IV. CHEMICAL RELEASE AND OTHER WASTE MANAGEMENT PROFILE

This section is designed to provide background information on the pollutant releases that are reported by this industry in correlation with other industries. The best source of comparative pollutant release and other waste management information is the Toxic Release Inventory (TRI). Pursuant to the Emergency Planning and Community Right-to-Know Act, TRI includes self-reported facility release and other waste management data for over 650 toxic chemicals and chemical categories. Facilities within SIC Codes 10 (except 1011, 1081, and 1094), 12 (except 1241), 20-39, 4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4953 (limited to facilities regulated under the RCRA Subtitle C, 42 U.S.C. section 6921 *et seq*.), 5169, 5171, and 7389 (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis) have more than 10 employees, and that manufactures, processes or otherwise uses listed chemical in quantities greater than the established threshold in the course of a calendar year are required to report to TRI annually release and other waste management quantities (on- and off-site). The information presented within the sector notebooks is derived from the most recently available (2000) TRI reporting year (which includes over 650 chemicals and chemical categories), and focuses primarily on the on-site releases reported by each sector. Because TRI requires consistent reporting regardless of sector, it is an excellent tool for drawing comparisons across industries. TRI data provide the type, amount and media receptor of each chemical released or otherwise managed as waste.

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 2000 Toxic Release Inventory Public Data Release, reported on-site and off-site releases of toxic chemicals to the environment from original TRI reporting industries (SIC codes 20-39) decreased by more than 8 percent (644 million pounds) between 1999 and 2000 (not including chemicals added and removed from the TRI chemical list during this period). Reported on-site releases dropped by almost 57 percent between 1988 and 2000. Reported transfers of TRI chemicals to off-site locations for disposal increased by almost 7 percent (28 million pounds) between 1988 and 2000. More detailed information can be obtained from EPA's annual Toxics Release Inventory Public Data Release Report (which is available through the EPCRA Call Center at 800-424-9346), or directly from the Internet at *www.epa.gov/tri*.

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

TRI Data Limitations

Certain limitations exist regarding TRI data. Within some sectors, (e.g., printing and transportation equipment cleaning) the majority of facilities are not subject to TRI reporting either because they do not fall under covered SIC codes, or because they are below the TRI reporting threshold amounts. However, EPA lowered threshold amounts for persistent bioaccumulative toxic (PBT) chemicals starting reporting year 2000. For these sectors, release information from other sources has been included. In addition, many facilities report to TRI under more than one SIC code, reflecting the multiple operations carried out onsite whether or not the operations are the facilities' primary area of business as reported to the U.S. Census Bureau. Reported chemicals are limited to the approximately 650 TRI chemicals and chemical categories. A portion of the emissions from pulp and paper mills, therefore, are not captured by TRI. Also, reported releases and other waste management quantities may or may not all be associated with the industrial operations described in this 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 and population exposure levels to each chemical released so that one can differentiate between pollutants with significant differences in toxicity. This project, the Risk Screening Environmental Indicators Model, can be found at http://www.epa.gov/opptintr/rsei/.

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

Definitions Associated with Section IV Data Tables

General Definitions

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

Data Table Column Heading Definitions

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

ON-SITE RELEASES -- are an on-site discharge of a toxic chemical to the environment. This includes emissions to the air, discharges to bodies of water, releases at the facility to land, as well as contained disposal into underground injection wells.

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

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

Releases to Land -- includes disposal of toxic chemicals in waste to on-site landfills, land treated or incorporation into soil, surface impoundments,

spills, leaks, or waste piles. These activities must occur within the facility's boundaries for inclusion in this category.

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

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

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

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

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

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

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

IV.A. EPA Toxics Release Inventory For the Pulp and Paper Industry

According to Toxic Release Inventory (TRI) data from SIC codes 261-263, the pulp and paper industry released (to the air, water, or land) and transferred (shipped off-site) a total of approximately 263 million pounds of

toxic chemicals during calendar year 2000.[1] This represents approximately 2.5 percent of the total pounds of TRI chemicals released and transferred by all reporting facilities that year.

Media comparison of TRI releases

The total amount of TRI toxic chemicals generated by the pulp and paper industry is a gross profile of the types and relative amounts of chemical outputs from mill processes. Additional information which can be related back to possible compliance requirements is available from the distribution of chemical releases across specific media within the environment. The TRI data requires filers to separate the total releases for the pulp and paper industry for air, water, and land releases. This distribution across media can also be compared to the profile of other industry sectors.

The pulp and paper industry releases 66 percent of its total TRI poundage to the air, approximately 22 percent to water and POTWs, and 9 percent is disposed on land (on site and off site). This release profile differs from other TRI industries which average approximately 63 percent to land, 27 percent to air, and 4 percent to water and POTWs. A larger proportion of water releases correlates with the water intensive processes of the pulp and paper industry. An average mill requires 10 million gallons of influent water per day and will produce the corresponding amount of effluent waters. Examining the pulp and paper industry's TRI reported toxic chemicals by chemical, highlights the likely origins of industry releases (see Table 14).

Air releases can be traced to a variety of sources. Approximately 63 percent are methanol, a by-product of the pulp making process. The other major air toxic chemicals, such as chlorinated compounds and sulfuric acid, originate in the bleaching stage. Methanol is the most frequently reported chemical by pulp and paper mills, and it accounts for approximately 15 percent of the water releases and 97 percent of transfers to POTWs by the industry. Overall, methanol represents roughly 60 percent of the pulp and paper industry's TRI releases and transfers.

The diversity of processes in the pulp and paper industry can be seen in the diversity of chemicals found in the TRI report. The TRI chemical released and transferred by the second largest number of mills is ammonia, which is used as a buffer in acid sulfite pulping (Air & Waste Management Association, 1992). In addition, some TRI chemicals are only reported by a few mills, suggesting process specific needs such as paper finishing or use in wet additives.

[1] Unless otherwise indicated, TRI data for SIC codes 261-263 were used for pulp and paper release and transfer values in this section and the tables therein.

Table 14: 2000 TRI Releases for Pulp and Paper Facilities (SICs 261, 262 and 263), by Number of Facilities Reporting (Releases Reported in pounds/year)

Chemical Name	# Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Underground Injection	Land Disposal	Total Releases	Avg. Releases Per Facility
Methanol	174	5,368,130	105,189,904	3,011,860		1,014,710	114,584,624	658,532
Ammonia	166	514,616	15,782,909	1,884,126		11,939	18,193,590	109,600
Hydrochloric Acid (1995 and after "Acid Aerosols"	137	8,037	16,114,754	10			16,122,801	117,685
Acetaldehyde	125	540,704	7,749,806	177,092		3,789	8,471,391	67,771
Manganese Compounds	124	1,932	199,238	4,187,964		8,733,410	13,122,544	105,827
Polycyclic Aromatic Compounds[PBT]	122	57	114,967	1,472		2,458	118,954	975
Formaldehyde	116	57,062	1,865,446	326,507		9,651	2,258,666	19,471
Sulfuric Acid (1994 and after "Acid Aerosols" Only	113	773	9,670,724				9,671,497	85,588
Phenol	105	14,983	1,105,065	9,244		3,209	1,132,501	10,786
Chlorine	102	25,236	449,437	60,185		17	534,875	5,244
Catechol	99	11	256	17,493		605	18,365	186
Barium Compounds	96	13	252,753	540,545		2,351,605	3,144,916	32,760
Nitrate Compounds	87			9,791,260		9,234	9,800,494	112,649
Chlorine Dioxide	80	2,215	701,625				703,840	8,798
Dioxin and Dioxin-Like Compounds[PBT]	77		55	103		162	320	4
Zinc Compounds	77	19	775,453	324,492		3,255,589	4,355,553	56,566
Mercury Compounds[PBT]	75	1	2,149	56		535	2,741	37
Methyl Ethyl Ketone	64	98,368	1,024,379	14,909		5,013	1,142,669	17,854
Benzo(g,h,i)perylene[PBT]	63		1,060	115		163	1,338	21
Formic Acid	54	1,210	1,105	92,178		2,211	96,704	1,791
Chloroform	40	1,076,881	1,810,096	49,459		12,285	2,948,721	73,718
Cresol (Mixed Isomers)	32	363	827,255	1,097		708	829,423	25,919
Mercury[PBT]	23		544	8		94	646	28
Hydrogen Fluoride	17		442,166				442,166	26,010
Vanadium Compounds	16	6,102	51,541	20,204		635,418	713,265	44,579
Chloromethane	15	62	492,139	10		5	492,216	32,814
Copper Compounds	15		8,343	3,591		50,429	62,363	4,158
Nickel Compounds	13		8,021	3,337		94,451	105,809	8,139
Certain Glycol Ethers	12	17,410	54,925	7,919		2,602	82,856	6,905
Chromium Compounds	9	30	1,409	10,341		32,731	44,511	4,946
Ethylene Glycol	9	60	2,316	29,596		5,810	37,782	4,198
Toluene	9	81,244	638,734	19			719,997	80,000
Xylene (Mixed Isomers)	7	33,224	41,507	202		1,260	76,193	10,885
Polychlorinated Biphenyls[PBT]	7		31				31	4
Styrene	5	19,000	53,239	104			72,343	14,469
C.i. Direct Blue 218	5			20		1,704	1,724	345
Manganese	5		11,163	94,428		500,902	606,493	121,299
Benzene	3		276,814				276,814	92,271
Dazomet	3	2,792		600			3,392	1,131
Vinyl Acetate	3	12,303	16,900	880			30,083	10,028
Biphenyl	3		117,000				117,000	39,000
1,2,4-trimethylbenzene	3	20,920	13,396	180		10	34,506	11,502
Diethanolamine	3	549	6,505	974			8,028	2,676
N-butyl Alcohol	3	29,759	61,970	10,943			102,672	34,224
Nitric Acid	2	10	1,310				1,320	660
Decabromodiphenyl Oxide	2			5		1,100	1,105	552
Antimony	2					350	350	175
Lead Compounds[PBT]	2		1,698	796			2,494	1,247
N-hexane	2	4,100	46,100				50,200	25,100
Arsenic Compounds	2		360			6	366	183
Lead[PBT]	1							
Antimony Compounds	1							

