IV. CHEMICAL RELEASE AND TRANSFER PROFILE

This section is designed to provide background information on the pollutant releases that are reported by this industry. The best source of comparative pollutant release information is the Toxic Release Inventory System (TRI). Pursuant to the Emergency Planning and Community Right-to-Know Act, TRI includes self-reported facility release and transfer data for over 600 toxic chemicals. Facilities within SIC Codes 20-39 (manufacturing industries) that have more than 10 employees, and that are above weight-based reporting thresholds are required to report TRI on-site releases and off-site transfers. The information presented within the sector notebooks is derived from the most recently available (1993) TRI reporting year (which then included 316 chemicals), 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, please note that in general, toxic chemical releases have been declining. In fact, according to the 1993 Toxic Release Inventory Data Book, reported releases dropped by 42.7% between 1988 and 1993. Although on-site releases have decreased, the total amount of reported toxic waste has not declined because the amount of toxic chemicals transferred off-site has increased. Transfers have increased from 3.7 billion pounds in 1991 to 4.7 billion pounds in 1993. Better management practices have led to increases in off-site transfers of toxic chemicals for recycling. More detailed information can be obtained from EPA's annual Toxics Release Inventory Public Data Release book (which is available through the EPCRA Hotline at 1-800-535-0202), or directly from the Toxic Release Inventory System database (for user support call 202-260-1531).

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 transferred. When other sources of pollutant release data have been obtained, these data have been included to augment the TRI information.

TRI Data Limitations

The reader should keep in mind the following limitations regarding TRI data. Within some sectors, the majority of facilities are not subject to TRI reporting because they are not considered manufacturing industries, or because they are below TRI reporting thresholds. Examples are the mining, dry cleaning, printing, and transportation equipment cleaning sectors. For these sectors, release information from other sources has been included.

The reader should also be aware that TRI "pounds released" data presented within the notebooks is 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. The Agency is in the process of developing an approach to assign toxicological weightings to each chemical released so that one can differentiate between pollutants with significant differences in toxicity. As a preliminary indicator of the environmental impact of the industry's most commonly released chemicals, the notebook briefly summarizes the toxicological properties of the top five chemicals (by weight) reported by each industry.

Definitions Associated With Section IV Data Tables

General Definitions

SIC Code -- the Standard Industrial Classification (SIC) is a statistical classification standard used for all establishment-based Federal economic statistics. The SIC codes facilitate comparisons between facility and industry data.

TRI Facilities -- are manufacturing facilities that have 10 or more full-time employees and are above established chemical throughput thresholds. Manufacturing facilities are defined as facilities in Standard Industrial Classification primary codes 20-39. Facilities must submit estimates for all chemicals that are on the EPA's defined list and are above throughput thresholds.

Data Table Column Heading Definitions

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

RELEASES-- are 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.

Releases to Air (Point and Fugitive Air Emissions) -- Include 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.

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

Releases to Land -- includes disposal of waste to on-site landfills, waste that is land treated or incorporated into soil, surface impoundments, spills, leaks, or waste piles. These activities must occur within the facility's boundaries for inclusion in this category.

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

TRANSFERS -- is 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.

Transfers to POTWs -- are 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 landfilled within the sludge.

Transfers to Recycling -- are 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.

Transfers to Energy Recovery -- are wastes combusted off-site in industrial furnaces for energy recovery. Treatment of a chemical by incineration is not considered to be energy recovery.

Transfers to Treatment -- are 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.

Transfers to Disposal -- are wastes taken to another facility for disposal generally as a release to land or as an injection underground.

IV.A. EPA Toxic Release Inventory for the Rubber and Miscellaneous Plastics Products Industry

The following section provides TRI data for those facilities categorized under SIC 30, the rubber and miscellaneous plastics products industry. According to the TRI data, the manufacture of rubber and miscellaneous plastics products results primarily in the release of solvents. The commonly released solvents include acetone, toluene, methyl ethyl ketone, 1,1,1-trichloroethane, and dichloromethane. According to the Toxic Release Inventory (TRI) Public Release Data for 1993, the rubber and miscellaneous plastics products industry released over 118 million pounds of pollutants and transferred over 44 million pounds of pollutants. Of pollutants released, approximately 69 percent were released as point source air emissions, approximately 30.5 percent were released as fugitive air emissions, approximately 0.2 percent were released to water, and approximately 0.3 percent were disposed of on land.

The TRI database contains a detailed compilation of self-reported, facility-specific chemical releases. The top reporting facilities for this sector are listed below. Facilities that have reported only the SIC codes covered under this notebook appear in Exhibit 24. Exhibit 25 contains additional facilities that have reported the SIC code covered within this report, and one or more SIC codes that are not within the scope of this notebook. Therefore, Exhibit 25 includes 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.

The rubber and miscellaneous plastics products industry air releases can be traced primarily to the mixing component preparation and building/assembly stages of the rubber manufacturing process and to the solvent cleaning and finishing stages of the plastics products manufacturing process. Major pollutants released to air include toluene, dichloromethane, methylene chloride, and carbon disulfide. Releases of pollutants to water and transfers of pollutants to POTWs arise primarily from the cleaning and cooling of machinery in both the rubber and plastic manufacturing processes and from the cooling and heating of rubber during the rubber products manufacturing process. Major pollutants released to water include zinc compounds, sulfuric acid, and ammonia, and ammonium sulfate. Major pollutants transferred to POTWs include acetone, methanol, and zinc compounds, and ammonium sulfate. Releases of pollutants to land arise from the use of various chemicals in the rubber and plastic mixing processes. Major releases of pollutants to land include barium compounds, antimony compounds, zinc compounds, and styrene.

The rubber and miscellaneous plastics products 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, copper, lead, and lead compounds. Both zinc and lead are used in the rubber mixing process as vulcanizing agents, accelerator activators, and processing aids (zinc only). Lead and zinc can be released during mixing operation as spills, leaks, and fugitive emissions in the form of dust and particulates (which can and often are captured by filters). Exhibit 27 and 28 present releases and transfers for SIC 30 TRI reporting facilities.

Exhibit 24
Top 10 TRI Releasing Rubber and Plastics Products Manufacturing Facilities (SIC 30)

Rank	Total TRI Releases in Pounds	Facility Name	City	State
1	5,425,721	Westinghouse Electric Corp.	Hampton	SC
2	3,603,789	Teepak Inc.	Danville	IL
3	2,901,978	Goodyear Tire & Rubber Co.	Lincoln	NE

4	2,586,030	Flexel Indiana Inc.	Covington	IN
5	2,559,756	O'Sullivan Corp.	Winchester	VA
6	2,129,000	Viskase Corp.	Loudon	TN
7	1,363,500	Viskase Corp.	Osceola	AR
8	1,359,629	Hickory Springs Mfg. Co.	Conover	NC
9	1,293,243	E. R. Carpenter Co. Inc.. Tupelo	Verona	MS
10	1,265,488	Foamex L.P. Great Western Carpet Cushion	Orange	CA

Source: US EPA, Toxics Release Inventory Database, 1993.

Note: Being included on this list does not mean that the release is associated with non-compliance with environmental laws.

Exhibit 25
Top 10 TRI Releasing Rubber and Misc. Plastics Products Facilities

SIC Codes	Total TRI Releases in Pounds	Facility Name	City	State
3083	5,425,721	Westinghouse Electric Corp.	Hampton	SC
3089	3,603,789	Teepak Inc.	Danville	IL
3052	2,901,978	Goodyear Tire & Rubber Co.	Lincoln	NE
3089	2,586,030	Flexel Indiana Inc.	Convington	IN
3081, 3083	2,559,756	O'Sullivan Corp.	Winchester	VA
3089	2,129,000	Viskase Corp.	Loudon	TN
2899, 3081, 2822	1,473,670	3M	Decatur	AL
3089	1,363,500	Viskase Corp.	Oseola	AR
3086	1,359,629	Hickory Spring Mfg. Co. Foam Plant	Conover	NC
3081, 3083, 2671, 2297	1,333,229	IPC Corinth Div.	Corinth	MS

Source: US EPA, Toxics Release Inventory Database, 1993.

