

#### 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 (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 through 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 (1995) TRI reporting year (which includes over 600 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. TRI data provide the type, amount and media receptor of each chemical released or transferred.

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 1995 Toxic Release Inventory Public Data Release, reported onsite releases of toxic chemicals to the environment decreased by 5 percent (85.4 million pounds) between 1994 and 1995 (not including chemicals added and removed from the TRI chemical list during this period). Reported releases dropped by 46 percent between 1988 and 1995. Reported transfers of TRI chemicals to off-site locations increased by 0.4 percent (11.6 million pounds) between 1994 and 1995. 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 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

Certain limitations exist regarding TRI data. Release and transfer reporting are limited to the approximately 600 chemicals on the TRI list. Therefore, a large portion of the emissions from industrial facilities are not captured by TRI. Within some sectors, (e.g. dry cleaning, printing and transportation equipment cleaning) 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. For these sectors, release information from other sources has been included. In addition, many facilities report more than one SIC code reflecting the multiple operations carried out onsite. Therefore, reported releases and transfers may or may not all be associated with the industrial operations described in this notebook.

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, vents, ducts, or pipes. Fugitive emissions include equipment leaks, evaporative losses from surface impoundments and spills, and releases from building ventilation systems.

**Releases to Water (Surface Water Discharges)** -- encompass any releases going directly to streams, rivers, lakes, oceans, or other bodies of water. Releases due to runoff, including storm water runoff, are also reportable to TRI.

**Releases to Land** -- occur within the boundaries of the reporting facility. Releases to land include disposal of toxic chemicals in landfills, land treatment/application farming, surface impoundments, and other land disposal methods (such as spills, leaks, or waste piles).

**Underground Injection** -- is a contained release of a fluid into a subsurface well for the purpose of waste disposal. Wastes containing TRI chemicals are injected into either Class I wells or Class V wells. Class I wells are used to inject liquid hazardous wastes or dispose of industrial and municipal wastewaters beneath the lowermost underground source of drinking water. Class V wells are generally used to inject non-hazardous fluid into or above an underground source of drinking water. TRI reporting does not currently distinguish between these two types of wells, although there are important differences in environmental impact between these two methods of injection.

**TRANSFERS** -- is a transfer of toxic chemicals in wastes to a facility that is geographically or physically separate from the facility reporting under TRI. Chemicals reported to TRI as transferred are sent to off-site facilities for the purpose of recycling, energy recovery, treatment, or disposal. The quantities reported represent a movement of the chemical away from the reporting facility. Except for off-site transfers for disposal, the reported quantities do not necessarily represent entry of the chemical into the environment.

**Transfers to POTWs** -- are wastewater transferred through pipes or sewers to a publicly owned treatment works (POTW). Treatment or removal of a chemical from the wastewater depend on the nature of the chemical, as well as the treatment methods present at the POTW. Not all TRI chemicals can be treated or removed by a POTW. Some chemicals, such as metals, may be removed, but are not destroyed and may be disposed of in landfills or discharged to receiving waters.

**Transfers to Recycling** -- are sent off-site for the purposes of regenerating or recovery by a variety of recycling methods, including solvent recovery, metals recovery, and acid regeneration. 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 to be treated through a variety of methods, including 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 Textile Industry

According to the 1995 Toxics Release Inventory (TRI) data, 339 textile facilities reporting SIC 22, released (to the air, water, or land) and transferred (shipped off-site or discharged to sewers) a total of 25 million pounds of toxic chemicals during calendar year 1995. This represents approximately 0.4 percent of the 5.7 billion pounds of releases and transfers from all manufacturers (SICs 20-39) reporting to TRI that year.

The releases and transfers are dominated by large volumes of solvents which are used extensively in coating textile materials with plastic and other synthetic materials. The top three chemicals released by volume are methyl ethyl ketone (MEK), toluene, and methanol. These three account for about 64 percent (11.4 million pounds) of the industry's total releases.

Evidence of the diversity of processes at textile facilities reporting to TRI is found in the fact that the most frequently reported chemicals, methanol and ammonia, account for only 18 percent of the total number of chemicals reported by all 338 textile facilities that report to TRI. Over half of the chemicals are reported by fewer than ten facilities. The variability in facilities' TRI chemical profiles may be attributed to the variety of processes and products in the industry.

##### *Releases*

Table 10 presents the number and volumes of chemicals released by textile manufacturing facilities reporting SIC 22, in 1995. The total volume of releases was 17.8 million pounds or 72 percent of the total volume of chemicals reported to TRI by the textile industry (i.e. releases and transfers).

The top five chemicals released by this industry, in terms of volumes, include: MEK, toluene, methanol, ammonia, and xylenes (mixed isomers). The very volatile nature of these chemicals is apparent in the fact that about 98 percent (17.5 million pounds) of the industry's releases are to the air. About 76 percent (13.6 million pounds) of all the chemicals released by the textile industry were released to air in the form of point source emissions. Another 22 percent (3.9 million pounds) were released as fugitive emissions. The remaining two percent (276,000 pounds) were released in the form of water discharges or disposals to land. Because the majority of TRI releases are in the form of air emissions, these data indicate that the large amount of wastewater discharged from textile facilities contain dilute amounts of TRI chemicals.

### *Transfers*

Table 11 presents the number and volumes of chemicals transferred by textile manufacturing facilities reporting SIC 22, in 1995. The total volume of transfers was 7.0 million pounds or 28 percent of the total volume of chemicals reported to TRI by the textile industry (i.e. releases and transfers). Transfers to POTWs accounted for the largest amount, 40 percent, (2.8 million pounds). About 30 percent (2.1 million pounds) was transferred for either disposal, recycling, or treatment and the remaining 30 percent (2.1 million pounds) was transferred for energy recovery. Three chemicals (MEK, toluene, and ammonia) accounted for about 38 percent of the 7.0 million pounds of total transfers for this industry.

**Table 10: 1995 TRI Releases for Textiles Manufacturing Facilities (SIC 22),  
by Number of Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL	FUGITIVE AIR	POINT AIR	WATER DISCHARGES	UNDERGROUND INJECTION	LAND DISPOSAL	TOTAL RELEASES	AVG. RELEASES PER FACILITY
METHANOL	64	212,358	2,717,312	1,764	0	0	2,931,434	45,804
AMMONIA	51	137,047	1,201,243	6,911	0	0	1,345,201	26,376
METHYL ETHYL KETONE	37	1,469,884	3,450,185	250	0	1	4,920,320	132,982
TOLUENE	33	588,915	2,918,775	5	0	1	3,507,696	106,294
PHOSPHORIC ACID	32	2,503	48,496	250	0	0	51,249	1,602
CHLORINE	31	13,885	20,523	11,908	0	0	46,316	1,494
ANTIMONY COMPOUNDS	30	322	1,065	1,067	0	250	2,704	90
DECABROMODIPHENYL OXIDE	26	206	1,075	1,860	0	1,754	4,895	188
ETHYLENE GLYCOL	23	5,705	131,720	9,102	0	286	146,813	6,383
CERTAIN GLYCOL ETHERS	21	20,329	166,765	18,651	0	0	205,745	9,797
CHROMIUM COMPOUNDS	20	15	18	2,712	0	1,811	4,556	228
ZINC COMPOUNDS	20	2,645	6,196	480	0	5	9,326	466
1,1,1-TRICHLOROETHANE	19	324,499	11,580	0	0	0	336,079	17,688
COPPER COMPOUNDS	18	2,199	181	10,908	0	2,789	16,077	893
FORMALDEHYDE	18	2,110	66,144	92	0	0	68,346	3,797
XYLENE (MIXED ISOMERS)	18	103,961	740,907	750	0	0	845,618	46,979
HYDROCHLORIC ACID								
(1995 AND AFTER "ACID AEROSOLS" ONLY)	17	4,451	171,436	250	0	5	176,142	10,361
SULFURIC ACID	15	250	250	0	0	0	500	33
DIISOCYANATES	11	1,818	1,676	0	0	0	3,494	318
N,N-DIMETHYLFORMAMIDE	11	60,816	56,263	0	0	0	117,079	10,644
BIPHENYL	11	6,935	147,813	762	0	0	155,510	14,137
N-METHYL-2-PYRROLIDONE	10	65,640	324,632	34	0	0	390,306	39,031
SODIUM NITRITE	9	19,033	18,005	0	0	0	37,038	4,115
BARIUM COMPOUNDS	8	10	10	5	0	0	25	3
TRICHLOROETHYLENE	8	40,980	241,477	0	0	0	282,457	35,307
1,2,4-TRIMETHYLBENZENE	8	6,704	44,108	3,005	0	0	53,817	6,727
NITRATE COMPOUNDS	7	0	0	187,450	0	0	187,450	26,779
FORMIC ACID	7	15,113	4,178	0	0	0	19,291	2,756
DICHLOROMETHANE	7	79,576	434,986	0	0	0	514,563	73,509
METHYL ISOBUTYL KETONE	7	84,572	331,139	0	0	1	415,711	59,387
PHENOL	6	6,189	86,482	0	0	0	92,671	15,445

