Releases of pollutants to land occur from the use of various chemicals in the rubber and plastic mixing processes. Major releases of pollutants to land include sodium nitrite, zinc compounds, methyl acrylate, and acrylonitrile.

The RMPP industry releases and transfers a number of metals in large quantities (i.e., transfers as high as millions of pounds and releases as high as hundreds of thousands of pounds). These metals include zinc compounds, lead compounds, lead, and zinc. Both zinc and lead are used in the rubber mixing process as vulcanizing agents, accelerators, activators, and processing aids (zinc only). Lead and zinc are bound within the rubber matrix and are sent off site for recycling or disposal. Tables 9, 10, and 11 present releases and transfers for SIC code 30 TRI reporting facilities.

Table 6: Top 10 TRI Releasing RMPP Facilities (SIC Code 30 Only Facilities)

Rank	Total TRI Releases in Pounds	Facility Name	City	State
1	3,113,500	Teepak LLC	Danville	IL
2	3,106,018	Nevamar Co. LLC	Hampton	SC
3	2,291,539	Viskase Corp.	Loudon	TN
4	1,755,043	Aqua Glass Main Plant	Adamsville	TN
5	1,443,305	Viskase Corp.	Osceola	AR
6	1,113,389	Texas Recreation Corp.	Wichita Falls	TX
7	1,109,555	Pactiv Corp.	Winchester	VA
8	1,092,955	Daramic Inc.	Corydon	IN
9	1,004,422	Spontex Inc.	Columbia	TN
10	768,075	Owens Corning Tallmadge	Tallmadge	OH

Source: U.S. EPA, Toxics Release Inventory Database, 2002.
Note: Being included on this list does not mean that the release is associated with noncompliance with environmental laws.

Table 7: Top 10 TRI Releasing RMPP Facilities (SIC Code 30 and Other SIC Code Facilities)

SIC Codes	Total TRI Releases in Pounds	Facility Name	City	State
3089	3,113,500	Teepak LLC	Danville	IL
3083	3,106,018	Nevamar Co. LLC	Hampton	SC
3089	2,291,539	Viskase Corp.	Loudon	TN
3088	1,755,043	Aqua Glass Main Plant	Adamsville	TN
3086, 2821	1,590,889	Dow Chemical Co. Riverside Site	Pevely	MO
3089	1,443,305	Viskase Corp.	Osceola	AR
2822, 3087	1,202,360	Kraton Polymers U.S. LLC	Belpre	OH
3086	1,113,389	Texas Recreation Corp.	Wichita Falls	TX
3086	1,109,555	Pactiv Corp.	Winchester	VA
3089	1,092,955	Daramic Inc.	Corydon	IN

Source: U.S. EPA, Toxics Release Inventory Database, 2002.
Note: Being included on this list does not mean that the release is associated with noncompliance with environmental laws.

Table 8: TRI Reporting RMPP Facilities (SIC Code 30) by State

State	Number of Facilities
AL	34
AR	29
AZ	26
CA	110
CO	12
CT	24
DE	10
FL	69
GA	70
IA	29
ID	1
IL	91
IN	136
KS	25
KY	35
LA	13
MA	40
MD	15
ME	7
MI	88
MN	34
MO	58
MS	28
NC	91

State	Number of Facilities
ND	4
NE	14
NH	17
NJ	35
NM	4
NV	8
NY	37
OH	195
OK	23
OR	19
PA	92
PR	5
RI	12
SC	51
SD	4
TN	81
TX	133
UT	6
VA	36
VT	4
WA	21
WI	60
WV	15
WY	

Source: U.S. EPA, Toxics Release Inventory Database, 2002.

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Styrene	675	5,461,024	19,892,568	532	0	80,789	25,434,913	37,681
Zinc Compounds	442	36,549	86,236	14,232	0	102,952	239,969	543
Lead Compounds	291	8,274	20,050	218	0	3,353	31,895	110
Diisocyanates	274	10,676	9,873	0	0	181,245	201,794	736
Toluene	197	2,288,190	5,059,580	512	0	260	7,348,542	37,302
Methyl Ethyl Ketone	163	1,538,639	2,870,242	5	0	676	4,409,562	27,053
Bis(2-ethylhexyl) Phthalate	155	88,637	471,389	440	0	5,207	565,673	3,650
Antimony Compounds	154	37,554	5,072	262	0	24,918	67,806	440
Xylene (Mixed Isomers)	108	490,844	2,696,529	7	0	3,267	3,190,646	29,543
Polycyclic Aromatic Compounds	85	58	6,967	0	0	1,902	8,927	105
Lead	80	709	112	97	0	9,539	10,457	131
Chromium Compounds (Except Chromite Ore Mined in the Transvaal Region)	79	973	878	10	0	1	1,862	24
Toluene Diisocyanate (Mixed Isomers)	78	5,589	18,348	0	0	0	23,936	307
Certain Glycol Ethers	72	67,105	606,644	14	0	10,887	684,650	9,509
1,1-dichloro-1-fluoroethane	65	793,732	1,130,128	0	0	21,421	1,945,281	29,927
Barium Compounds	62	900	2,126	168	0	1,756	4,950	80
Methyl Methacrylate	59	169,660	725,407	0	0	0	895,067	15,171
Benzo(g,h,i)perylene	59	41	114	0	0	0	155	3
Decabromodiphenyl Oxide	55	2,762	5,845	58	0	30,243	38,908	707
Methyl Isobutyl Ketone	51	194,762	1,244,271	0	0	170	1,439,203	28,220
Thiram	49	1,435	2,074	31	0	9,729	13,269	271
Methanol	47	284,936	2,453,282	635	0	355	2,739,208	58,281
Phenol	43	68,348	1,064,463	18	0	0	1,132,829	26,345

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Dichloromethane	43	456,421	1,585,297	5	0	0	2,041,723	47,482
Ethylbenzene	42	76,514	375,431	17	0	616	452,579	10,776
Cobalt Compounds	38	25	5,648	287	0	13	5,974	157
Chlorodifluoromethane	37	333,349	344,881	0	0	0	678,230	18,331
Ethylene Glycol	35	4,256	55,581	0	0	0	59,837	1,710
N-hexane	35	293,776	166,683	0	0	0	460,458	13,156
Manganese Compounds	30	531	277	0	0	0	808	27
Copper	29	92,217	566	3	0	2,718	95,504	3,293
N-methyl-2-pyrrolidone	28	9,414	218,983	0	0	38	228,435	8,158
Diethanolamine	26	1,648	1,111	0	0	0	2,759	106
Nitrate Compounds	26	505	8,043	68,084	0	0	76,632	2,947
Formaldehyde	24	10,003	106,164	0	0	0	116,166	4,840
Trichloroethylene	21	1,223,894	126,851	1	0	0	1,350,746	64,321
N-butyl Alcohol	20	46,259	168,677	0	0	900	215,836	10,792
Nickel Compounds	19	45	540	0	0	0	585	31
Chromium	18	251	10	0	0	0	261	15
Dimethylformamide	18	12,931	142,731	1,902	0	0	157,564	8,754
Ammonia	18	173,651	810,755	14,040	0	0	998,446	55,469
2-mercaptobenzothiazole	18	141	647	5	0	0	793	44
1,2,4-trimethylbenzene	16	49,583	159,940	0	0	1,794	211,317	13,207
Dibutyl Phthalate	16	96,520	3,168	0	0	5	99,693	6,231
4,4-methylene bis(2-chloroaniline)	15	1	6	0	0	0	7	0
Cadmium Compounds	15	200	356	5	0	0	561	37
Dimethyl Phthalate	14	4,751	58,569	0	0	86	63,406	4,529

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Sodium Nitrite	14	250	10,136	250	0	234,000	244,636	17,474
Nickel	13	250	750	0	0	0	1,000	77
Copper Compounds	13	48	70	253	0	0	371	29
Toluene-2,4-diisocyanate	12	1,806	611	0	0	0	2,417	201
Nitric Acid	11	716	615	0	0	0	1,331	121
Zinc (Fume or Dust)	11	481	3,875	250	0	0	4,606	419
Tetrabromobisphenol A	10	11	38	4	0	0	53	5
Mercury Compounds	10	0	10	0	0	0	10	1
1-chloro-1,1-difluoroethane	10	625,482	3,302,675	0	0	0	3,928,157	392,816
Antimony	9	500	0	0	0	167	667	74
Vinyl Acetate	9	13,167	50,397	0	0	0	63,564	7,063
Ethylene Thiourea	8	10	91	5	0	0	106	13
Hydrochloric Acid (1995 and after "Acid Aerosols" Only)	8	49,651	467,071	0	0	0	516,722	64,590
Toluene-2,6-diisocyanate	8	385	133	0	0	0	518	65
Tetrachloroethylene	7	36,735	83,426	0	0	0	120,161	17,166
Chlorine	7	3,017	304	473	0	0	3,794	542
Aluminum (Fume or Dust)	7	186	6	0	0	0	192	27
Carbon Disulfide	7	505,604	7,430,918	556	0	0	7,937,078	1,133,868
Cumene Hydroperoxide	7	7,616	2,226	0	0	0	9,842	1,406
Phthalic Anhydride	7	753	332	0	0	1,838	2,922	417
Aluminum Oxide (Fibrous Forms)	6	250	39	0	0	0	289	48
Benzoyl Peroxide	6	5	5	0	0	0	10	2
Acrylonitrile	6	102	657	0	0	250	1,009	168

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Cumene	6	131	1,076	0	0	0	1,207	201
Sulfuric Acid (1994 and after "Acid Aerosols" Only)	6	30,557	137,049	0	0	0	167,606	27,934
4,4'-methylene dianiline	5	750	256	0	0	0	1,006	201
Ozone	5	5	142,068	0	0	0	142,073	28,415
Manganese	5	250	0	0	0	0	250	50
Bisphenol A	5	75	6,339	0	0	0	6,414	1,283
Cyclohexane	4	1,050	21,977	0	0	0	23,027	5,757
Butyl Acrylate	4	718	341	0	0	0	1,059	265
1,3-phenylenediamine	4	0	0	0	0	0	0	0
Mercury	4	2	0	0	0	0	2	1
Maleic Anhydride	4	505	5	0	0	0	510	128
Ethylene Oxide	4	561	1,987	0	0	0	2,548	637
Cadmium	4	0	0	0	0	0	0	0
Butyraldehyde	3	13,664	23,147	0	0	0	36,811	12,270
Chloroprene	3	0	0	0			0	0
Barium	3	2	1	0	0	0	3	1
1,1,1-trichloroethane	3	255	5	0	0	0	260	87
Dicyclopentadiene	3	98	25	0	0	0	123	41
Mixture	3	0	955	0	0	0	955	318
Dioxin and Dioxin-like Compounds	3	0	210	0	0	0	210	70
Ethyl Acrylate	3	1,154	2,057	0	0	0	3,211	1,070
Methyl Acrylate	3	1,186	1,784	0	0	0	2,970	990
Hexachlorobenzene	3	388	0	0	0	0	388	129

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
1,4-dioxane	2	360	254	0	0	0	614	307
N,N-dimethylaniline	2	0	0	0	0	0	0	0
Benzene	2	0	0	0	0	0	0	0
Silver	2	5	250	0	0	0	255	128
Acetaldehyde	2	2,330	40,000	0	0	0	42,330	21,165
Acetonitrile	2	2,317	0	0	0	0	2,317	1,159
Propylene Oxide	2	44	31	0	0	0	75	38
Acrylic Acid	2	8	11	0	0	0	19	10
2-methoxyethanol	2	0	293,562	0	0	0	293,562	146,781
1,3-butadiene	2	0	250	0	0	250	500	250
Cresol (Mixed Isomers)	2	56	55,826	0	0	0	55,882	27,941
Formic Acid	2	90	0	0	0	0	90	45
Cobalt	2	0	0	0			0	0
Chloroethane	2	283,170	188,240	0	0	0	471,410	235,705
Diphenylamine	2	200	105	0	0	0	305	153
Arsenic Compounds	2	0	0	0			0	0
Vinyl Chloride	2	0	0	0			0	0
1,2-butylene Oxide	1	0	0	0			0	0
Vinylidene Chloride	1	145	880	0	0	0	1,025	1,025
Tert-butyl Alcohol	1	2,231	9,196	0	0	0	11,427	11,427
Trifluralin	1	238	0	0	0	0	238	238
4,4'-diaminodiphenyl Ether	1	0	0	0			0	0
Trichlorofluoromethane	1	0	0	0			0	0
1,2-dichloroethane	1	0	0	0			0	0

Table 9: Releases for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (releases reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air Emissions	Point Source Air Emissions	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Triethylamine	1	0	2,927	0	0	0	2,927	2,927
Selenium Compounds	1	0	0	0			0	0
Tetramethrin	1	1,577	11,023	0	0	0	12,600	12,600
N-nitrosodiphenylamine	1	0	0	0	0	0	0	0
Dimethipin	1	250	0	0	0	0	250	250
Epichlorohydrin	1	0	0	0			0	0
Chloroform	1	0	0	0			0	0
Chlorobenzene	1	0	16,007	0	0	0	16,007	16,007
Freon 113	1	13,078	0	0	0	0	13,078	13,078
Methyl Isocyanate	1	1	1	0	0	0	2	2
Methyl Tert-butyl Ether	1	0	0	0	0	0	0	0
Arsenic	1	0	0	0	0	0	0	0
Naphthalene	1	0	0	0			0	0
Selenium	1	0	0	0			0	0
Diazinon	1	0	0	0			0	0
Asbestos (Friable)	1	0	1	0	0	0	1	1
Ethylene	1	97	0	97	0	0	194	194
O-toluidine	1	0	0	0			0	0
Polychlorinated Alkanes	1	0	0	0	0	0	0	0
Aniline	1	0	0	0	0	0	0	0
Quinone	1	0	0	0	0	0	0	0
M-xylene	1	0	0	0			0	0
Total	**1,952**	**16,042,856**	**55,025,345**	**103,476**	**0**	**731,344**	**71,903,021**	**36,836**

Source: U.S. EPA, Toxics Release Inventory Database, 2002.