Note: Being included on this list does not mean that the release is associated with non-compliance with environmental laws.

Exhibit 26
TRI Reporting Rubber and Plastics Products Manufacturing Facilities (SIC 30) by State

State	Number of Facilities
AL	31
AR	30
AZ	13
CA	100
CO	15
CT	21
DE	11
FL	38
GA	57
IA	28
ID	2
IL	86
IN	118
KS	18
KY	31

State	Number of Facilities
NC	101
ND	2
NE	10
NH	11
NJ	42
NM	3
NV	4
NY	33
OH	171
OK	13
OR	17
PA	76
PR	4
RI	9
SC	44

Exhibit 26 (cont'd)
TRI Reporting Rubber and Plastics Products
Manufacturing Facilities (SIC 30) by State

State	Number of Facilities
LA	6
MA	44
MD	9
ME	5
MI	81
MN	36
MO	41
MS	31

State	Number of Facilities
SD	4
TN	74
TX	110
UT	6
VA	35
VT	4
WA	16
WI	53
WV	17

Source: US EPA, Toxics Release Inventory Database, 1993.

Exhibit 27
Releases for Rubber and Plastics Products Manufacturing (SIC 30) in TRI, by Number of Facilities (releases reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Styrene	461	4755176	7692418	250	0	40057	12487901	27089
Zinc Compounds	370	44973	44157	14578	0	93945	197653	534
Acetone	329	6479638	5821271	353	0	184	12301446	37390
Toluene	219	3785915	11297325	2279	0	0	15085519	68884
Methyl Ethyl Ketone	199	2793949	7482034	0	0	0	10275983	51638
1,1,1-Trichloroethane	193	5374360	5647721	7	0	0	11022088	57109
Dichloromethane	160	8144323	13955176	450	0	9753	22109702	138186
Di(2-Ethylhexyl) Phthalate	151	91271	122847	95	0	92220	306433	2029
Methylenebis (Phenylisocyanate)	139	8978	10312	0	0	992	20282	146
Antimony Compounds	127	8144	9895	1953	0	9810	29802	235
Barium Compounds	119	72062	7778	1060	0	109945	190845	1604
Xylene (Mixed Isomers)	99	417496	3406217	10	0	0	3823723	38623
Lead Compounds	91	5278	8328	1014	0	4682	19302	212
Toluenediisocyanate (Mixed Isomers)	74	5847	15492	0	0	0	21339	288
Sulfuric Acid	65	1043	2590	7005	5	2000	12643	195
Chromium Compounds	63	2258	3395	10	0	707	6370	101
Methyl Isobutyl Ketone	63	167312	1894129	0	0	0	2061441	32721
Methanol	60	324667	5964005	0	0	0	6288672	104811
Glycol Ethers	51	95289	649213	5	0	750	745257	14613
Bis(2-Ethylhexyl) Adipate	50	18402	72313	10	0	9374	100099	2002
Trichlorofluoromethane	41	1008351	465928	0	0	0	1474279	35958
Decabromodiphenyl Oxide	39	3815	19389	357	0	0	23561	604
Hydrochloric Acid	35	2207	62715	0	0	250	65172	1862
Formaldehyde	33	32787	114922	90	0	0	147799	4479
N-Butyl Alcohol	33	80646	627028	0	0	0	707674	21445
Phenol	33	59278	662329	132	0	4	721743	21871
Methyl Methacrylate	29	52402	255715	0	0	2250	310367	10702
Cobalt Compounds	28	453	506	280	0	5	1244	44
Ethylene Glycol	28	22121	402124	2700	0	0	426945	15248
Toluene-2,4-Diisocyanate	27	2165	3405	0	0	0	5570	206
Trichloroethylene	26	738682	336336	10	0	0	1075028	41347
Butyl Benzyl Phthalate	25	13603	1930	203	0	0	15736	629
Cadmium Compounds	24	573	525	15	0	1100	2213	92
Ammonia	23	312606	230462	6037	0	0	549105	23874
Toluene-2,6-Diisocyanate	23	1449	2369	0	0	0	3818	166
Dimethyl Phthalate	22	5861	10186	5	0	0	16052	730
Diethanolamine	20	1584	1496	0	0	0	3080	154
Lead	18	272	1213	12	0	5	1502	83
Dibutyl Phthalate	17	314	9400	7	0	0	9721	572
Manganese Compounds	17	281	1024	16	0	250	1571	92
Chlorine	16	42439	34255	484	0	0	77178	4824
Tetrachloroethylene	16	46975	368793	0	0	0	415768	25986

Source: US EPA, Toxics Release Inventory Database, 1993.

Exhibit 27 (cont'd)
Releases for Rubber and Plastics Products Manufacturing (SIC 30) in TRI, by Number of Facilities (releases reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Release per Facility
Ethylbenzene	14	4752	200554	250	0	0	205556	14683
Copper Compounds	13	156	50	6	0	0	212	16
Isopropyl Alcohol (Manufacturing)	13	47381	207141	0	0	0	254522	19579
Nickel Compounds	13	286	960	5	0	0	1251	96
Phosphoric Acid	12	5404	1205	0	0	0	6609	551
Zinc (Fume Or Dust)	12	500	504	5	0	4169	5178	432
Freon 113	11	229347	389191	0	0	0	618538	56231
Nitric Acid	11	1477	1164	0	0	0	2641	240
Chromium	10	25	5	0	0	5	35	4
4,4'-Methylenebis (2-Chloroaniline)	10	10	5	0	0	0	15	2
Antimony	9	5	250	0	0	5	260	29
Copper	9	171	799	0	0	0	970	108
Carbon Disulfide	8	451497	12136818	18273	0	0	12606588	157582 4
Barium	7	4193	2007	0	0	0	6200	886
Dichlorodifluoromethane	7	72623	42675	0	0	0	115298	16471
Benzoyl Peroxide	6	252	0	0	0	0	252	42
Cumene Hydroperoxide	6	23422	903	0	0	0	24325	4054
Cyclohexane	6	61564	66357	0	0	0	127921	21320
Diethyl Phthalate	6	11457	23745	18	0	0	35220	5870
Ethylene Thiourea	6	0	260	0	0	0	260	43
Nickel	6	120	179	0	0	5	304	51
4,4'-Methylenedianiline	6	255	311	0	0	0	566	94
Manganese	5	82	215	0	0	0	297	59
Phthalic Anhydride	5	298	489	0	0	0	787	157
Propylene Oxide	5	7076	44815	0	0	0	51891	10378
Vinyl Acetate	5	8977	6643	0	0	0	15620	3124
Acrylic Acid	4	0	6506	1	0	0	6507	1627
Acrylonitrile	4	0	1850	0	0	6332	8182	2046
Aluminum Oxide (Fibrous Form)	4	1005	732	159	0	0	1896	474
Ammonium Sulfate (Solution)	4	0	0	250000	0	0	250000	62500
Arsenic Compounds	4	5	5	0	0	0	10	3
Chloroprene	4	0	0	0	0	3018	3018	755
Ethylene Oxide	4	14717	58889	0	0	0	73606	18402
1,2,4-Trimethylbenzene	4	5757	40835	0	0	0	46592	
1,4-Dioxane	4	920	10341	0	0	0	11261	2815
Cresol (Mixed Isomers)	3	5389	1118	1	0	0	6508	2169
Maleic Anhydride	3	250	258	0	0	0	508	169
Selenium Compounds	3	0	2	0	0	0	2	1
2-Methoxyethanol	3	8152	250318	0	0	0	258470	86157
4,4'-Isopropylidenediphenol	3	212	45	0	0	0	257	86
Asbestos (Friable)	2	0	0	0	0	0	0	0
Chloroethane	2	140680	201840	0	0	0	342520	171260

Source: US EPA, Toxics Release Inventory Database, 1993.