**Table 10 (cont.): 1995 TRI Releases for Textiles Manufacturing Facilities (SIC 22),  
by Number of Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL	FUGITIVE AIR	POINT AIR	DISCHARGES	WATER UNDERGROUND INJECTION	LAND DISPOSAL	TOTAL RELEASES	AVG. RELEASES PER FACILITY
1,2,4-TRICHLOROBENZENE	6	7,416	38,623	189	0	0	46,228	7,705
ANTIMONY	6	50	34	0	0	0	84	14
LEAD COMPOUNDS	4	5	5	5	0	0	15	4
TETRACHLOROETHYLENE	4	5,818	58,166	0	0	0	63,984	15,996
COPPER	4	0	0	0	0	0	0	0
COBALT COMPOUNDS	3	0	10	590	0	0	600	200
STYRENE	3	63,553	47,181	0	0	0	110,734	36,911
DIETHANOLAMINE	3	0	5,696	150	0	0	5,846	1,949
DI(2-ETHYLHEXYL) PHTHALATE	3	0	799	0	0	0	799	266
ARSENIC COMPOUNDS	2	0	0	0	0	0	0	0
NICKEL COMPOUNDS	2	0	0	0	0	0	0	0
ISOPROPYL ALCOHOL (MANUFACTURING, STRONG-ACID PROCESS ONLY, NO SUPPLIE	2	12,129	13,155	0	0	0	25,284	12,642
NAPHTHALENE	2	173	8,600	7,800	0	0	16,573	8,287
PROPYLENE	2	0	0	0	0	0	0	0
DIMETHYL PHTHALATE	2	0	2,708	0	0	0	2,708	1,354
LEAD	2	5	5	0	0	0	10	5
CHLORINE DIOXIDE	2	5,141	0	0	0	0	5,141	2,571
CADMIUM COMPOUNDS	1	0	0	0	0	0	0	0
THIOUREA	1	0	0	0	0	0	0	0
N-BUTYL ALCOHOL	1	0	50	1,900	0	0	1,950	1,950
HYDROGEN CYANIDE	1	250	2,566	0	0	0	2,816	2,816
VINYL CHLORIDE	1	5	5	0	0	0	10	10
ACETALDEHYDE	1	0	13,400	0	0	0	13,400	13,400
TRICHLOROFLUOROMETHANE	1	250	0	0	0	0	250	250
FREON 113	1	18,507	0	0	0	0	18,507	18,507
METHYL METHACRYLATE	1	454	1,816	0	0	0	2,270	2,270
DIBUTYL PHTHALATE	1	40	46	0	0	0	86	86
2-PHENYLPHENOL	1	0	26,240	0	0	0	26,240	26,240
ACETOPHENONE	1	0	0	0	0	0	0	0
1,4-DICHLOROBENZENE	1	14,665	0	0	0	0	14,665	14,665

**Table 10 (cont.): 1995 TRI Releases for Textiles Manufacturing Facilities (SIC 22),  
by Number of Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL	FUGITIVE AIR	POINT AIR	DISCHARGES	WATER DISCHARGES	UNDERGROUND INJECTION	LAND DISPOSAL	TOTAL RELEASES	AVG. RELEASES PER FACILITY
1,2-DICHLOROETHANE	1	0	8,935	0	0	0	0	8,935	8,935
MALEIC ANHYDRIDE	1	0	0	0	0	0	0	0	0
2-METHOXYETHANOL	1	3,200	750	0	0	0	0	3,950	3,950
N-HEXANE	1	130,000	658	0	0	0	0	130,658	130,658
2-ETHOXYETHANOL	1	4,800	900	0	0	0	0	5,700	5,700
FOLPET	1	0	0	0	0	0	0	0	0
C.I. BASIC GREEN 4	1	0	0	0	0	0	0	0	0
TOLUENE-2,4-DIISOCYANATE	1	0	0	0	0	0	0	0	0
MOLYBDENUM TRIOXIDE	1	750	250	0	0	0	0	1,000	1,000
POLYCHLORINATED BIPHENYLS	1	0	0	0	0	0	0	0	0
1,1-DICHLORO-1-FLUOROETHANE	1	367,120	0	0	0	0	0	367,120	367,120
C.I. DISPERSE YELLOW 3	1	349	0	0	0	0	0	349	349
NICKEL	1	18	0	0	0	0	0	18	18
BARIUM	1	0	0	0	0	0	0	0	0
CHROMIUM	1	0	0	0	0	0	0	0	0
	339	3,913,368	13,575,488	268,850	0	6,903	17,764,609	52,403	

**Table 11: 1995 TRI Transfers for Textiles Manufacturing Facilities (SIC 22),  
by Number and Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL	POTW TRANSFERS	DISPOSAL TRANSFERS	RECYCLING TRANSFERS	TREATMENT TRANSFERS	ENERGY		TOTAL TRANSFERS	AVG TRANSFER PER FACILITY
						RECOVERY	TRANSFERS		
METHANOL	64	110,082	0	18,123	6,111	135,698	270,014	4,219	
AMMONIA	51	517,662	3,849	.	1,548	2,780	525,839	10,311	
METHYL ETHYL KETONE	37	4,550	27,000	280,256	324,111	775,448	1,411,365	38,145	
TOLUENE	33	505	32,650	250	52,351	646,897	732,653	22,202	
PHOSPHORIC ACID	32	184,990	.	.	25,329	.	210,319	6,572	
CHLORINE	31	27,891	0	.	.	.	27,891	900	
ANTIMONY COMPOUNDS	30	72,575	120,995	750	26,401	5,761	226,482	7,549	
DECABROMODIPHENYL OXIDE	26	243,056	55,546	1,993	5,434	3,300	309,329	11,897	
ETHYLENE GLYCOL	23	428,068	38,000	.	.	.	466,068	20,264	
CERTAIN GLYCOL ETHERS	21	192,060	14	.	.	9,890	201,964	9,617	
CHROMIUM COMPOUNDS	20	52,996	3,828	750	4,615	.	62,189	3,109	
ZINC COMPOUNDS	20	60,950	91,231	6,830	7,787	1,213	168,011	8,401	
1,1,1-TRICHLOROETHANE	19	0	.	614	.	3,922	4,536	239	
COPPER COMPOUNDS	18	18,683	9,482	2,376	1,421	.	31,962	1,776	
FORMALDEHYDE	18	5,947	251	.	5,797	121	12,116	673	
XYLENE (MIXED ISOMERS)	18	58,600	.	4,800	40,755	43,330	147,485	8,194	
HYDROCHLORIC ACID	17	66,613	50,920	.	129,493	.	247,026	14,531	
(1995 AND AFTER "ACID AEROSOLS" ONLY)	15	1,585	.	.	29,994	.	31,579	2,105	
SULFURIC ACID	11	0	1,300	3	386	.	1,689	154	
DIISOCYANATES	11	11,123	291	.	3,403	100,913	115,730	10,521	
N,N-DIMETHYLFORMAMIDE	11	239,361	.	.	.	.	239,361	21,760	
BIPHENYL	10	250	1,300	72,767	13,140	94,915	182,372	18,237	
N-METHYL-2-PYRROLIDONE	9	128,764	.	.	.	.	128,764	14,307	
SODIUM NITRITE	8	10	36,652	.	500	2,403	39,565	4,946	
BARIUM COMPOUNDS	8	10	2,910	326,000	3,000	49,934	381,854	47,732	
TRICHLOROETHYLENE	8	44,335	1,274	.	.	.	45,609	5,701	
1,2,4-TRIMETHYLBENZENE	7	59,671	9,332	.	.	.	69,003	9,858	
NITRATE COMPOUNDS	7	593	.	.	.	.	593	85	
FORMIC ACID	7	5	.	240	5	18,849	19,099	2,728	
DICHLOROMETHANE	7	500	3,600	250	1,359	128,668	134,377	19,197	
METHYL ISOBUTYL KETONE	6	0	1,566	.	459	21,841	23,866	3,978	
PHENOL									

**Table 11 (cont.): 1995 TRI Transfers for Textiles Manufacturing Facilities (SIC 22),  
by Number and Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL FACILITIES	POTW TRANSFERS	DISPOSAL TRANSFERS	RECYCLING TRANSFERS	TREATMENT TRANSFERS	ENERGY RECOVERY TRANSFERS	TOTAL TRANSFERS	AVG PER FACILITY
1,2,4-TRICHLOROBENZENE	6	80,552	31,898	.	.	.	112,450	18,742
ANTIMONY	6	20,627	18,162	1,489	1,258	230	41,766	6,961
LEAD COMPOUNDS	4	257	12,450	79,500	1,010	.	93,217	23,304
TETRACHLOROETHYLENE	4	10,928	2,340	.	45,327	.	58,595	14,649
COPPER	4	1,735	.	.	.	.	1,735	434
COBALT COMPOUNDS	3	858	907	.	.	.	1,765	588
STYRENE	3	0	.	.	177	.	177	59
DIETHANOLAMINE	3	39,979	.	.	133	.	40,112	13,371
DI(2-ETHYLHEXYL) PHTHALATE	3	4,500	.	.	.	19,200	23,700	7,900
ARSENIC COMPOUNDS	2	0	216	.	5	.	221	111
NICKEL COMPOUNDS	2	508	.	.	.	.	508	254
ISOPROPYL ALCOHOL (MANUFACTURING, STRONG-ACID PROCESS ONLY, NO SUPPLIE	2	1,916	.	.	.	.	1,916	958
NAPHTHALENE	2	0	.	.	.	.	0	0
PROPYLENE	2	0	.	.	.	.	0	0
DIMETHYL PHTHALATE	2	51,441	.	.	.	.	51,441	25,721
LEAD	2	5	2,758	.	.	458	3,221	1,611
CHLORINE DIOXIDE	2	0	.	.	.	.	0	0
CADMIUM COMPOUNDS	1	0	250	.	.	.	250	250
THIOUREA	1	0	.	.	.	.	0	0
N-BUTYL ALCOHOL	1	0	.	.	.	.	0	0
HYDROGEN CYANIDE	1	0	.	.	.	.	0	0
VINYL CHLORIDE	1	0	15,167	.	.	2,518	17,685	17,685
ACETALDEHYDE	1	30,600	.	.	.	.	30,600	30,600
TRICHLOROFLUOROMETHANE	1	0	.	.	.	.	0	0
FREON 113	1	0	.	.	.	.	0	0
METHYL METHACRYLATE	1	0	.	.	.	.	0	0
DIBUTYL PHTHALATE	1	0	.	.	.	.	0	0
2-PHENYLPHENOL	1	0	1,875	.	.	3,020	4,895	4,895
ACETOPHENONE	1	18,233	.	.	.	.	18,233	18,233
1,4-DICHLOROBENZENE	1	0	.	.	.	.	0	0