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Styrene	675	3,946	859,569	8,792	290,121	1,137,561	2,299,989	3,407
Zinc Compounds	442	42,128	5,631,888	2,869,577	0	1,700	8,545,293	19,333
Lead Compounds	291	723	183,920	321,365	0	0	506,008	1,739
Diisocyanates	274	5	235,018	3,986	100,619	56,824	396,452	1,447
Toluene	197	594	58,387	548,813	435,972	2,107,294	3,151,060	15,995
Methyl Ethyl Ketone	163	321	8,806	2,380,041	1,420,252	1,788,074	5,597,494	34,340
Di(2-ethylhexyl) Phthalate	155	2,601	605,431	1,499,732	39,571	162,697	2,310,032	14,903
Antimony Compounds	154	1,124	292,392	71,779	0	0	365,295	2,372
Xylene (Mixed Isomers)	108	20	4,462	239,371	1,475,502	600,687	2,320,042	21,482
Polycyclic Aromatic Compounds	85	6,747	161,942	121,595	1,239	2,129	293,652	3,455
Lead	80	78	5,747,333	201,591	8	0	5,949,010	74,363
Chromium Compounds(Except Chromite Ore Mined in the Transvaal Region)	79	913	246,967	14,207	0	0	262,087	3,318
Toluene Diisocyanate (Mixed Isomers)	78	0	24,874	0	82,982	68,032	175,888	2,255
Certain Glycol Ethers	72	19,474	81,917	52,397	258,880	151,039	563,707	7,829
1,1-dichloro-1-fluoroethane	65	2,430	106,287	49,770	6,382	40,063	204,932	3,153
Barium Compounds	62	63	43,997	14,376	5	0	58,441	943
Methyl Methacrylate	59	38,188	9,824	0	23,535	969,523	1,041,070	17,645
Benzo(g,h,i)perylene	59	0	174	514	52	133	873	15
Decabromodiphenyl Oxide	55	279	367,722	46,546	3,834	1,655	420,036	7,637
Methyl Isobutyl Ketone	51	6,591	4,182	62,847	57,896	306,258	437,774	8,584

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Thiram	49	1,495	61,124	36,640	9,481	1,182	109,922	2,243
Methanol	47	554,954	2,130	1,432,879	68,837	1,071,039	3,129,839	66,592
Phenol	43	372	104,825	23,334	20,939	31,921	181,391	4,218
Dichloromethane	43	250	250	27,124	24,498	35,400	87,522	2,035
Ethylbenzene	42	56	133	34,370	137,642	232,799	405,000	9,643
Cobalt Compounds	38	702	47,854	13,887	0	0	62,443	1,643
Chlorodifluoromethane	37	0	6,887	1,208	0	4,137	12,232	331
Ethylene Glycol	35	62,827	3,557	1,276,345	226,706	57,641	1,627,076	46,488
N-hexane	35	0	205	0	28,057	63,608	91,870	2,625
Manganese Compounds	30	267	12,657	3,904	0	0	16,828	561
Copper	29	65	106,504	2,671,557	0	0	2,778,126	95,797
N-methyl-2-pyrrolidone	28	172,324	755	204,959	43,123	129,743	550,904	19,675
Diethanolamine	26	0	0	0	270	1,087	1,357	52
Nitrate Compounds	26	5,397,797	343,938	350	1,359	0	5,743,444	220,902
Formaldehyde	24	2,413,754	15,096	374	15,944	7,475	2,452,643	102,193
Trichloroethylene	21	42	521	51,085	25,906	250	77,804	3,705
N-butyl Alcohol	20	150,000	0	6,034	142,462	103,915	402,411	20,121
Nickel Compounds	19	582	225,073	42,920	0	0	268,575	14,136
Chromium	18	5	902	420,575	0	0	421,482	23,416
N,N-dimethylformamide	18	3,584,844	0	0	2,229	219,616	3,806,689	211,483
Ammonia	18	14,470	20,698	0	0	0	35,168	1,954
2-mercaptobenzothiazole	18	10	31,919	500	0	24	32,453	1,803

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
1,2,4-trimethylbenzene	16	0	1	19,095	30,254	29,577	78,927	4,933
Dibutyl Phthalate	16	41	6,666	1,904	393	853	9,857	616
4,4'-methylene bis(2-chloroaniline)	15	0	1,440	0	12,269	1,547	15,256	1,017
Cadmium Compounds	15	41	2,264	0	0	0	2,305	154
Dimethyl Phthalate	14	160	1,100	0	86	35,551	36,897	2,636
Sodium Nitrite	14	335,137	7,224	5	11,549	1,110	355,025	25,359
Nickel	13	256	23,497	143,149	0	0	166,902	12,839
Copper Compounds	13	887	217,815	60,114	0	0	278,816	21,447
Toluene-2,4-diisocyanate	12	0	5,488	0	614	0	6,102	509
Nitric Acid	11	5	0	0	22,133	0	22,138	2,013
Zinc (Fume or Dust)	11	0	12,670	0	0	0	12,670	1,152
Tetrabromobisphenol a	10	9	9,654	0	250	98	10,011	1,001
Mercury Compounds	10	0	34	0	0	0	34	3
1-chloro-1,1-difluoroethane	10	0	9,498	0	0	0	9,498	950
Antimony	9	0	15,243	3,865	0	0	19,108	2,123
Vinyl Acetate	9	20,525	1,938	0	28,397	7,517	58,377	6,486
Ethylene Thiourea	8	1	2,005	2,005	5,470	14	9,495	1,187
Hydrochloric Acid (1995 and after "Acid Aerosols" Only)	8	0	0	0	141	0	141	18
Toluene-2,6-diisocyanate	8	0	1,372	0	154	0	1,526	191
Tetrachloroethylene	7	0	33	746	7,917	4,850	13,546	1,935
Chlorine	7	750	0	0	0	0	750	107

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Aluminum (Fume or Dust)	7	5	2,553	0	5,464	0	8,022	1,146
Carbon Disulfide	7	123,100	0	0	0	0	123,100	17,586
Cumene Hydroperoxide	7	0	0	0	0	571	571	82
Phthalic Anhydride	7	0	8,611	1,732	0	0	10,343	1,478
Aluminum Oxide (Fibrous Forms)	6	5	19,250	0	0	0	19,255	3,209
Benzoyl Peroxide	6	0	2,700	0	0	0	2,700	450
Acrylonitrile	6	5	8,103	0	0	68,027	76,135	12,689
Cumene	6	0	3,923	0	13,931	13,218	31,072	5,179
Sulfuric Acid (1994 and after "Acid Aerosols" Only)	6	0	0	0	0	0	0	0
4,4'-methylene dianiline	5	0	0	0	4,346	0	4,346	869
Ozone	5	0	0	0	0	0	0	0
Manganese	5	0	4,343	17,600	0	0	21,943	4,389
Bisphenol A	5	250	2,130	70	0	250	2,700	540
Cyclohexane	4	0	0	0	500	250	750	188
Butyl Acrylate	4	401	20	0	388	8,864	9,673	2,418
1,3-phenylenediamine	4	54,502	0	0	0	0	54,502	13,626
Mercury	4	0	18	0	0	0	18	5
Maleic Anhydride	4	0	250	0	5,398	0	5,648	1,412
Ethylene Oxide	4	0	5,674	7,800	0	0	13,474	3,369
Cadmium	4	0	11	0	0	0	11	3
Butyraldehyde	3	310,490	14	0	16,316	0	326,820	108,940

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Chloroprene	3	0	0	0	0	0	0	0
Barium	3	0	0	0	0	0	0	0
1,1,1-trichloroethane	3	0	5	5	0	5,388	5,398	1,799
Dicyclopentadiene	3	0	1,873	0	17,100	0	18,973	6,324
Mixture	3	0	0	0	0	0	0	0
Dioxin and Dioxin-like Compounds	3	4	0	0	0	0	4	1
Ethyl Acrylate	3	1,322	0	0	1,110	2,977	5,409	1,803
Methyl Acrylate	3	365	1	0	1,001	103,663	105,030	35,010
Hexachlorobenzene	3	0	21	0	0	0	21	7
1,4-dioxane	2	88,954	0	0	20,708	2,544	112,206	56,103
N,N-dimethylaniline	2	0	0	0	0	0	0	0
Benzene	2	0	0	0	0	0	0	0
Silver	2	15	0	0	0	0	15	8
Acetaldehyde	2	2,610	0	0	5	0	2,615	1,308
Acetonitrile	2	0	0	0	45,303	0	45,303	22,652
Propylene Oxide	2	0	0	0	0	0	0	0
Acrylic Acid	2	67	0	0	403	0	470	235
2-methoxyethanol	2	28,836	0	0	0	7,216	36,052	18,026
1,3-butadiene	2	5	250	0	0	0	255	128
Cresol (Mixed Isomers)	2	0	0	0	3,848	67	3,915	1,958
Formic Acid	2	300	0	0	61	0	361	181
Cobalt	2	0	0	0	0	0	0	0

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Chloroethane	2	0	3,799	0	0	0	3,799	1,900
Diphenylamine	2	637	1,111	1,368	0	0	3,116	1,558
Arsenic Compounds	2	0	0	0	0	0	0	0
Vinyl Chloride	2	0	0	0	0	0	0	0
1,2-butylene Oxide	1	0	0	0	0	0	0	0
Vinylidene Chloride	1	0	0	0	0	0	0	0
Tert-butyl Alcohol	1	5,513	0	0	4,370	0	9,883	9,883
Trifluralin	1	0	345	0	0	0	345	345
4,4'-diaminodiphenyl Ether	1	0	0	0	0	0	0	0
Trichlorofluoromethane	1	0	0	0	0	0	0	0
1,2-dichloroethane	1	0	0	0	0	0	0	0
Triethylamine	1	0	0	0	5,762	0	5,762	5,762
Selenium Compounds	1	0	0	0	0	0	0	0
Tetramethrin	1	0	0	0	0	0	0	0
N-nitrosodiphenylamine	1	0	0	0	0	0	0	0
Dimethipin	1	0	0	2,548	0	0	2,548	2,548
Epichlorohydrin	1	0	0	0	0	0	0	0
Chloroform	1	0	0	0	0	0	0	0
Chlorobenzene	1	0	0	0	750	0	750	750
Freon 113	1	0	0	0	2,141	0	2,141	2,141
Methyl Isocyanate	1	0	0	0	0	0	0	0
Methyl Tert-butyl Ether	1	0	0	0	0	0	0	0

Table 10: Transfers for RMPP Facilities (SIC Code 30) in TRI, by Number of Facilities (transfers reported in pounds/year) (Continued)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Arsenic	1	0	0	0	0	0	0	0
Naphthalene	1	0	0	0	0	0	0	0
Selenium	1	0	0	0	0	0	0	0
Diazinon	1	0	0	0	0	0	0	0
Asbestos (Friable)	1	0	0	0	0	0	0	0
Ethylene	1	0	0	0	0	0	0	0
O-toluidine	1	0	0	0	0	0	0	0
Polychlorinated Alkanes	1	0	85	0	0	1,374	1,459	1,459
Aniline	1	0	0	0	0	0	0	0
Quinone	1	0	0	0	0	0	0	0
M-xylene	1	0	0	0	0	0	0	0
Total	**1,952**	**13,456,239**	**16,043,153**	**15,017,350**	**5,212,835**	**9,649,032**	**59,378,609**	**30,419**

Source: U.S. EPA, Toxics Release Inventory Database, 2002.

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI

SIC Code 3011: Tires and Inner Tubes

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Zinc Compounds	N982	—	—	—	3,038,118
N-hexane	110-54-3	—	—	—	372,293
Hydrochloric Acid (1995 and after "Acid Aerosols" Only)	7647-01-0	—	—	—	341,531
Polycyclic Aromatic Compounds	N590	2A or 2B	P	—	180,743
Sulfuric Acid (1994 and after "Acid Aerosols" Only)	7664-93-9	—	—	—	137,049
Methyl Isobutyl Ketone	108-10-1	—	—	—	106,339
Toluene	108-88-3	—	—	—	105,590
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	66,233
Tetrachloroethylene	127-18-4	2B	P	—	65,424
Cobalt Compounds	N096	2B	—	—	50,530
Total release of top TRI chemicals:					**4,463,850**
Total release of all TRI chemicals:					**4,624,503**
Percentage contributed by top TRI chemicals:					**96.5%**
Total release of top carcinogens:					**362,930**
Total release of all carcinogens:					**419,907**
Percentage contributed by top carcinogens:					**86.4%**

SIC Code 3052: Rubber and Plastics Hose and Belting

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Zinc Compounds	N982	—	—	—	774,149
Toluene	108-88-3	—	—	—	699,290
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	197,362
Carbon Disulfide	75-15-0	—	—	—	158,920
1,2,4-Trimethylbenzene	95-63-6	—	—	—	114,954
Dichloromethane	75-09-2	2B	P	—	78,611
Methyl Ethyl Ketone	78-93-3	—	—	—	77,858
Trichloroethylene	79-01-6	2A	P	—	49,990
Certain Glycol Ethers	N230	—	—	—	46,827
Tetrachloroethylene	127-18-4	2B	P	—	26,785
Total release of top TRI chemicals:					**2,224,746**
Total release of all TRI chemicals:					**2,311,986**
Percentage contributed by top TRI chemicals:					**96.2%**
Total release of top carcinogens:					**352,748**
Total release of all carcinogens:					**364,655**
Percentage contributed by top carcinogens:					**96.7%**

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI (Continued)

SIC Code 3053: Gaskets, Packing, and Sealing Devices

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Toluene	108-88-3	—	—	—	480,187
Methyl Ethyl Ketone	78-93-3	—	—	—	286,562
Zinc Compounds	N982	—	—	—	265,518
Methanol	67-56-1	—	—	—	180,766
Copper	7440-50-8	—	—	—	91,786
Methyl Isobutyl Ketone	108-10-1	—	—	—	75,955
Xylene (Mixed Isomers)	1330-20-7	—	—	—	37,222
Trichloroethylene	79-01-6	2A	P	—	9,724
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	6,360
Ethylene Oxide	75-21-8	1	K	Z	5,674
Total release of top TRI chemicals:					**1,439,753**
Total release of all TRI chemicals:					**1,457,021**
Percentage contributed by top TRI chemicals:					**98.8%**
Total release of top carcinogens:					**21,758**
Total release of all carcinogens:					**29,552**
Percentage contributed by top carcinogens:					**73.6%**

SIC Code 3061: Mechanical Rubber Goods

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Toluene	108-88-3	—	—	—	909,839
Xylene (Mixed Isomers)	1330-20-7	—	—	—	723,208
Methyl Isobutyl Ketone	108-10-1	—	—	—	632,816
Zinc Compounds	N982	—	—	—	518,060
1,1-dichloro-1-fluoroethane	1717-00-6	—	—	—	125,764
Ethylbenzene	100-41-4	2B	—	—	117,803
1-chloro-1,1-difluoroethane	75-68-3	—	—	—	68,000
Methyl Ethyl Ketone	78-93-3	—	—	—	67,698
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	52,213
Chlorodifluoromethane	75-45-6	—	—	—	45,000
Total release of top TRI chemicals:					**3,260,401**
Total release of all TRI chemicals:					**3,497,059**
Percentage contributed by top TRI chemicals:					**93.2%**
Total release of top carcinogens:					**170,016**
Total release of all carcinogens:					**247,761**
Percentage contributed by top carcinogens:					**68.6%**

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI (Continued)

SIC Code 3069: Fabricated Rubber Products, Not Elsewhere Classified (N.E.C.)

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Toluene	108-88-3	—	—	—	2,480,705
Zinc Compounds	N982	—	—	—	1,274,649
Xylene (Mixed Isomers)	1330-20-7	—	—	—	890,444
Ammonia	7664-41-7	—	—	—	472,159
Methyl Ethyl Ketone	78-93-3	—	—	—	327,665
Sodium Nitrite	7632-00-0	—	—	—	310,594
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	216,756
Methyl Isobutyl Ketone	108-10-1	—	—	—	177,287
Nitrate Compounds	N511	—	—	—	133,273
Dibutyl Phthalate	84-74-2	—	—	—	91,884
Total release of top TRI chemicals:					**6,375,416**
Total release of all TRI chemicals:					**6,804,311**
Percentage contributed by top TRI chemicals:					**93.7%**
Total release of top carcinogens:					**216,756**
Total release of all carcinogens:					**457,039**
Percentage contributed by top carcinogens:					**47.4%**

SIC Code 3081: Unsupported Plastics Film and Sheet

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Methyl Ethyl Ketone	78-93-3	—	—	—	717,958
Toluene	108-88-3	—	—	—	596,016
Xylene (Mixed Isomers)	1330-20-7	—	—	—	411,099
Certain Glycol Ethers	N320	—	—	—	179,770
Methyl Methacrylate	80-62-6	—	—	—	164,349
Methyl Isobutyl Ketone	108-10-1	—	—	—	143,373
Ammonia	7664-41-7	—	—	—	109,852
Methanol	67-56-1	—	—	—	102,783
Ozone	10028-15-6	—	—	—	94,251
Ethylbenzene	100-41-4	2B	—	—	81,390
Total release of top TRI chemicals:					**2,600,841**
Total release of all TRI chemicals:					**3,264,037**
Percentage contributed by top TRI chemicals:					**79.7%**
Total release of top carcinogens:					**81,390**
Total release of all carcinogens:					**311,221**
Percentage contributed by top carcinogens:					**26.2%**

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI (Continued)

SIC Code 3084: Plastics Pipe

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Styrene	100-42-5	2B	—	—	193,741
Dichloromethane	75-09-2	2B	P	—	36,660
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	6,353
Trifluralin	1582-09-8	—	—	—	583
Lead Compounds	N420	2B	—	Z	448
Bisphenol A	80-05-7	—	—	—	164
Zinc (Fume or Dust)	7440-66-6	—	—	—	50
4,4'-methylene dianiline	101-77-9	2B	P	Z	1
Zinc Compounds	N982	—	—	—	0
Cobalt Compounds	N096	2B	—	—	0
Total release of top TRI chemicals:					**238,000**
Total release of all TRI chemicals:					**238,000**
Percentage contributed by top TRI chemicals:					**100.0%**
Total release of top carcinogens:					**237,203**
Total release of all carcinogens:					**237,203**
Percentage contributed by top carcinogens:					**100.0%**

SIC Code 3085: Plastics Bottles

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
1,1-Dichloro-1-fluoroethane	1717-00-6	—	—	—	12,499
Ethylene Glycol	107-21-1	—	—	—	11,000
Certain Glycol Ethers	N230	—	—	—	27
Total release of top TRI chemicals:					**23,526**
Total release of all TRI chemicals:					**23,526**
Percentage contributed by top TRI chemicals:					**100.0%**
Total release of top carcinogens:					**NA**
Total release of all carcinogens:					**NA**
Percentage contributed by top carcinogens:					**NA**

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI (Continued)

SIC Code 3086: Plastics Foam Products

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
1-Chloro-1,1-difluoroethane	75-68-3	—	—	—	3,869,313
Dichloromethane	75-09-2	2B	P	—	1,726,324
1,1-Dichloro-1-fluoroethane	1717-00-6	—	—	—	1,599,017
Methyl Ethyl Ketone	78-93-3	—	—	—	686,688
Toluene	108-88-3	—	—	—	662,689
Chlorodifluoromethane	75-45-6	—	—	—	579,762
Chloroethane	75-00-3	—	—	—	475,229
Diisocyanates	N120	—	—	—	276,876
Xylene (Mixed Isomers)	1330-20-7	—	—	—	247,903
Di(2-ethylhexyl) Phthalate	117-81-7	—	P	—	113,906
Total release of top TRI chemicals:					**10,237,708**
Total release of all TRI chemicals:					**10,761,266**
Percentage contributed by top TRI chemicals:					**95.1%**
Total release of top carcinogens:					**1,840,230**
Total release of all carcinogens:					**2,029,742**
Percentage contributed by top carcinogens:					**90.7%**

SIC Code 3089: Plastics Products, Not Elsewhere Classified (N.E.C.)