Table 14: 2000 TRI Releases for Pulp and Paper Facilities (SICs 261, 262 and 263), by Number of Facilities Reporting (Releases Reported in pounds/year)

Chemical Name	# Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Underground Injection	Land Disposal	Total Releases	Avg. Releases Per Facility
Chlordane[PBT]	1							
Maleic Anhydride	1	200	210				410	410
Ethylbenzene	1	290	90				380	380
Potassium Dimethyldithiocarbamate	1	19		10,394			10,413	10,413
O-xylene	1	15	46,430			5	46,450	46,450
Diisocyanates	1	750					750	750
Ozone	1		102,763				102,763	102,763
Naphthalene	1	83	17,000	1		4,800	21,884	21,884
Copper	1							
Methyl Methacrylate	1	750	1,154				1,904	1,904
Acrylic Acid	1	1	280				281	281
Trichloroethylene	1							
Dichloromethane	1	6	33,316	1			33,323	33,323
Polychlorinated Alkanes	1							
Barium	1			250		250	500	500
Mixture	1	1	4				5	5
	268**	7,940,291	166,187,814	20,684,970	0	16,749,220	211,562,315	789,411

[PBT] Persistent, Bioaccumulative, and Toxic

* Refer to Section III for a discussion of the TRI data and its limitations, methodology used to obtain this data, definitions of the column headings, and the definition of persistant, bioaccumulative, and toxic chemicals.

**Total number of facilities (not chemical reports) reporting to TRI in this industry sector.

Table 15: 2000 TRI Transfers for Pulp and Paper Facilities (SICs 261, 262 and 263), by Number of Facilities Reporting (Transfers Reported in pounds/year)

Chemical Name	# Reporting Chemical	POTW Transfers	Disposal Transfers	Recycling Transfers	Treatment Transfers	Energy Recovery	Total Transfers	Avg Transfers Per Facility
Methanol	174	36,098,617	144,671	24,058	6,993,725	13,736	43,274,807	248,706
Ammonia	166	56,000	79,785		2,966		138,751	836
Hydrochloric Acid (1995 and after "Acid Aerosols"	137							
Acetaldehyde	125	111,435	757	25	10,100		122,317	979
Manganese Compounds	124	204,150	2,977,098	152,646			3,333,894	26,886
Polycyclic Aromatic Compounds[PBT]	122	1,224	1,257	52	5	129	2,667	22
Formaldehyde	116	116,817	18,814	63	53,825	279	189,798	1,636
Sulfuric Acid (1994 and after "Acid Aerosols" Only	113	5					5	0
Phenol	105	16,753	2,372	15	4,983	2,529	26,652	254
Chlorine	102	14,443			1		14,444	142
Catechol	99	66,175	602	3	630	2,250	69,660	704
Barium Compounds	96	41,058	1,316,911	86,502			1,444,471	15,047
Nitrate Compounds	87	40,310	38,220		118,370		196,900	2,263
Chlorine Dioxide	80							
Dioxin and Dioxin-Like Compounds[PBT]	77	21	101	6	10		138	2
Zinc Compounds	77	30,256	1,129,573	72,525			1,232,354	16,005
Mercury Compounds[PBT]	75	14	23,862	95			23,971	320
Methyl Ethyl Ketone	64	56,874	680	4,350	20,062	38,121	120,087	1,876
Benzo(g,h,i)perylene[PBT]	63	7	101	3	2	2	115	2
Formic Acid	54	6,334	251				6,585	122
Chloroform	40	155,257	8,630		308		164,195	4,105
Cresol (Mixed Isomers)	32	4,448	394		1,600		6,442	201
Mercury[PBT]	23		485				485	21
Hydrogen Fluoride	17							
Vanadium Compounds	16	1,400	88,540	11,463			101,403	6,338
Chloromethane	15	306					306	20
Copper Compounds	15	1,515	64,245				65,760	4,384
Nickel Compounds	13	2,120	91,928	180			94,228	7,248
Certain Glycol Ethers	12		815				815	68
Chromium Compounds	9	1,351	71,901	1,000			74,252	8,250
Ethylene Glycol	9	24,658	2,810		84,004		111,472	12,386
Toluene	9				220	383,822	384,042	42,671
Xylene (Mixed Isomers)	7				5	10,291	10,296	1,471
Polychlorinated Biphenyls[PBT]	7		207		57		264	38
Styrene	5			160	750		910	182
C.i. Direct Blue 218	5	1,984	3,848	1,065			6,897	1,379
Manganese	5		38,661				38,661	7,732
Benzene	3							
Dazomet	3	13,535					13,535	4,512
Vinyl Acetate	3					19	19	6
Biphenyl	3							
1,2,4-trimethylbenzene	3		4				4	1
Diethanolamine	3	36,070	483	715			37,268	12,423
N-butyl Alcohol	3							
Nitric Acid	2							
Decabromodiphenyl Oxide	2		26,600				26,600	13,300
Antimony	2	251	6,650				6,901	3,450
Lead Compounds[PBT]	2		127,400				127,400	63,700
N-hexane	2					11,000	11,000	5,500
Arsenic Compounds	2	120	24,200				24,320	12,160
Lead[PBT]	1		350				350	350
Antimony Compounds	1		2,200				2,200	2,200
Chlordane[PBT]	1				50		50	50
Maleic Anhydride	1							
Ethylbenzene	1					840	840	840
Potassium Dimethyldithiocarbamate	1							
O-xylene	1							
Diisocyanates	1							
Ozone	1							
Naphthalene	1							
Copper	1		675				675	675

Table 15: 2000 TRI Transfers for Pulp and Paper Facilities (SICs 261, 262 and 263), by Number of Facilities Reporting (Transfers Reported in pounds/year)

Chemical Name	# Reporting Chemical	POTW Transfers	Disposal Transfers	Recycling Transfers	Treatment Transfers	Energy Recovery	Total Transfers	Avg Transfers Per Facility
Methyl Methacrylate	1				750		750	750
Acrylic Acid	1							
Trichloroethylene	1		4,985				4,985	4,985
Dichloromethane	1							
Polychlorinated Alkanes	1				24,000		24,000	24,000
Barium	1		5,100				5,100	5,100
Mixture	1							
	268**	37,103,508	6,306,166	354,926	7,316,423	463,018	51,544,041	192,328

[PBT] Persistent, Bioaccumulative, and Toxic

* Refer to Section III for a discussion of the TRI data and its limitations, methodology used to obtain this data, definitions of the column headings, and the definition of persistant, bioaccumulative, and toxic chemicals.