Exhibit 27 (cont'd)
Releases for Rubber and Plastics Products Manufacturing (SIC 30) in TRI, by Number of Facilities (releases reported in pounds/year)

Chemical Name	#/ Facilities Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Releases per Facility
Chloroform	2	11825	5829	0	0	0	17654	8827
Cobalt	2	0	0	0	0	5	5	3
Acetaldehyde	1	0	114	0	0	0	114	114
Aluminum (Fume Or Dust)	1	0	0	0	0	0	0	0
Ammonium Nitrate (Solution)	1	0	0	0	0	0	0	0
Butyl Acrylate	1	0	0	0	0	0	0	0
Cadmium	1	5	0	0	0	0	5	5
Chloromethane	1	95980	0	0	0	0	95980	95980
Cumene	1	250	250	0	0	0	500	500
Cyanide Compounds	1	0	0		0	0	0	0
Dichlorvos	1	250	250			250	750	750
M-Xylene	1	0	31000	0	0	1700	32700	32700
Michler's Ketone	1	100	1442	0	0	0	1542	1542
Naphthalene	1	250	0	0	0	0	250	250
Vinylidene Chloride	1	0	1525	1	0	1	1527	1527
1,2-Dichloroethane	1	0	250	0	0	0	250	250
1,3-Butadiene	1	0	0	0	0	0	0	0
Total	**1579**	**36242322**	**81459310**	**308146**	**5**	**393773**	**118,403,556**	**74,986**

Source: US EPA, Toxics Release Inventory Database, 1993

Exhibit 28
Transfers for Rubber and Plastics Products Manufacturing (SIC 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 Transfer sper Facility
Styrene	461	6412	912615	86676	84467	540858	1631033	3538
Zinc Compounds	370	48197	5313559	1330657	450403	64930	7208206	19482
Acetone	329	163425	62738	1021491	178209	1669477	3106290	9442
Toluene	219	6166	24650	337563	413312	2672384	3455230	15777
Methyl Ethyl Ketone	199	12	9481	1517588	454307	3024993	5007954	25166
1,1,1-Trichloroethane	193	250	8081	356140	254839	380732	1000042	5182
Dichloromethane	160	753	23838	1061649	219538	238847	1544625	9654
Di(2-Ethylhexyl) Phthalate	151	13806	819005	2219672	203704	84937	3341124	22127
Methylenebis (Phenylisocyanate)	139	0	50991	78361	25255	14927	169534	1220
Antimony Compounds	127	2362	307512	61111	8576	7085	386646	3044
Barium Compounds	119	2021	609352	57595	33789	44543	747300	6280
Xylene (Mixed Isomers)	99	9	250	234297	63807	549669	848032	8566
Lead Compounds	91	1258	100404	1441782	22879	1977	1568300	17234
Toluenediisocyanate (Mixed Isomers)	74	5	5524	3335	293268	417	302549	4089

Sulfuric Acid	65	61066	5900	123620	22650		213236	3281
Chromium Compounds	63	293	88952	5735	329484		424464	6738
Methyl Isobutyl Ketone	63	589	1005	126226	41739	393497	563056	8937
Methanol	60	174509	255	95817	88988	367353	726922	12115
Glycol Ethers	51	19935	68165	73819	17486	47661	227066	4452

Source: US EPA, Toxics Release Inventory Database, 1993

Exhibit 28 (cont'd)
Transfers for Rubber and Plastics Products Manufacturing (SIC 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 Transfer sper Facility
Bis(2-Ethylhexyl) Adipate	50	1255	58390	146605	632	108276	315158	6303
Trichlorofluoromethane	41	250	552	2498	3277	18920	25497	622
Decabromodiphenyl Oxide	39	515	332723	6905	8067	2729	350939	8998
Hydrochloric Acid	35	14926	100		268		15294	437
Formaldehyde	33	25727	9735	365	11194	3488	50509	1531
N-Butyl Alcohol	33	5	105	2053	12209	101677	116049	3517
Phenol	33	59	260711		38458	13963	313191	9491
Methyl Methacrylate	29	15002	33335		7238	44159	99734	3439
Cobalt Compounds	28	22	40697	2700	4385		47804	1707
Ethylene Glycol	28	12047	5778	4146395	137387	1030	4302637	153666
Toluene-2,4-Diisocyanate	27	0		49588	54488	1960	106036	3927
Trichloroethylene	26	10	5430	70433	36970	27640	140483	5403
Butyl Benzyl Phthalate	25	935	4778	1108	180	15283	22284	891
Cadmium Compounds	24	36	10043	3022	667	14	13782	574
Ammonia	23	28069	2600		180		30849	1341
Toluene-2,6-Diisocyanate	23	0		12397			12397	539
Dimethyl Phthalate	22	7893	3267	250	1635	1590	14635	665
Diethanolamine	20	0			497	51	548	27
Lead	18	67	12167	1183359	27499	1800	1224892	68050
Dibutyl Phthalate	17	5498	42354	12044	22860	11000	93756	5515
Manganese Compounds	17	271	17219	281	5		17776	1046
Chlorine	16	32800					32800	2050
Tetrachloroethylene	16	0		33955	13840	1850	49645	3103
Ethylbenzene	14	251	0		998	71764	73013	5215
Copper Compounds	13	331	47972	505	115960		164768	12674
Isopropyl Alcohol (Manufacturing)	13	0	5	3760		42047	45812	
Nickel Compounds	13	271	22882	43	179905		203101	15623
Phosphoric Acid	12	0	0		28180		28180	2348
Zinc (Fume Or Dust)	12	1774	73419	1610			76803	6400
Freon 113	11	0		218046	17751		235797	21436
Nitric Acid	11	5	41		21		67	6
Chromium	10	0	56721	267963	119		324803	32480
4,4'-Methylenebis (2-Chloroaniline)	10	5	750			1589	2344	234
Antimony	9	22	8063	7656	250	1924	17915	1991
Copper	9	5	21780	292083	125		313993	34888
Carbon Disulfide	8	201233	250		250		201733	25217
Barium	7	0	6018	5			6023	860
Dichlorodifluoromethane	7	0					0	0
Benzoyl Peroxide	6	0	5000				5000	833
Cumene Hydroperoxide	6	0	10609				10609	1768
Cyclohexane	6	250	250		5187	18368	24055	4009
Diethyl Phthalate	6	45954	11650	69000	22267		148871	24812
Ethylene Thiourea	6	5	1010	2054	5585		8654	1442
Nickel	6	5	10650	85382			96037	16006
4,4'-Methylenedianiline	6	0			3890		3890	648
Manganese	5	5	9634	36964			46603	9321

Phthalic Anhydride	5	0	4900			630	5530	1106
Propylene Oxide	5	0			250		250	50

Source: US EPA, Toxics Release Inventory Database, 1993

Exhibit 28 (cont'd)
Transfers for Rubber and Plastics Products Manufacturing (SIC 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 Transfer sper Facility
Vinyl Acetate	5	0	1638		6880	5681	14199	2840
Acrylic Acid	4	0	0				0	0
Acrylonitrile	4	0	6332			1268	7600	1900
Aluminum Oxide (Fibrous Form)	4	0	3591				3591	898
Ammonium Sulfate (Solution)	4	2630872					2630872	657718
Arsenic Compounds	4	5	5	15	5		30	8
Chloroprene	4	0	5045				5045	1261
Ethylene Oxide	4	750					750	188
1,2,4-Trimethylbenzene	4	0		10161			10161	2540
1,4-Dioxane	4	113353		2270		2215	117838	29460
Cresol (Mixed Isomers)	3	4	1320		2700	962	5986	1995
Maleic Anhydride	3	0	1600				1600	533
Selenium Compounds	3	5	834		0		839	280
2-Methoxyethanol	3	0				14883	14883	4961
4,4'-Isopropylidenediphenol	3	0	234		9		243	81
Asbestos (Friable)	2	0	135704				135704	67852
Chloroethane	2	0					0	0
Chloroform	2	0			169675		169675	84838
Cobalt	2	5					5	3
Acetaldehyde	1	115					115	115
Aluminum (Fume Or Dust)	1	0	250	250			500	500
Ammonium Nitrate (Solution)	1	0					0	0
Butyl Acrylate	1	0				600	600	600
Cadmium	1	0					0	0
Chloromethane	1	0					0	0
Cumene	1	0	1136				1136	1136
Cyanide Compounds	1	0					0	0
Dichlorvos	1						0	0
M-Xylene	1	0				1700	1700	1700
Michler's Ketone	1	0				216	216	216
Naphthalene	1	0		5		5	10	10
Vinylidene Chloride	1	0					0	0
1,2-Dichloroethane	1	0					0	0
1,3-Butadiene	1	5410	2863				8273	8273
Total	**1579**	**3,647,090**	**9,704,417**	**16,904,864**	**4,148,643**	**10,623,569**	**45,043,726**	**28,537**