Chemical Name	CAS No.	Carcinogenicity (by source)			TRI Release (lbs)
		IARC[1]	NTP[2]	OSHA-Z[3]	
Styrene	100-42-5	2B	—	—	12,594,826
Carbon Disulfide	75-15-0	2B	—	—	7,762,922
Methyl Ethyl Ketone	78-93-3	—	—	—	1,391,619
Trichloroethylene	79-01-6	2A	P	—	1,099,186
Toluene	108-88-3	—	—	—	1,072,741
Xylene (Mixed Isomers)	1330-20-7	—	—	—	893,011
Nitrate Compounds	N511	—	—	—	540,805
Methyl Methacrylate	80-62-6	—	—	—	480,135
Ammonia	7664-41-7	—	—	—	428,283
Certain Glycol Ethers	N230	—	—	—	401,291
Total release of top TRI chemicals:					**26,664,820**
Total release of all TRI chemicals:					**29,435,198**
Percentage contributed by top TRI chemicals:					**90.6%**
Total release of top carcinogens:					**13,694,012**
Total release of all carcinogens:					**14,535,784**
Percentage contributed by top carcinogens:					**94.2%**

Table 11: Releases by Subsector for RMPP Facilities (SIC Code 30) in TRI (Continued)

Footnotes

[1]IARC: International Agency for Research on Cancer - from "Monographs."
1 - The chemical is known to be carcinogenic to humans.
2A - The chemical is probably carcinogenic to humans.
2B - The chemical is possibly carcinogenic to humans.
[2]NTP: National Toxicology Program - from "Annual Report on Carcinogens."
K - The chemical is known to be carcinogenic.
P - The chemical may reasonably be anticipated to be carcinogenic.
[3]OSHA-Z: 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.
Z - The chemical appears at 29 CFR Part 1910 Subpart Z.
NA - Not Applicable
Source of TRI data: US EPA, Toxic Release Inventory Database, Reporting Year 2002.
Source of HPV data: EPA Office of Pollution Prevention and Toxics, HPV Challenge Program Chemical List.
Source of HAP data: EPA Office of Air Quality Planning and Standards, Air Toxics Web Site.
Source of carcinogenicity data: Appendix C, "Basis of OSHA Carcinogen Listing for Individual Chemicals," 2001 TRI Public Data Release Report.

IV.B. Summary of the Selected Chemicals Released

This subsection summarizes current scientific toxicity and fate information for the top chemicals (by weight) that facilities within the RMPP sector self-reported as released to the environment based upon 2002 TRI data. Because this subsection is based upon self-reported release data, it does not provide information on management practices used by the sector to reduce the release of these chemicals. Information regarding pollutant release reductions over time might be available from EPA's TRI program or from the industrial trade associations that are listed in Section IX of this document. Because these descriptions are cursory, consult the sources referenced below for a more detailed description of both the chemicals described in this section and the chemicals that appear on the full list of TRI chemicals appearing in Section IV.A.

The brief descriptions provided below were taken from the *1993 Toxics Release Inventory Public Data Release* (EPA, 1994), the Hazardous Substances Data Bank (HSDB), and the Integrated Risk Information System (IRIS), both accessed via TOXNET[1]. The information contained below is based upon exposure assumptions that have been made using standard scientific procedures. The effects listed below must be taken in context of these exposure assumptions that are more fully explained within the full chemical profiles in HSDB.

The top 10 chemicals released by the RMPP industry in 2002 were:

1. 1,1-Dichloro-1-Fluoroethane;
2. 1-Chloro-1,1-Difluoroethane;
3. Carbon Disulfide;
4. Dichloromethane;
5. Methanol;
6. Methyl Ethyl Ketone (MEK);
7. Styrene;
8. Toluene;
9. Xylene (Mixed Isomers); and
10. Zinc Compounds.

Some of the health and environmental impacts of several of these chemicals are discussed below.

[1] TOXNET is a computer system run by the National Library of Medicine that includes a number of toxicological databases managed by EPA, the National Cancer Institute, and the National Institute for Occupational Safety and Health. For more information on TOXNET, contact the TOXNET help line at (800) 231-3766. Databases included in TOXNET are: CCRIS (Chemical Carcinogenesis Research Information System), DART (Developmental and Reproductive Toxicity Database), DBIR (Directory of Biotechnology Information Resources), EMICBACK (Environmental Mutagen Information Center Backfile), GENE-TOX (Genetic Toxicology), HSDB (Hazardous Substances Data Bank), IRIS (Integrated Risk Information System), RTECS (Registry of Toxic Effects of Chemical Substances), and TRI (Toxic Release Inventory). HSDB contains chemical-specific information on manufacturing and use, chemical and physical properties, safety and handling, toxicity and biomedical effects, pharmacology, environmental fate and exposure potential, exposure standards and regulations, monitoring and analysis methods, and additional references.

1,1- Dichloro-1-Fluoroethane

Toxicity. Exposure to 1,1-dichloro-1-fluoroethane can have an anesthetic effect on the central nervous system, irritate the eyes, cause asphyxiation and defatting of skin.

Inhaling 1,1-dichloro-1-fluoroethane may cause dizziness, weakness, fatigue, nausea, and headaches. Ingesting of the same may cause gastrointestinal irritation, nausea, vomiting, and diarrhea. Overexposure may result in impaired cardiovascular functions.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. 1,1-dichloro-1-fluoroethane is expected to exist solely as vapor in the ambient atmosphere. Vapor phase 1,1-dichloro-1-fluoroethane will be degraded in the atmosphere by reaction with photochemically produces hydroxyl radicals. It may be partially removed from the atmosphere by rain.

If released to soil, 1,1-dichloro-1-fluoroethane has limited mobility and it may volatilize from dry soil surfaces based on its vapor pressure. Its biodegradability in soil is low. If released in water, it is expected to adsorb moderately to suspended solids and sediment. Its potential for bioconcentration in aquatic organism is low.

Carbon Disulfide

Toxicity. Short-term (acute) exposure of humans to carbon disulfide can cause headache, dizziness, fatigue, and irritation of eye, nose, and throat. Exposure to high concentrations may result in trouble breathing or respiratory failure. Contact with skin can cause severe burns.

Long-term (chronic) exposure to high levels in excess of regulatory standards may result in peripheral nerve damage (involving the nerves that control feet, legs, hands, and arms) and cardiovascular effects. A few studies contend that chronic exposure may also result in potential reproductive effects.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. If released on land, carbon disulfide will be primarily lost to volatilization and it may leach into the ground where it would be expected to biodegrade. The chemical will also volatilize if released to water and does not adsorb to sediment. In air, carbon disulfide reacts with atomic oxygen to produce hydroxyl radicals with half-lives of a few days. Carbon disulfide gas is adsorbed and degraded by soil, which demonstrates that soil may be a natural sink for this chemical. The general population may be exposed to carbon disulfide primarily from ambient air as it is released not only from industrial sources, but also from a wide variety of natural sources.

Methanol

Toxicity. Methanol is readily absorbed from the gastrointestinal tract and the respiratory tract, and is toxic to humans in moderate to high doses. In the body, methanol is converted into formaldehyde and formic acid. Methanol is excreted as formic acid. Observed toxic effects at high-dose levels generally include central nervous system damage and blindness. Long-term exposure to high levels of methanol via inhalation cause liver and blood damage in animals.

Ecologically, methanol is expected to have low toxicity to aquatic organisms. Concentrations lethal to half the organisms of a test population are expected to exceed 1 mg methanol per liter water. Methanol is not likely to persist in water or to bioaccumulate in aquatic organisms.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. Liquid methanol is likely to evaporate when left exposed. Methanol reacts in air to produce formaldehyde, which contributes to the formation of air pollutants. In the atmosphere, it can react with other atmospheric chemicals or be washed out by rain. Methanol is readily degraded by microorganisms in soils and surface waters.

Physical Properties. Methanol is highly flammable.

Methyl Ethyl Ketone (MEK)

Toxicity. Breathing moderate amounts of MEK for short periods of time can cause adverse effects on the nervous system ranging from headaches, dizziness, nausea, and numbness in the fingers and toes to unconsciousness. Its vapors are irritating to the skin, eyes, nose, and throat and can damage the eyes. Repeated exposure to moderate to high amounts may cause liver and kidney effects.

Carcinogenicity. No agreement exists over the carcinogenicity of MEK. One source believes MEK is a possible carcinogen in humans based on limited animal evidence. Other sources believe that there is insufficient evidence to make any statements about possible carcinogenicity.

Environmental Fate. Most of the MEK released to the environment will end up in the atmosphere. MEK can contribute to the formation of air pollutants in the lower atmosphere. It can be degraded by microorganisms living in water and soil.

Physical Properties. MEK is a flammable liquid.

Toluene

Toxicity. Inhalation or ingestion of toluene can cause headaches, confusion, weakness, and memory loss. Toluene may also affect the way the kidneys and liver function.

Reactions of toluene (see environmental fate) in the atmosphere contribute to the formation of ozone in the lower atmosphere. Ozone can affect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

Some studies have shown that unborn animals were harmed when high levels of toluene were inhaled by their mothers, although the same effects were not seen when the mothers were fed large quantities of toluene. Note that these results may reflect similar difficulties in humans.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. The majority of releases of toluene to land and water will evaporate. Toluene may also be degraded by microorganisms. Once volatilized, toluene in the lower atmosphere will react with other atmospheric components contributing to the formation of ground-level ozone and other air pollutants.

Physical Properties. Toluene is a volatile organic chemical.

Xylene (Mixed Isomers)

Toxicity. Xylenes are rapidly absorbed into the body after inhalation, ingestion, or skin contact. Short-term exposure of humans to high levels of xylenes can cause irritation of the skin, eyes, nose, and throat, difficulty in breathing, impaired lung function, impaired memory, and possible changes in the liver and kidneys. Both short- and long-term exposure to high concentrations can cause effects such as headaches, dizziness, confusion, and lack of muscle coordination. Reactions of xylenes (see environmental fate) in the atmosphere contribute to the formation of ozone in the lower atmosphere. Ozone can affect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. The majority of releases to land and water will quickly evaporate, although some degradation by microorganisms will occur.

Xylenes are moderately mobile in soils and may leach into groundwater, where they may persist for several years.

Xylenes are volatile organic chemicals. As such, xylenes in the lower atmosphere will react with other atmospheric components, contributing to the formation of ground-level ozone and other air pollutants.

Zinc Compounds

Toxicity. Zinc is a nutritional trace element; toxicity from ingestion is low. Severe exposure to zinc might give rise to gastritis with vomiting due to swallowing of zinc

dusts. Short-term exposure to very high levels of zinc is linked to lethargy, dizziness, nausea, fever, diarrhea, and reversible pancreatic and neurological damage. Long-term zinc poisoning causes irritability, muscular stiffness and pain, loss of appetite, and nausea. Zinc chloride fumes cause injury to mucous membranes and to the skin. Ingestion of soluble zinc salts may cause nausea, vomiting, and purging.

Carcinogenicity. There is currently no evidence to suggest that this chemical is carcinogenic.

Environmental Fate. Significant zinc contamination of soil is only seen in the vicinity of industrial point sources.

Zinc bioconcentrates in aquatic organisms.

IV.C. Other Data Sources

The Aerometric Information Retrieval System (AIRS) contains a wide range of information related to stationary sources of air pollution, including the emissions of a number of air pollutants that may be of concern within a particular industry. With the exception of VOCs, there is little overlap with the TRI chemicals reported above. Table 12 summarizes annual releases of carbon monoxide (CO), ammonia (NH_3), nitrogen oxides (NO_x), particulate matter of 10 microns or less (PM10), sulfur dioxide (SO_2), and VOCs from the RMPP industry.

Table 12: Pollutant Releases (Short Tons/Years)

Industry	CO	NH_3	NO_X	PM_{10}	SO_2	VOC
U.S. Total	4,200,454	87,445	8,664,338	1,662,730	15,511,867	1,681,011
Metal Mining	7,402	1.4	58,450	26,701	22,308	1,714
Nonmetal Mining	32,729	2,629	16,383	33,540	9,029	6,793
Lumber and Wood Products	160,262	218	62,420	78,592	5,144	106,331
Wood Furniture and Fixtures	5,158	4.3	3,461	7,673	1,771	70,669
Pulp and Paper	499,750	2,339	301,487	115,084	450,669	118,828
Printing	1,346	25	4,030	2,310	3,430	57,119
Inorganic Chemicals	127,815	5,430	58,982	19,573	100,105	13,446
Organic Chemicals	136,885	949	185,159	24,540	130,679	92,594
Petroleum Refining	187,404	15,815	243,757	42,107	417,048	144,252
Rubber and Misc. Plastics Products	**4,240**	**170**	**9,485**	**9,938**	**18,516**	**88,585**
Stone, Clay, Glass, and Concrete	199,381	103	373,658	118,838	268,524	28,859
Iron and Steel	783,961	4,754	108,721	84,416	102,103	42,304
Nonferrous Metals	544,482	176	30,973	28,968	266,104	10,008

Table 12: Pollutant Releases (Short Tons/Year) (Continued)

Industry	CO	NH_3	NO_X	PM_{10}	SO_2	VOC
Fabricated Metals	6,510	83	10,584	9,361	6,770	74,920
Electronics	27533	91	5543	7432	8184	19873
Motor Vehicles, Bodies, Parts, and Accessories	11,514	1,302	10,797	6,299	8,556	81,151
Dry Cleaning	72	4.4	228	62	125	2161

Source: U.S. EPA, National Emission Inventory Database, 1999.

IV.D. Comparison of TRI Between Selected Industries

This subsection compares pollutant release and transfer data across industrial categories. The information gives a general sense as to the relative scale of releases and transfers within each sector profiled under this project. Note that Table 13 does not contain releases and transfers for industrial categories that are not included in this project, and thus cannot be used to draw conclusions regarding the total release and transfer amounts that are reported to TRI. Similar information is available within the annual TRI Public Data Release book.

Figure 20 summarizes the 2002 TRI data in graphical form for the RMPP industry and the other sectors profiled in separate notebooks. The bar graph presents the total TRI releases and total transfers on the left axis and the triangle points show the average releases per facility on the right axis. The graph is based on the data in Table 13 and helps compare the relative amounts of releases and transfers per facility both within and between these sectors. Note, however, that differences in the proportion of facilities captured by TRI exist between industry sectors. This can be a factor of poor SIC matching and relative differences in the number of facilities reporting to TRI from the various sectors. The 2002 TRI data presented for the RMPP industry covers 1,952 facilities. These facilities listed SIC code 30, the RMPP industry, as a primary SIC code.