**Total number of facilities (not chemical reports) reporting to TRI in this industry sector.

The TRI database contains a detailed compilation of self-reported, facility-specific chemical releases. The top reporting facilities for this sector are listed below (Table 16).

Table 16: Ten Largest Volume TRI Releasing Facilities in the Pulp and Paper Industry*

Rank	Facility	Total TRI Releases in Pounds
1	Westvaco Corporation - Covington, VA	5,066,296
2	International Paper - Mansfield, LA	4,472,550
3	International Paper Company Camden Facility - Camden, AR	3,842,484
4	International Paper - Bleachboard Department - Riegelwood, NC	3,619,809
5	Georgia Pacific Corporation Port Hudson Operations - Zachary, LA	3,292,540
6	Smurfit Stone Container Corporation - Missoula, MT	3,133,396
7	Great Southern Paper Co - Cedar Springs, GA	3,125,666
8	Stora Enso North America Corporation - Wisconsin Rapids, WI	3,095,151
9	Weyerhaeuser Company - Valliant, OK	3,041,630
10	International Paper Georgetown Mill - Georgetown, SC	2,967,101

Source: 2000 Toxics Release Inventory Database

* Being included in this list does not mean that the release is associated with non-compliance with environmental laws.

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 this sector self-reported as released to the environment based upon 2000 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 releases of these chemicals. Information regarding pollutant release reductions over time may be available from EPA's TRI program, or directly from the industrial trade associations that are listed in Section IX of this document. Since these descriptions are cursory, please consult the sources referenced below for a more detailed description of both the chemicals described in this section, and the chemicals that appear on the full list of TRI chemicals appearing in Section IV.A.

The brief descriptions provided below were taken from the Hazardous Substances Data Bank (HSDB), accessed via TOXNET. TOXNET is a computer system run by the National Library of Medicine. It includes a number of toxicological databases managed by EPA, National Cancer

Institute, and the National Institute for Occupational Safety and Health.[2] 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. The information contained below is based upon exposure assumptions that have been conducted using standard scientific procedures. The effects listed below must be taken in context of these exposure assumptions that are more fully explained within the full chemical profiles in HSDB. For more information on TOXNET, contact the TOXNET help line at 800-231-3766 or see the website at *http://toxnet.nlm.nih.gov/*.

Methanol (CAS: 67-56-1)

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 milligram of methanol per liter of water. Methanol is not likely to persist in water or to bioaccumulate in aquatic organisms.

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

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

Physical Properties. Methanol is highly flammable.

[2] 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).

Ammonia (CAS: 7664-41-7)

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

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 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.

Physical Properties. Ammonia is a corrosive and severely irritating gas with a pungent odor.

Hydrochloric Acid (CAS: 7647-01-1)

Toxicity. Hydrochloric acid is primarily a concern in its aerosol form. Acid aerosols have been implicated in causing and exacerbating a variety of respiratory ailments. Dermal exposure and ingestion of highly concentrated hydrochloric acid can result in corrosivity.

Ecologically, accidental releases of solution forms of hydrochloric acid may adversely affect aquatic life by including a transient lowering of the pH (i.e., increasing the acidity) of surface waters.

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

Environmental Fate. Releases of hydrochloric acid to surface waters and soils will be neutralized to an extent due to the buffering capacities of both systems. The extent of these reactions will depend on the characteristics of the specific environment.

Physical Properties. Concentrated hydrochloric acid is highly corrosive.

Manganese Compounds

Toxicity. Manganese is an essential nutrient for most plants and animals. However, at high concentrations can produce an irreversible syndrome resembling Parkinson's disease.

Carcinogenicity. There is currently no evidence to suggest that manganese chemicals are carcinogenic.

Environmental Fate. As ions or insoluble solids, most manganese compounds are not expected to volatilize from water and moist soil surfaces. Manganese compounds released into the ambient atmosphere are expected to exist in the particulate phase. In the particulate phase, manganese compounds may be removed from the air by wet and dry deposition. Manganese compounds do not bioconcentrate in humans and animals.

Sulfuric Acid (CAS: 7664-93-9)

Toxicity. Concentrated sulfuric acid is corrosive. In its aerosol form, sulfuric acid has been implicated in causing and exacerbating a variety of respiratory ailments.

Ecologically, accidental releases of solution forms of sulfuric acid may adversely affect aquatic life by inducing a transient lowering of the pH (i.e., increasing the acidity) of surface waters. In addition, sulfuric acid in its aerosol form is also a component of acid rain. Acid rain can cause serious damage to crops and forests.

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

Environmental Fate. Releases of sulfuric acid to surface waters and soils will be neutralized to an extent due to the buffering capacities of both systems. The extent of these reactions will depend on the characteristics of the specific environment.

In the atmosphere, aerosol forms of sulfuric acid contribute to acid rain. These aerosol forms can travel large distances from the point of release before the acid is deposited on land and surface waters in the form of rain.

IV.C. Other Data Sources

The toxic chemical release data obtained from TRI captures the vast majority of facilities in the pulp and paper industry. It also allows for a comparison across years and industry sectors. Reported chemicals are limited, however,

to the approximately 650 required by TRI. Some pulp and paper emissions may not be 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_x, NO_x, CO, particulates, etc.) from many sources.

The EPA Office of Air's Aerometric Information Retrieval System (AIRS) contains a wide range of information related to stationary sources of air pollution, including the emissions of a number of air pollutants which may be of concern within a particular industry. With the exception of volatile organic compounds (VOCs), there is little overlap with the TRI chemicals reported above. Table 17 summarizes releases in 2001 of volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter of 10 microns or less (PM10).

Table 17: Air Pollutant Releases by Industry Sector (tons/year)

Industry Sector	CO	NO_2	PM10	PM25	SO_2	VOC
Metal Mining	8,039	45,341	61,358	32,534	10,926	2,109
Oil and Gas Extraction	151,763	366,793	4,607	4,379	226,208	94,549
Non-Fuel, Non-Metal Mineral Mining	27,001	15,747	48,760	20,956	16,874	3,806
Textiles	7,448	15,043	5,343	3,386	25,544	18,286
Lumber and Wood Products	142,955	37,313	57,009	38,337	9,189	100,761
Wood Furniture and Fixtures	7,046	3,008	6,905	5,260	2,779	62,457
Pulp and Paper	**567,542**	**318,263**	**85,403**	**63,577**	**488,029**	**144,373**
Printing	604	2,466	1,723	1,723	1,915	80,982
Inorganic Chemicals	176,697	94,938	19,549	12,586	201,994	43,563
Plastic Resins and Man-made Fibers	28,890	56,946	5,493	4,155	71,815	83,363
Pharmaceuticals	2,662	14,676	2,273	1,455	17,132	13,407
Organic Chemicals	128,454	166,398	34,637	16,900	102,461	159,319
Agricultural Chemicals	18,492	65,389	10,257	7,311	65,765	12,700
Petroleum Refining	438,375	298,602	33,620	26,870	478,998	161,207
Rubber and Plastic	2,515	9,565	5,209	3,217	20,368	87,258
Stone, Clay, Glass and Concrete	161,113	372,679	127,283	78,647	312,740	32,687
Iron and Steel	1,080,576	105,794	60,962	47,501	307,981	44,608
Metal Castings	104,350	6,298	22,393	15,654	4,770	17,285
Nonferrous Metals	418,647	30,882	24,019	17,433	244,413	8,663
Fabricated Metal Products	6,029	11,672	4,691	3,264	18,742	90,575
Electronics and Computers	22,105	6,428	3,184	2,349	6,882	27,453
Motor Vehicle Assembly	13,439	15,388	4,016	2,270	24,123	95,861
Aerospace	2,832	7,413	1,834	1,287	5,363	7,440
Shipbuilding and Repair	471	2,139	1,574	753	2,537	4,984
Ground Transportation	711,155	6,681,163	285,932	165,029	12,976,279	191,063
Water Transportation	83	153	2,162	733	66	6,787
Air Transportation	5,231	2,079	186	140	90	2,398
Fossil Fuel Electric Power	436,151	5,789,099	252,539	141,002	12,667,567	54,727
Dry Cleaning	217	438	190	117	220	3,163