Source: US EPA, Toxics Release Inventory Database, 1993

IV.B. Summary of the Selected Chemicals Released

The following is a synopsis of current scientific toxicity and fate information for the top chemicals (by weight) that facilities within this sector self-reported as released to the environment based upon 1993 TRI data. Because this section is based upon self-reported release data, it does not attempt to provide information on management practices employed by the sector to reduce the release of these chemicals. Information regarding pollutant release reductions over time may be available from EPA's TRI and 33/50 programs, or directly from the industrial trade associations that are listed in Section IX of this document. Since these descriptions are cursory, please 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 conducted 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 ten chemicals released by the rubber and miscellaneous plastics products industry in 1993 were:

1,1,1-Trichloroethane
Acetone
Carbon Disulfide
Dichloromethane
Methanol
Methyl Ethyl Ketone
Methyl Isobutyl Ketone.
Styrene
Toluene
Xylene (Mixed Isomers)

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

1,1,1-Trichloroethane

Toxicity. Repeated contact of 1,1,1-trichloroethane (TCE) with skin may cause serious skin cracking and infection. Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations.

Exposure to high concentrations of TCE causes reversible mild liver and kidney dysfunction, central nervous system depression, gait disturbances, stupor, coma, respiratory depression, and even death. Exposure to lower concentrations of TCE leads to light-headedness, throat irritation, headache, disequilibrium, impaired coordination, drowsiness, convulsions and mild changes in perception.

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

Environmental Fate. Releases of TCE to surface water or land will almost entirely volatilize. Releases to air may be transported long

distances and may partially return to earth in rain. In the lower atmosphere, TCE degrades very slowly by photo-oxidation and slowly diffuses to the upper atmosphere where photo-degradation is rapid.

Any TCE that does not evaporate from soils leaches to groundwater. Degradation in soils and water is slow. TCE does not hydrolyze in water, nor does it significantly bioconcentrate in aquatic organisms.

Acetone

Toxicity**.** Acetone is irritating to the eyes, nose, and throat. Symptoms of exposure to large quantities of acetone may include headache, unsteadiness, confusion, lassitude, drowsiness, vomiting, and respiratory depression.

Reactions of acetone (see environmental fate) in the lower atmosphere contribute to the formation of ground-level ozone. Ozone (a major component of urban smog) can affect the respiratory system, especially in sensitive individuals such as asthmatics or allergy sufferers.

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

Environmental Fate**.** If released into water, acetone will be degraded by microorganisms or will evaporate into the atmosphere. Degradation by microorganisms will be the primary removal mechanism.

Acetone is highly volatile, and once it reaches the troposphere (lower atmosphere), it will react with other gases, contributing to the formation of ground-level ozone and other air pollutants. EPA is reevaluating acetone's reactivity in the lower atmosphere to determine whether this contribution is significant.

Physical Properties. Acetone is a volatile and flammable organic chemical.

Note: Acetone was removed from the list of TRI chemicals on June 16, 1995 (60 FR 31643) and will not be reported for 1994 or subsequent years.

Dichlorodifluoromethane

Toxicity. Ordinary occupational and ambient exposure to dichlorodifluoromethane (CFC-12 or Freon 12) causes neither eye nor respiratory irritation. Short-term moderate to high inhalation exposure to CFC-12 is linked to irregular heart beat and central nervous system effects, such as dizziness, decreased coordination, amnesia, apprehension, tingling, and unconsciousness. Attendant lack of oxygen at high concentrations may also produce tremors, convulsions, and cerebral edema. Inhalation of highly-concentrated vapors, such as through accidental exposure to concentrated refrigerant, can cause death through cardiovascular collapse and/or severe damage to the respiratory tract. Long-term exposure to CFC-12 is reported to cause heart palpitations and lightheadedness.

The most significant toxic effect associated with CFC-12 is its role as a potent ozone-depletor. Stratospheric ozone depletion causes an increase in the levels of ultraviolet solar radiation reaching the earth's surface, which in turn is linked to increased incidence of skin cancers, immune system suppression, cataracts, and disruptions in terrestrial and aquatic ecosystems. In addition, increased UV-B radiation is expected to increase photochemical smog, aggravating related health problems in urban and industrialized areas.

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

Environmental Fate. All of the CFC-12 produced is eventually lost as air emissions and builds up in the atmosphere. If released on land, dichlorodifluoromethane leaches into the ground and volatilizes from the soil surface. No degradative processes are known to occur in the soil. Dichlorodifluoromethane is also stable in water and the only removal process is volatilization. Dichlorodifluoromethane is extremely stable in the lower atmosphere and disperses over the globe and diffuses slowly into the stratosphere where it is lost by photolysis. In this process, chlorine atoms are released that degrade stratospheric ozone.

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

Toxicity. Breathing moderate amounts of methyl ethyl ketone (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. Methyl ethyl ketone 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.

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 which may be of concern within a particular industry. With the exception of volatile organic compounds (VOCs), there is little overlap with the TRI chemicals reported above. Exhibit 29 summarizes annual releases of carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter of 10 microns or less (PM10), total particulates (PT), sulfur dioxide (SO_2), and volatile organic compounds (VOCs).

Exhibit 29
Pollutant Releases (Short Tons/Years)

Industry	CO	NO_2	PM_{10}	PT	SO_2	VOC
U.S. Total	97,208,000	23,402,000	45,489,000	7,836,000	21,888,000	23,312,000
Metal Mining	5,391	28,583	39,359	140,052	84,222	1,283
Nonmetal Mining	4,525	28,804	59,305	167,948	24,129	1,736
Lumber and Wood Products	123,756	42,658	14,135	63,761	9,149	41,423
Wood Furniture and Fixtures	2,069	2,981	2,165	3,178	1,606	59,426
Pulp and Paper	624,291	394,448	35,579	113,571	341,002	96,875
Printing	8,463	4,915	399	1,031	1,728	101,537
Inorganic Chemicals	166,147	108,575	4,107	39,082	182,189	52,091
Organic Chemicals	146,947	236,826	26,493	44,860	132,459	201,888
Petroleum Refining	419,311	380,641	18,787	36,877	648,153	309,058
Rubber and Misc. Plastic Products	**2,090**	**11,914**	**2,407**	**5,355**	**29,364**	**140,741**
Stone, Clay, Glass, and Concrete	58,043	338,482	74,623	171,853	339,216	30,262
Iron and Steel	1,518,642	138,985	42,368	83,017	238,268	82,292
Nonferrous Metals	448,758	55,658	20,074	22,490	373,007	27,375
Fabricated Metals	3,851	16,424	1,185	3,136	4,019	102,186
Electronics	367	1,129	207	293	453	4,854
Motor Vehicles, Bodies, Parts, and Accessories	35,303	23,725	2,406	12,853	25,462	101,275
Dry Cleaning	101	179	3	28	152	7,310

Source U.S. EPA Office of Air and Radiation, AIRS Database, May 1995.

IV.D. Comparison of Toxic Release Inventory Between Selected Industries

The following information is presented as a comparison of pollutant release and transfer data across industrial categories. It is provided to give a general sense as to the relative scale of releases and transfers within each sector profiled under this project. Please note that the following table 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.