Figure 20: Summary of 2002 TRI Data: Releases and Transfers by Industry (SIC Code)

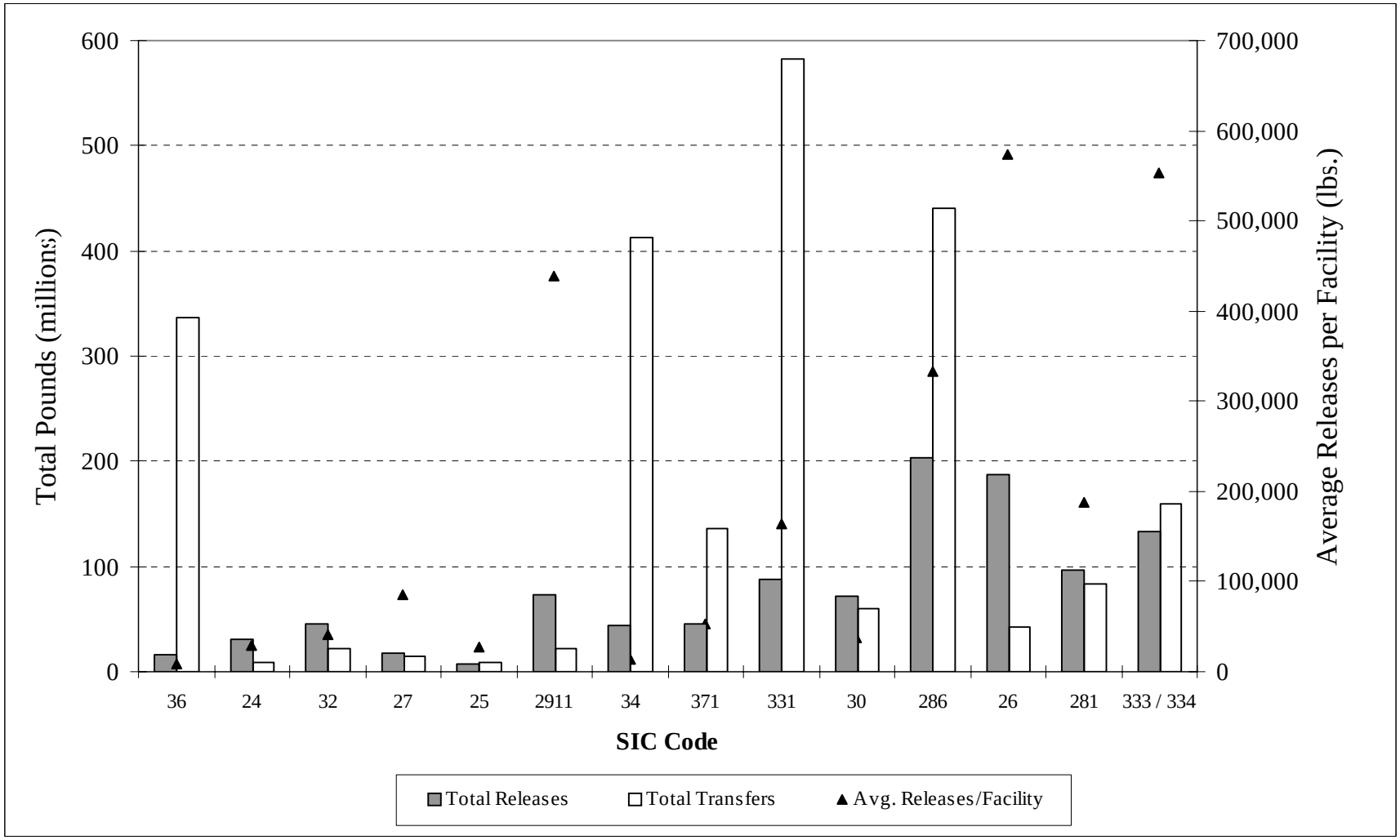

Table 13: Toxic Release Inventory Data for Selected Industries

Industry Sector	SIC Range	# TRI Facilities	Releases		Transfers		Total		Carcinogens	
			Total Releases (10^6 pounds)	Avg. Releases per Facility (pounds)	Total Transfers (10^6 pounds)	Avg. Transfers per Facility (pounds)	Releases + Transfers (10^6 pounds)	Avg. Release+ Transfers per Facility (pounds)	Total Releases (10^6 pounds)	Avg. Releases per Facility (pounds)
Stone, Clay, and Concrete	32	1,124	45.6	40,546	21.4	19,060	67.0	59,606	7.2	6,432
Lumber and Wood Products	24	1,040	30.4	29,202	8.2	7,838	38.5	37,040	7.0	6,770
Furniture and Fixtures	25	284	7.9	27,830	8.4	29,548	16.3	57,379	0.5	1,668
Printing	2711-2789	200	17.2	85,779	15.3	76,343	32.4	162,121	0.05	240
Electronics/Computers	36	1,747	15.5	8,892	336.7	192,724	352.2	201,616	3.2	1,823
Rubber and Misc. Plastics	30	1,952	71.2	36,836	59.4	30,419	131.3	67,255	32.0	16,406
Motor Vehicle, Bodies, Parts and Accessories	371	863	45.2	52,322	135.5	157,029	180.7	209,361	7.8	9,033
Pulp and paper	2611-2631	326	187.2	574,531	42.5	130,347	229.7	704,698	12.3	37,615
Inorganic Chem. Mfg.	2812-2819	518	96.9	187,129	83.5	161,173	180.4	348,301	14.3	27,604
Petroleum Refining	2911	167	73.4	439,439	21.6	129,072	94.9	568,511	4.9	29,341
Fabricated Metals	34	3,098	43.8	14,143	412.8	133,250	456.6	147,393	9.3	3,001
Iron and Steel	3312-3313 3321-3325	534	87.4	163,666	582.8	1,091,406	670.2	1,255,072	24.0	44,918
Nonferrous Metals	333, 334	240	132.6	552,362	159.9	666,350	292.5	1,218,713	35.9	149,389
Organic Chem. Mfg.	2861-2869	610	203.4	333,511	439.8	720,934	643.2	1,054,445	34.5	56,529
Metal Mining	10	Industry sector not subject to TRI reporting								
Nonmetal Mining	14	Industry sector not subject to TRI reporting								
Dry Cleaning	7215, 7216, 7218	Industry sector not subject to TRI reporting								

Source: U.S. EPA, Toxics Release Inventory Database, 2002.

V. POLLUTION PREVENTION OPPORTUNITIES

The best way to reduce pollution is to prevent it in the first place. Some companies have creatively implemented pollution prevention techniques that improve efficiency and increase profits while at the same time minimizing environmental impacts. This can be done in many ways such as reducing material inputs, reengineering processes to reuse by-products, improving management practices, and using substitutes for toxic chemicals. Some smaller facilities are able to get below regulatory thresholds just by reducing pollutant releases through aggressive pollution prevention policies.

To encourage these approaches, this section provides both general and company-specific descriptions of pollution prevention advances that have been implemented within the RMPP industry. While the list is not exhaustive, it does provide information that can be used as the starting point for facilities interested in beginning their own pollution prevention projects. When possible, this section provides information from real activities that can, or are being implemented by this sector - including a discussion of associated costs, time frames, and expected rates of return. This section summarizes information from activities that may be, or are being implemented by this sector. When possible, information is provided that gives the context in which the techniques can be effectively used. Note that the activities described in this section do not necessarily apply to all facilities that fall within this sector. When evaluating pollution prevention options, facilities must carefully consider facility-specific conditions and how each option might affect air, land, and water pollution releases.

V.A. Identification of Pollution Prevention Activities in Use

V.A.1. Plastic

In the miscellaneous plastics products industry, there are substantial pollution prevention options for most environmental concerns including chemical spills, process wastewater (including solvents in wastewater), plastic pellet loss, and plastic product disposal. According to one NEIC inspector, pollution prevention for leaks and spills of chemical additives during compounding or finishing operations can be as simple as covering the chemical containers as often as possible and training employees to properly handle and dispose of chemicals.

Wastewater

The pollution prevention options for process wastewater from the miscellaneous plastics products manufacturing industry are slightly more complex. As discussed in Section III.B.1, wastewater can be divided into three categories: contact cooling and heating water; cleaning water; and finishing water. The technologies identified by EPA as appropriate for contact cooling and heating water are good housekeeping practices and the activated carbon process. The activated carbon process uses activated (powered or granulated) carbon to remove soluble organics from air and water. The organics are removed as they became physically/ chemically attached to the carbon (i.e., adsorbed to the carbon surface). EPA analysis indicates that only one pollutant of concern, BEHP, is present in contact cooling and heating water in treatable concentrations, and the only technology identified to control BEHP is the activated carbon process. To maintain low concentrations of other pollutants currently discharged in

contact cooling and heating water, EPA advises applying good housekeeping practices. For example, routine segregation of raw materials and lubricating oils from the cooling and heating water will keep pollutants not actually generated during the plastic molding and forming operation out of the cooling and heating water.

In cleaning water, the data indicate that there are three conventional pollutants (BOD_5, oil and grease, and TSS), three nonconventional (COD, TOC, and total phenols), and two priority pollutants (phenol and zinc) present in treatable concentrations. For the cleaning water category, EPA proposes pollution prevention technologies based on in-process controls. One control is recycling process water through a sedimentation tank designed to remove the suspended solids so the process water can be reused. The other control is end-of-pipe treatment of the discharge from the recycle unit.

In finishing water, the data indicate that the only pollutants present in treatable concentrations are TSS and three phthalates. The only pollution prevention technology EPA has identified to remove TSS is a settling unit, and the only technology identified to remove phthalates present in finishing water is an activated carbon process.

Pellet Release

The issue of plastic resin pellet loss to the environment during the manufacturing process is being addressed by many manufacturers through participation in "Operation Clean Sweep" (OCS). All participating facilities take measures to minimize spills, promptly and thoroughly clean up spills, and properly dispose of pellets. Such measures include employee education, extra conscientious sweeping efforts, enhanced pellet capture methods, and disposal precautions. Currently, SPI and the American Plastics Council are working together on this industry education project.

Solid Waste Disposal

Miscellaneous plastics products solid waste disposal, as discussed earlier, is a concern because plastics make up a significant portion of the nation's waste stream. The most common pollution prevention method currently used is recycling. Both single plastic resins and mixtures of plastic resins can be recycled, but the end products from mixtures are often lower in quality than those from just one type of resin. Therefore, the success of plastic recycling will depend on the development of technologies to separate mixed plastic into single resins, and on increasing the markets for products made of mixed plastic resins. Although recycling is the most common method of plastic waste pollution prevention, at present, less than one percent of all plastics products are recycled. Only a few plastic consumer items such as soft drink bottles and milk jugs are being recycled on a wide scale in the United States, and food container and cup recycling is just getting started. Enhancing the degradation of plastic has been offered as a solution to both the waste stream and marine environmental problems; however, EPA believes source reduction and recycling will most significantly reduce the impact of plastic in the environment. EPA is conducting a study of substitutes for lead- and cadmium-based additives as a possible pollution prevention action for metal leaching at landfills and metal releases from incinerator ash.

V.A.2. Rubber

As discussed in Section III.B.2, pollution outputs from the rubber products industry occur at many stages of the manufacturing process. Most facilities are reducing these outputs by using the many reasonable and effective pollution prevention options that exist.

Chemicals

The compounding and mixing area of a rubber products manufacturing facility, where dry chemicals are weighed, put into small containers, and loaded into the rubber mixer, is generally a minor source of particulate emissions. Some mixing facilities have practically eliminated particulate emissions by purchasing their chemicals in small preweighed, sealed polyethylene bags. The sealed bags are put directly into the Banbury mixer and the bag itself becomes part of the rubber matrix, thus eliminating this formerly dusty operation. For facilities not purchasing their chemicals in preweighed bags, a variety of other pollution prevention options exist. The following pollution prevention methods have been used by various facilities:

- **Careful Transportation Mechanisms** - Receiving chemicals in closed docks in sealed containers or in bulk rail or truck shipments with a minimal history of spills. Storing chemical piles inside the facility to ensure that any fugitive emissions can be contained within the facility.

- **Sealed Containers** - Providing sealed containers for all open materials. Sealed containers should have air space between the chemical and the container cover to minimize "puffing" losses when the container is opened. Similarly, placing secondary containment mechanisms around all storage containers provides further protection from spills and leaks.

- **Automatic Dispensing** - Utilizing automatic dispensing and weighing equipment whenever possible. Automatic dispensing minimizes waste due to spills from manual dispensing and provides quality control.

- **Reduced Toxic Chemical Usage** - Reducing the use of toxic chemicals via reformulation. Rubber manufacturers continually research opportunities for pollution prevention through product reformulation. However, rubber manufacturers must adhere to stringent product performance requirements. Therefore, pollution prevention opportunities must be balanced with product specifications.

- **Computer Inventories** - Providing computer inventory control methods to minimize the amount of stock purchased.

- **Spills and Sweeping Protocols** - Providing protocols for cleaning up spills and sweeping to ensure the proper segregation of waste.

Wastewater

Contaminated wastewater is another pollution concern at many rubber products manufacturing facilities. All but the largest rubber products manufacturing facilities participate in wastewater pretreatment programs with local POTWs. Many plants meet pretreatment standards without treating their wastewater. Some facilities, however, require solids settling, pH adjustment, or oil removal. To address the wastewater issue, many facilities have implemented water reuse and recycling programs. Options for wastewater reuse and recycling include installing a closed-loop water cooling or heating system. Another problem is that wastewater is often contaminated by oil and grease. To prevent spilling and leaking waste oil and grease, which contaminates wastewater, EPA suggests the following pollution prevention methods:

- **Substituting lubricating grease for oil, especially for milling equipment.** Grease has been shown to reduce substantially the amount of manifested waste.

- **Performing preventive maintenance of processing, molding, and curing equipment.** Such practices can further reduce the volume of manifested oil and grease waste by reducing waste from worn seals and gaskets.

- **Removing oil from oily wastewaters prior to disposal to reduce the volume of wastewater disposal.** For instance, oily wastewaters collected from equipment engine pits could be routed through a centrally located oil/water separator prior to discharge.

Spent Solvents

Spent solvents known to contribute to ozone depletion is not a problem in rubber products manufacturing facilities. A major initiative by the rubber products industry to eliminate ozone-depleting chemicals in 1994 and early 1995 resulted in many innovative spent solvent pollution prevention activities. Among the accomplishments were replacing solvent cleaning applications with high pressure water systems, using caustic cleaning solutions, and substituting old solvents with cleaner, citrus-based solvents. Many mold release compounds, coatings, and adhesives that formerly used ozone-depleting chemicals as carriers were reformulated to eliminate the offending chemicals. In some cases, process changes directly eliminated the chemicals of concern. Most rubber products are now free from having been manufactured with ozone-depleting chemicals.

Disposal

A significant issue in the rubber products industry is the disposal of waste rubber. To prevent the improper disposal of scrap rubber, facilities can segregate and recycle rubber wastes. Properly segregating waste streams may be as simple as placing a screen over part of the molding equipment so that waste rubber stock produced during preforming operations can be segregated from the oily wastewaters and recycled back into the process. Other segregation processes may include separating cured from uncured rubber, and recycling the uncured portion back into the process.

Reclaiming and recycling cured, off-specification rubber is also a waste minimization option. Reprocessing rubber involves taking used rubber products and processing them in a manner such that they can be incorporated into virgin rubber compounds.

Scrap rubber that cannot be recycled within the manufacturing process is being used in the following manner:

- Adding it to coal and wood waste fuels for firing process boilers;
- Making it into sheets and various shapes to use as athletic area surfaces and other floor coverings;
- Making it into sheet gasket material; and
- Making it into loading dock bumpers.

An important factor that limits recycling post-consumer and post-production scrap into products is the increased performance requirements of the materials. Automobile components are continuously being designed for greater endurance (e.g., automobiles capable of 150,000 miles without maintenance or a tune-up). Such performance standards require manufacturers to use high-purity chemicals and quality, precision manufacturing processes. These rubber products, whether they are tires, belts, hoses, motor mounts, gaskets, or seals, turn out to be highly engineered entities with strict quality standards. Introducing used, off-specification, or unknown quality ingredients into the dynamically stressed, high-performance rubber product can be a problem. As a result, recycling of the post-consumer and post-production waste applies to materials used in less demanding applications.

To better understand how much waste is being produced by their facility in comparison to other facilities, many rubber product manufacturers are monitoring waste indices (i.e., pounds of waste per 100 pounds of product) with the goal of continuously reducing the index. Index criteria include the following:

- Total pounds of nonrecyclable waste shipped off site per 100 pounds of product; and
- Total pounds of solid and hazardous water generated per 100 pounds of product.