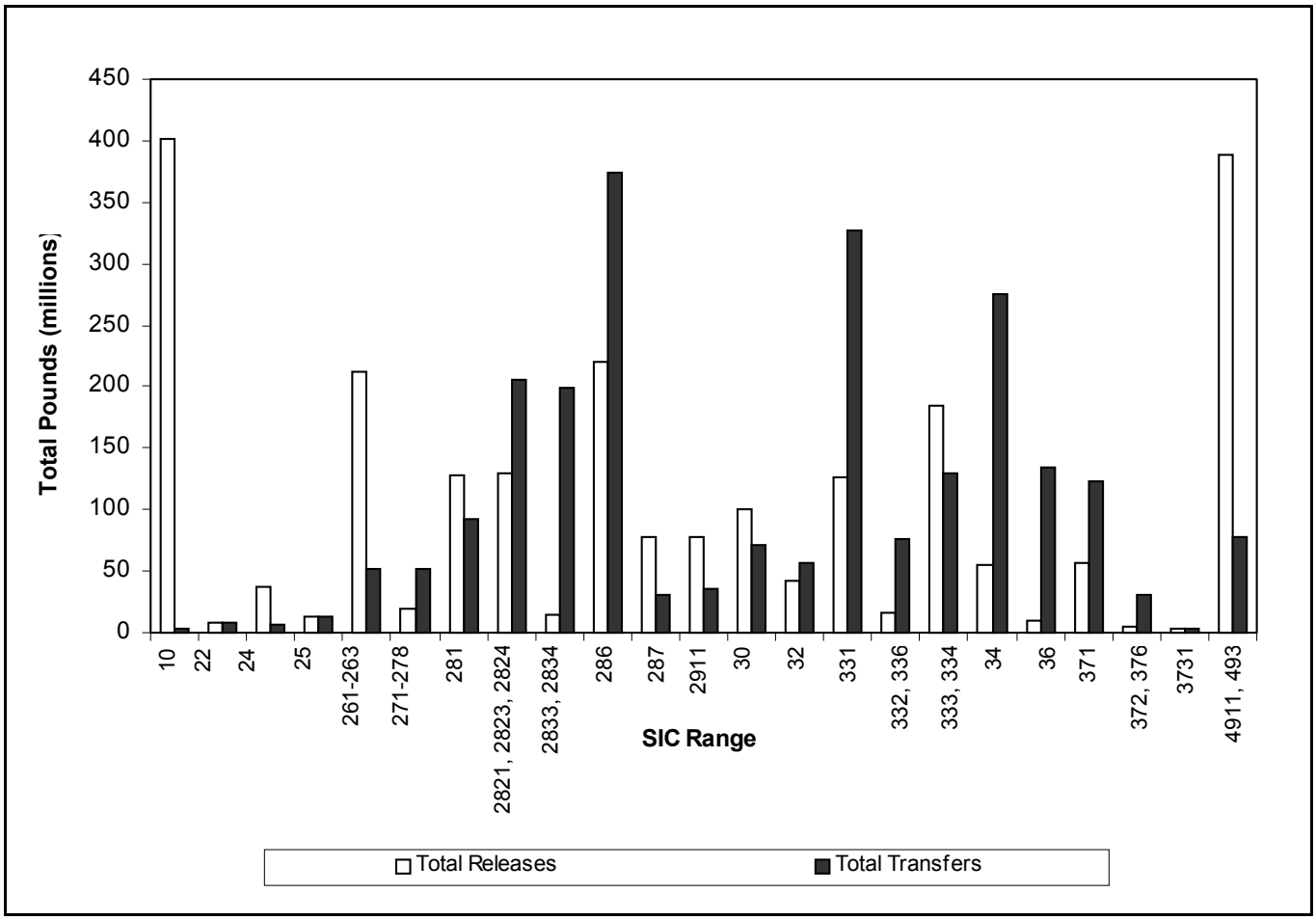
Source: U.S. EPA Office of Air and Radiation, AIRS Database, 2001.

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 Report.

Figure 12 is a graphical representation of a summary of the 2000 TRI data for the Pulp and Paper industry and the other sectors profiled in separate notebooks. The bar graph presents the total TRI releases and total transfers on the left axis and the triangle points show the average releases per facility on the right axis. Industry sectors are presented in the order of increasing total TRI releases. The graph is based on the data shown in Table 17 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 Pulp and Paper industry the 2000 TRI data presented here covers 268 facilities. These facilities listed SIC 2611-2631 (Pulp, Paper, and Paperboard Mills) as primary SIC codes.

Figure 12: 2000 Summary of TRI Releases and Transfers by Industry



Key to Standard Industrial Classification (SIC) Codes

SIC Range	Industry Sector	SIC Range	Industry Sector	SIC Range	Industry Sector
02	Agricultural Crops, Forestry	281	Inorganic Chemicals	333, 334	Nonferrous Metals
01, 08	Agricultural Livestock	2821, 2823, 2824	Plastic Resins and Man-made Fibers	34	Fabricated Metals
10	Metal Mining	2833, 2834	Pharmaceuticals	36	Electronics and Computers
13	Oil and Gas Extraction	286	Organic Chemicals	371	Motor Vehicle Assembly
14	Non-Fuel, Non-Metal Mining	287	Agricultural Chemicals	372, 376	Aerospace
22	Textiles	2911	Petroleum Refining	3731	Shipbuilding and Repair
24	Lumber and Wood Products	30	Rubber and Plastic	40, 42, 46, 4922-4925, 4932	Ground Transportation
25	Furniture and Fixtures	32	Stone, Clay, Glass and Concrete	44	Water Transportation
261-263	Pulp and Paper	331	Iron and Steel	45	Air Transportation
271-278	Printing	332, 336	Metal Casting	4911, 493	Fossil Fuel Electric Power Generation
				7216	Dry cleaning

Table 18: 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. Transfers per Facility (pounds)		
Agricultural Crops, Forestry	2	Industry sector currently not subject to TRI reporting.						
Agricultural Livestock	01, 08	Industry sector currently not subject to TRI reporting.						
Metal Mining	10	58	402.1	690,837	2.8	4,894	404.9	695,731
Oil and Gas Extraction	13	Industry sector currently not subject to TRI reporting.						
Non-Fuel, Non-Metal Mining	14	Industry sector currently not subject to TRI reporting.						
Textiles	22	194	8.9	17,018	8.1	15,527	17.0	32,545
Lumber and Wood Products	24	410	36.6	28,305	7.1	5,497	43.7	33,802
Furniture and Fixtures	25	280	13.0	18,912	13.5	19,605	26.6	38,517
Pulp and Paper	**261,262,263**	**268**	**211.6**	**90,180**	**51.5**	**21,971**	**263.1**	**112,151**
Printing	271-278	163	19.0	50,148	51.5	21,971	70.5	72,119
Inorganic Chemicals	281	343	128.2	64,085	91.8	45,921	220.0	110,006
Plastic Resins and Man-made Fibers	2821, 2823, 2824	369	129.5	45,534	205.1	72,139	334.5	117,673
Pharmaceuticals	2833, 2834	151	15.1	19,275	199.0	254,766	214.0	274,041
Organic Chemicals	286	467	219.4	47,377	374.3	80,833	593.6	128,210
Agricultural Chemicals	287	172	78.1	78,927	30.1	30,417	108.3	109,344
Petroleum Refining	2911	162	78.5	25,948	36.2	11,973	114.7	37,921
Rubber and Plastic	30	1,154	100.2	28,358	71.0	20,099	171.2	48,457
Stone, Clay, Glass and Concrete	32	484	42.1	21,860	56.7	29,389	98.8	51,249
Iron and Steel	331	325	125.7	63,336	327.5	164,981	453.2	228,317
Metal Casting	332, 336	447	16.8	9,081	75.5	40,849	92.3	49,930
Nonferrous Metals	333, 334	181	185.3	184,340	128.9	128,258	314.2	312,598
Fabricated Metals	34	2,047	54.8	7,759	275.5	38,991	330.3	46,750
Electronics and Computers	36	419	9.0	5,968	133.7	88,279	142.7	94,247
Motor Vehicle Assembly	371	622	56.0	19,495	123.7	43,019	179.7	62,514
Aerospace	372, 376	184	5.3	8,277	30.1	46,674	35.4	54,951
Shipbuilding and Repair	3731	39	4.0	19,884	2.5	12,316	6.4	32,200
Ground Transportation	40, 42, 46, 4922- 4925, 4932	Industry sector currently not subject to TRI reporting.						
Water Transportation	44	Industry sector currently not subject to TRI reporting.						
Air Transportation	45	Industry sector currently not subject to TRI reporting.						
Fossil Fuel Electric Power Generation	4911, 493	613	388.7	73,037	78.0	14,647	466.7	87,684
Dry cleaning	7216	Industry sector currently not subject to TRI reporting.						
Sector Notebook Total	NA	9,552	2,327.8	1,617,941	2,374.1	1,213,016	4,701.9	2,830,957
2000 TRI Total	NA	23,484	6,575.7	280,007	4,139.7	176,277	10,715.4	456,285

Source: *US EPA Toxics Release Inventory Database, 2000.*

V. POLLUTION PREVENTION OPPORTUNITIES

The best way to reduce pollution is to prevent it in the first place. Industries 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.