Exhibit 30 is a graphical representation of a summary of the 1993 TRI data for the Rubber and Miscellaneous Plastics Products 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. Industry sectors are presented in the order of increasing total TRI releases. The graph is based on the data shown in Exhibit 31 and is meant to facilitate comparisons between the relative amounts of releases, transfers, and releases per facility both within and between these sectors. The reader should 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. In the case of the Rubber and Miscellaneous Plastics Products Industry, the 1993 TRI data presented here covers 1,579 facilities. These facilities listed SIC 30, the Rubber and Miscellaneous Plastics Products industry, as a primary SIC code.

Exhibit 30: Summary of 1993 TRI Data: Releases and Transfers by Industry

Exhibit 31
Toxic Release Inventory Data for Selected Industries

Industry Sector	SIC Range	# TRI Facilities	Releases		Transfers		Total Releases + Transfers (10^6 pounds)	Average Release+ Transfers per Facility (pounds)
			Total Releases (10^6 pounds)	Average Releases per Facility (pounds)	1993 Total (10^6 pounds)	Average Transfers per Facility (pounds)		
Stone, Clay, and Concrete	32	634	26.6	41,895	2.2	3,500	28.2	46,000
Lumber and Wood Products	24	491	8.4	17,036	3.5	7,228	11.9	24,000
Furniture and Fixtures	25	313	42.2	134,883	4.2	13,455	46.4	148,000
Printing	2711-2789	318	36.5	115,000	10.2	732,000	46.7	147,000
Electronics/Computers	36	406	6.7	16,520	47.1	115,917	53.7	133,000
Rubber and Misc. Plastics	30	1,579	118.4	74,986	45.0	28,537	163.4	104,000
Motor Vehicle, Bodies, Parts and Accessories	371	609	79.3	130,158	145.5	238,938	224.8	369,000
Pulp and paper	2611-2631	309	169.7	549,000	48.4	157,080	218.1	706,000
Inorganic Chem. Mfg.	2812-2819	555	179.6	324,000	70.0	126,000	249.7	450,000
Petroleum Refining	2911	156	64.3	412,000	417.5	2,676,000	481.9	3,088,000
Fabricated Metals	34	2,363	72.0	30,476	195.7	82,802	267.7	123,000
Iron and Steel	3312-3313 3321-3325	381	85.8	225,000	609.5	1,600,000	695.3	1,825,000
Nonferrous Metals	**333, 334**	**208**	**182.5**	**877,269**	**98.2**	**472,335**	**280.7**	**1,349,000**
Organic Chemical Mfg.	2861-2869	417	151.6	364,000	286.7	688,000	438.4	1,052,000
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, 1993.

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, re-engineering processes to reuse by-products, improving management practices, and employing substitutes for toxic chemicals. Some smaller facilities are able to get below regulatory thresholds just by reducing pollutant releases through aggressive pollution prevention policies.

In order to encourage these approaches, this section provides both general and company-specific descriptions of some pollution prevention advances that have been implemented within the Rubber and Miscellaneous Plastics Products industry. While the list is not exhaustive, it does provide core 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 provides summary 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. Please note that the activities described in this section do not necessarily apply to all facilities that fall within this sector. Facility-specific conditions must be carefully considered when pollution prevention options are evaluated, and the full impacts of the change must examine how each option affects, air, land, and water pollutant releases.

V.A. Identification of Pollution Prevention Activities in Use

Plastic

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

Waste Water

The pollution prevention options for process waste water from the plastic manufacturing industry are slightly more complex. As discussed earlier, waste water 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, bis(2-ethylhexyl)phthalate, is present in contact cooling and heating water in treatable concentrations, and the only technology identified to control bis(2-ethylhexyl)phthalate is the activated carbon process. To maintain low concentrations of other pollutants currently discharged in contact cooling and heating water, EPA advises the application of 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 (BOD5, oil and grease, and TSS), three non conventional (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 total suspended solids (TSS) and three phalates. The only pollution prevention technology EPA has identified for the removal of TSS is a settling unit, and the only technology identified for removal of 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 most manufacturers through participation in "Operation Clean Sweep" (OCS). All participating facilities take measures to ensure spill minimization, prompt and thorough cleanup of spills, and proper pellet disposal. Such measures include employee education, extra conscientious sweeping efforts, enhanced pellet capture methods, and disposal precautions. Currently, the Society of the Plastic Industry is in the process of putting labels on all hoppers and cars used to transport the pellets to remind employees of the importance of not spilling the pellets.

Disposal

Plastics products 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 employed 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 U.S., and the recycling of food containers and cups 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 provide the most significant results in reducing 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.

Rubber

As discussed, pollution outputs from the rubber products industry occur at many stages of the manufacturing process. Most facilities are reducing these outputs by employing 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, can be a significant source of particulate emissions. Some mixing

facilities have practically eliminated particulate emissions by purchasing their chemicals in small pre-weighed, 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 pre-weighed 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. For example, one manufacturer claims to have reduced zinc waste simply by reducing the amount of zinc added to the compound master batch. He kept reducing the amount of zinc added until the quality of the product suffered. The manufacturer then assumed that the last zinc level at which no decrease in product quality was discovered was the best "waste minimized" operating level. Since manufacturers may use several hundred compounding formulae on a regular basis, formulae review may not only reduce waste production, but also provide for increased quality control.

- **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.

Waste Water

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

- 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 waste waters prior to disposal to reduce the volume of waste water disposal. For instance, oily waste waters 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 are another pollution problem in rubber product 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 the replacement of solvent cleaning applications with high pressure water systems, the use of caustic cleaning solutions, and the substitution of old solvents with cleaner, citrus-based solvents. Many mold release compounds, coatings, and adhesives which formerly used ozone depleting chemicals as carriers were reformulated to eliminate the offending chemicals. Process changes and direct elimination of the chemicals of concern were also accomplished. Most rubber products are now free from having been manufactured with ozone depleting chemicals.

Disposal

A significant issue in the rubber product 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 performing operations can be segregated from the oily waste waters 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 that produces a form of rubber filler or an ingredient that can be incorporated into virgin rubber compounds. There are two general methods for producing reprocessed rubber. The first is a severing of cross-links by chemical or steam digestion to produce a product known as reclaiming. The second is a grinding of rubber compounds by ambient grinding, cryogenic grinding, or solution grinding in water. These processes are also applicable to the scrap rubber produced during finishing operations.

Scrap rubber which cannot be recycled within the manufacturing process is being addressed by some of the following methods:

- 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
- Making it into loading dock bumpers.

Recycling post-consumer and post-production scrap into products offers great challenges. 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 be tires, belts, hoses, motor mounts, gaskets, or a 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 seems, as a necessity, to apply to the less sophisticated, non-dynamic, static application products.

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 lbs. of non recyclable waste shipped off-site per 100 lbs. of product
- Total lbs. of solid and hazardous water generated per 100 lbs. of product.

Tires

All of the pollution prevention options discussed in the section on rubber product manufacture also apply to tire production. In addition, the two pollution issues which apply specifically to the tire industry are VOC emissions from the building and assembly process and scrap tire disposal. In terms of pollution prevention for VOC emissions from tire cementing and spraying operations, EPA recommends 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. EPA also recommends that green tire spraying operations consider switching to water-based sprays (i.e., any green tire spray that contains 12 percent or less, by weight, of VOC as sprayed) or organic solvent-based sprays.

While not technically a "pollution" output from the tire manufacturing process. Scrap tire disposal has been a big waste disposal issue in the U.S. Recently, legislation and initiatives have been finding innovative ways to address this issue. The Scrap Tire Management Council (the Council), made up of rubber industry representatives, is leading the effort to find and expand markets for the environmentally and economically sound uses of scrap tires. According to the Rubber Manufacturers Association, in 1993, an estimated 33 percent of the 250 million tires scrapped annually were utilized in a positive manner. This represents more than a tripling of scrap tire use since 1990, and more than a five-fold increase since 1985. 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. The tires not utilized are landfilled or stockpiled.