V.A.3. Tires

All of the pollution prevention options discussed in Section V.A.2 also apply to tire production. In addition, the two pollution issues that apply specifically to the tire industry are VOC and HAP emissions from the building and assembly process and scrap tire disposal.

Volatile Organic Compound Emissions

In terms of pollution prevention for VOC and HAP emissions from tire cementing and spraying operations, the EPA NESHAP requires 99 percent reduction in the amount of HAP

use in the solvents and cements used in the tire manufacturing industry. This requirement also applies to retread and recapping industries. The primary recommendation is eliminating or substituting the HAPs used in the solvents and cements. Many of the major manufacturers have begun eliminating all solvents and cements from the tire building process as the compatibility of the rubber compound components allows for adhesion without the solvent and cement aides. Some capture and control technologies for undertread cementing operations, tread end-cementing operations, bead cementing operations, and green tire spraying operations where organic solvent-based sprays are used. Most of the major tire manufacturing plants in the United States commonly use silicone and water-based sprays for green tire spraying operations (i.e., any green tire spray that contains 12 percent or less, by weight, of VOC as sprayed) or organic solvent-based sprays.

Scrap Tires

While not technically a "pollution" output from the tire manufacturing process, scrap tire disposal has been a big waste disposal issue in the United States. Recently, legislation and initiatives have been finding innovative ways to address this issue. The RMA is leading the effort to find and expand markets for the environmentally and economically sound uses of scrap tires. According to the RMA, in 2001, an estimated 78 percent of the 281 million tires scrapped annually were utilized in a positive manner. This represents a 50-percent increase of scrap tire use since 1994, and more than a seven-fold increase since 1990. The principal use of scrap tires is as a fuel and fuel supplement in a variety of utility and industrial applications. Other major uses include ground rubber as an additive to asphalt paving materials, whole and processed tire uses in civil engineering, and utilization of cut, split, and ground tires in new products. In addition, approximately 33 million passenger and light duty truck tires are recycled (i.e., recapped for resale each year). The tires not utilized are landfilled or stockpiled.

In 2001, 115 million tires were used in energy recovery. Civil engineering utilized nearly 20 million tires and paving utilized 15 million tires. The equivalent of 8 million tires were used to manufacture various new products. Table 14 shows the trends in the number of scrap tires used in various capacities.

Table 14: Scrap Tire Usage

Scrap Tire Uses (Millions of Units)						
	1990	**1992**	**1994**	**1996**	**1998**	**2001**
Fuel	24.5	57	101	115	114	115
Ground Rubber	0.0	5.0	1.5	7.5	7	21
Paving	N/A	N/A	3	5	8	12
Civil Engineering	N/A	5	9	10	20	40
Products	N/A	N/A	8	8	8	8
Other	N/A	1	16	19	20.5	22
Total Usage	**24.5**	**68**	**138.5**	**164.5**	**177.5**	**218**

Source: RMA U.S. Scrap Tire Markets 2001.
N/A - Not available.

The first line of defense against increasing scrap tire numbers is tire retreading. The figures presented in Table 14 do not include retreaded tires because tire casings that are capable of being retreaded are not, by definition, scrap tires. Only tires that can no longer be used for their original intended purpose, even if retreaded, are considered scrap tires.

The Federal Government is working to identify and implement pollution prevention strategies to decrease the number of scrap tires and the economic and environmental problems that accompany scrap tire disposal. If the retread markets could be developed so that all passenger and light truck tires suitable for retreading were actually retreaded, approximately 20 million fewer new replacement tires would be needed annually. This would reduce the number of scrap tires generated per year by almost 10 percent.

As of January 1991, 36 states regulated scrap tires as a form of waste, up from only one state in 1985. Twenty-four states have final regulations in place that address storage of tires; typical provisions include requiring permits for tire piles over a certain size and requiring fire lanes in large tire piles. Funds may also be used to provide grants or loans to entrepreneurs who are recycling tires or incinerating them for energy recovery. At least four states (Oregon, Wisconsin, Utah, and Oklahoma) have developed rebate systems for scrap tires in which users of scrap tires are paid rebates of one cent per pound or more for recycling tires or burning them for energy recovery.

Additional Initiatives to Improve Environmental Performance Within the RMPP Industry

Many dry chemicals are purchased in sealed preweighed poly-logs that can be put directly into the manufacturing process, thus eliminating fugitive emission. Fluorescent lamps and pressurized spray cans are managed to minimize adverse impact on the environment. Also, packaging materials are being reduced, returnable containers are being used, and waste oil recycled. General production improvements include upgrading and adding plant ventilation systems, which provides cleaner air in the workplace, improving solvent application efficiency to decrease the amount of solvents needed, using more efficient coating equipment that speeds the production process, and refining preventive maintenance programs that often virtually eliminate unplanned shutdowns. Solvent use in the rubber industry has been reduced through the development of water-based adhesives and coatings and astute raw material substitution.

Enhanced personnel training, product substitution, and process alternations have reduced the amount of hazardous waste generated. The recycling of paper, wood, skids, plastic shrink wrap, cardboard, cord, wire, fabric, and white office paper has increased. Some manufacturing plants have reduced wastewater discharges by installing closed-loop water cooling systems. Some manufacturing plants have removed their underground storage tanks (USTs) and replaced them with aboveground tanks that are easier to monitor for leaks.

VI. SUMMARY OF FEDERAL STATUTES AND REGULATIONS

This section discusses the federal regulations that may apply to the RMPP sector. The purpose of this section is to highlight and briefly describe the applicable federal requirements, and to provide citations for more detailed information. The three following subsections are included:

- Section VI.A contains a general overview of major statutes;
- Section VI.B lists regulations specific to this industry; and
- Section VI.C lists pending and proposed regulatory requirements.

The descriptions in Section VI are intended solely for general information. Depending upon the nature or scope of the activities at a particular facility, these summaries may or may not necessarily describe all applicable environmental requirements. Moreover, they do not constitute formal interpretations or clarifications of the statutes and regulations. For example, some facilities in the RMPP industry are co-located with facilities that manufacture the plastic resins used by the RMPP industry. The resin manufacturing facilities have additional regulatory requirements. These requirements can be found in the Profile of the Plastic Resins and Man-made Fibers Industry located at: http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/ and on EPA's Air Toxics website for National Emission Standards for Hazardous Air Pollutants located at: http://www.epa.gov/ttn/atw/mactfnlalph.html. For further information, consult the Code of Federal Regulations and other state or local regulatory agencies. EPA Hotline contacts are also provided for each major statute.

To search the CFR, go to the Electronic Code of Federal Regulations (e-CFR) at http://www.gpoaccess.gov/ecfr/. The e-CFR consists of two linked databases: the "current Code" and "amendment files." The Office of Federal Register updates the current Code database according to the effective dates of amendments published in the *Federal Register*. The *Federal Register* is the official daily publication for rules, proposed rules, and notices of federal agencies and organizations, as well as executive orders and other presidential documents. The *Federal Register* can be searched at http://www.gpoaccess.gov/fr/index.html.

VI.A. General Description of Major Statutes

The RMPP industry is affected by multiple federal environmental statutes. In addition, the industry is subject to numerous laws and regulations from state, tribal, and local governments designed to protect and improve the nation's health, safety, and environment. Table 15 summarizes the major federal regulations affecting air, water, and waste outputs from the RMPP industry.

Table 15: Summary of Potentially Applicable EPA Regulations

Water Programs (CWA and SWDA)	
40 CFR Part 112	Oil Pollution Prevention
40 CFR Part 122	EPA-administered Permit Programs: The National Pollutant Discharge Elimination System
40 CFR Part 141	National Primary Drinking Water Regulations
40 CFR Part 142	National Primary Drinking Water Regulations Implementation
40 CFR Part 143	National Secondary Drinking Water Regulations
40 CFR Part 144	Underground Injection Control ("UIC") Program
40 CFR Part 145	State UIC Program Requirements
40 CFR Part 146	UIC Program: Criteria and Standards
40 CFR Part 147	State UIC Programs
40 CFR Part 148	Hazardous Waste Injection Restrictions
40 CFR Part 403	General Pretreatment Regulations for Existing and New Sources of Pollution
Solid and Hazardous Wastes (RCRA)	
40 CFR Part 260	Hazardous Waste Management System
40 CFR Part 261	Identification and Listing of Hazardous Waste
40 CFR Part 262	Standards Applicable to Generators of Hazardous Waste
40 CFR Part 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR Part 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR Part 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR Part 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR Part 268	Land Disposal Restrictions
40 CFR Part 273	Standards for Universal Waste Management
40 CFR Part 279	Standards for the Management of Used Oil
40 CFR Part 280	Technical Standards and Corrective Requirements for Owners and Operators of Underground Storage Tanks (USTs)
Hazardous Substances and Chemicals, Environmental Response, Emergency Planning, and Community Right-to-Know Programs (CERCLA and EPCRA)	
40 CFR Part 302	Designation, Reportable Quantities, and Notification
40 CFR Part 355	Emergency Planning and Notification
40 CFR Part 370	Hazardous Chemical Reporting: Community Right-to-Know
40 CFR Part 372	Toxic Chemical Release Reporting: Community Right-to-Know

Table 16: Summary of Applicable EPA Regulations (Continued)

Air Programs (CAA)	
40 CFR Section 52.21	Prevention of Significant Deterioration of Air Quality
40 CFR Part 60	Standards of Performance for New Stationary Sources
40 CFR Part 61	National Emission Standards for Hazardous Air Pollutants, Subpart M, National Emission Standard for Asbestos
40 CFR Part 63	National Emission Standards for Hazardous Air Pollutants for Source Categories (all applicable provisions)
40 CFR Part 68	Chemical Accident Prevention Provisions
40 CFR Part 70	State Operating Permit Programs
40 CFR Part 82	Protection of Stratospheric Ozone
All applicable provisions of State Implementation Plan Regulations (promulgated pursuant to Section 110 of the Clean Air Act) including the New Source Review regulations	
Toxic Substances (TSCA)	
40 CFR Part 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
40 CFR Part 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR Part 763	Asbestos
Pesticide Programs (FIFRA)	
40 CFR Part 160	Good Laboratory Practice Standards
40 CFR Part 162	State Registration of Pesticide Products
40 CFR Part 170	Worker Protection Standard
40 CFR Part 171	Certification of Pesticide Applicators
40 CFR Part 172	Experimental Use Permits

Note that, in the RMPP industry, compliance with environmental regulations may be handled in many different ways. Though ideally all employees should help comply, official responsibility could lie at the corporate level, it could lie within the RMPP facility as either a centrally or non-centrally organized activity, or it could be part of a function for vendored-out services. EPA observes that the organizations that successfully achieve compliance engage all or many employees in the various facility operations.

Clean Water Act

The primary objective of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. Pollutants regulated under the CWA are classified as either “toxic” pollutants; “conventional” pollutants, such as BOD, TSS, fecal coliform, oil and grease, and pH; or “nonconventional” pollutants, including any pollutant not identified as either conventional or priority.

The CWA regulates both direct and indirect dischargers (those who discharge to POTWs). The National Pollutant Discharge Elimination System (NPDES) permitting program (CWA section 402) controls direct discharges into navigable waters. Direct discharges or "point source" discharges are from sources such as pipes and sewers. NPDES permits, issued by either EPA or an authorized state (EPA has authorized 43 states and one territory to administer the NPDES program), contain industry-specific, technology-based and water-quality-based limits and establish pollutant monitoring and reporting requirements. A facility that proposes to discharge into the nation's waters must obtain a permit prior to initiating a discharge. A permit applicant must provide quantitative analytical data identifying the types of pollutants present in the facility's effluent. The permit will then set forth the conditions and effluent limitations under which the facility may discharge.

Water-quality-based discharge limits are based on federal or state water quality criteria or standards that were designed to protect designated uses of surface waters, such as supporting aquatic life or recreation. These standards, unlike the technology-based standards, generally do not take into account technological feasibility or costs. Water quality criteria and standards vary from state to state and site to site, depending on the use classification of the receiving body of water. Most states follow EPA effluent guidelines, which propose aquatic life and human health criteria for many of the 126 priority pollutants.

As stated in Section I of this document, wastewater sources for RMPP facilities include heating, cooling, cleaning, and finishing process waters as well as stormwater. The RMPP industry is subject to various provisions of the CWA including:

- **Wastewater Discharges**: NPDES effluent limitations and guidelines for direct dischargers and general pretreatment standards.

- **Stormwater Permits**: Municipal separate storm sewer systems (MS4), such as those from RMPP facilities, and construction activities are subject to stormwater permitting requirements.

- **Oil Pollution Prevention Requirements**: RMPP facilities that have aboveground oil storage capacity exceeding 660 gallons individually or 1,320 gallons total or an underground storage capacity exceeding 42,000 gallons are subject to spill prevention control and countermeasure (SPCC) plan requirements.

Wastewater Discharges

As stated above, the water regulations establish different permitting programs for direct and indirect wastewater discharges. Most facilities in the RMPP industry are indirect dischargers.

- **Indirect Dischargers:** RMPP facilities that are indirect dischargers are subject to regulations by the local sewer authority. At present, approximately 1,500 of the nation's largest municipalities are required to implement industrial pretreatment programs that include issuing industrial

user permits to significant industrial users. Some municipalities have determined RMPP facilities to be significant industrial users.

Federal pretreatment regulations prohibit discharges of fire or explosion hazards; corrosive discharges (pH < 5.0); solid or viscous pollutants; heat (in amounts that cause the treatment plant influent to exceed 104 degrees F); pollutants that cause toxic gases, fumes, or vapors; and any other pollutant (including oil and grease) that will interfere with or pass through the treatment plant.

- **Direct Dischargers:** Facilities that directly discharge process and sewer wastes must be permitted (i.e., obtain a permit) for any point source discharge of pollutants to waters of the United States. These permits are issued either by U.S. EPA or the state, where the state has been authorized to implement the NPDES permit program. The federal regulations establish the permit application and permit requirements. Specific numeric limitations that apply to a RMPP facility depend on the receiving stream of the discharge. EPA Regional pretreatment coordinators can provide detailed information on numeric limitations. Contact information can be found at the following web site: http://cfpub.epa.gov/npdes contacts.cfm?program_id=3&type=REGION/.

Stormwater Discharges

EPA's NPDES web site http://cfpub.epa.gov/npdes provides technical and regulatory information about the NPDES) permit program. The stormwater program is part of the NPDES program and is designed to prevent the discharge of contaminated stormwater into navigable waters http://cfpub.epa.gov/npdes/home.cfm?program_id=6

EPA promulgated Phase I of the stormwater program in 1990 and applied it to medium and large municipal separate storm sewer systems (MS4), certain industrial facilities, and any construction activity disturbing greater than 5 acres (large construction sites).

The Agency promulgated Phase II of the stormwater program in 1999; Phase II applies to small municipal separate storm sewer systems (MS4) and construction activity greater than 1 acre and less than 5 acres (small construction sites).

The term MS4 does not solely refer to municipally owned storm sewer systems, but rather has a much broader application that can include, in addition to local jurisdictions, state departments of transportation, universities, local sewer districts, hospitals, military bases, and prisons. A MS4 also is not always just a system of underground pipes - it can include roads with drainage systems, gutters, and ditches. RMPP facilities in urban areas should consult with their state NPDES authority to evaluate whether a permit authorization is required.

The regulatory definition of an MS4 is provided in 40 CFR 122.26(b)(8). General stormwater information can be found at http://cfpub.epa.gov/npdes/home.cfm?program_id=6 and the Stormwater Phase II Compliance Assistance Guide, at http://www.epa.gov/npdes/pubs/comguide.pdf.

EPA's Office of Water operates a Water Resource Center with a 24-hour voice mail system for publication orders or reference questions at (202) 566-1729 (e-mail address: center.water-resource@epa.gov). Long-distance callers in the United States may also use the Wetlands Helpline ((800) 832-7828), operating weekdays from 8:30 a.m. to 4:30 p.m., EST, excluding federal holidays. Visit the Office of Water web site (http://www.epa.gov/OW/index.html) and the NPDES web site (http://cfpub.epa.gov/npdes/) for additional material.