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 pulp and paper industry. While the list is not exhaustive, it does provide core information that can be used as the starting point for facilities interested in beginning their own pollution prevention projects. When possible, this section provides information from real activities that can, or are being implemented by this sector -- including a discussion of associated costs, time frames, and expected rates of return. This section provides summary information from activities that may be, or are being implemented by this sector. When possible, information is provided that gives the context in which the technique can be effectively used. Please note that the activities described in this section do not necessarily apply to all facilities that fall within this sector. Facility-specific conditions must be carefully considered when pollution prevention options are evaluated, and the full impacts of the change must examine how each option affects air, land and water pollutant releases.

Pollution Prevention Opportunities for the Pulp and Paper Industry

The chemical recovery systems used in chemical pulping processes are an example of pollution prevention technologies that have evolved alongside process technologies. An efficient chemical recovery system is a crucial component of chemical pulping mill operation: the chemical recovery process regenerates process chemicals, reducing natural resource usage and associated costs, as well as discharges to the environment and producing energy. Many recent pollution prevention efforts in the pulp and paper industry have focused on reducing the releases of toxics, in particular, chlorinated compounds. Pollution prevention techniques have proven to be more effective in controlling these pollutants than conventional control and treatment technologies. Most conventional, end-of-pipe treatment technologies are not effective in destroying many chlorinated compounds and often merely transfer the pollutants to another environmental medium. Efforts to prevent chlorinated releases have, therefore, focused on source reduction and material substitution techniques such as defoamers, bleaching chemical or wood chip substitution to reduce the industry's use and releases

of chlorinated compounds. Such source reduction efforts and material substitutions usually require substantial changes in the production process. In addition to the major process changes aimed at reducing toxics releases, the industry is implementing a number of pollution prevention techniques to reduce water use and pollutant releases (BOD, COD, and TSS) such as: dry debarking, recycling of log flume water, improved spill control, bleach filtrate recycle, closed screen rooms, and improved storm water management. The pulp and paper industry has also worked to increase the amount of secondary and recycled fibers used for the pulping process. According to industry sources, the pulp and paper industry set and met a 1995 goal of 40 percent recycling and reuse of all paper consumed in the U.S. Currently, the industry has set a new goal of recovering 50 percent of all paper consumed in the U.S. for recycle and reuse. These figures should be compared with the utilization rate of secondary fibers (secondary fibers as a percentage of the total fibers used to make pulp) which is at approximately 37 percent and is climbing slowly (AF&PA, 1999). Current secondary fiber utilization rates in resource deficient countries such as Japan are close to 50 percent.

Because the pulp and paper industry is highly capital intensive and uses long-established technologies with long equipment lifetimes, major process-changing pollution prevention opportunities are expensive and require long time periods to implement. The pulp and paper industry is a dynamic one, however, that constantly makes process changes and material substitutions to increase productivity and cut costs. The trend towards materials substitutions is reflected in an increasing demand for alternative pulping and bleaching chemicals and in the participation of many facilities in voluntary environmental programs (see Section VIII).

One of the factors that is driving the industry towards pollution prevention much more rapidly is the integrated NESHAP and effluent limitation guidelines for the pulp and paper industry. (See Section VI.B. for a description of this "cluster rule.") These regulations were developed together in part to reduce the costs of compliance, to emphasize the multi-media nature of pollution control, and to promote pollution prevention. Many of the technology-based effluent limitation guidelines for the control of toxic releases consist of process changes that substitute chlorine dioxide for elemental chlorine and that completely eliminate elemental chlorine in bleaching processes. The NESHAP standards also allow Hazardous Air Pollutant (HAP) reductions through recycling of wastewater streams to a process unit and routing pulping emissions to a boiler, lime kiln, or recovery furnace.

Brief descriptions of some of the pollution prevention techniques found to be effective at pulp and paper facilities are provided below. For more detail on the pollution prevention options listed below and for descriptions of additional alternative pulping and bleaching processes refer to the Office of

Pollution Prevention and Toxics' 1993 report, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry* and other pollution prevention/waste minimization documents listed in Resource Materials section. It should be noted that although many of the pollution prevention opportunities listed below are primarily aimed at reducing toxics releases, the process changes can often lead to reductions in the conventional pollutants such as BOD_5 and TSS as well as COD, AOX, and contribute to reduced water use, sludge volumes generated, and air emissions.

Extended Delignification. Extended delignification further reduces the lignin content of the pulp before it moves to the bleach plant. Because the amount of bleaching chemicals required to achieve a certain paper brightness is proportional to the amount of lignin remaining in the pulp after the pulping process, extended delignification can reduce the amounts of bleaching chemicals needed. A number of different extended delignification processes have been developed. These processes involve: increasing the cooking time; adding the cooking chemicals at several points throughout the cooking process; regulating the cooking temperatures; and carefully controlling the concentration of hydrogen sulfide ions and dissolved lignin. Importantly, the process changes do not degrade the cellulose which would normally accompany increased cooking time. Extended delignification processes have been developed for both batch and continuous pulping processes. The lignin content of the brownstock pulp has been reduced by between 20 and 50 percent with no losses in pulp yield or strength using such processes. In consequence, chlorinated compounds generated during bleaching are reduced in approximate proportion to reductions in the brownstock lignin content. In addition, the same changes have resulted in significant reductions in BOD_5, COD and color. One study demonstrated a 29 percent decrease in BOD_5 resulting from an extended delignification process. Facility energy requirements have been shown to increase slightly with extended delignification. However, off-site power requirements (associated with decreased chemical use) have been estimated to more than offset the on-site increases.

Oxygen Delignification. Oxygen delignification also reduces the lignin content in the pulp. The process involves the addition of an oxygen reactor between the kraft pulping stages and the bleach plant. The brownstock pulp from the digester is first washed and then mixed with sodium hydroxide or oxidized cooking liquor. The pulp is fluffed, deposited in the oxygen reactor, steam heated, and injected with gaseous oxygen wherein it undergoes oxidative delignification. The pulp is then washed again to remove the dissolved lignin before moving to the bleaching plant. Oxygen delignification can reduce the lignin content in the pulp by as much as 50 percent resulting in a potentially similar reduction in the use of chlorinated bleaching chemicals and chlorinated compound pollutants. The process can

be used in combination with other process modifications that can completely eliminate the need for chlorine-based bleaching agents. In addition, unlike bleach plant filtrate, the effluent from the oxygen reactor can be recycled through the pulp mill recovery cycle, further reducing the non-pulp solids going to the bleaching plant and the effluent load from the bleach plant. The net effect is reduced effluent flows and less sludge generation. Facility energy requirements have been shown to increase with oxygen delignification, however, the decrease in off-site power requirements (associated with decreased chemical use) have been estimated to exceed the on-site increases resulting in a decrease in overall energy requirements. Also, the recovered energy and reduced chemical use offset the cost.

Ozone Delignification. As a result of a considerable research effort, ozone delignification (ozone bleaching) is now being used in a limited number of pulp mills. The technology has the potential to eliminate the need for chlorine in the bleaching process. Ozone delignification is performed using processes and equipment similar to that of oxygen delignification. The ozone process, however, must take place at a very low pH (1.0 to 2.0), requiring the addition of sulfuric acid to the pulp prior to the ozonation. In addition to low pH, a number of process conditions are critical for ozone delignification: organic materials must be almost completely washed out of the brownstock pulp; temperatures must stay at about 20 ˚C; and ozone reactive metals must be removed prior to the ozonation stage. Oxygen delignification and/or extended delignification processes are considered a prerequisite for successful ozone bleaching. When used in combination, the two processes can result in a high quality bright pulp that requires little or no chlorine or chlorine dioxide bleaching. Overall emissions from the combination of the oxygen and ozone processes are substantially lower than conventional processes because effluents from each stage can be recycled. Pilot systems consisting of ozone delignification in combination with oxygen delignification and oxygen extraction have shown reductions in BOD_5 of 62 percent, COD of 53 percent, color of 88 percent, and organic chlorine compounds of 98 percent. However, ozone is unstable and will decompose to molecular oxygen, thus ozone must be generated on-site and fed immediately to the pulp reactor. Ozone generation systems are complex and account for a high percentage of the total costs. Facility energy use will increase due to the on-site production of ozone, however, this energy will be offset by the energy that would normally be used to produce chlorine and chlorine dioxide.