**Table 11 (cont.): 1995 TRI Transfers for Textiles Manufacturing Facilities (SIC 22),  
by Number and Facilities Reporting (in pounds/year)**

CHEMICAL NAME	# REPORTING CHEMICAL FACILITIES	POTW TRANSFERS	DISPOSAL TRANSFERS	RECYCLING TRANSFERS	TREATMENT TRANSFERS	ENERGY RECOVERY TRANSFERS	TOTAL TRANSFERS	AVG TRANSFER PER FACILITY
1,2-DICHLOROETHANE	1	7,659	.	.	.	.	7,659	7,659
MALEIC ANHYDRIDE	1	7,530	.	.	.	.	7,530	7,530
2-METHOXYETHANOL	1	0	.	.	.	.	0	0
N-HEXANE	1	0	.	.	.	.	0	0
2-ETHOXYETHANOL	1	0	.	.	.	.	0	0
FOLPET	1	0	1,300	.	.	.	1,300	1,300
C.I. BASIC GREEN 4	1	0	.	.	.	.	0	0
TOLUENE-2,4-DIISOCYANATE	1	0	.	.	5	.	5	5
MOLYBDENUM TRIOXIDE	1	0	2,300	.	.	.	2,300	2,300
POLYCHLORINATED BIPHENYLS	1	0	.	.	.	.	0	0
1,1-DICHLORO-1-FLUOROETHANE	1	0	.	.	.	.	0	0
C.I. DISPERSE YELLOW 3	1	5,189	.	.	.	.	5,189	5,189
NICKEL	1	0	120	.	.	.	120	120
BARIUM	1	5	.	750	10	.	765	765
CHROMIUM	1	1,602	.	.	.	.	1,602	1,602
	339	2,815,559	581,734	797,741	731,324	2,071,309	6,997,667	20,642

The TRI database contains a detailed compilation of self-reported, facility-specific chemical releases. The top reporting facilities for this sector, based on pounds released, are listed below (Table 12). Facilities that have reported only the SIC codes covered under this notebook appear on the first list. Table 13 contains additional facilities that have reported only the SIC codes covered within this report, or facilities that have reported SIC codes covered within this notebook and one or more SIC codes that are not within the scope of this notebook. Therefore, the second list includes facilities that conduct multiple operations -- some that are under the scope of this notebook, and some that may not. Currently, the facility-level data do not allow pollutant releases to be broken apart by industrial process.

Rank	Facility	Total Releases in Pounds
1	Gencorp, Columbus, MS*	2,761,015
2	Holliston Mills Inc., Church Hill, TN	1,755,090
3	Avondale Mills, Inc., Graniteville, SC	1,260,050
4	American & Efird Inc., Mount Holly, NC	1,070,442
5	Uniroyal Engineered Products, Stoughton, WI*	758,023
6	Textileather Corporation, Toledo, OH*	520,890
7	Athol Corporation, Butner, NC*	421,229
8	Excello Fabric Finishers Inc., Coshocton, OH	414,000
9	Shaw Ind. Inc., Dalton, GA	412,873
10	Collins & Aikman Products Company, Farmville, NC	367,120
<b>TOTAL</b>		<b>9,740,732</b>

Source: *US Toxics Release Inventory Database, 1995.*  
<sup>1</sup>Being included on this list does not mean that the releases are associated with non-compliance with environmental laws.  
 \*This facility manufactures coated fabrics and is classified as SIC Code 2295, Miscellaneous Textiles, Coated Fabrics -- Not Rubberized.

<b>Table 13: Top 10 TRI Releasing Facilities Reporting Only Textile Manufacturing SIC Codes (SIC 22) or SIC 22 and Other SIC Codes<sup>1</sup></b>		
<b>Rank</b>	<b>Facility</b>	<b>Total Releases in Pounds</b>
1	Gencorp, Columbus, MS*	2,761,015
2	Holliston Mills Inc., Church Hill, TN*	1,755,090
3	Du Pont, Old Hickory, TN	1,737,853
4	IPC Corinth Div. Inc., Corinth, MS	1,479,471
5	Avondale Mills, Inc., Graniteville, SC	1,260,050
6	American & Efird Inc., Mount Holly, NC	1,070,442
7	E.R. Carpenter Co. Inc., Riverside, CA	896,755
8	Carpenter Co., Russellville, KY	877,660
9	Reeves Intl., Spartanburg, SC	855,355
10	Carpenter Co., Richmond, VA	799,567
<b>TOTAL</b>		<b>13,493,258</b>
Source: <i>US Toxics Release Inventory Database, 1995.</i>		
<sup>1</sup> Being included on this list does not mean that the releases are associated with non-compliance with environmental laws.		
*This facility manufactures coated fabrics and is classified as SIC Code 2295, Miscellaneous Textiles, Coated Fabrics -- Not Rubberized.		

#### IV.B. Summary of Selected Chemicals Released

The following is a synopsis of current scientific toxicity and fate information for the top chemicals (by weight) that facilities within SIC 22 self-reported as released to the environment based upon 1994 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 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.C.

The brief descriptions provided below were taken from the *1994 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.<sup>1</sup>

##### Ammonia<sup>2</sup> (CAS: 7664-41-7)

**Sources.** Ammonia is used in some printing, coating, preparation, and dyeing processes (ATMI, 1997b).

**Toxicity.** Anhydrous ammonia is irritating to the skin, eyes, nose, throat, and upper respiratory system.

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

<sup>2</sup> The reporting standards for ammonia were changed in 1995. Ammonium sulfate is deleted from the list and threshold and release determinations for aqueous ammonia are limited to 10 percent of the total ammonia present in solution. This change will reduce the amount of ammonia reported to TRI. Complete details of the revisions can be found in 40 CFR Part 372.

Ecologically, ammonia is a source of nitrogen (an essential element for aquatic plant growth), and may therefore contribute to eutrophication of standing or slow-moving surface water, particularly in nitrogen-limited waters such as the Chesapeake Bay. In addition, aqueous ammonia is moderately toxic to aquatic organisms.

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

**Environmental Fate.** Ammonia is a corrosive and severely irritating gas with a pungent odor. Ammonia combines with sulfate ions in the atmosphere and is washed out by rainfall, resulting in rapid return of ammonia to the soil and surface waters.

Ammonia is a central compound in the environmental cycling of nitrogen. Ammonia in lakes, rivers, and streams is converted to nitrate.

Methanol (CAS: 67-56-1)

**Sources.** Methanol primarily arises from the use of PVA in sizing operations. It may also be emitted from finishing operations where methanol-etherated formaldehyde resins are used (ATMI, 1997b).

**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 one 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.** Methanol is highly flammable and volatile. 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.

Methyl Ethyl Ketone (CAS: 78-93-3)

**Sources.** Methyl ethyl ketone may be used in solvent coating operations (ATMI, 1997b).

**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 defects.

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

**Environmental Fate.** Methyl ethyl ketone is a flammable and volatile liquid. 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.

Toluene (CAS: 108-88-3)

**Sources.** Toluene may be used in solvent coating operations (ATMI, 1997b).

**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 toluene is carcinogenic.

**Environmental Fate.** Toluene is a volatile organic chemical. A portion 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.

*Xylene (mixed isomers) (CAS: 1330-20-7)*

**Sources.** Xylenes are used in printing operations.

**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 effect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

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

**Environmental Fate.** 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. 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.

#### IV.C. Other Data Sources

The toxic chemical release data obtained from TRI captures only 7 percent of facilities in the textile industry. Reported chemicals are limited to the 316 reported chemicals. It allows, however, for a comparison across years and industry sectors. Most of the air emissions from textile facilities are not captured by TRI. The EPA Office of Air Quality Planning and Standards has compiled air pollutant emission factors for determining the total air emissions of priority pollutants (e.g., total hydrocarbons, SO<sub>x</sub>, NO<sub>x</sub>, CO, particulates, etc.) from many manufacturing sources.

The EPA Office of Air's database 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. Table 14 summarizes annual releases of carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), particulate matter of 10 microns or less (PM<sub>10</sub>), total particulates (PT), sulfur dioxide (SO<sub>2</sub>), and volatile organic compounds (VOCs).

<b>Table 14: 1995 Criteria Air Pollutant Releases (tons/year)</b>						
<b>Industry Sector</b>	<b>CO</b>	<b>NO<sub>2</sub></b>	<b>PM<sub>10</sub></b>	<b>PT</b>	<b>SO<sub>2</sub></b>	<b>VOC</b>
Metal Mining	4,670	39,849	63,541	173,566	17,690	915
Nonmetal Mining	25,922	22,881	40,199	128,661	18,000	4,002
Lumber and Wood Production	122,061	38,042	20,456	64,650	9,401	55,983
Furniture and Fixtures	2,754	1,872	2,502	4,827	1,538	67,604
Pulp and Paper	566,883	358,675	35,030	111,210	493,313	127,809
Printing	8,755	3,542	405	1,198	1,684	103,018
Inorganic Chemicals	153,294	106,522	6,703	34,664	194,153	65,427
Organic Chemicals	112,410	187,400	14,596	16,053	176,115	180,350
Petroleum Refining	734,630	355,852	27,497	36,141	619,775	313,982
Rubber and Misc. Plastics	2,200	9,955	2,618	5,182	21,720	132,945
Stone, Clay and Concrete	105,059	340,639	192,962	662,233	308,534	34,337
Iron and Steel	1,386,461	153,607	83,938	87,939	232,347	83,882
Nonferrous Metals	214,243	31,136	10,403	24,654	253,538	11,058
Fabricated Metals	4,925	11,104	1,019	2,790	3,169	86,472
Electronics and Computers	356	1,501	224	385	741	4,866
Motor Vehicles, Bodies, Parts and Accessories	15,109	27,355	1,048	3,699	20,378	96,338
Dry Cleaning	102	184	3	27	155	7,441
Ground Transportation	128,625	550,551	2,569	5,489	8,417	104,824
Metal Casting	116,538	11,911	10,995	20,973	6,513	19,031
Pharmaceuticals	6,586	19,088	1,576	4,425	21,311	37,214
Plastic Resins and Manmade Fibers	16,388	41,771	2,218	7,546	67,546	74,138
<b>Textiles</b>	<b>8,177</b>	<b>34,523</b>	<b>2,028</b>	<b>9,479</b>	<b>43,050</b>	<b>27,768</b>
Power Generation	366,208	5,986,757	140,760	464,542	13,827,511	57,384
Ship Building and Repair	105	862	638	943	3,051	3,967