Wetlands

Wetlands, commonly called swamps, marshes, fens, bogs, vernal pools, playas, and prairie potholes, are a subset of "waters of the United States," as defined in Section 404 of the CWA. The placement of dredge and fill material into wetlands and other water bodies (i.e., waters of the United States) is regulated by the U.S. Army Corps of Engineers (Corps) under 33 CFR Part 328. The Corps regulates wetlands by administering the CWA Section 404 permit program for activities that impact wetlands. EPA's authority under Section 404 includes veto power of Corps permits, authority to interpret statutory exemptions and jurisdiction, enforcement actions, and delegating the Section 404 program to the states.

The EPA Wetlands Helpline ((800) 832-7828, or (202) 566-1730 for international calls) provides information and referral services on wetland topics (e-mail address: wetlands.helpline@epa.gov). The helpline operates weekdays from 8:30 a.m. to 4:30 p.m., EST, excluding federal holidays. Visit the Office of Water Wetlands web site at http://www.epa.gov/owow/wetlands/ for additional material.

Oil Pollution Prevention Regulation

Section 311(b) of the CWA prohibits the discharge of oil, in such quantities as may be harmful, into the navigable waters of the United States and adjoining shorelines. The EPA Discharge of Oil regulation, 40 CFR Part 110, provides information regarding these discharges. The Oil Pollution Prevention regulation, 40 CFR Part 112, under the authority of Section 311(j) of the CWA, requires regulated facilities to prepare and implement spill prevention, control, and countermeasure (SPCC) plans. The intent of an SPCC plan is to prevent the discharge of oil from onshore and offshore non-transportation-related facilities. In 1990, Congress passed the Oil Pollution Act (OPA), which amended Section 311(j) of the CWA to require facilities, that because of their location could reasonably be expected to cause "substantial harm" to the environment by a discharge of oil, to develop and implement Facility Response Plans (FRP). The intent of an FRP is to provide for planned responses to discharges of oil.

A facility is SPCC-regulated if the facility, due to its location, could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines, and the facility meets one of the following criteria regarding oil storage: (1) the capacity of any aboveground storage tank exceeds 660 gallons, or (2) the total aboveground storage capacity exceeds 1,320 gallons, or (3) the underground storage capacity exceeds 42,000 gallons. When determining facility capacity, the following exemptions apply:

- Completely buried tanks subject to the Underground Storage Tank rules;
- Containers with less than 55-gallon capacity;

- Wastewater treatment facilities; and
- Permanently closed tanks.

40 CFR Part 112.7 contains the format and content requirements for an SPCC plan. In New Jersey, SPCC plans can be combined with discharge prevention, containment, and countermeasures plans, required by the state, provided there is an appropriate cross-reference index to the requirements of both regulations at the front of the plan.

According to the FRP regulation, a facility can cause "substantial harm" if it meets one of the following criteria: (1) the facility has a total oil storage capacity greater than or equal to 42,000 gallons and transfers oil over water to or from vessels; or (2) the facility has a total oil storage capacity greater than or equal to one million gallons and meets any one of the following conditions: (i) does not have adequate secondary containment, (ii) a discharge could cause "injury" to fish and wildlife and sensitive environments, (iii) shut down a public drinking water intake, or (iv) has had a reportable oil spill greater than or equal to 10,000 gallons in the past five years. Appendix F of 40 CFR Part 112 contains the format and content requirements for an FRP. FRPs that meet EPA's requirements can be combined with U.S. Coast Guard FRPs or other contingency plans, provided there is an appropriate cross-reference index to the requirements of all applicable regulations at the front of the plan.

For additional information regarding SPCC plans, contact EPA's RCRA, Superfund, and EPCRA Call Center, at (800) 424-9346 (or e-mail at epacallcenter@bah.com). Additional documents and resources can be obtained from the call center's homepage at http://www.epa.gov/epaoswer/hotline. The call center operates weekdays from 9:00 a.m. to 5:00 p.m., EST, excluding federal holidays. Visit EPA's Oil Program web site (http://www.epa.gov/oilspill/index.htm) for further material.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) mandates that EPA establish regulations to protect human health from contaminants in drinking water. The law authorizes EPA to develop national drinking water standards and to create a joint federal-state system to ensure compliance with these standards. The SDWA also directs EPA to protect underground sources of drinking water by controlling underground injection of fluid wastes.

EPA has developed primary and secondary drinking water standards under its SDWA authority. EPA and authorized states enforce the primary drinking water standards, which are contaminant-specific concentration limits that apply to certain public drinking water supplies. Primary drinking water standards consist of maximum contaminant level goals (MCLGs), which are nonenforceable health-based goals, and maximum contaminant levels (MCLs), which are enforceable limits set generally as close to MCLGs as possible, considering cost and feasibility of attainment.

Part C of the SDWA mandates EPA to protect underground sources of drinking water from inadequate injection practices. EPA has published regulations codified at 40 CFR Parts 144 to 148 to comply with this mandate. The Underground Injection Control (UIC) regulations break down injection wells into five different types, depending on the fluid injected and the formation that receives it. The regulations also include construction, monitoring, testing,

and operating requirements for injection well operators. All injection wells have to be authorized by permit or by rule depending on their potential to threaten Underground Sources of Drinking Water. RCRA also regulates hazardous waste injection wells, and a UIC permit is considered to meet the requirements of a RCRA permit. EPA has authorized delegation of the UIC for all well classes in 34 states, implements the program in 10 states and all Native American lands, and shares responsibility with 6 states.

The SDWA also provides for a federally implemented Sole Source Aquifer program, which prohibits federal funds from being expended on projects that may contaminate the sole or principal source of drinking water for a given area, and for a state-implemented Wellhead Protection program, designed to protect drinking water wells and drinking water recharge areas.

The SDWA Amendments of 1996 require states to develop and implement source water assessment programs (SWAP) to analyze existing and potential threats to the quality of the public drinking water throughout the state. Every state is required to submit a program to EPA and to complete all assessments within 3½ years of EPA approval of the program. SWAP include: (1) delineating the source water protection area, (2) conducting a contaminant source inventory, (3) determining the susceptibility of the public water supply to contamination from the inventory's sources, and (4) releasing the results of the assessments to the public.

EPA's Safe Drinking Water Hotline, at (800) 426-4791 (or (703) 412-3330 for local and international calls), answers questions and distributes guidance pertaining to SDWA standards (e-mail: hotline-sdwa@epa.gov). The Hotline operates from 9:00 a.m. to 5:00 p.m., EST, excluding federal holidays. Visit the web site at http://www.epa.gov/ogwdw for additional material.

Resource Conservation and Recovery Act

The Solid Waste Disposal Act (SWDA), as amended by the RCRA of 1976, addresses solid and hazardous waste management activities. The Act is commonly referred to as RCRA. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs USTs.

Although RCRA is a federal statute, many states administer the RCRA hazardous waste program in lieu of the federal program. Currently, EPA has authorized 48 of the 50 states and two U.S. territories to administer various provisions of RCRA Subtitle C. States must have regulations consistent with and at least as stringent as the federal program; some states have additional reporting requirements. RMPP facilities should contact their state or tribal authority to determine which state or tribal requirements apply to their business. RCRA does not enable EPA to authorize tribal hazardous waste programs in lieu of the federal program; therefore, EPA directly implements RCRA hazardous waste programs in Indian country, but tribes may have their own, independent hazardous waste programs.

RCRA assigns each hazardous waste reporting facility a generator status. Reporting requirements are different for each generator type. Hazardous waste generators are divided into three categories, according to how much they generate in a calendar month:

- **Large Quantity Generators** (LQG) generate greater than or equal to 1,000 kg (approximately 2,200 lbs) of hazardous waste per month, or greater than 1 kg (approximately 2.2 lbs) of acutely hazardous waste per month. EPA considers acute hazardous wastes the P-listed wastes. If facilities generate more than 1 kg (approximately 1 quart) of acutely hazardous waste, then they are LQGs and must comply with all LQG reporting requirements.

- **Small Quantity Generators** (SQG) generate greater than 100 kg (approximately 220 lbs) but less than 1,000 kg of hazardous waste per month and/or less than 1 kg (approximately 2.2 lbs) of acutely hazardous waste per month.

- **Conditionally Exempt Small Quantity Generators** (CESQG) generate less than or equal to 100 kg of hazardous waste per month, and less than or equal to 1 kg of acutely hazardous waste per month. Not all states recognize the CESQG class.

- **Large Quantity Handler of Universal Waste** store greater than 5,000 kg of universal waste on site.

- **Small Quantity Handler of Universal Waste** store less than 5,000 kg or about 11,000 lbs of universal waste (all types combined) on any given day during the calendar year.

Regulations promulgated pursuant to Subtitle C of RCRA (40 CFR Parts 260-299) establish a "cradle-to-grave" system governing hazardous waste from the point of generation to disposal. RCRA defines hazardous waste as a subset of solid waste. Solid waste is defined as garbage, refuse, sludge, or other discarded material (including solids, semisolids, liquids, and contained gaseous materials). Once a waste is considered solid waste, facilities must determine if it is hazardous waste. RCRA hazardous wastes include the specific materials listed in the regulations (discarded commercial chemical products, designated with the code "P" or "U"; hazardous wastes from specific industries/sources, designated with the code "K"; or hazardous wastes from nonspecific sources, designated with the code "F") or materials that exhibit a hazardous waste characteristic (ignitability, corrosivity, reactivity, or toxicity and designated with the code "D").

Subtitle C permits are required for treatment, storage, or disposal facilities. These permits contain general facility standards such as contingency plans, emergency procedures, recordkeeping and reporting requirements, financial assurance mechanisms, and unit-specific standards. RCRA also contains provisions (40 CFR Subparts I and S) for conducting corrective actions that govern the cleanup of releases of hazardous waste or constituents from solid waste management units at RCRA treatment, storage, or disposal facilities.

Entities that generate hazardous waste are subject to Federal standards applicable to generators of hazardous waste (e.g., hazardous waste manifest, pre-transportation, recordkeeping and reporting, etc). Storage of hazardous waste generally requires a permit under RCRA hazardous waste regulations, but provisions under RCRA do allow generators to

"accumulate" hazardous waste on site without a permit or interim status as long as they comply, among other things, with the technical standards for the containment unit(s). The length of time a generator is allowed to accumulate hazardous waste on site without a permit or interim status depends on the generator's classification. For instance, Large Quantity Generators may accumulate any quantity on-site for 90 days or less without a permit or interim status. Small Quantity Generators may accumulate no more than 6,000 kg of hazardous waste without a permit or interim status for 180 days or less (or for 270 days or less depending on transport distance). CESQGs may accumulate 1,000 kg of waste, 1kg acute waste, or 100 kg residue or contaminated soil from a cleanup of an acute hazardous waste spill. Generators also may treat hazardous waste in accumulation tanks or containers (in accordance with the requirements of 40 CFR Part 262.34) without a permit or interim status. Facilities that treat, store, or dispose of hazardous waste generally are required to obtain a RCRA permit.

Generator status is determined by calendar month; therefore, one month a facility may be a CESQG, and the rest of the year it may be an SQG. In this case, it might be easier to comply with SQG reporting requirements for consistency. On the other hand, if the facility is usually an SQG, a store room or laboratory cleanout might push it into being an LQG. In exceptional cases like this when it is a one time occurrence, some states have made exceptions so that the cleanout does not trigger LQG status.

Generators "count" the amount of waste generated, by adding up the total weight of all quantities of characteristic and listed waste generated at a particular facility. Certain wastes, such as those that are reclaimed or recycled continuously on site, are not counted under the federal regulations but might be counted under some state regulations.

Most RCRA requirements are not industry-specific but apply to any company that generates, transports, treats, stores, or disposes of hazardous waste. Below are some important RCRA regulatory requirements:

- **Criteria for Classification of Solid Waste Disposal Facilities and Practices** (40 CFR Part 257) establish the criteria for determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment. The criteria were adopted to ensure nonmunicipal, nonhazardous waste disposal units that receive CESQG waste do not present risks to human health and environment.

- **Criteria for Municipal Solid Waste Landfills** (40 CFR Part 258) establish minimum national criteria for all municipal solid waste landfill units, including those that are used to dispose of sewage sludge.

- **Identification of Solid and Hazardous Wastes** (40 CFR Part 261) establishes the standard to determine whether the material in question is considered a solid waste and, if so, whether it is a hazardous waste or is exempted from regulation.

- **Standards for Generators of Hazardous Waste** (40 CFR Part 262) establishes the responsibilities of hazardous waste generators including obtaining an EPA identification number, preparing a manifest, ensuring

proper packaging and labeling, meeting standards for waste accumulation units, and recordkeeping and reporting requirements. Generators can accumulate hazardous waste on site for up to 90 days (or 180 days depending on the amount of waste generated) without obtaining a permit.

- **Land Disposal Restrictions** (LDRs) (40 CFR Part 268) prohibit the disposal of hazardous waste on land without prior treatment. Under the LDR program, materials must meet treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Generators of waste subject to the LDRs must provide notification of such to the designated TSD facility to ensure proper treatment prior to disposal.

- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of used oil. For parties that merely generate used oil, regulations establish storage standards. A party considered a used oil processor, re-refiner, burner, or marketer (one who generates and sells off-specification used oil directly to a used oil burner) must meet additional tracking and paperwork requirements.

  RCRA contains unit-specific standards for all units used to store, treat, or dispose of hazardous waste, including **Tanks and Containers**. Tanks and containers used to store hazardous waste with a high volatile organic concentration must meet emission standards under RCRA. Regulations (40 CFR Part 264-265, Subpart CC) require generators to test the waste to determine the concentration of the waste, to satisfy tank and container emissions standards, and to inspect and monitor regulated units. These regulations apply to all facilities that store such waste, including large quantity generators accumulating waste prior to shipment off site.

- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substances are regulated under Subtitle I of RCRA. Subtitle I regulations (40 CFR Part 280) contain tank design and release detection requirements, as well as financial responsibility and corrective action standards for USTs. The UST program also includes upgrade requirements for existing tanks that were to be met by December 22, 1998.

- **Boilers and Industrial Furnaces** (BIFs) that use or burn fuel containing hazardous waste must comply with design and operating standards. BIF regulations (40 CFR Part 266, Subpart H) address unit design, provide performance standards, require emissions monitoring, and, in some cases, restrict the type of waste that may be burned.

Some wastes have special exclusions for practices that are not considered to be hazardous, as determined by federal policy. Several exclusions and exemptions pertain specifically to RMPP facilities. Keep in mind that some states do not recognize the federal exclusions. Some federal exclusions that are relevant to RMPP facilities are listed below:

- **Domestic Sewage Exclusion**. Mixtures of domestic sewage and other wastes that discharge to a sewer system and then to a POTW for treatment are excluded from the definition of solid waste. For example, an employee may generate a hazardous waste by washing hands with a soap containing listed hazardous waste. The mixture will be going through a POTW; therefore, it is excluded from the facility's hazardous waste "count." Generators need to contact their local POTW for prior approval. Note that wastes must actually reach the POTW to be covered by this exclusion. Waste that volatilizes in the drain or corrodes the pipes does not reach the POTW.

- **Point Source Exclusions**. Point source discharges of industrial waste waters that are subject to regulation under Section 402 of the CWA are excluded from the definition of solid waste.

- **Wastewater Treatment Unit**. Any hazardous waste tank system used to store or treat the wastewater that is managed at an on-site wastewater treatment facility with an NPDES permit or that discharges to a POTW is exempt from the RCRA regulations. Most RMPP facilities do not perform this type of wastewater treatment but instead perform elementary neutralization, discussed below.

- **Elementary Neutralization Unit**. Tanks used for neutralizing waste that is hazardous solely because of its corrosive characteristic are excluded from the permitting requirements.

- **De Minimis Exclusion**. Small quantities of some solvents and other chemicals are exempt from the regulations when they are mixed with wastewater in a wastewater treatment system discharging, according to the Clean Water Act.

RCRA defines lead-based paint debris as hazardous waste, unless generated during abatement, renovation, and remodeling of homes or other residences. Lead-based paint debris may be generated at a facility during renovations. Regardless of the debris source, facilities cannot dump or open-burn lead-based paint debris. See the Toxic Substances Control Act (TSCA) for further lead rules. *For more information on lead regulations, visit the web site http://www.epa.gov/lead/regulation.htm.*

EPA's RCRA, Superfund, and EPCRA Call Center, at (800) 424-9346, responds to questions and distributes guidance regarding all RCRA regulations. Additional documents and resources can be obtained from the hotline's homepage at http://www.epa.gov/epaoswer/hotline. The RCRA Hotline operates weekdays from 9:00 a.m. to 5:00 p.m., EST, excluding federal holidays. Visit the web site (http://www.epa.gov/epaoswer/osw/laws-reg.htm) for additional material.