Anthraquinone Catalysis. The addition of anthraquinone (a chemical catalyst produced from coal tar) to the pulping liquor has been shown to speed up the kraft pulping reaction and increase yield by protecting cellulose fibers from degradation. The anthraquinone accelerates the fragmentation of lignin, allowing it to be broken down more quickly by the pulping chemicals. This lowers the amount of lignin in the prechlorination pulp, thus reducing

the amount of bleaching chemicals needed. Anthraquinone catalysts are increasingly used in combination with oxygen delignification and extended delignification to overcome boiler capacity bottlenecks arising from these delignification processes.

Black Liquor Spill Control and Prevention. The mixture of dissolved lignin and cooking liquor effluent from the pulping reactor and washed pulp is known as black liquor. Raw black liquor contains high levels of BOD, COD, and organic compounds. Spills of black liquor can result from overflows, leaks from process equipment, or from deliberate dumping by operators to avoid a more serious accident. Spills of black liquor can have impacts on receiving waters, are a source of air emissions, and can shock the microbial action of wastewater treatment systems. Black liquor losses also result in the loss of the chemical and heat value of the material. Systems needed to control black liquor spills are a combination of good design, engineering, and, most importantly, operator training. A few elements of an effective spill control system include: physical isolation of pieces of equipment; floor drainage systems that allow spills to be collected; backup black liquor storage capacity; sensors that provide immediate warning of potential or actual spills; and enclosed washing and screening equipment.

Enzyme Treatment of Pulp. Biotechnology research has resulted in the identification of a number of microorganisms that produce enzymes capable of breaking down lignin in pulp. Although the technology is new, it is believed that a number of mills are currently conducting enzyme treatment trials. The microorganisms capable of producing the necessary enzymes are called xylanases. Xylanases for pulp bleaching trials are available from several biotechnology and chemical companies. Since enzymes are used as a substitute for chemicals in bleaching pulp, their use will result in a decrease in chlorinated compounds released somewhat proportional to the reduction in bleaching chemicals used. Enzymes are also being used to assist in the deinking of secondary fiber. Research at the Oak Ridge National Laboratories has identified cellulase enzymes that will bind ink to the smaller fiber particles facilitating recovery of the ink sludge. Use of enzymes may also reduce the energy costs and chemical use in retrieving ink sludge from deinking effluent.

Improved Brownstock and Bleaching Stage Washing. Liquor solids remaining in the brownstock pulp are carried over to the bleach plant and then compete with the remaining lignin in the pulp for reaction with the bleaching chemicals. Improved washing, therefore, can reduce the required amount of bleaching chemicals and the subsequent reductions in chlorinated compounds as well as conventional pollutants. Modern washing systems with improved solids removal and energy efficiency are beginning to replace the conventional rotary vacuum washers. State-of-the-art washing systems include: atmospheric or pressure diffusion washers, belt washers, and pulp

presses. Opportunities for reduced effluent flows and water use are also present in the bleaching plant. Acid filtrates from hypochlorite or chlorine dioxide stages can be used as dilution and wash water for the first bleaching stage. Similarly, second extraction stage filtrates can be used as dilution and wash water in the first extraction stage. Most new mills are designed with these counter-current washing systems and some mills are retrofitting their existing wash systems.

Improved Chipping and Screening. The size and thickness of wood chips is critical for proper circulation and penetration of the pulping chemicals. Chip uniformity is controlled by the chipper and screens that remove under and oversized pieces. Standard equipment normally does not sort chips by thickness although it has been demonstrated that chip thickness is extremely important in determining the lignin content of pulp. Improper chip thicknesses can therefore result in increased use of bleaching chemicals and the associated chlorinated compounds and conventional pollutants. Some mills are beginning to incorporate equipment that will separate chips according to their thickness as well as by length and width.

Oxygen-Reinforced/Peroxide Extraction. Oxygen-reinforced extraction (or oxidative extraction) and peroxide-reinforced extraction processes used separately or together have been shown to reduce the amount of elemental chlorine and chlorine dioxide needed in the bleaching process while increasing the pulp brightness. Gaseous elemental oxygen (in the case of oxygen-reinforced extraction) and aqueous hydrogen peroxide (in the case of peroxide extraction) are used as a part of the first alkaline extraction stage to facilitate the solubilization and removal of chlorinated and oxidized lignin molecules. Oxygen-reinforced extraction has seen widespread adoption by the industry in recent years. It is estimated that up to 80 percent of mills in the U.S. are using oxygen-reinforced extraction. The use of peroxide extraction is also increasing. As of 1987, it was estimated that 25 percent of domestic mills were using peroxide extraction.

Improved Chemical Controls and Mixing. The formation of chlorinated organics can be minimized by avoiding excess concentrations of chlorine-based bleaching chemicals within reactor vessels. This can be accomplished by carefully controlling the chemical application rates and by ensuring proper mixing of chemicals within the reactor. Modern chemical application control and monitoring systems and high-shear mixers have been developed which decrease formation of chlorinated organic compounds.

VI. SUMMARY OF 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 three 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 regulatory requirements.

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

Clean Water Act

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

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

effluent. The permit will then set forth the conditions and effluent limitations under which a facility may make a discharge.

Water quality-based discharge limits are based on federal or state water quality criteria or standards, that were designed to protect designated uses of surface waters, such as supporting aquatic life or recreation. These standards, unlike the technology-based standards, generally do not take into account technological feasibility or costs. Water quality criteria and standards vary from state to state, and site to site, depending on the use classification of the receiving body of water. Most states follow EPA 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 NPDES permitting regulations for storm water discharges. These regulations require that facilities with the following types of storm water discharges, among others, 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 Part 122.26. Six of the categories are defined by SIC codes while the other five are identified through narrative descriptions of the regulated industrial activity. If the primary SIC code of the facility is one of those identified in the regulations, the facility is subject to the storm water permit application requirements. If any activity at a facility is covered by one of the five narrative categories, storm water discharges from those areas where the activities occur are subject to storm water discharge permit application requirements.

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

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

Category ii: Facilities classified as SIC 24-lumber and wood products (except wood kitchen cabinets); SIC 26-paper and allied products (except paperboard containers and products); SIC 28-chemicals and allied products

(except drugs and paints); SIC 29-petroleum refining; SIC 311-leather tanning and finishing; SIC 32 (except 323)-stone, clay, glass, and concrete; SIC 33-primary metals; SIC 3441-fabricated structural metal; and SIC 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.

Phase II storm water requirements were established in 1999. Permits are now required for certain small municipal separate storm sewer systems (MS4s) and for construction activity disturbing between one and five acres of land (i.e., small construction activities). The Phase II rule also revised the "no exposure" exclusion and the temporary exemption for certain industrial facilities that had been established under Phase I regulations.

Pretreatment Program

Another type of discharge that is regulated by the CWA is one that goes to a publicly owned treatment works (POTW). The national pretreatment program (CWA section 307(b)) controls the indirect discharge of pollutants to POTWs by "industrial users." Facilities regulated under section 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.

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.

Wetlands

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

EPA's Office of Water, at 202-566-1730, 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 1-800-426-4791.

Oil Pollution Prevention Regulation

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

A facility is SPCC-regulated if the facility, due to its location, could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines, and the facility meets one of the following criteria regarding oil storage: (1) the capacity of any aboveground storage tank exceeds 660 gallons, or (2) the total aboveground storage capacity exceeds 1,320 gallons, or (3) the underground storage capacity exceeds 42,000 gallons. 40 CFR Part 112.7 contains the format and content requirements for a SPCC plan. In New Jersey, SPCC plans can be combined with DPCC plans, required by the state, provided there is an appropriate cross-reference index to the requirements of both regulations at the front of the plan.