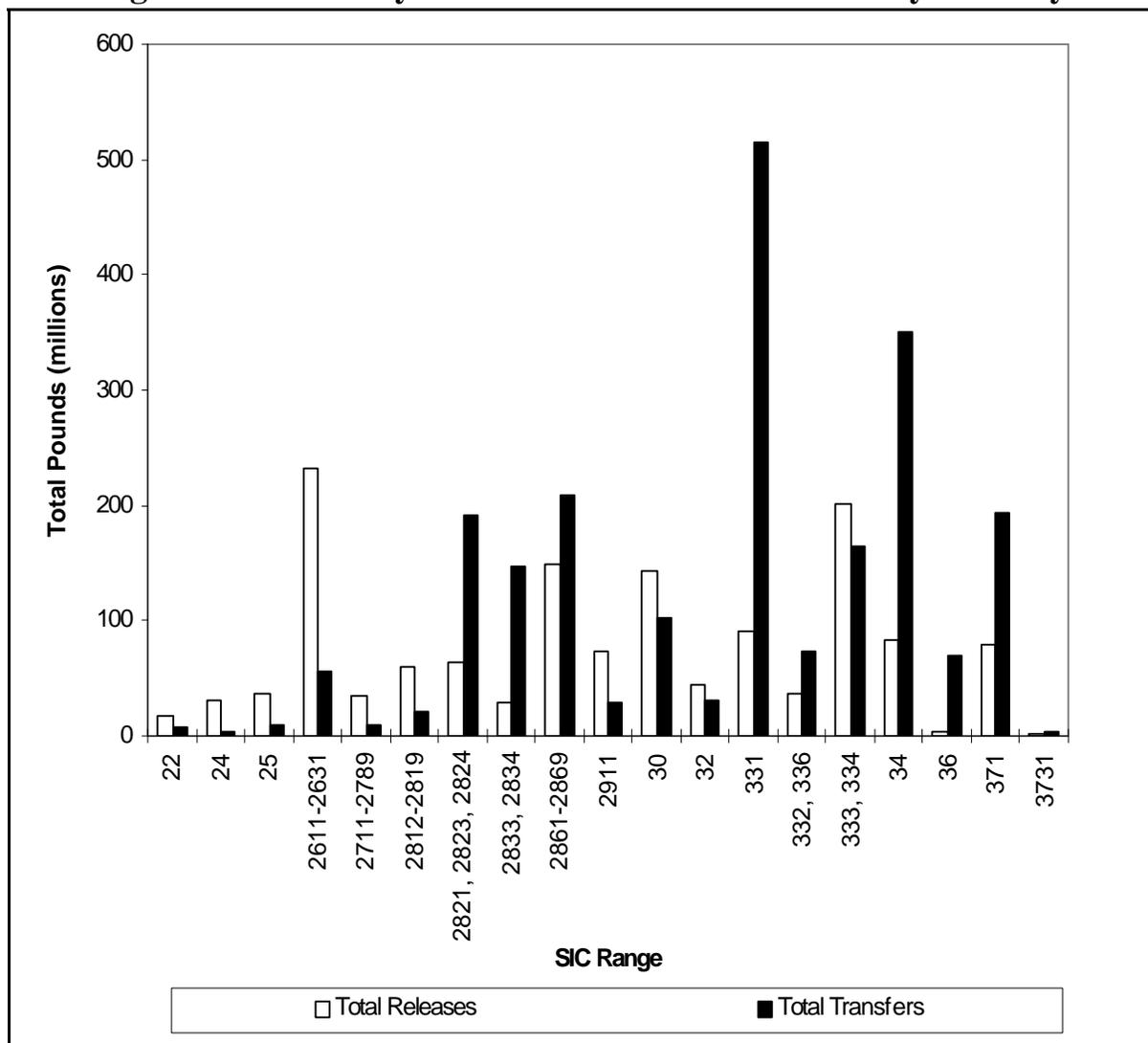
Source: U.S. EPA Office of Air and Radiation, AIRS Database, 1997.

#### 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 figure and table do not contain releases and transfers for industrial categories that are not included in this project, and thus cannot be used to draw conclusions regarding the total release and transfer amounts that are reported to TRI. Similar information is available within the annual TRI Public Data Release Book.

Figure 13 is a graphical representation of a summary of the 1995 TRI data for the textile industry and the other sectors profiled in separate notebooks. The bar graph presents the total TRI releases and total transfers on the vertical axis. The graph is based on the data in Table 15 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 textile industry, the 1995 TRI data presented here covers 416 facilities. Only those facilities listing SIC Codes falling within SIC 22 were used.

**Figure 13: Summary of TRI Releases and Transfers by Industry**



Source: US EPA 1995 Toxics Release Inventory Database.

SIC Range	Industry Sector	SIC Range	Industry Sector	SIC Range	Industry Sector
22	Textiles	2833, 2834	Pharmaceuticals	333, 334	Nonferrous Metals
24	Lumber and Wood Products	2861-2869	Organic Chem. Mfg.	34	Fabricated Metals
25	Furniture and Fixtures	2911	Petroleum Refining	36	Electronic Equip. and Comp.
2611-2631	Pulp and Paper	30	Rubber and Misc. Plastics	371	Motor Vehicles, Bodies, Parts, and Accessories
2711-2789	Printing	32	Stone, Clay, and Concrete	3731	Shipbuilding
2812-2819	Inorganic Chemical Manufacturing	331	Iron and Steel		
2821, 2823, 2824	Resins and Plastics	332, 336	Metal Casting		

Table 15: Toxics Release Inventory Data for Selected Industries

Industry Sector	SIC Range	# TRI Facilities	TRI Releases		TRI Transfers		Total Releases + Transfers (million lbs.)	Average Releases + Transfers per Facility (pounds)
			Total Releases (million lbs.)	Ave. Releases per Facility (pounds)	Total Transfers (million lbs.)	Ave. Trans. per Facility (pounds)		
Textiles	22	339	17.8	53,000	7.0	21,000	24.8	74,000
Lumber and Wood Products	24	397	30.0	76,000	4.1	10,000	34.1	86,000
Furniture and Fixtures	25	336	37.6	112,000	9.9	29,000	47.5	141,000
Pulp and Paper	2611-2631	305	232.6	763,000	56.5	185,000	289.1	948,000
Printing	2711-2789	262	33.9	129,000	10.4	40,000	44.3	169,000
Inorganic Chem. Mfg.	2812-2819	413	60.7	468,000	21.7	191,000	438.5	659,000
Resins and Plastics	2821,2823,2824	410	64.1	156,000	192.4	469,000	256.5	625,000
Pharmaceuticals	2833, 2834	200	29.9	150,000	147.2	736,000	177.1	886,000
Organic Chemical Mfg.	2861-2869	402	148.3	598,000	208.6	631,000	946.8	1,229,000
Petroleum Refining	2911	180	73.8	410,000	29.2	162,000	103.0	572,000
Rubber and Misc. Plastics	30	1,947	143.1	73,000	102.6	53,000	245.7	126,000
Stone, Clay, and Concrete	32	623	43.9	70,000	31.8	51,000	75.7	121,000
Iron and Steel	331	423	90.7	214,000	513.9	1,215,000	604.6	1,429,000
Metal Casting	332, 336	654	36.0	55,000	73.9	113,000	109.9	168,000
Nonferrous Metals	333, 334	282	201.7	715,000	164	582,000	365.7	1,297,000
Fabricated Metals	34	2,676	83.5	31,000	350.5	131,000	434.0	162,000
Electronic Equip. and Comp.	36	407	4.3	11,000	68.8	169,000	73.1	180,000
Motor Vehicles, Bodies, Parts, and Accessories	371	754	79.3	105,000	194	257,000	273.3	362,000
Shipbuilding	3731	43	2.4	56,000	4.1	95,000	6.5	151,000

Source: US EPA Toxics Release Inventory Database, 1995.

## **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 substitution of toxic chemicals. Some smaller facilities are able to actually get below regulatory thresholds just by reducing pollutant releases through aggressive pollution prevention policies.

The Pollution Prevention Act of 1990 established a national policy of managing waste through source reduction, which means preventing the generation of waste. The Pollution Prevention Act also established as national policy a hierarchy of waste management options for situations in which source reduction cannot be implemented feasibly. In the waste management hierarchy, if source reduction is not feasible the next alternative is recycling of wastes, followed by energy recovery, and waste treatment as a last alternative.

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 metal casting 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. 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 technique can be used effectively. 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.

Most of the pollution prevention activities in the textile industry have focused on reducing chemical use, reusing process water, and reducing all solid waste forms - pallets, cardboard, etc (ATMI, 1997b). This section describes some of the pollution prevention opportunities for textile facilities. Much of the following section is based upon "*Best Management Practices for Pollution Prevention in the Textile Industry*," by the U.S. EPA Office of Research and Development. Most case studies, unless noted, were taken from this document. Additional references are cited in the text.

### **V.A. Quality Control for Raw Materials**

Raw material quality control programs can be implemented by establishing specific and appropriate purchasing, packaging, and inventory control policies to prevent the ordering and use of untested materials. Textile

companies can reduce waste by working with suppliers to come up with less-polluting raw materials and by developing purchasing codes that commit companies to using less-polluting raw materials.

Benefits of such programs can include decreased production of off-quality goods, less rework, and increased product consistency. Companies can also control raw materials quality by prescreening and testing shipments as they are received. Prescreening provides facilities with opportunities to determine chemical and mechanical alternatives, proper chemical use and training, and proper disposal and treatment methods.