Universal Waste Rule

EPA created the Universal Waste Rule to encourage and streamline recycling efforts. It allows facilities to count wastes as universal instead of hazardous, which does not count toward generator status. Segregating universal wastes from the rest of the hazardous waste streams can save RMPP facilities money on disposal costs, as well as on recordkeeping. Federal universal wastes include certain batteries, mercury-containing thermostats, and fluorescent light bulbs. Facilities should make sure that their state or territory has adopted these universal wastes. Section VI.C also discusses this rule.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a 1980 law commonly known as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that may endanger public health, welfare, or the environment. CERCLA also enables EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response or remediation costs incurred by EPA. The Superfund Amendments and Reauthorization Act (SARA) of 1986 revised various sections of CERCLA, extended the taxing authority for the Superfund, and created a free-standing law, SARA Title III, also known as EPCRA.

The CERCLA hazardous substance release reporting regulations (40 CFR Part 302) direct the person in charge of a facility to report to the National Response Center (NRC) any environmental release of a hazardous substance that equals or exceeds a reportable quantity. Reportable quantities are listed in 40 CFR Part 302.4. A release report may trigger a response by EPA or by one or more federal or state emergency response authorities.

EPA implements hazardous substance responses according to procedures outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). The NCP includes provisions for cleanups. The National Priorities List (NPL) currently includes 1,240 sites (as of January 2004). Both EPA and states can act at other sites; however, EPA provides responsible parties the opportunity to conduct cleanups and encourages community involvement throughout the Superfund response process.

EPA's RCRA, Superfund, and EPCRA Call Center, at (800) 424-9346, responds to questions and distributes guidance pertaining to the Superfund program. Additional documents and resources can be obtained from the hotline's homepage at http://www.epa.gov/epaoswer/hotline. The Superfund Hotline operates weekdays from 9:00 a.m. to 5:00 p.m., EST, excluding federal holidays. Visit the Superfund web site (http://www.epa.gov/superfund/index.htm) for additional material.

Emergency Planning And Community Right-To-Know Act

The SARA of 1986 created EPCRA (also known as SARA Title III), a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state and local governments. Under EPCRA, states establish State Emergency Response Commissions (SERC), responsible for

coordinating certain emergency response activities and for appointing Local Emergency Planning Committees (LEPC).

EPCRA establishes the following types of reporting obligations for facilities that store or manage specified chemicals:

- **EPCRA Section 302** requires facilities to notify the SERC and LEPC of the presence of any extremely hazardous substance at the facility in an amount in excess of the established threshold planning quantity. The list of extremely hazardous substances and their threshold planning quantities is found at 40 CFR Part 355, Appendices A and B.

- **EPCRA Section 303** requires that each LEPC develop an emergency plan. The plan must contain (but is not limited to) the identification of facilities within the planning district, likely routes for transporting extremely hazardous substances, a description of the methods and procedures to be followed by facility owners and operators, and the designation of community and facility emergency response coordinators.

- **EPCRA Section 304** requires the facility to notify the SERC and the LEPC in the event of a release exceeding the reportable quantity of a CERCLA hazardous substance (defined at 40 CFR Part 302) or an EPCRA extremely hazardous substance.

- **EPCRA Sections 311 and 312** require a facility at which a hazardous chemical, as defined by the Occupational Safety and Health Act, is present in an amount exceeding a specified threshold to submit to the SERC, LEPC, and local fire department material safety data sheets (MSDS) or lists of MSDSs and hazardous chemical inventory forms (also known as Tier I and II forms). This information helps the local government respond in the event of a spill or release of the chemical.

- **EPCRA Section 313** requires certain covered facilities to submit an annual toxic chemical release report. This report, commonly known as Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media. EPA maintains the data reported in the TRI database. Covered facilities meet the following requirements: (1) have 10 or more employees; (2) are included in one of the following SIC codes:

  — 10 (except 1011, 1081, and 1094),

  — 12 (except 1241),

  — 20 through 39,

— 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce),

— 4953 (limited to facilities regulated under RCRA Subtitle C),

— 5169,

— 5171, and

— 7389 (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis); and

(3) manufacture, process, or use specified chemicals in amounts greater than threshold quantities. Starting with reporting year 2000, EPA lowered the threshold quantities on PBT chemicals. Visit the TRI web site (http://www.epa.gov/tri/) for additional material.

All information submitted pursuant to EPCRA regulations is publicly accessible, unless protected by a trade secret claim.

EPA's RCRA, Superfund, and EPCRA Call Center, at (800) 424-9346, responds to questions and distributes guidance regarding the emergency planning and community right-to-know regulations. Additional documents and resources can be obtained from the hotline's homepage at http://www.epa.gov/epaoswer/hotline. The EPCRA Hotline operates weekdays from 9:00 a.m. to 5:00 p.m., EST, excluding federal holidays.

Clean Air Act

The Clean Air Act (CAA) and its amendments are designed to "protect and enhance the nation's air resources so as to promote the public health and welfare and the productive capacity of the population." The CAA consists of six sections, known as Titles, which direct EPA to establish national standards for ambient air quality and for EPA and the states to implement, maintain, and enforce these standards through a variety of mechanisms. Under the CAA, many facilities are required to obtain operating permits that consolidate their air emission requirements. State and local governments oversee, manage, and enforce many of the requirements of the CAA. CAA regulations appear at 40 CFR Parts 50-99.

VOC and PM emissions are the main concern for this industry, which accounts for approximately 5 percent of total emissions for these pollutants. VOC emissions result from the mixing, milling, extruding, calendering, vulcanizing, and grinding processes as well as solvent use. Although VOC emissions are low per mass of material processed, the facilities processing large quantities of materials face the potential of significant VOC emissions. PM emissions result from mixing, milling, cutting, and grinding processes; many of these processes produce fugitive emissions that are difficult to quantify.

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including CO, lead, nitrogen dioxide

(NO_2), particulate matter, ozone, and SO_2. Geographic areas that meet NAAQSs for a given pollutant are designated as attainment areas; those that do not meet NAAQSs are designated as nonattainment areas. Under Section 110 and other provisions of the CAA, each state must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet federal air quality standards. Revised NAAQSs for particulates and ozone became effective in 2004.

Title I also authorizes EPA to establish NSPS, which are nationally uniform emission standards for new and modified stationary sources falling within particular industrial categories. NSPSs are based on the pollution control technology available to that category of industrial source (see 40 CFR Part 60).

Under Title I, EPA establishes and enforces NESHAPs, nationally uniform standards oriented toward controlling specific HAPs. Section 112(c) of the CAA further directs EPA to develop a list of source categories that emit any of 188 HAPs, and to develop regulations for these categories of sources. To date, EPA has listed 185 source categories and developed a schedule for establishing emission standards. The emission standards are being developed for both new and existing sources based on MACT. The MACT is defined as the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors.

Title II of the CAA pertains to mobile sources, such as cars, trucks, buses, and planes. Reformulated gasoline, automobile pollution control devices, and vapor recovery nozzles on gas pumps are a few of the mechanisms EPA uses to regulate mobile air emission sources.

Title IV-A establishes a SO_2 and NO_x emissions program designed to reduce the formation of acid rain. Sulfur dioxide releases will be reduced by granting to certain sources limited emissions allowances that are set below previous levels of SO_2 releases.

Title V of the CAA establishes an operating permit program for all "major sources" (and certain other sources) regulated under the CAA. One purpose of the operating permit is to include in a single document all air emissions requirements that apply to a given facility. States have developed the permit programs in accordance with guidance and regulations from EPA. Once a state program is approved by EPA, the state issues and monitors permits.

Title VI is intended to protect stratospheric ozone by phasing out the manufacture of ozone-depleting chemicals and restricting their use and distribution. Production of Class I substances, including 15 kinds of chlorofluorocarbons (CFCs), was phased out (except for essential uses) in 1996.

EPA's Clean Air Technology Center, at (919) 541-0800 (in Spanish: (919) 541-1800) or http://www.epa.gov/ttn/catc, provides general assistance and information on CAA standards (e-mail: catcmail@epamail.epa.gov). The Stratospheric Ozone Information Hotline, at (800) 296-1996, or the Ozone Depletion web site (http://www.epa.gov/ozone), provides general information about regulations promulgated under Title VI of the CAA. The RCRA, Superfund, and EPCRA Call Center, at (800) 424-9346 or http://www.epa.gov/epaoswer/hotline, responses to questions about accidental release prevention under CAA Section 112(r).

Information on air toxics can be accessed through the Unified Air Toxics web site at http://www.epa.gov/ttn/atw/. In addition, the Clean Air Technology Center's web site includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was first passed in 1947 and amended numerous times, most recently by the Food Quality Protection Act (FQPA) of 1996. FIFRA provides EPA with the authority to oversee, among other things, the registration, distribution, sale and use of pesticides. The Act applies to all types of pesticides, including insecticides, herbicides, fungicides, rodenticides, and antimicrobials. FIFRA covers both intrastate and interstate commerce.

Establishment Registration

Section 7 of FIFRA requires that establishments producing pesticides, or active ingredients used in producing a pesticide subject to FIFRA, register with EPA. Registered establishments must report the types and amounts of pesticides and active ingredients they produce. FIFRA also provides EPA inspection authority and enables the Agency to take enforcement actions against facilities that are not in compliance with FIFRA.

Product Registration

Under Section 3 of FIFRA, all pesticides (with few exceptions) sold or distributed in the United States must be registered by EPA. Pesticide registration is very specific and generally allows use of the product only as specified on the label. Each registration specifies the use site (i.e., where the product may be used) and the amount that may be applied. The person who seeks to register the pesticide must file an application for registration. The application process often requires either the citation or submission of extensive environmental, health, and safety data.

To register a pesticide, the EPA Administrator must make a number of findings, one of which is that the pesticide, when used in accordance with widespread and commonly recognized practice, will not generally cause unreasonable adverse effects on the environment.

FIFRA defines "unreasonable adverse effects on the environment" as "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide, or (2) a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the standard under section 408 of the Federal Food, Drug, and Cosmetic Act (FFDCA) (21 U.S.C. 346a)."

Under FIFRA section 6(a)(2), after a pesticide is registered, the registrant must also notify EPA of any additional facts and information concerning unreasonable adverse environmental effects of the pesticide. Also, if EPA determines that additional data are needed to support a registered pesticide, registrants may be requested to provide additional data. If EPA determines that the registrant(s) did not comply with their request for more information, the registration can be suspended under FIFRA section 3(c)(2)(B).

Use Restrictions

As a part of the pesticide registration, EPA must classify the product for general use, restricted use, or general for some uses and restricted for others. For pesticides that may cause unreasonable adverse effects on the environment, including injury to the applicator, EPA may require that the pesticide be applied either by, or under the direct supervision of, a certified applicator.

Reregistration

Due to concerns that much of the safety data underlying pesticide registrations becomes outdated and inadequate, in addition to requiring that registrations be reviewed every 15 years, FIFRA requires EPA to reregister all pesticides that were registered prior to 1984 (section 4). After reviewing existing data, EPA may approve the reregistration, request additional data to support the registration, cancel, or suspend the pesticide.

Tolerances and Exemptions

A tolerance is the maximum amount of pesticide residue that can be on a raw product and still be considered safe. Before EPA can register a pesticide that is used on raw agricultural products, it must grant a tolerance or exemption from a tolerance (40 CFR Parts 163.10 through 163.12). Under the FFDCA, a raw agricultural product is deemed unsafe if it contains a pesticide residue, unless the residue is within the limits of a tolerance established by EPA or is exempt from the requirement.

Cancellation and Suspension

EPA can cancel a registration if it is determined that the pesticide or its labeling does not comply with the requirements of FIFRA or causes unreasonable adverse effects on the environment.

In cases where EPA believes that an "imminent hazard" would exist if a pesticide were to continue to be used through the cancellation proceedings, EPA may suspend the pesticide registration through an order, and thereby halt the sale, distribution, and usage of the pesticide. An "imminent hazard" is defined as an unreasonable adverse effect on the environment or an unreasonable hazard to the survival of a threatened or endangered species that would be the likely result of allowing continued use of a pesticide during a cancellation process.

When EPA believes an emergency exists that does not permit a hearing to be held prior to suspending, EPA can issue an emergency order that makes the suspension immediately effective.

Imports and Exports

Under FIFRA section 17(a), pesticides not registered in the United States and intended solely for export are not required to be registered, provided that the exporter obtains and submits to EPA, prior to export, a statement from the foreign purchaser acknowledging that the purchaser is aware that the product is not registered in the United States and cannot be sold

for use there. EPA sends these statements to the government of the importing country. FIFRA sets forth additional requirements that must be met by pesticides intended solely for export. The enforcement policy for exports is codified at 40 CFR Parts 168.65, 168.75, and 168.85.

Under FIFRA section 17(c), imported pesticides and devices must comply with U.S. pesticide law. Except where exempted by regulation or statute, imported pesticides must be registered. FIFRA section 17(c) requires that EPA be notified of the arrival of imported pesticides and devices. To do this, an importer must complete the Notice of Arrival (NOA) (EPA Form 3540-1) prior to importation and submit it to the EPA Regional office applicable to the intended port of entry. U.S. Customs regulations prohibit importing pesticides without a completed NOA. The EPA-reviewed and signed form is returned to the importer to present to U.S. Customs when the shipment arrives in the United States. NOA forms can be obtained from contacts in the EPA Regional offices or *http://www.epa.gov/oppfead1/international/noalist.htm*.

Additional information on FIFRA and the regulation of pesticides can be obtained from a variety of sources, including EPA's Pesticide Program at http://www.epa.gov/pesticides, EPA's Office of Compliance, Agriculture and Ecosystem Division at http://www.epa.gov/compliance/assistance/sectors/agriculture.html, or The National Agriculture Compliance Assistance Center, (888) 663-2155 or http://www.epa.gov/agriculture/ (e-mail: agcenter@epa.gov). Other sources include the National Pesticide Information Center, (800) 858-7378 or http://npic.orst.edu/, and EPA's Antimicrobial hotline, (703) 308-0127, operating weekdays from 9:00 a.m. to 4:00 p.m., EST, excluding federal holidays (e-mail: info_antimicrobial@epa.gov) or web site, http://www.epa.gov/oppad001/.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) granted EPA authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks that may be posed by their manufacture, processing, and use. TSCA provides a variety of control methods to prevent chemicals from posing unreasonable risk. It is important to note that pesticides as defined in FIFRA are not included in the definition of a "chemical substance" when manufactured, processed, or distributed in commerce for use as a pesticide. RMPP facilities may be subject to TSCA through:

- Lead hazard reduction regulations;
- Polychlorinated Biphenyls (PCB) hazard reduction regulations; and
- Asbestos hazard reduction regulations.

TSCA Regulations for Lead

- **National Lead Laboratory Accreditation Program** (TSCA section 405(b)) establishes protocols, criteria, and minimum performance standards for laboratory analysis of lead in paint, dust, and soil.

- **Hazard Standards for Lead in Paint, Dust, and Soil** (TSCA section 403) establishes standards for lead-based paint hazards and lead dust cleanup levels in most pre-1978 housing and child-occupied facilities.

- **Training & Certification Program for Lead-Based Paint Activities** (TSCA section 402/404) ensures that individuals conducting lead-based paint abatement, risk assessment, or inspection are properly trained and certified, that training programs are accredited, and that these activities are conducted according to reliable, effective, and safe work practice standards.

- **Pre-Renovation Education Rule** (TSCA section 406(b)) ensures that owners and occupants of most pre-1978 housing are provided information concerning potential hazards of lead-based paint exposure before beginning certain renovations on that housing.

- **Lead-Based Paint Disclosure Rule** (TSCA section 1018) requires disclosure of known lead-based paint and/or lead-based paint hazards by persons selling or leasing housing constructed before the phase-out of residential lead-based paint use in 1978.

TSCA Regulations for PCBs

The PCB regulations and requirements apply to both PCB waste materials and PCBs still in use. Because of potential harmful effects on human health and the environment, federal law banned U.S. production of PCBs as of July 2, 1979. However, PCB-containing materials may be present at facilities and PCB-laden wastes may be generated during renovations.