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

For additional information regarding SPCC plans, contact EPA's RCRA, Superfund, and EPCRA Call Center, at 800-424-9346. Additional documents and resources can be obtained from the hotline's homepage at

www.epa.gov/epaoswer/hotline. The hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

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 fluid wastes.

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

Part C of the SDWA mandates EPA to protect underground sources of drinking water from inadequate injection practices. EPA has published regulations codified in 40 CFR Parts 144 to 148 to comply with this mandate. The Underground Injection Control (UIC) regulations break down injection wells into five different types, depending on the fluid injected and the formation that receives it. The regulations also include construction, monitoring, testing, and operating requirements for injection well operators. All injection wells have to be authorized by permit or by rule depending on their potential to threaten Underground Sources of Drinking Water (USDW). RCRA also regulates hazardous waste injection wells and a UIC permit is considered to meet the requirements of a RCRA permit. EPA has authorized delegation of the UIC for all wells in 35 states, implements the program in 10 states and all Indian lands, and shares responsibility with five states.

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

The SDWA Amendments of 1996 require states to develop and implement source water assessment programs (SWAPs) to analyze existing and potential threats to the quality of the public drinking water throughout the state. Every state is required to submit a program to EPA and to complete all assessments within 3 ½ years of EPA approval of the program. SWAPs include: (1)

delineating the source water protection area, (2) conducting a contaminant source inventory, (3) determining the susceptibility of the public water supply to contamination from the inventories sources, and (4) releasing the results of the assessments to the public.

EPA's Safe Drinking Water Hotline, at 800-426-4791, answers questions and distributes guidance pertaining to SDWA standards. The Hotline operates from 9:00 a.m. through 5:30 p.m., EST, excluding federal holidays. Visit the website at www.epa.gov/ogwdw for additional material.

Resource Conservation and Recovery Act

The Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, addresses solid and hazardous waste management activities. The Act is commonly referred to as RCRA. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs 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 (discarded commercial chemical products, designated with the code "P" or "U"; hazardous wastes from specific industries/sources, designated with the code "K"; or hazardous wastes from 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").

Entities that generate hazardous waste are subject to waste accumulation, manifesting, and recordkeeping standards. A hazardous waste facility may accumulate hazardous waste for up to 90 days (or 180 days depending on the amount generated per month) without a permit or interim status. Generators may also treat hazardous waste in accumulation tanks or containers (in accordance with the requirements of 40 CFR Part 262.34) without a permit or interim status. Facilities that treat, store, or dispose of hazardous waste are generally required to obtain a RCRA permit.

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

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

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

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

- **Standards for Generators of Hazardous Waste** (40 CFR Part 262) establishes the responsibilities of hazardous waste generators including obtaining an EPA identification number, preparing a manifest, ensuring proper packaging and labeling, meeting standards for waste accumulation units, and recordkeeping and reporting requirements. Generators can accumulate hazardous waste on-site for up to 90 days (or 180 days depending on the amount of waste generated) without obtaining a permit.

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

- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of 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 directly to a used oil burner), 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 who store such waste, including large quantity generators accumulating waste prior to shipment offsite.

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

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

EPA's RCRA, Superfund, and EPCRA Call Center, at 800-424-9346, responds to questions and distributes guidance regarding all RCRA regulations. Additional documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline. The RCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a 1980 law commonly known as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that

may endanger public health, welfare, or the environment. CERCLA also enables EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response or remediation costs incurred by EPA. The Superfund Amendments and Reauthorization Act (SARA) of 1986 revised various sections of CERCLA, extended the taxing authority for the Superfund, and created a free-standing law, SARA Title III, also known as 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 Part 302.4. A release report may trigger a response by EPA or by one or more federal or state emergency response authorities.

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

EPA's RCRA, Superfund and EPCRA Call Center, at 800-424-9346, answers questions and references guidance pertaining to the Superfund program. Documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline. The Superfund Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III), a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state and local governments. Under EPCRA, states establish 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 section 302** requires facilities to notify the SERC and LEPC of the presence of any extremely hazardous substance at the facility in an amount in excess of the established threshold planning quantity. The list of extremely hazardous substances and their threshold planning quantities is found at 40 CFR Part 355, Appendices A and B.

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

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

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

- **EPCRA section 313** requires certain covered facilities, including SIC codes 20 through 39 and others, which have ten or more employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report. This report, commonly known as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media. EPA maintains the data reported in a publically accessible database known as the Toxics Release Inventory (TRI).

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

EPA's RCRA, Superfund and EPCRA Call Center, at 800-424-9346, answers questions and distributes guidance regarding the emergency planning and community right-to-know regulations. Documents and resources can be obtained from the hotline's homepage at www.epa.gov/epaoswer/hotline.

The EPCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding federal holidays.

Clean Air Act

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

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. Geographic areas that meet NAAQSs for a given pollutant are designated as attainment areas; those that do not meet NAAQSs are designated as non-attainment areas. Under section110 and other provisions of the CAA, each state must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet federal air quality standards. Revised NAAQSs for particulates and ozone became effective in 2001.

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

Under Title I, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented toward controlling specific hazardous air pollutants (HAPs). Section 112(c) of the CAA further directs EPA to develop a list of sources that emit any of 188 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 185 source categories and developed a schedule for the establishment of emission standards. The emission standards are being 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-A establishes a sulfur dioxide and nitrogen oxides 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 that are set below previous levels of sulfur dioxide releases.

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

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

EPA's Clean Air Technology Center, at 919-541-0800 or www.epa.gov/ttn/catc, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at 800-296-1996 or www.epa.gov/ozone, provides general information about regulations promulgated under Title VI of the CAA; EPA's EPCRA Call Center, at 800-424-9346 or www.epa.gov/epaoswer/hotline, answers questions about accidental release prevention under CAA section112(r); and information on air toxics can be accessed through the Unified Air Toxics website at http://www.epa.gov/ttn/atw/. In addition, the Clean Air Technology Center's website includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

Federal Insecticide, Fungicide, and Rodenticide Act

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

Establishment Registration

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

Product Registration

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

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

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

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

Use Restrictions

As a part of the pesticide registration, EPA must classify the product for general use, restricted use, or general for some uses and restricted for others (Miller, 1993). For pesticides that may cause unreasonable adverse effects on the environment, including injury to the applicator, EPA may require that the pesticide be applied either by or under the direct supervision of a certified applicator.

Reregistration

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

Tolerances and Exemptions

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

Cancellation and Suspension

EPA can cancel a registration if it is determined that the pesticide or its labeling does not comply with the requirements of FIFRA or causes unreasonable adverse effects on the environment (Haugrud, 1993).

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

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

Imports and Exports

Under FIFRA section 17(a), pesticides not registered in the U.S. and intended solely for export are not required to be registered provided that the exporter obtains and submits to EPA, prior to export, a statement from the foreign purchaser acknowledging that the purchaser is aware that the product is not registered in the United States and cannot be sold for use there. EPA sends these statements to the government of the importing country. FIFRA sets forth additional requirements that must be met by pesticides intended solely for export. The enforcement policy for exports is codified at 40 CFR Parts 168.65, 168.75, and 168.85.

Under FIFRA section 17(c), imported pesticides and devices must comply with U.S. pesticide law. Except where exempted by regulation or statute, imported pesticides must be registered. FIFRA section 17(c) requires that EPA be notified of the arrival of imported pesticides and devices. This is accomplished through the Notice of Arrival (NOA) (EPA Form 3540-1), which is filled out by the importer prior to importation and submitted to the EPA regional office applicable to the intended port of entry. U.S. Customs regulations prohibit the importation of pesticides without a completed NOA. The EPA-reviewed and signed form is returned to the importer for presentation to U.S. Customs when the shipment arrives in the U.S. NOA forms can be obtained from contacts in the EPA Regional Offices or *www.epa.gov/oppfead1/international/noalist.htm*.

Additional information on FIFRA and the regulation of pesticides can be obtained from a variety of sources, including EPA's Office of Pesticide Programs www.epa.gov/pesticides, EPA's Office of Compliance, Agriculture and Ecosystem Division http://www.epa.gov/compliance/assistance/sectors/agriculture.html, or The National Agriculture Compliance Assistance Center, 888-663-2155 or http://www.epa.gov/agriculture/. Other sources include the National Pesticide Telecommunications Network, 800-858-7378, and the National Antimicrobial Information Network, 800-447-6349.