✓ ***Adopt environmentally responsible purchasing policies and work with suppliers to obtain less-polluting raw materials.***

Facilities can adopt purchasing policies that restrict the use of hazardous chemicals as a way to reduce waste. Facilities can also work with vendors to set acceptable guidelines for the purity and content of chemicals, like chemical specialties, which are typically of unknown composition to the textile mill.

- Mills in the United Kingdom adopted purchasing policies as a way to reduce pollution. Researchers determined that 70 percent of woolen mills in the United Kingdom emitted pentachlorophenol (PCP), a harmful agricultural residue in wool, from their finishing plants. A study determined that it originated in the incoming greige goods. By specifying in company purchasing policies that they would not accept PCP-containing greige goods, the presence of PCP in wastewater decreased by 50 percent. This was a good method of reducing this waste since there are no acceptable PCP treatment technologies (EPA, 1996).
- At its Monroe, North Carolina facility, *Bloomsburg Mills* scours, dyes, and finishes about 22 million yards of fabric per year. The facility uses dye carrier chemicals, such as tetrachloroethylene, biphenyl, and trichlorobenzene, to promote level dyeing. In an effort to reduce SARA III, Section 313 regulatory burdens (TRI reporting), *Bloomsburg Mills* discussed with vendors the elimination of these chemicals. The company substituted a dye carrier containing methyl naphthalene with non-photochemically reactive solvents. This dye carrier subsequently reduced the release of hazardous air pollutants by 91 percent from 64,713 pounds in 1988 to 5,932 pounds in 1993 (NC DEHNR, 1995).

✓ ***Perform tests on raw materials shortly after receipt.***

Prescreening raw materials can be used to determine interactions with processes, substrates, and other chemicals. This method can also be used to determine environmental effects, proper handling, and emergency procedures for chemicals. This can enable the early detection of mislabeled drums and changes in the formulation of a chemical specialty, and reduce the occurrence of costly production mistakes stemming from untested chemicals being processed (NC DEHNR, 1986). Protocol for incoming chemical quality

control may consist of the following steps: marking the date the container was opened; checking pH, viscosity, density, conductivity, and color; comparing data with previous history and vendor's standard values; entering data on a control chart for display; maintaining records; and reviewing data with the vendor. Environmental data that should be checked include whether the chemicals are listed as priority pollutants under the Clean Water Act, hazardous air pollutants under the Clean Air Act, and as 33/50 chemicals, the indoor air pollution hazard potential, and the potential for release to the environment.

- An example where raw material testing would have been useful involves a mill that used a solvent scouring chemical specialty. The manufacturer produced the chemical specialty, which consisted of emulsifier and xylene as a solvent. Without notifying its customers, the manufacturer changed the solvent composition to chlorotoluene to cut costs and minimize labeling requirements when the vendor's insurance company began to require special labeling and handling of xylene. This had a profound effect on the mill's air emissions, water toxicity, and other aspects of production. If the mill had prescreened chemical specialties, it could have detected these changes and reduced waste (NC DEHNR, 1986).
- A committee at a facility in Lumberton, North Carolina prescreened raw material (dyes and chemicals) to ensure that offensive-smelling, toxic, and other objectionable material use were minimized in the production facility. In the event that raw materials with undesirable properties had to be used due to lack of alternatives, these raw materials were identified to all workers before use. This process entailed no capital costs. Benefits, such as the ability to dispose of waste treatment sludges since they did not contain toxics or metals, were realized (NC DEHNR, 1986).



***Purchase raw materials in returnable containers.***

Facilities can work with vendors to ensure that packages can be returned without being cleaned on site. Offsite cleaning transfers chemical wastes back to the production facility, which may be better able to handle wastes. Chemical specialties should be purchased in returnable, reusable containers. Purchase of chemicals in bulk containers and intermediate bulk containers eliminates waste packing materials, and reduces spillage, handling costs, and worker exposure to chemicals. Bagged chemicals and drums tend to be more susceptible to damage and spills than bulk containers (EPA, 1996).

- At its Monroe, North Carolina facility, *Bloomsburg Mills* eliminated the disposal of 50 drums to the landfill each week by receiving and storing process chemicals in reusable totes and plastic drums (NC DEHNR, 1995).
- *Amital* began purchasing dyes and chemicals in intermediate bulk containers (IBCs) or in bulk. Drum disposal decreased by 69 per week, or about 3,500 annually. Pallet disposal decreased by 40 per week, or 2,000 annually. By

making these changes, vendors were partners in the reduction of packaging waste.

### V.B. Chemical Substitution

Since textile manufacturing is a chemically intensive process, a primary focus for pollution prevention should be on substituting less-polluting chemicals for textile process chemicals. Chemical substitution can eliminate chemical waste and the need for costly pollution control equipment. Opportunities for chemical substitution vary substantially among mills because of differences in environmental conditions, process conditions, product, and raw materials.



#### *Replace chemicals with less-polluting ones.*

By replacing solvents, facilities can reduce waste, reduce costs associated with treatment systems, and increase worker safety. This is one of the best methods to prevent pollution. Some textile chemicals that can be substituted include desizing agents, dyes, and auxiliaries. For instance, replacing enzymes with hydrogen peroxide to desize starch can be cost-effective (ATMI, 1997b). This method produces carbon dioxide and water as wastes instead of hydrolyzed starch, which increases BOD load. Copper-free dyes can be used to reduce metal loading of wastewater although this may sacrifice the range of color shades that can be achieved. Improved fixation reactives can be used to reduce unreacted and degraded dye in spent bath and improve the reuse potential of washwater. High-temperature reactives can also be used in dyeing for simultaneous application of disperse and reactive dyes. This reduces energy use and eliminates the caustic bath required after disperse dyeing. Finally, auxiliaries, such as phosphates, can be substituted with acetic acid and EDTA to reduce phosphorus load in wastewater. New washing agents can also be used to increase wash efficiency, decrease water consumption, and improve fastness of reactives (Snowden-Swan, 1995).

- *Bloomsburg Mills* substituted a solvent containing isopropanol and heptane as a suitable spot-washing alternative for 1,1,1 trichloroethane, a hazardous air pollutant. No loss of quality was noted with the substitution (NC DEHNR, 1995).
- *Guilford Mills*' has integrated plants in both North Carolina and Pennsylvania. At these plants, the company substituted a solvent-based chemical system used in the heatsetting process with a water-based chemical system. An emissions survey conducted by the company identified that heatsetting accounted for the majority of volatile organic compound emissions. The new system uses an acrylic latex emulsion to dissolve gum which stabilizes fabric edges and prevents curling. This change accounted for most of the plants' reductions in VOC emissions, from 246.8 tons per year in 1993 to an estimated 93.7 tons per year in 1995 (NC DEHNR, 1995).
- *Cleveland Mills Company* reduced formaldehyde emission to the air by 84 percent by switching to low-shade change resins in the production process.

Formaldehyde emissions at the mill dropped from 3,500 to 580 pounds per year (NC DEHNR, 1995).

- *One textile facility* investigated substitutes for sodium sulfide, which is used to convert water-insoluble dyes to the soluble form for application of sulfur dyes to textiles. The facility found that they could replace 100 parts sodium sulfide with 65 parts alkaline solution containing 50 percent reducing sugars plus 25 parts caustic soda. As a result, sulfide levels dropped substantially to below 2 ppm (Snowden-Swan, 1995).



***Replace chemical treatment with other treatment.***

Waste can be reduced by replacing chemicals in some processes with mechanical or other nonchemical treatment. Instead, some textile mills add chemicals to counteract harmful side effects of other chemicals. In many cases, offending chemicals should be adjusted, substituted, or removed from a process, rather than adding chemicals to offset undesired side effects of other chemicals.

- *JP Stevens and Company, Inc.* substituted chemical biocides, used in disinfecting air washers and cooling towers, with the use of ultraviolet light. Although this may not be viable for all facilities, during a 6-month test period, results showed improved worker safety, reduced discharge of biocides to the sanitary sewer, reduced chemical inventory and handling, improved workplace air quality, and reduced pH and foaming problems in wastewater. The facility also showed enhanced air washer performance and more consistent control of workplace air quality. The UV system operated with no required maintenance or repairs during the test. Based on chemical savings, the payback is expected to be 11 to 18 months.

### V.C. Process Modification

Process changes that optimize reactions and raw materials use can be used to prevent pollution. Modifications may include improved process control systems or changes in chemical application methods.



***Use low-liquor ratio dyeing machines.***

Mills have been moving towards reduced bath ratio dyeing. Bath ratio is defined as the weight of goods (or fabric) divided by the weight of the bath. Some chemicals, such as salt and lubricants, act on the dyebath, whereas others, such as dyes and softeners, act on the fabric. In each case, these chemicals are factored into either the weight of the bath or the weight of the fabric.

Low bath ratio dyeing can save energy and reduce chemical use, because energy and chemical use depend on bath volume. Jet dyeing and package dyeing are commonly used for low bath ratio dyeing. Typical bath ratios for exhaust dyeing methods are as follows: beck (17:1), jet (12:1), jig (5:1), and

package (10:1). Pad batch methods have a 1:1 bath ratio. Ultra-low liquor bath ratios can also reduce cycle times due to quick machine drains and fills and rapid heating and cooling.

- At its Lumberton, North Carolina facility, *Alamac Knits* upgraded jet dyeing machinery to low-liquor-ratio machines with shorter cycles. This modification resulted in a decrease of between 60 and 70 percent of consumption of dye chemicals.