In 1993, 70 million tires were used in energy recovery. The capacity to use an additional seven million tires in cement kilns was permitted but not utilized. Asphalt paving utilized nearly five million tires, as did civil engineering uses. The equivalent of one million tires were used to manufacture various new products. The Council projections indicate that by 1997, more than 328 million tires could be utilized annually. Exhibit 32 shows the trends in the number of scrap tires used in various capacities.

Exhibit 32
Scrap Tire Usage

SCRAP TIRE USES (Millions of Units)				
	1990	**1992**	**1993**	***1997***
Fuel	24.5	57	70	230
Paving	N/A	5	5	80
Civil Engineering	N/A	5	5	15
Products	N/A	1	1	3
Total Usage	24.5	68	81	328

Source: RMA 1993 Tire Industry Facts.

The first line of defense against increasing scrap tire numbers is tire retreading. The figures presented above do not include retreaded tires because tire casings which are capable of being retreaded are not, by definition, scrap tires. Only tires which can no longer be used for their original intended purpose, even if retreaded, are considered scrap tires. The American Retreaders Association estimates that in 1993, nearly 32 million tires were retreaded and returned to useful life on America's cars, trucks, airplanes, earth movers, and industrial equipment.

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. For example, in 1989 EPA promulgated procurement guidelines that promote the use of retread tires by government agencies and entities funded by the government. 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 (OR, WI, UT, and OK) 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.

Other Private Sector Initiatives to Improve Environmental Performance

Many dry chemicals are purchased in sealed pre-weighed poly-logs which 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 the upgrading and addition of plant ventilation systems, which provides

cleaner air in the workplace, improvement in solvent application efficiency to decrease the amount of solvents needed, use of more efficient coating equipment which speeds the production process, and the refinement of preventive maintenance programs that often virtually eliminate unplanned shutdowns which lead to waste. Solvent use 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 led to reduction in the amount of hazardous waste generated, and recycling of paper, wood, skids, plastic shrink wrap, cardboard, cord, wire, fabric, and white office paper have increased. Some manufacturing plants have reduced waste water discharges by installing closed loop water cooling systems, and other companies removed and their underground storage tanks replaced with above ground tanks that are easier to monitor for leaks.

VI. SUMMARY OF APPLICABLE FEDERAL STATUTES AND REGULATIONS

This section discusses the Federal statutes and regulations that may apply to this 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 two following sections are included.

- Section VI.A contains a general overview of major statutes
- Section VI.B contains a list of regulations specific to this industry

The descriptions within Section IV 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 further information, readers should consult the Code of Federal Regulations and other state or local regulatory agencies. EPA Hotline contacts are also provided for each major statute.

VI.A. General Description of Major Statutes

Resource Conservation And Recovery Act

The Resource Conservation And Recovery Act (RCRA) of 1976 which amended the Solid Waste Disposal Act, addresses solid (Subtitle D) and hazardous (Subtitle C) waste management activities. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs underground storage tanks (USTs).

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 hazardous wastes include the specific materials listed in the regulations (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 non-specific sources, designated with the code "F") or materials which exhibit a hazardous waste characteristic (ignitibility, corrosivity, reactivity, or toxicity and designated with the code "D").

Regulated entities that generate hazardous waste are subject to waste accumulation, manifesting, and recordkeeping standards. Facilities that treat, store, or dispose of hazardous waste must obtain a permit, either from EPA or from a State agency which EPA has authorized to implement the permitting program. Subtitle C 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 Part 264 Subpart S and §264.10) for conducting corrective actions which govern the cleanup of releases of hazardous waste or constituents from solid waste management units at RCRA-regulated facilities.

Although RCRA is a Federal statute, many States implement the RCRA program. Currently, EPA has delegated its authority to implement various provisions of RCRA to 46 of the 50 States.

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

- **Identification of Solid and Hazardous Wastes** (40 CFR Part 261) lays out the procedure every generator should follow to determine whether the material created is considered a hazardous waste, solid 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 ID 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 for up to 90 days (or 180 days depending on the amount of waste generated) without obtaining a permit.

- **Land Disposal Restrictions** (LDRs) are regulations prohibiting the disposal of hazardous waste on land without prior treatment. Under the LDRs (40 CFR 268), materials must meet land disposal restriction (LDR) treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Wastes subject to the LDRs include solvents, electroplating wastes, heavy metals, and acids. 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 the used oil. For parties that merely generate used oil, regulations establish storage standards. For a party considered a used oil marketer (one who generates and sells off-specification used oil directly to a used oil burner), additional tracking and paperwork requirements must be satisfied.

- **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 who store such waste, including generators operating under the 90-day accumulation rule.

- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substance 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 establishes increasingly stringent standards, including upgrade requirements for existing tanks, that must be met by 1998.

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

EPA's RCRA/Superfund/UST Hotline, at (800) 424-9346, responds to questions and distributes guidance regarding all RCRA regulations. The RCRA Hotline operates weekdays from 8:30 a.m. to 7:30 p.m., EST, excluding Federal holidays.

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 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 the Emergency Planning and Community Right-to-Know Act (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 which exceeds a reportable quantity. Reportable quantities are defined and listed in 40 CFR § 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 permanent cleanups, known as remedial actions, and other cleanups referred to as "removals." EPA generally takes remedial actions only at sites on the National Priorities List (NPL), which currently includes approximately 1300 sites. Both EPA and states can act at other sites; however, EPA provides responsible parties the opportunity to conduct removal and remedial actions and encourages community involvement throughout the Superfund response process.

EPA's RCRA/Superfund/UST Hotline, at (800) 424-9346, answers questions and references guidance pertaining to the Superfund program. The CERCLA Hotline operates weekdays from 8:30 a.m. to 7:30 p.m., EST, excluding Federal holidays.

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (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. EPCRA required the establishment of State emergency response commissions (SERCs), responsible for coordinating certain emergency response activities and for appointing local emergency planning committees (LEPCs).

EPCRA and its regulations (40 CFR Parts 350-372) establish four types of reporting obligations for facilities which store or manage specified chemicals:

- **EPCRA §302** requires facilities to notify the SERC and LEPC of the presence of any "extremely hazardous substance" (the list of such substances is in 40 CFR Part 355, Appendices A and B) if it has such substance in excess of the substance's threshold planning quantity, and directs the facility to appoint an emergency response coordinator.

- **EPCRA§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 or an EPCRA extremely hazardous substance.

- **EPCRA§§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 (MSDSs) 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 §313** requires manufacturing facilities included in SIC codes 20 through 39, which have ten or more employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report. This report, commonly known as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media, and allows EPA to compile the national Toxic Release Inventory (TRI) database.

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

EPA's EPCRA Hotline, at (800) 535-0202, answers questions and distributes guidance regarding the emergency planning and community right-to-know regulations. The EPCRA Hotline operates weekdays from 8:30 a.m. to 7:30 p.m., EST, excluding Federal holidays.

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 include "priority" pollutants, including various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, oil and grease, and pH; and "non-conventional" pollutants, including any pollutant not identified as either conventional

or priority.

The CWA regulates both direct and indirect discharges. The **National Pollutant Discharge Elimination System (NPDES)** program (CWA §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 presently authorized forty States to administer the NPDES program), contain industry-specific, technology-based and/or water quality-based limits, and establish pollutant monitoring and reporting requirements. A facility that intends to discharge into the nation's waters must obtain a permit prior to initiating its 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 a facility may make a discharge.

A NPDES permit may also include discharge limits 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 technological 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 guidelines which propose aquatic life and human health criteria for many of the 126 priority pollutants.