Items with a PCB concentration of 50 ppm or greater are regulated for disposal under 40 CFR Part 761. Some potential sources of PCBs include:

- Mineral-oil filled electrical equipment such as motors or pumps manufactured prior to July 2, 1979;

- Capacitors or transformers manufactured prior to July 2, 1979;

- Plastics, molded rubber parts, applied dried paints, coatings or sealants, caulking, adhesives, paper, Galbestos, sound-deadening materials, insulation, or felt or fabric products such as gaskets manufactured prior to July 2, 1979;

- Fluorescent light ballasts manufactured prior to July 2, 1979;

- Waste or debris from the demolition of buildings and equipment manufactured, serviced, or coated with PCBs; and

- Waste containing PCBs from spills, such as floors or walls contaminated by a leaking transformer.

The general requirements for handling PCB materials and equipment include identifying and labeling the material, notifying EPA, properly storing the material, and properly disposing of the material.

TSCA Regulations for Asbestos

EPA and the Occupational Safety and Health Administration (OSHA) have promulgated rules regulating asbestos production, use, and disposal. OSHA regulates private sector and some public sector employees' exposure to asbestos and specifies work practices and engineering controls for removing and handling asbestos. Along with EPA and OSHA, some states also have established asbestos requirements that extend the federal requirements. Asbestos programs implemented under TSCA include the Asbestos Hazard Emergency Response Act (AHERA), which regulates asbestos contained in schools and all public and commercial buildings including RMPP facilities. It requires the development of management plans; specifies work practices and engineering controls for removing and handling asbestos; and sets emissions limitations in schools after an abatement activity is completed. EPA Region 6 lists suspected asbestos-containing materials at http://www.epa.gov/Region06/6pd/asbestos/asbmatl.htm.

EPA's TSCA Assistance Information Service, at (202) 554-1404 (e-mail: tsca-hotline@epa.gov), responds to questions and distributes guidance pertaining to TSCA standards. The Service operates from 8:30 a.m. through 5:00 p.m., EST, excluding federal holidays.

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) encourages states/tribes to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. It includes areas bordering the Atlantic, Pacific, and Arctic Oceans, Gulf of Mexico, Long Island Sound, and Great Lakes. A unique feature of this law is that participation by states/tribes is voluntary.

In the Coastal Zone Management Act Reauthorization Amendments (CZARA) of 1990, Congress identified nonpoint source pollution as a major factor in the continuing degradation of coastal waters. Congress also recognized that effective solutions to nonpoint source pollution could be implemented at the state/tribe and local levels. In CZARA, Congress added section 6217 (16 U.S.C. section 1455b), which calls upon states/tribes with federally approved coastal zone management programs to develop and implement coastal nonpoint pollution control programs. The Section 6217 program is administered at the federal level jointly by EPA and the National Oceanic and Atmospheric Agency (NOAA).

Section 6217(g) of CZARA called for EPA, in consultation with other agencies, to develop guidance on "management measures" for sources of nonpoint source pollution in coastal waters. Under section 6217, EPA is responsible for developing technical guidance to assist states/tribes design coastal nonpoint pollution control programs. On January 19, 1993, EPA issued its *Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters*, which addresses five major source categories of nonpoint pollution: (1) urban runoff, (2) agriculture runoff, (3) forestry runoff, (4) marinas and recreational boating, and (5)

hydromodification. This document is available online at the following web site: http://www.epa.gov/owow/nps/MMGI/index.html.

Additional information on coastal zone management can be obtained from EPA's Office of Wetlands, Oceans, and Watersheds, http://www.epa.gov/owow, or from the Watershed Information Network, http://www.epa.gov/win. The NOAA web site, http://www.ocrm.nos.noaa.gov/czm/, *also contains additional information on coastal zone management.*

VI.B. Industry-Specific Requirements

Although the RMPP manufacturing industries are grouped together under SIC code 30, current federal regulations separate the two industries. The environmental issues directly addressed for rubber products manufacturing are recycling mandates, air emissions, and hazardous waste disposal. Recycling requirements exist at the state and local level for plastics products and will be expanded upon later. Based on their pollutant outputs, both plastics and rubber products manufacturing processes have the potential to be regulated under the CAA, the CWA, and RCRA. The specific requirements of each of these statutes on the RMPP sector are discussed in this subsection.

Clean Air Act

Under Title I of the Clean Air Act Amendments of 1990 (CAAA) and under previous legislation, EPA has provided guidance and other information to state and local agencies on reducing VOC emissions from existing sources in ozone nonattainment areas. These documents are referred to as Control Techniques Guidelines (CTG) and Alternative Control Techniques (ACT). EPA issued a CTG for rubber tire manufacturing in 1978 (*Control of Volatile Organic Compound Emissions from Manufacture of Pneumatic Rubber Tires*, EPA-450/2-78/030). The Agency also issued an ACT for coating of plastic parts in 1994 (*Alternative Control Techniques Document: Surface Coating of Automotive/Transportation and Business Machine Plastic Parts*, EPA - 453/R-94/017).

National Ambient Air Quality Standards

At rubber and plastics products manufacturing facilities, air emissions from both process and combustion units are regulated under the NAAQS and the State Implementation Plans (SIP) that enforce the standards. States may implement controls to limit emissions of PM, NO_x, VOC, and SO_2.

Although many limits are implemented at the state level, there are national guidelines that serve as a basis for more specific limits. Sources that are considered "major" under the CAA are subject to prevention of significant deterioration (PSD) or new source review (NSR). Both PSD and NSR are permit programs for facilities that were constructed or modified after a certain date.

Facilities in NAAQS attainment areas must follow PSD requirements by demonstrating that the construction/modification project will not cause a violation of air quality limits and by implementing the best available control technology (BACT).

New or modified facilities in nonattainment areas must follow NSR requirements, which require the source to meet the lowest achievable emission rate and to obtain emission offsets to ensure that the nonattainment problem is not made worse by the new/modified source.

In addition to the PSD/NSR preconstruction obligations, there are process-specific operational standards, NSPS. 40 CFR 60 lists these standards, which serve as minimum requirements in states SIPs. Individual states may impose requirements that are more strict. The following NSPSs are particularly relevant to the RMPP industry:

Subparts D, Db, Dc	Industrial Boilers (Regulates PM, NO_x, and SO_2 from new boilers)
Subpart GG	Gas-Fired Turbines (Regulates PM, NO_x, and SO_2 from new gas-fired turbines)
Subpart Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) (Regulates VOCs from applicable storage tanks containing volatile organic liquids)
Subpart BBB	Rubber and Tire Manufacturing Industry (Regulates VOC emissions from undertread cementing, sidewall cementing, tread end cementing, bead cementing, and green tire spraying operations)
Subpart TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines (Regulates VOC emissions from prime coats, color coats, texture coats, and touch-up coats)
Subpart VVV	Polymeric Coating of Supporting Substrates (Regulates VOC emissions from coating operations)

Hazardous Air Pollutants

Air toxics regulations apply to rubber and plastics products manufacturing industries. EPA has developed NESHAPs expressly for several processes in these industries. The NESHAPs establish process-based MACT for "major sources," which are defined as facilities that emit or have the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs. The following NESHAPs are particularly relevant to the RMPP industry:

40 CFR 61 Subpart M	Controlling asbestos emissions from demolition or renovation activities.
40 CFR 63 Subpart H	Controlling HAP emissions from equipment leaks, “Leak Detection and Repair.”

40 CFR 63 Subpart Q	Controlling chromium emissions from cooling towers.
40 CFR 63 Subpart III	Controlling HAP emissions from facilities that make flexible polyurethane foam products, targeting methylene chloride in particular.
40 CFR 63 Subpart MMMM	Controlling HAP emissions from facilities that coat miscellaneous metal parts and products.
40 CFR 63 Subpart PPPP	Controlling HAP emissions from facilities that coat plastic parts and products.
40 CFR 63 Subpart WWWW	Controlling HAP emissions from facilities that make reinforced plastic composites products, targeting styrene in particular.
40 CFR 63 Subpart XXXX	Controlling HAP emissions from all rubber tire manufacturing industry facilities that make rubber tire products.
40 CFR 63 Subpart MMMMM	Controlling HAP emissions from facilities that cut, glue, and/or laminate pieces of flexible polyurethane foam.

Some NESHAPS such as 40 CFR 63 Subpart J Polyvinyl Chloride and Copolymers Production and 40 CFR 63 Subpart U Group 1 Polymers and Resins Production apply to facilities that manufacture the plastic resins used by the RMPP industry. Since these facilities are sometimes co-located with facilities in the RMPP industry, these regulations may also apply. Additional information concerning potentially applicable NESHAPs can be found in the Profile of the Plastic Resins and Man-made Fibers Industry located at: http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/ and on EPA's Air Toxics website for National Emission Standards for Hazardous Air Pollutants located at: http://www.epa.gov/ttn/atw/mactfnlalph.html. Unlike the industry-specific NESHAP standards, chemical-specific NESHAPs may apply to all facilities regardless of their size.

Risk Management Program

RMPP manufacturing facilities are subject to section 112(r) of CAA, which states that stationary sources using extremely hazardous substances have a "general duty" to initiate specific activities to prevent and mitigate accidental releases. The general duty requirements apply to stationary sources that produce, process, handle, or store these substances, regardless of the quantity managed at the facility. Although there is no list of "extremely hazardous substances," EPA's Chemical Emergency Preparedness and Prevention Office provides some guidance at its web site: http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/index.html. The general duty clause requires facilities to identify hazards that may result from accidental

releases, to design and maintain a safe facility, and to minimize the consequences of releases when they occur.

Many large RMPP manufacturing facilities are subject to additional, more explicit risk management requirements. Facilities that have more than a threshold quantity of any of the 140 regulated substances in a single process are required to develop a risk management program and to summarize their program in a risk management plan (RMP). Facilities subject to the requirements were required to submit a registration and RMP in 1999 or whenever they first exceed the threshold for a listed regulated substance after that date.

All facilities meeting the RMP threshold requirements must follow Program 1 requirements:

- Conduct off-site consequence analysis that evaluates specific potential release scenarios, including worst-case and alternative scenarios;
- Maintain a five-year history of certain accidental releases of regulated substances from covered processes; and
- Prepare an RMP, revised at least once every five years, that describes and documents these activities for all covered processes.

In addition, many RMPP manufacturing facilities may be subject to the requirements of Program 2 or 3. These additional requirements include:

- An integrated prevention program to manage risk. The prevention program will include hazards identification, written operating procedures, training, maintenance, and accident investigation.
- An emergency response program.
- An overall management system to put these program elements into effect.

The list of chemicals that trigger RMP requirements can be found in 40 CFR68.130; information to determine the required program level also can be found in 40 CFR 68.

Title V Permits

Title V requires that all "major sources" (and certain minor sources) obtain an operating permit. Many RMPP facilities are required to have a Title V permit, and may be required to submit information about emissions, control devices, and the general processes at the facility in the permit application. Permits may limit pollutant emissions and impose monitoring, recordkeeping, and reporting requirements.

Title VI Stratospheric Ozone Protection

Many RMPP facilities operate industrial process refrigeration units, such as chillers for chlorine dioxide plants. For those units that utilize ozone-depleting chemicals, such as CFCs, facilities are required under Title VI to follow leak repair requirements.

Clean Water Act

There are two industry-specific components of the CWA requirements: NPDES permitting and pretreatment programs. Other general CWA requirements, such as those for wetlands and stormwater, may also apply to rubber and plastics products manufacturing facilities and are described in Section VI.A.

In addition to applicable general CWA requirements, rubber product manufacturers are subject to the specific requirements contained in 40 CFR Part 428, "EPA Effluent Guidelines and Standards for Rubber Manufacturing." These regulations contain pre-treatment and performance standards and requirements for the application of best practicable control technologies and/or best available technologies. The regulated pollutants include TSS, oil and grease, pH, COD, BOD_5, lead, and chromium. The standards are promulgated under the authority of Sections 301, 304, 306, 307, 308, and 501 of the CWA and in response to the settlement reached in *Natural Resources Defense Council v. Train*.

EPA promulgated regulations contained in the *Federal Register*, Vol. 55 No. 222, "National Pollutants Discharge Elimination System Permit Application Regulations for Storm Water Discharge: Final Rule" on November 16, 1990. These regulations require permit applications for stormwater discharges from selected municipal and industrial point sources. The rubber manufacturing industry is regulated because it is covered by SIC code 30. Only areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial equipment are exposed to stormwater are covered. The regulations require that a stormwater pollution prevention plan (SWPPP) be developed for each facility covered by this regulation. The regulations require that the SWPPP be prepared in accordance with good engineering practices and in accordance with the factors outlined in 40 CFR Section 125.3(d)(2) or (3) as appropriate.

Plastics products manufacturers are subject to applicable general CWA requirements and to the specific requirements contained in 40 CFR Part 463, "Plastic Molding and Forming Point Source Category Effluent Limitations Guidelines; Pretreatment Standards and New Source Performance Standards." This regulation establishes effluent limitations guidelines and standards that limit the discharge of pollutants into navigable waters by existing and new sources engaged in plastic molding and forming. The regulated pollutants include BOD_5, TSS, oil and grease, and pH.

For facilities that discharge their wastewater to a POTW, pretreatment standards may apply. In addition to general standards established by EPA that address all industries, there are pretreatment standards for new sources and pretreatment standards for existing sources that are specific to the RMPP industry. These standards regulate the biocides trichlorophenol and pentachlorophenol, with limits that are specified for each subcategory of the industry.

Emergency Planning and Community Right-to-Know Act

Three of the components of EPCRA are directly relevant to the rubber and plastics products manufacturing facilities:

- Emergency Planning (Section 302(a)) - Businesses that produce, use or store "hazardous substances" must submit: 1) MSDSs or the equivalent, and 2) Tier I/Tier II annual inventory report forms to the appropriate local emergency planning commission. Those handling "extremely hazardous substances" also are required to submit a one-time notice to the SERC.

- Emergency Notification of Extremely Hazardous Substance Release (Section 304) - A business that unintentionally releases a reportable quantity of an extremely hazardous substance must report that release to the SERC and the LEPC.

- Release Reporting (Section 313) - Manufacturing businesses with 10 or more employees that manufactured, processed, or otherwise used a listed toxic chemical in excess of the "established threshold" must annually file a Toxic Chemical Release form with EPA and the state. Documentation supporting release estimates must be kept for three years.

Resource Conservation and Recovery Act

Facilities engaged in rubber product or rubber tire manufacture use RCRA-regulated commercial chemical products which, if spilled or sent for disposal, are considered hazardous waste. These include ethylene thiourea, phenol, guanidines, and some lead, selenium, and cadmium compounds. Because these are all compounding agents that are added to the rubber mixture in their original form, spills are a reasonable possibility and RCRA requirements are likely to apply. Some waste streams containing solvents such as toluene, MEK, 1,1,1-trichloroethane, acetone, methanol, xylene, methyl isobutyl ketone, trichlorofluoromethane, trichloroethylene, and n-butyl alcohol may be hazardous waste if they are D001 ignitable.

VI.C. Pending and Proposed Regulatory Requirements

The following pending and proposed regulations affect the RMPP industry:

Clean Water Act

Minimizing Adverse Environmental Impact from Cooling Water Intake Structures at Existing Facilities Under Section 316(b) of the Clean Water Act, Phase III

This rulemaking affects existing facilities that use cooling water intake structures, and whose intake flow levels exceed a minimum threshold EPA will determine. The rule will require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. The final

rule is anticipated before December 2004. (Deborah Nagle, Office of Water, (202) 566-1063 or J.T. Morgan, Office of Water, (202) 564-7684)

Clean Air Act

NESHAP: Industrial/Commercial/Institutional Boilers and Process Heaters

This rule would affect any new or existing boiler or process heater at a major (for HAPs) source facility. The final rule was signed in 2004. A copy of the final signed version and the proposed version are at: http://www.epa.gov/ttn/atw/boiler/boilerpg.html.

Resource Conservation and Recovery Act

Universal Waste Regulations

In June 2002, EPA proposed to add mercury-containing equipment to the universal waste list. The Universal Waste Rule allows facilities to streamline the waste management of certain widely generated hazardous wastes. The waste management requirements of universal wastes are less strict than those for other RCRA-listed hazardous wastes. Visit the web site www.epa.gov/epaoswer/hazwaste/id/univwast/regs.htm for more information.