***Use pad batch dyeing methods.***

Use of pad batch (cold) dyeing for cotton, rayon, and blends conserves energy, water, dyes and chemicals, labor, and floor space. Pad batch dyeing methods do not require salt or chemical specialties, so this method can be a good way for facilities to reduce waste and save money. While pad batch dyeing is a cost-effective way for facilities to apply reactive dyes to cotton and rayon, this method may not achieve the desired final fabric properties for all cottons. Pad batch dyeing is also not appropriate for dyeing synthetic fabrics (ATMI, 1997b). Salt consumption can be reduced from as much as 100 percent of weight of goods to zero. Water consumption for pad batch dyeing with beam wash-off is only 10 percent of the amount used to dye fabrics using beck methods, or two gallons per pound of dyed fabric. Energy consumption can be reduced from about 9,000 BTUs per pound of dyed fabric for beck methods to under 2,000 BTUs per pound for pad batch methods with beam washing. In addition, labor costs and chemical use can be reduced up to 80 percent as compared to atmospheric beck methods (NC DEHNR, 1988).

In pad batch dyeing, prepared fabric is impregnated with liquor (water and process chemicals) containing premixed fiber reactive dyestuff and alkali. Excess liquid is squeezed out on a device known as a mangle. The fabric is then batched onto rolls or into boxes and covered with plastic film to prevent absorption of CO<sub>2</sub> from air or evaporation of water. The fabric is then stored for two to twelve hours. The goods can be washed with becks, beams, or other available machines. Production of between 75 and 150 yards a minute, depending on the construction and weight of goods involved, is typical. Pad batch dyeing is more flexible than continuous dyeing methods. Either wovens or knits can be dyed, and shades can be changed frequently because reactive dyes remain water soluble. The flexibility of pad batch equipment and the use of water soluble dyes minimizes cleaning operations.

- *Ti-Caros* switched to a pad-batch process for bleaching which reduced water and energy use. The bath ratio decreased on all batch processes to 10:1.



***Use countercurrent washing to reduce water use.***

Countercurrent washing decreases wastewater from preparation processes. Countercurrent washing is simple, easy to implement, and relatively

inexpensive. Countercurrent washing is a technique to reuse the least contaminated water from the final wash for the next-to-last wash and so on until the water reaches the first wash stage. Washwater from the first stage is discharged (NC DEHNR, 1988). Table 16 shows typical water savings based on the number of times the water is reused. Countercurrent washing equipment can be retrofitted to any multistage continuous washing operation, whether it is installed for different fabrics or for dyeing, printing, or preparation operations. Flow optimization is usually a good pollution prevention activity to run in conjunction with countercurrent washing.

Number of Washing Steps	Water Savings (percent)
2	50
3	67
4	75
5	80

Source: *Best Management Practices for Pollution Prevention in the Textile Industry*, EPA, Office of Research and Development, 1995.

- *Bloomsburg Mills* uses countercurrent washing to conserve water during the scouring process. The cleaner wash water enters the exit wash unit and counterflows back toward the dirtier units. This provides a more efficient cleaner wash and requires less water (NC DEHNR, 1995).
- *An international company* reduced water consumption by enacting several measures over a one-month period. Countercurrent flow was installed on all soapers, mercerizing range, and J-boxes. J-boxes are large J-shaped containers used to hold fabrics at high temperatures during bleaching. Washwater was reused in upstream processes for less critical uses, such as print blanket washing.



#### ***Optimize process conditions.***

Mills can reduce waste and increase production efficiency by optimizing process conditions, such as temperature and time. Mills can also modify the processes themselves to increase efficiency.

- *Americal Corporation* improved dyeing exhaustion by extending the length of time fabrics were dyed by 15 minutes. Results showed about a 60 percent drop in BOD and chemical oxygen demand (COD), a 20 percent drop in fats, oils, and grease, and a 98 percent drop in ammonia-nitrogen. This resulted in a savings of \$35,000 annually.

***Combine processes.***

Mills can reduce waste and increase production efficiency by combining operations. For instance, combined scouring and bleaching can save energy and water. Cold pad-batch methods can be used at room temperature for long desizing, scouring, and bleaching cycles. The single-step, cold-batch method of desizing minimizes energy and water use and maximizes productivity. Note that these methods may not help facilities achieve the desired product result in all cases (ATMI, 1997b).

**V.D. Process Water Reuse and Recycle**

Although they do not constitute pollution prevention as defined by the Pollution Prevention Act of 1990, recovery, recycling, and reuse can be effective tools for minimizing pollutant releases to the environment. By recovering solvents and raw materials, textile mills can reduce raw materials costs and can reduce pollution with little modification of existing processes. Water is widely used in the industry for processes ranging from dyeing to preparation and finishing. Raw materials, such as unexhausted dyestuff and additives, can also be recycled. Reuse and recycling are excellent ways for facilities to save money, reduce waste, and save energy.

***Reuse dyebaths.***

Dyebath reuse is the process of analyzing, replenishing, and reusing exhausted hot dyebaths to dye further batches of material. Although not applicable to all processes, in some processes, dyebath reuse can reduce pollution concentrations and effluent volume and generally requires a smaller capital outlay than pretreatment plant construction. It also saves on the costs of dyes, chemicals, and energy. Dyebath reuse principles can also be applied to bleach baths. Table 17 lists example costs and savings for dyebath reuse for a dye machine. Depending on the machine, types of fabrics, and range of shades, after a couple of years, dyebath reuse could save companies about \$21,000 per year for each machine.

Dye bath reuse is comprised of four basic steps. The first step is to save the exhausted dyebath. This can occur by pumping the dyebath to a holding tank, rinsing the product in the same machine in which it was dyed, and then removing the product and returning the dyebath to the dye machine. The product can also be removed from the exhausted dyebath and placed in another machine for rinsing. The dyebath can then be analyzed for residual chemicals. Unexhausted dyestuffs must be analyzed to determine the exact quantities remaining in the dyebath to ensure the proper shade in the next dyeing cycle. This analysis can be performed using a spectrophotometer and guidelines based on specific production experience. Equipment for this is available for under \$10,000. After the dyebath has been analyzed, it must be

reconstituted by adding water, auxiliary chemicals, and dyestuffs. If properly controlled, dyebaths can be reused for 15 or more cycles, with an average of 5 to 25 times.

<b>Description of Cost/Savings</b>	<b>Value</b>
<b><i>Total Costs</i></b>	
Lab and support equipment	\$9,000
Machine modifications, tanks, pumps, pipes	\$15,000-\$25,000
Annual Operating Costs	\$1,000-\$2,000
<b><i>Total Savings (Annual)</i></b>	
Dyes and chemicals	\$15,000
Water	\$750
Sewer	\$750
Energy	\$4,500

Source: *Best Management Practices for Pollution Prevention in the Textile Industry*, EPA, Office of Research and Development, 1995.

- *Adams-Millis Company* implemented dyebath reuse at its High Point, North Carolina and Franklinton, North Carolina mills. The mills reused dyebath for dyeing nylon pantyhose in rotary drum dyeing machines. Water use decreased by 35 percent with a cost savings of \$0.02 per pound of production. The mill also reduced energy use by 57 percent.
- *Bigelow Carpets* reused dyebaths by equipping pairs of dyeing machines with plumbing and pumps capable of moving a processing bath back and forth from one machine to the other. This allowed immediate reuse of dyebaths for over 20 cycles. Scheduling of lots on the pair was coordinated to ensure efficient reuse. The cost savings was \$60,000 per year per pair of machines. Biological oxygen demand, color, and other water pollutants were reduced.
- *Amital* saved a large amount of money by reusing dyebaths and noncontact cooling water. The facility reduced its water consumption from 320,000 gallons per day to 102,000 gallons per day and simultaneously increased production from 12 to 20 batches per day. Additionally, energy consumption for heating dyebath decreased substantially. The investment saved the company about

\$13,000 a month and paid for itself 30 days after implementation (Snowden-Swan, 1995).



***Reuse rinse baths.***

Wet processing consumes a large amount of water from rinsing of textiles. Preparation and finishing water can also be reused.

- *A yarn finishing company* drastically reduced wastewater pollution, soda ( $\text{Na}_2\text{CO}_3$ ), and caustic consumption by implementing recycling. The new process involved reusing the rinse bath three times following mercerizing rather than dumping the bath water after each use. The spent rinsewater was then processed in an evaporator and concentrated caustic was reused in mercerizing. The facility reduced suspended solids by 80 percent, COD by 55 percent, and neutralizing soda in the wastewater by 70 percent. Corresponding reductions in hydrochloric acid used to neutralize the effluent were also made. The investment in new equipment resulted in an annual savings of \$189,000, with a payback of under one year (Snowden-Swan, 1995).
- *A Kings Mountain, North Carolina facility* installed holding tanks for bleach bath reuse. The bath was reconstituted to correct strength after analysis by titration. BOD decreased over 50 percent from 842 milligrams per liter to 400 milligrams per liter. Water use also decreased. The mill also came into compliance with permits and realized economic benefits.

### V.E. Equipment Modification

An additional method to reduce waste is to modify, retrofit, or replace equipment. Some facilities are switching to computer-controlled dyeing systems, which analyze the process continuously and respond more quickly and accurately than manually controlled systems. In many cases, modifying equipment can provide source reduction by reducing the ratio of water and chemicals to textile goods.



***Install automated dosing systems and dye machine controllers.***

The use of automated process control equipment has had a significant effect on the textile industry. Chemical dosing systems can be optimized to deliver the right amount of the right chemical at just the right time. These systems improve the efficiency and reliability of chemical reactions in the dyebath, ensuring more consistent and reproducible results. In addition, these systems reduce the tendency to overuse environmentally harmful chemicals, which may pass through treatment systems unreacted or may react to produce undesirable by-products. Dosing systems can also reduce handling losses and equipment cleanup. Automated dosing systems are commercially available and are being adopted throughout the textile industry.

In addition to automated dosing equipment, dye machine controllers are a good way to increase control over processes. Sales of dye machine controllers are now overtaking sales of dye machines. These devices can be retrofitted for many of the machines in mills. They contain microprocessor controllers that allow feedback control of properties such as pH, color, and temperature. Note that this method only works for acrylic because cationic dyes have high exhaust rates associated with them. This may not work for other fibers or dye classes (ATMI, 1997b).