Storm Water Discharges

In 1987 the CWA was amended to require EPA to establish a program to address **storm water discharges**. In response, EPA promulgated the NPDES storm water permit application regulations. Storm water discharge associated with industrial activity means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant (40 CFR 122.26(b)(14)). These regulations require that facilities with the following storm water discharges apply for a NPDES permit: (1) a discharge associated with industrial activity; (2) a discharge from a large or medium municipal storm sewer system; or (3) a discharge which EPA or the State determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

The term "storm water discharge associated with industrial activity" means a storm water discharge from one of 11 categories of industrial activity defined at 40 CFR 122.26. Six of the categories are defined by SIC codes while the other five are identified through narrative descriptions of the regulated industrial activity. If the primary SIC code of the facility is one of those identified in the regulations, the facility is subject to the storm water permit application requirements. If any activity at a facility is covered by one of the five narrative categories, storm water discharges from those areas where the activities occur are subject to storm water discharge permit application requirements.

Those facilities/activities that are subject to storm water discharge permit application requirements are identified below. To determine whether a particular facility falls within one of these categories, the regulation should be consulted.

Category i: Facilities subject to storm water effluent guidelines, new source performance standards, or toxic pollutant effluent standards.

Category ii: Facilities classified as SIC 24-lumber and wood products (except wood kitchen cabinets); SIC 26-paper and allied products (except paperboard containers and products); SIC 28-chemicals and allied products (except drugs and paints); SIC 29-petroleum refining; and SIC 311-leather tanning and finishing.

Category iii: Facilities classified as SIC 10-metal mining; SIC 12-coal mining; SIC 13-oil and gas extraction; and SIC 14-nonmetallic mineral mining.

Category iv: Hazardous waste treatment, storage, or disposal facilities.

Category v: Landfills, land application sites, and open dumps that receive or have received industrial wastes.

Category vi: Facilities classified as SIC 5015-used motor vehicle parts; and SIC 5093-automotive scrap and waste material recycling facilities.

Category vii: Steam electric power generating facilities.

Category viii: Facilities classified as SIC 40-railroad transportation; SIC 41-local passenger transportation; SIC 42-trucking and warehousing (except public warehousing and storage); SIC 43-U.S. Postal Service; SIC 44-water transportation; SIC 45-transportation by air; and SIC 5171-petroleum bulk storage stations and terminals.

Category ix: Sewage treatment works.

Category x: Construction activities except operations that result in the disturbance of less than five acres of total land area.

Category xi: Facilities classified as SIC 20-food and kindred products; SIC 21-tobacco products; SIC 22-textile mill products; SIC 23-apparel related products; SIC 2434-wood kitchen cabinets manufacturing; SIC 25-furniture and fixtures; SIC 265-paperboard containers and boxes; SIC 267-converted paper and paperboard products; SIC 27-printing, publishing, and allied industries; SIC 283-drugs; SIC 285-paints, varnishes, lacquer, enamels, and allied products; SIC 30-rubber and plastics; SIC 31-leather and leather products (except leather and tanning and finishing); SIC 323-glass products; SIC 34-fabricated metal products (except fabricated structural metal); SIC 35-industrial and commercial machinery and computer equipment; SIC 36-electronic and other electrical equipment and components; SIC 37-transportation equipment (except ship and boat building and repairing); SIC 38-measuring, analyzing, and controlling instruments; SIC 39-miscellaneous manufacturing industries; and SIC 4221-4225-public warehousing and storage.

Pretreatment Program

Another type of discharge that is regulated by the CWA is one that goes to a publicly-owned treatment works (POTWs). The national **pretreatment program** (CWA §307(b)) controls the indirect discharge of pollutants to POTWs by "industrial users." Facilities regulated under §307(b) must meet certain pretreatment standards. The goal of the pretreatment program is to protect municipal wastewater treatment plants from damage that may occur when hazardous, toxic, or other wastes are discharged into a sewer system and to protect the quality of sludge generated by these plants. Discharges to a POTW are regulated primarily by the POTW itself, rather than the State or EPA.

EPA has developed technology-based standards for industrial users of POTWs. Different standards apply to existing and new sources within each category. "Categorical" pretreatment standards applicable to an industry on a nationwide basis are developed by EPA. In addition, another kind of pretreatment standard, "local limits," are developed by the POTW in order to assist the POTW in achieving the effluent limitations in its NPDES permit.

Regardless of whether a State is authorized to implement either the NPDES or the pretreatment program, if it develops its own program, it may enforce requirements more stringent than Federal standards.

EPA's Office of Water, at (202) 260-5700, will direct callers with questions about the CWA to the appropriate EPA office. EPA also maintains a bibliographic database of Office of Water publications which can be accessed through the Ground Water and Drinking Water resource center, at (202) 260-7786.

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 through the control of underground injection of liquid 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 non-enforceable health-based goals, and maximum contaminant levels (MCLs), which are enforceable limits set as close to MCLGs as possible, considering cost and feasibility of attainment.

The SDWA **Underground Injection Control (UIC)** program (40 CFR Parts 144-148) is a permit program which protects underground sources of drinking water by regulating five classes of injection wells. UIC permits include design, operating, inspection, and monitoring requirements. Wells used to inject hazardous wastes must also comply with RCRA corrective action standards in order to be granted a RCRA permit, and must meet applicable RCRA land disposal restrictions standards. The UIC permit program is primarily State-enforced, since EPA has authorized all but a few States to administer the program.

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.

EPA's Safe Drinking Water Hotline, at (800) 426-4791, answers questions and distributes guidance pertaining to SDWA standards. The Hotline operates from 9:00 a.m. through 5:30 p.m., EST, excluding Federal holidays.

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 which may be posed by their manufacture, processing, and use. TSCA provides a variety of control methods to prevent chemicals from posing unreasonable risk.

TSCA standards may apply at any point during a chemical's life cycle. Under TSCA §5, EPA has established an inventory of chemical substances. If a chemical is not already on the inventory, and has not been excluded by TSCA, a premanufacture notice (PMN) must be submitted to EPA prior to manufacture or import. The PMN must identify the chemical and provide available information on health and environmental effects. If available data are not sufficient to evaluate the chemical's effects, EPA can impose restrictions pending the development of information on its health and environmental effects. EPA can also restrict significant new uses of chemicals based upon factors such as the projected volume and use of the chemical.

Under TSCA §6, EPA can ban the manufacture or distribution in commerce, limit the use, require labeling, or place other restrictions on chemicals that pose unreasonable risks. Among the chemicals EPA regulates under §6 authority are asbestos, chlorofluorocarbons (CFCs), and polychlorinated biphenyls (PCBs).

EPA's TSCA Assistance Information Service, at (202) 554-1404, answers questions and distributes guidance pertaining to Toxic Substances Control Act standards. The Service operates from 8:30 a.m. through 4:30 p.m., EST, excluding Federal holidays.

Clean Air Act

The Clean Air Act (CAA) and its amendments, including the Clean Air Act Amendments (CAAA) of 1990, 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 CAAA, many facilities will be required to obtain permits for the first time. State and local governments oversee, manage, and enforce many of the requirements of the CAAA. CAA regulations appear at 40 CFR Parts 50-99.

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. Geographic areas that meet NAAQSs for a given pollutant are classified as attainment areas; those that do not meet NAAQSs are classified as non-attainment areas. Under §110 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.

Title I also authorizes EPA to establish New Source Performance Standards (NSPSs), which are nationally uniform emission standards for new stationary sources falling within particular industrial categories. NSPSs are based on the pollution control technology available to that category of industrial source but allow the affected industries the flexibility to devise a cost-effective means of reducing emissions.

Under Title I, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented towards controlling particular hazardous air pollutants (HAPs). Title III of the CAAA further directed EPA to develop a list of sources that emit any of 189 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 174 categories and developed a schedule for the establishment of emission standards. The emission standards will be developed for both new and existing sources based on "maximum achievable control technology" (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 establishes a sulfur dioxide emissions program designed to reduce the formation of acid rain. Reduction of sulfur dioxide releases will be obtained by granting to certain sources limited emissions allowances, which, beginning in 1995, will be set below previous levels of sulfur dioxide releases.