- *Amital*, which produces acrylic yarn, implemented computer technology to automate dyebath flow and temperature in a new facility. This enabled the facility to precisely control the addition of auxiliary chemicals, such as retarders and leveling agents. As a result, *Amital* produces a clean exhausted dyebath, eliminating the need for postrinsing and reducing water and chemical consumption (Snowden-Swan, 1995).
- *Bloomsburg Mills* upgraded instrumentation and process controls for the dyeing process from manual to computer control. The controlled time of the wash after dyeing has reduced water usage by 28 percent and fuel heat consumption per yard produced by 15.9 percent (NC DEHNR, 1995).
- *Cleveland Mills Company* replaced coal-fired boilers with cleaner natural gas-fired boilers and eliminated the generation of 220,000 pounds of fly ash each year (NC DEHNR, 1995).

✓ ***Use continuous horizontal washers.***

Continuous horizontal washers can conserve energy and water. Horizontal washers work for woven fabrics in a narrow weight range (ATMI, 1997b). These washers operate by spraying clean washwater on the top (final) pass of fabric as it makes a series of horizontal traverses upward in the machine. The unprocessed fabric enters at the bottom traverse, and the water enters at the top. These vertical spray washers reduce water and energy use as well as improve quality and captured suspended solids for dry disposal. Note that vertical, double-laced washers with serpentine counterflow may be more versatile and achieve better results than continuous horizontal washers (ATMI, 1997b).

✓ ***Use continuous knit bleaching ranges.***

Many textile companies use continuous knit bleaching ranges to reduce water consumption. These ranges consume less water, energy, and chemicals than batch preparation knitting equipment. Recent models have shown improved flexibility in terms of production capacity. Lower capacity machines are available for smaller operations. The new machines feature inherent countercurrent water use and improvements over old rope bleaching units, including better fabric transport, better chemical metering systems, and better filtering of the baths.

## V.F. Good Operating Practices

Companies can improve production efficiency and maintain low operating costs by incorporating pollution prevention codes into their management procedures. These codes can include a written commitment by senior management to ongoing waste reduction at each of the company's facilities and to include pollution prevention objectives in research and new facility design. Establishing training and incentive programs and improving recordkeeping are other ways that companies can prevent pollution without changing industrial processes. These factors, along with better housekeeping practices, can help minimize wastes from maintenance and off-spec materials. Water use can be significantly reduced through minimizing leaks and spills, proper maintenance of production equipment, and identification of unnecessary washing of both fabric and equipment (NC DEHNR, 1985).

✓ ***Schedule dyeing operations to minimize machine cleaning.***

In dyeing operations, startups, stopoffs, and color changes often result in losses of substrate, potential off-quality work, and chemically intensive cleanings of machines and facilities. Scheduling dyeing operations to minimize machine cleanings can have a considerable effect on pollution prevention. Changes required by scheduling activities generate significant amounts of waste for the textile mill. Machine cleaning is a significant contributor to waste load for textile facilities, particularly for changes in polyester color sequence and oligomer build-up (ATMI, 1997b). A well-planned dyeing schedule may reduce the number of machine cleanings required and the pollution that results from startups, stopoffs, and color changes. Minimizing machine cleaning may not be possible in some cases because of the need for flexible schedules to meet changing market demands (ATMI, 1997b).

Ultimately, the need for dye machine cleaning is contingent upon the sequencing of colors in the dyeing process. The ideal sequence, requiring the least amount of machine cleaning, is to run the same color repeatedly on a particular machine. The second best way is to group colors within families (red, yellow, blue), and then run the dyes within one color family from lighter to darker values and from brighter to duller chromas.

- ✓ ***Optimize cleaning practices.***  
Modifying equipment cleaning practices may reduce wastewater discharges and reduce solvent use. Substituting cleaning solvents with less toxic solvents can reduce hazardous waste generation and can simplify treatment of wastewater (EPA, 1996).
  
- ✓ ***Optimize housekeeping practices.***  
Good inventory management can reduce waste by using all materials efficiently and reducing the likelihood of accidental releases of stored material. Although it may seem simplistic, housekeeping and work habits of chemical mixers can account for 10 to 50 percent of a mill's total effluent load in BOD, COD, metals, and organic solvents. Improvements in housekeeping generally cost little or nothing and improve employee morale, workplace safety, and product quality (NC DEHNR, 1988). Designating a materials storage area, limiting traffic through the area, and giving one person the responsibility to maintain and distribute materials can also reduce materials use and contamination and dispersal of materials.
  
- ✓ ***Adopt worker training programs.***  
Companies should establish safety procedures for receiving, storing, and mixing chemicals, and implement worker training programs. These programs should inform workers of the environmental impacts of chemicals and identify those most harmful to the environment. Workers should be trained in proper procedures for handling these chemicals. Training should also include the correct procedures for pasting, dissolving, and emulsifying of chemicals. These procedures should be subject to auditing and recordkeeping. In addition, policies regarding receipt, storage, and mixing should be established.

Page 88 intentionally left blank.

## VI. SUMMARY OF APPLICABLE FEDERAL STATUTES AND REGULATIONS

This section discusses the Federal 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 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

Section VI.C contains a list of pending and proposed regulations

The descriptions within Section VI are intended solely for general information. Depending upon the nature or scope of the activities at a particular facility, these summaries may or may not necessarily describe all applicable environmental requirements. Moreover, they do not constitute formal interpretations or clarifications of the statutes and regulations. For 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 (ignitability, corrosivity, reactivity, or toxicity and designated with the code "D").

Regulated entities that generate hazardous waste are subject to waste accumulation, manifesting, and record keeping standards. Facilities must obtain a permit either from EPA or from a State agency which EPA has authorized to implement the permitting program if they store hazardous wastes for more than 90 days before treatment or disposal. Facilities may

treat hazardous wastes stored in less-than-ninety-day tanks or containers without a permit. Subtitle C permits contain general facility standards such as contingency plans, emergency procedures, record keeping 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 47 of the 50 States and two U.S. territories. Delegation has not been given to Alaska, Hawaii, or Iowa.

Most RCRA requirements are not industry specific but apply to any company that generates, 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 must follow to determine whether the material in question 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 EPA 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) (40 CFR Part 268) are regulations prohibiting the disposal of hazardous waste on land without prior treatment. Under the LDRs program, materials must meet LDR treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Generators of waste subject to the LDRs must provide notification of such to the designated TSD facility to ensure proper treatment prior to disposal.
- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of the used oil. For parties that merely generate used oil, regulations establish storage standards. For a party considered a used oil processor, re-refiner, burner, or marketer (one who

generates and sells off-specification used oil), additional tracking and paperwork requirements must be satisfied.

- RCRA contains unit-specific standards for all units used to store, treat, or dispose of hazardous waste, including **Tanks and Containers**. Tanks and containers used to store hazardous waste with a high volatile organic concentration must meet emission standards under RCRA. Regulations (40 CFR Part 264-265, Subpart CC) require generators to test the waste to determine the concentration of the waste, to satisfy tank and container emissions standards, and to inspect and monitor regulated units. These regulations apply to all facilities that store such waste, including large quantity generators accumulating waste prior to shipment off-site.
- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substances are regulated under Subtitle I of RCRA. Subtitle I regulations (40 CFR Part 280) contain tank design and release detection requirements, as well as financial responsibility and corrective action standards for USTs. The UST program also includes upgrade requirements for existing tanks that must be met by December 22, 1998.
- **Boilers and Industrial Furnaces** (BIFs) that use or burn fuel containing hazardous waste must comply with design and operating standards. BIF regulations (40 CFR Part 266, Subpart H) address unit design, provide performance standards, require emissions monitoring, and restrict the type of waste that may be burned.

*EPA's RCRA, Superfund and EPCRA Hotline, at (800) 424-9346, responds to questions and distributes guidance regarding all RCRA regulations. The RCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., ET, excluding Federal holidays.*

#### *Comprehensive Environmental Response, Compensation, and Liability Act*

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a 1980 law known commonly 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 equals or exceeds a reportable quantity. Reportable quantities are 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 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 and EPCRA Hotline, at (800) 424-9346, answers questions and references guidance pertaining to the Superfund program. The CERCLA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., ET, 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 the EPCRA 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 equaling or 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 MSDS's 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, known commonly 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 RCRA, Superfund and EPCRA Hotline, at (800) 424-9346, answers questions and distributes guidance regarding the emergency planning and community right-to-know regulations. The EPCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., ET, 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 §502) controls direct discharges into navigable waters. Direct discharges or "point source" discharges are from sources such as pipes and sewers. NPDES permits, issued by either EPA or an authorized State (EPA has authorized 42

States to administer the NPDES program), contain industry-specific, technology-based and/or water quality-based limits, and establish pollutant monitoring 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 the conditions and effluent limitations on the facility discharges.

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. These regulations require that facilities with the following storm water discharges apply for an 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, consult the regulation.

**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 291-petroleum refining; and SIC 311-leather tanning and finishing, 32 (except 323)-stone, clay, glass, and concrete, 33-primary metals, 3441-fabricated structural metal, and 373-ship and boat building and repairing.

**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.

#### Spill Prevention, Control and Countermeasure Plans

The 1990 Oil Pollution Act requires that facilities that could reasonably be expected to discharge oil in harmful quantities prepare and implement more rigorous Spill Prevention Control and Countermeasure (SPCC) Plan required under the CWA (40 CFR §112.7). There are also criminal and civil penalties for deliberate or negligent spills of oil. Regulations covering response to oil discharges and contingency plans (40 CFR Part 300), and Facility Response Plans to oil discharges (40 CFR §112.20) and for PCB transformers and PCB-containing items were revised and finalized in 1995.

*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., ET, 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 chemicals 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., ET, 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, volatile organic compounds (VOCs), 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 section 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. Revised NAAQSs for particulates and ozone were proposed in 1996 and may go into effect as early as late 1997.

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.

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 I, section 112(c) of the CAA 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 of the CAA establishes a sulfur dioxide nitrous oxide 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 CAA 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 of the CAA 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) and chloroform, were phased out (except for essential uses) in 1996.

*EPA's Clean Air 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 Clean Air Technology Center's website includes recent CAA rules, EPA guidance documents, and updates of EPA activities ([www.epa.gov/ttn](http://www.epa.gov/ttn) then select Directory and then CATC).*

## VI.B. Industry Specific Requirements

The textile industry is affected by several major federal environmental statutes. In addition, the industry is subject to numerous laws and regulations from state and local governments designed to protect and improve the nation's health, safety, and environment. A summary of the major federal regulations affecting the textile industry follows.

### *Clean Water Act (CWA)*

Since the textiles industry is a major water user, perhaps the most important environmental regulation affecting the textile industry is the Clean Water Act. In 1982, EPA promulgated effluent guidelines for the textile manufacturing point source category. The Textile Mills Point Source Category effluent guidelines are listed under 40 CFR Part 410. Part 410 is divided into nine subparts for each applying to a different textile manufacturing subcategory as outlined below. Each Subpart contains effluent limitations, new source performance standards (NSPS), and pretreatment standards.

<b><u>Subpart</u></b>	<b><u>Applicability</u></b>
<b>Subpart A</b> - Wool Scouring Subcategory	Wool scouring, topmaking, and general cleaning of raw wool.
<b>Subpart B</b> - Wool Finishing Subcategory	Wool finishers, including carbonizing, fulling, dyeing, bleaching, rinsing, fireproofing, and other similar processes.
<b>Subpart C</b> - Low Water Use Processing Subcategory	Yarn manufacturing, yarn texturizing, unfinished fabric manufacturing, fabric coating, fabric laminating, tire cord and fabric dipping, carpet tufting, and carpet backing.
<b>Subpart D</b> - Woven Fabric Finishing Subcategory	Woven fabric finishers which may include desizing, bleaching, mercerizing, dyeing, printing, resin treatment, water proofing, flame proofing, soil repellency application, and special finish application.
<b>Subpart E</b> - Knit Fabric Finishing Subcategory	Knit fabric finishers which may include bleaching, mercerizing, dyeing, printing, resin treatment, water proofing, flame proofing, soil repellency application, and special finish application.
<b>Subpart F</b> - Carpet Finishing Subcategory	Carpet mills which may include bleaching, scouring, carbonizing, fulling dyeing, printing, water proofing, flame proofing, soil repellency, looping, and backing with foamed and unfoamed latex and jute.

<b>Subpart G</b> - Stock and Yarn Finishing Subcategory	Stock or yarn dyeing or finishing which may include cleaning, scouring, bleaching, mercerizing, dyeing, and special finishing.
<b>Subpart H</b> - Nonwoven Manufacturing Subcategory	Applies to process wastewater discharges from manufacture of nonwoven textile products of wool, cotton, or synthetic, thermal and/or adhesive bonding procedures.
<b>Subpart I</b> - Felted Fabric Processing Subcategory	Applies to process wastewater discharges from manufacture of nonwoven products by employing fulling and felting operations as a means of achieving fiber bonds.

Effluent limitations representing the degree of effluent reduction attainable by using either best practicable control technologies (BPT), or best available technologies (BAT) are given for all subcategories. BPTs are used for discharges from existing point sources to control conventional and non-conventional pollutants as well as some priority pollutants. BATs are used to control priority pollutants and non-conventional pollutants when directly discharged into the nation's waters.

Best practicable control technology (BPT) limits for biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), sulfide, phenol, total chromium, and pH are set for every category (every Subpart), with the exception of Subpart C (Low Water Use Processing Subcategory). Each Subpart, with the exception again of Subpart C, also has best available technology (BAT) limits for COD, sulfide, phenols, and total chromium.

In Subpart C (Low Water Use Processing Subcategory) effluent reduction guidelines, attainable with best practicable control technologies (BPT) (40 CFR 410 Part 410.32), are set for BOD, COD, TSS, and pH only. In addition, these BPT attainable limits differ depending on which type of low water use process a facility uses. The two types of low water use processes are general processing and water jet weaving. Water jet weaving is defined as "the internal subdivision of the low water use processing subcategory for facilities primarily engaged in manufacturing woven greige goods through the water jet weaving process" (40 CFR 410 Part 410.31). General processing is any low water use processing, other than water jet processing, which facilities in this category may use. Similarly, best available technology (BAT) standards are also different depending on the process employed, but are only set for chemical oxygen demand (COD).

New source performance standards (NSPS) for BOD, COD, TSS, sulfide, phenols, total chromium, and pH are set for each subcategory. However, for the Low Water Use Processing Subcategory (Subpart C) and for the Woven Fabric Finishing Subcategory (Subpart D), the NSPS are divided into process

specific standards. For the Woven Fabric Finishing Subcategory (Subpart D) these standards are different for simple manufacturing operations, complex manufacturing operations and for desizing. In Subpart C, NSPS are for general processing and water jet weaving and are only for BOD, COD, TSS, and pH.

All existing and new sources discharging to POTWs in all subcategories in the Textile Mills Point Source Category are subject to the General Pretreatment Regulations for Existing and New Sources of Pollution set forth in 40 CFR Part 403.

The Storm Water Rule (40 CFR §122.26(b)(14) Subparts (i, ii)) requires facilities to apply for storm water discharge permits if they are subject to storm water effluent guidelines, new source performance standards, or toxic pollutant effluent standards. In addition, facilities are subject to storm water permit application requirements if their primary SIC code is one of those identified in the regulations. To determine whether a particular facility falls within one of these categories, the regulation should be consulted.

#### *Clean Air Act (CAA)*

Under Title I of the CAA, EPA has the authorization 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. EPA has not established NSPSs for the textiles industrial category. Refer to the EPA Sector Notebook on Plastic Resins and Manmade Fibers for a discussion of the NSPS for synthetic fiber production facilities (40CFR Part 60 Subpart HHH).

Under Title V of the CAAA 1990 (40 CFR Parts 70-72) all of the applicable requirements of the Amendments are integrated into one federal renewable operating permit. Facilities defined as "major sources" under the Act must apply for permits within one year from when EPA approves the state permit programs. Since most state programs were not approved until after November 1994, Title V permit applications will, for the most part, begin to be due in late 1995. Due dates for filing complete applications vary significantly from state to state, based on the status of review and approval of the state's Title V program by EPA.

A facility is designated as a major source under Title V if it includes sources subject to the NSPS acid rain provisions or NESHAPS, or if it releases a certain amount of any one of the CAAA regulated pollutants (SO<sub>x</sub>, NO<sub>x</sub>, CO, VOC, PM<sub>10</sub>, hazardous air pollutants, extremely hazardous substances, ozone

depleting substances, and pollutants covered by NSPSs) depending on the region's air quality category. Title V permits may set limits on the amounts of pollutant emissions; require emissions monitoring, and record keeping and reporting.

Depending on their location and operational factors, some of the larger textiles manufacturing facilities may be considered major sources and therefore would apply for a Title V permit.

#### *Resource Conservation and Recovery Act (RCRA)*

The Resource Conservation and Recovery Act (RCRA) was enacted in 1976 to address problems related to hazardous and solid waste management. RCRA gives EPA the authority to establish a list of solid and hazardous wastes and to establish standards and regulations for the treatment, storage, and disposal of these wastes. Regulations in Subtitle C of RCRA address the identification, generation, transportation, treatment, storage, and disposal of hazardous wastes. These regulations are found in 40 CFR Part 124 and CFR Parts 260-279. Under RCRA, persons who generate waste must determine whether the waste is defined as solid waste or hazardous waste. Solid wastes are considered hazardous wastes if they are listed by EPA as hazardous or if they exhibit characteristics of a hazardous waste: toxicity, ignitability, corrosivity, or reactivity.

Products, intermediates, and off-specification products potentially generated at textiles facilities that are considered hazardous wastes are listed in 40 CFR Part 261.33(f). Some of the handling and treatment requirements for RCRA hazardous waste generators are covered under 40 CFR Part 262 and include the following: determining what constitutes a RCRA hazardous waste (Subpart A); manifesting (Subpart B); packaging, labeling, and accumulation time limits (Subpart C); and record keeping and reporting (Subpart D).

Some textiles facilities may store some hazardous wastes at the facility for more than 90 days and may be considered a storage facility under RCRA. Storage facilities are required to have a RCRA treatment, storage, and disposal facility (TSDF) permit (40 CFR Part 262.34). In addition, some textiles facilities considered TSDF facilities are subject to the following regulations covered under 40 CFR Part 264: contingency plans and emergency procedures (40 CFR Part 264 Subpart D); manifesting, record keeping, and reporting (40 CFR Part 264 Subpart E); use and management of containers (40 CFR Part 264 Subpart I); tank systems (40 CFR Part 264 Subpart J); surface impoundments (40 CFR Part 264 Subpart K); land treatment (40 CFR Part 264 Subpart M); corrective action of hazardous waste releases (40 CFR Part 264 Subpart S); air emissions standards for process vents of processes that process or generate hazardous wastes (40 CFR Part 264 Subpart AA); emissions standards for leaks in hazardous waste handling

equipment (40 CFR Part 264 Subpart BB); and emissions standards for containers, tanks, and surface impoundments that contain hazardous wastes (40 CFR Part 264 Subpart CC).

Many textiles manufacturing facilities are also subject to the underground storage tank (UST) program (40 CFR Part 280). The UST regulations apply to facilities that store either petroleum products or hazardous substances (except hazardous waste) identified under the Comprehensive Environmental Response, Compensation, and Liability Act. UST regulations address design standards, leak detection, operating practices, response to releases, financial responsibility for releases, and closure standards.

### **VI.C. Pending and Proposed Regulatory Requirements**

A NESHAP for Fabric Coating, Printing and Dyeing is under development and is scheduled to be proposed in November 1999 and promulgated in November 2000. (Contact Paul Almodovar, US EPA Office of Air and Radiation, at 919-541-0283.)

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