Title V of the CAAA of 1990 created a 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 are developing the permit programs in accordance with guidance and regulations from EPA. Once a State program is approved by EPA, permits will be issued and monitored by that State.

Title VI is intended to protect stratospheric ozone by phasing out the manufacture of ozone-depleting chemicals and restrict their use and distribution. Production of Class I substances, including 15 kinds of chlorofluorocarbons (CFCs), will be phased out entirely by the year 2000, while certain hydrochlorofluorocarbons (HCFCs) will be phased out by 2030.

EPA's Control Technology Center, at (919) 541-0800, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at (800) 296-1996, provides general information about regulations promulgated

under Title VI of the CAA, and EPA's EPCRA Hotline, at (800) 535-0202, answers questions about accidental release prevention under CAA §112(r). In addition, the Technology Transfer Network Bulletin Board System (modem access (919) 541-5742)) includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

VI.B. Industry Specific Regulations

Although the rubber and plastics products manufacturing industries are grouped together under SIC 30, current Federal regulations separate the two industries. The environmental issues directly addressed for rubber product manufacture are recycling mandates, air emissions, and hazardous waste disposal. For plastic, the only Federally-regulated issue is contaminated waste water. Recycling requirements exist on the State and local level for plastics products and will be expanded upon later. Based on their pollutant outputs, both plastic and rubber products manufacturing processes have the potential to be regulated under the Clean Water Act, the Clean Air Act, and RCRA.

The Clean Air Act (CAA)

In addition to the applicable general requirements of the CAA, rubber and plastics products manufacturing facilities are subject to numerous industry-specific air regulations. Several new source performance standards (NSPS) affect facilities in the rubber and plastics manufacturing industries. One NSPS is 40 CFR Part 60, Subpart BBB, "Standards of Performance for the Rubber Tire Manufacturing Industry." This standard applies to new, modified or reconstructed facilities which mass produce passenger car and light-duty truck tires and similar tires with a bead diameter less than or equal to 0.5 meters (19.7 inches) and a cross section dimension less than 0.325 meters (12.98 inches). The emission limits in the standard are for volatile organic compound (VOC) emissions from undertread cementing, sidewall cementing, tread end cementing, bead cementing and green tire spraying operations.

Another NSPS that affects certain facilities in the rubber and plastics manufacturing industries is 40 CFR Part 60, Subpart TTT, "Standards of Performance for Industrial Surface Coating: Surface Costing of Plastic Parts for Business Machines." This standard applies to new, modified, or reconstructed facilities that apply coatings to plastic parts that will be used in the manufacture of business machines. The emission limits in the standards are for VOC emissions from prime coats, color coats, texture coats, and touch-up coats. Other NSPS standards such as NSPS DDD - For VOC for the Polymer Manufacturing Industry, and NSPS VVV - For Polymeric Coating of Supporting Substrates Facilities, may also apply to some facilities under SIC 30.

Under Title III of the Clean Air Act Amendments (CAAA), the EPA is developing many national emission standards for hazardous air pollutants (NESHAPs). Several

of these will affect certain facilities in the rubber and plastics products manufacturing industries. These include standards for reinforced plastics and composites, rubber tire manufacturing, and plastic parts coating. Development of the standard for reinforced plastics and composites started in 1995. The development of the other two standards has not yet started.

Under Title I of the CAAA and under previous legislation, the EPA has provided guidance and other information to State and local agencies on reducing VOC emissions from existing sources in ozone non-attainment areas. These documents are referred to as Control Techniques Guidelines (CTGs) and Alternative Control Techniques (ACTs). A CTG for rubber tire manufacturing was issued in 1978 (Control of Volatile Organic Compound Emissions from Manufacture of Pneumatic Rubber Tires, EPA-450/2-78/030). An ACT for coating of plastic parts was issued in 1994 (Alternative Control Techniques Document: Surface Coating of Automotive/Transportation and Business Machine Plastic Parts, EPA - 453/R-94/017).

The Clean Water Act (CWA)

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 (BPT) and/or Best Available Technologies (BAT). The regulated pollutants include TSS, oil and grease, pH, COD, BOD5, lead, and chromium. The standards are promulgated under the authority of §§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 storm water discharges from selected municipal and industrial point sources. The rubber manufacturing industry was among the industries required to submit an application for storm water discharge permits. The regulations require that a storm water pollution prevention plan (SWPPP) be developed for each facility covered by this regulation. The regulations state that the SWPPP shall be prepared in accordance with good engineering practices and in accordance with the factors outlined in 40 CFR §§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 BOD5, TSS, oil and grease, and pH.

Resource Conservation and Recovery Act (RCRA)

Facilities engaged in rubber product or rubber tire manufacture use RCRA-regulated unused 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 which are added to the rubber mixture in their original form, spills are a reasonable possibility and RCRA requirements are likely to apply. Also, according to Toxic Release Inventory (TRI) data, rubber and miscellaneous plastics products manufacturing facilities use many solvents that are regulated by RCRA. These solvents include toluene, methyl ethyl keytone, 1,1,1-trichloroethane, acetone, methanol, xylene, methyl isobutyl keytone, trichlorofluoromethane, freon 113, trichloroethylene, and n-butyl alcohol.

Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)

Facilities engaged in rubber compounding at either rubber products or tire facilities may be required to report annually any releases to the environment of certain chemicals regulated under §313, Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. If a rubber compounding facility has 10 or more full time employees, all environmental releases of any §313-listed chemical or chemical category manufactured or processed by the facility in an amount exceeding 25,000 pounds per year or otherwise used in an amount exceeding 10,000 pounds per year must be reported. It is important to note that approximately 35 percent of all rubber and miscellaneous plastics products manufacturing facilities have less than 10 employees and are not covered by EPCRA.

The Intermodal Surface Transportation Act of 1991

The purpose of the Intermodal Surface Transportation Act is to increase the use of ground tire rubber in asphalt materials which are purchased with Federal funds for use in highway construction and maintenance. Ground tire rubber is produced by recycling used automotive and truck tires that would ordinarily by disposed of by placement in landfills or by other disposal procedures. Increased use of tires in asphalt materials should help to remove tires from the solid waste stream. At the same time, such use will assist in conserving both energy and natural resources used in constructing and maintaining pavement systems.

The Act mandates that starting in 1991, a "minimum utilization" of five percent of all asphalt pavement financed in whole or in part by the Federal government be asphalt rubber. This minimum is to increase annually by five percent until 1997, when the minimum utilization will have risen to 20 percent. More than 500 tires are consumed to produce asphalt for a one-lane, one-mile stretch of road. By encouraging the use of ground tire rubber, the guideline should result in a decrease

in the number of tires going to landfills or to tire stockpiles. In addition, the increased use of rubber in asphalt materials will result in reduced generation of solid wastes, air pollutants, and water pollutants generated during the production of asphalt and the aggregates used in asphalt concrete pavements. To the extent that ground tire rubber replaces the asphalt or the aggregate, these pollutants will be reduced. Implementation of this Act has been delayed many times, and to date it has not been fully implemented.

Guidance for Federal Procurement of Retread Tires

Retreading is the application of a new tread to a worn tire whose casing is still in good condition. Currently, over 1,900 retreaders operate in the U.S., though that number is shrinking because of declining markets for passenger retreads. This decline is due to the relatively low price of new tires and concerns about the safety of retreads. Truck tires, however, are often retreaded three times before they are discarded, and the truck tire retreading business is increasing. On November 17, 1989, EPA promoted the use of retread tires by government agencies and other government-funded entities by promulgating procurement guidelines for retread tires.

The purpose of retread guidelines is to assist procuring agencies in complying with the requirements of §6002 of RCRA, as amended, 42 U.S.C. 6962, as that section applies to procurement of tires. By May 8, 1986, Federal agencies were required to eliminate from their specifications any exclusion of retread tires and any requirement that tires be manufactured from virgin materials unless there is a technical basis for such exclusion or requirement. The current guideline requires each procuring agency to assure that its specifications require the use of retread tires to the maximum extent possible without jeopardizing the intended end use of these items.