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. It is important to note that pesticides as defined in FIFRA are not included in the definition of a "chemical substance" when manufactured, processed, or distributed in commerce for use as a pesticide.

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

Under TSCA section 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 section 6 authority are asbestos, chlorofluorocarbons (CFCs), lead, and polychlorinated biphenyls (PCBs).

Under TSCA section 8(e), EPA requires the producers and importers (and others) of chemicals to report information on a chemicals' production, use, exposure, and risks. Companies producing and importing chemicals can be required to report unpublished health and safety studies on listed chemicals and to collect and record any allegations of adverse reactions or any information indicating that a substance may pose a substantial risk to humans or the environment.

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

Coastal Zone Management Act

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

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

Section 6217(g) called for EPA, in consultation with other agencies, to develop guidance on "management measures" for sources of nonpoint source pollution in coastal waters. Under Section 6217, EPA is responsible for developing technical guidance to assist states/tribes in designing coastal nonpoint pollution control programs. On January 19, 1993, EPA issued its *Guidance Specifying Management Measures For Sources of Nonpoint*

Pollution in Coastal Waters, which addresses five major source categories of nonpoint pollution: (1) urban runoff, (2) agriculture runoff, (3) forestry runoff, (4) marinas and recreational boating, and (5) hydromodification.

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

VI.B. Industry Specific Requirements

Clean Air Act (CAA)

National Ambient Air Quality Standards

At pulp and paper mills, air emissions from both process and combustion units are regulated under the National Ambient Air Quality Standards (NAAQS) and the State Implementation Plans (SIP) that enforce the standards. States may implement controls to limit emissions of particulate matter (PM), nitrogen oxides (NOx), volatile organic compounds (VOC), and sulfur dioxide (SO_2).

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

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

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

In addition to the PSD/NSR pre-construction obligations, there are process-specific operational standards: New Source Performance Standards (NSPS). 40 CFR 60 lists these standards, which serve as minimum requirements in states SIPs. Individual states may impose requirements that are more strict. The following NSPSs are particularly relevant to the pulp and paper industry:

Subpart BB	Kraft pulp mills (Regulates PM and TRS emissions from new kraft mills.)
Subparts D, Db, Dc	Industrial boilers (Regulates PM, nitrogen oxides (NOx) and sulfur dioxide (SO_2) from new boilers used at pulp and paper mills.)
Subpart GG	Gas-fired turbines (Regulates PM, nitrogen oxides (NOx) and sulfur dioxide (SO_2) from new gas-fired turbines used at pulp and paper mills.)
Subpart Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) (Regulates VOC from applicable storage tanks containing volatile organic liquids at pulp and paper mills)

Hazardous Air Pollutants

Air toxics regulations apply to several parts of the pulp and paper milling process. National Emission Standards for Hazardous Air Pollutants (NESHAP) have been developed expressly for two processes of the pulp and paper industry. Both NESHAPs establish process-based maximum achievable control technologies (MACT) for "major sources," which are defined as facilities that emit or have the potential to emit 10 tons per year or more of any hazardous air pollutant (HAP) or 25 tons per year or more of any combination of HAPs. Standards for both MACT I & III standards are integrated into one subpart (Subpart S) of 40 CFR 63. MACT II standards are in a separate subpart (Subpart MM).:

Subpart S	Controlling HAP emissions from the pulp and paper production areas of mills using the kraft, sulfite, semi-chemical, and soda pulping processes (MACT I), and controlling HAP emissions from pulp and paper production areas of mills using mechanical, secondary fiber, and non-wood pulping, and papermaking systems at all mills (MACT II).
Subpart MM	Controlling HAP emissions from chemical recovery processes that involve the combustion of spent pulping liquor at kraft, soda, sulfite, and stand-alone semichemical pulp mills (MACT III).

Other NESHAPs that are relevant for the industry are those for asbestos (relevant during demolition and renovation activities) and mercury (important for sludge dryers and incinerators). Unlike the industry-specific NESHAP standards, chemical-specific NESHAPs may apply to all facilities regardless of their size.

Risk Management Program

Pulp and paper mills are subject to section 112(r) of CAA, which states that stationary sources using extremely hazardous substances have a "general duty" to initiate specific activities to prevent and mitigate accidental releases. The general duty requirements apply to stationary sources that produce, process, handle, or store these substances, regardless of the quantity of managed at the facility. Although there is no list of "extremely hazardous substances," EPA's Chemical Emergency Preparedness and Prevention Office provides some guidance at its website: *www.epa.gov/ceppo*. The general duty clause requires facilities to identify hazards that may result from accidental releases, to design and maintain a safe facility, and to minimize the consequences of releases when they occur.

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

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

- An offsite consequence analysis that evaluates specific potential release scenarios, including worst-case and alternative scenarios.
- A five-year history of certain accidental releases of regulated substances from covered processes.
- A risk management plan, revised at least once every five years, that describes and documents these activities for all covered processes.

In addition, most pulp and paper facilities may be subject to the requirements of Program 2 or 3. These additional requirements include:

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

The list of chemicals that trigger RMP requirements can be found in 40 CFR 68.130; information to determine the required program level also can be found in 40 CFR 68.

Title V permits

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

Title VI Stratospheric Ozone Protection

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

Clean Water Act (CWA)

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

Individual NPDES requirements have been developed for several subcategories of the industry; they are described in 40 CFR 430. For each of these subcategories, the regulations outline some or all of the following for facilities that discharge wastewater directly to the environment:

- best practicable control technology currently available (BPT) and best conventional control technology (BCT) guidelines for the control of conventional pollutants (biological oxygen demand, total suspended solids, and pH).

- best available technology economically achievable (BAT) guidelines for the control of nonconventional and toxic pollutants (trichlorophenol and pentachlorophenol, which are chemicals used as biocides).

- new source performance standards (NSPS) for the control of conventional, non-conventional, and toxic pollutants from new facilities that discharge directly to the environment.

For facilities that discharge their wastewater to a publicly-owned treatment works (POTW), pretreatment standards may apply. In addition to general standards established by EPA that address all industries, there are Pretreatment Standards for New Sources (PSNS) and Pretreatment Standards for Existing Sources (PSES) that are specific to the pulp and paper industry. These regulate the biocides trichlorophenol and pentachlorophenol, with limits that are specified for each subcategory of the industry.

In 1998, in conjunction with the development of the pulp and paper cluster rule, EPA reorganized the regulations in order to group processes that are similar. Table 19 presents the revised and original subcategory groupings, and summarizes the portions of the CWA regulations that apply. More detail can be found in 40 CFR 430.

Table 19: Applicability of Clean Water Act Requirements

Revised Subpart of 40 CFR 430	Revised Subcategory	Previous Subcategory (Previous Subpart in Parentheses)	Applicable Regulations		
			BAT, PSES, and PSNS	BPT, BCT, NSPS	BMP
A	Dissolving Kraft	Dissolving Kraft (F)	✔	✔	
B	Bleached Papergrade Kraft and Soda[a]	Market Bleached Kraft (G) BCT Bleached Kraft (H) Fine Bleached Kraft (I) Soda (P)	✔	✔	✔
C	Unbleached Kraft	Unbleached Kraft (A) • Linerboard • Bag and Other Products Unbleached Kraft and Semi-Chemical (D, V)	✔	✔	
D	Dissolving Sulfite	Dissolving Sulfite (K) • Nitration • Viscose • Cellophane • Acetate	✔	✔	
E	Papergrade Sulfite[a]	Papergrade Sulfite (J, U) • Blow Pit Wash • Drum Wash	✔	✔	✔
F	Semi-Chemical	Semi-Chemical (B) • Ammonia • Sodium	✔	✔	
G	Mechanical Pulp	Groundwood-Thermo-Mechanical (M) Groundwood-Coarse, Molded, News (N) Groundwood-Fine Papers (O) Groundwood-Chemi-Mechanical (L)		✔	

Table 19: Applicability of Clean Water Act Requirements

Revised Subpart of 40 CFR 430	Revised Subcategory	Previous Subcategory (Previous Subpart in Parentheses)	Applicable Regulations		
			BAT, PSES, and PSNS	BPT, BCT, NSPS	BMP
H	Non-Wood Chemical Pulp	Miscellaneous mills not covered by a specific subpart		✔	
I	Secondary Fiber Deink	Deink Secondary Fiber (Q) • Fine Papers • Tissue Papers • Newsprint		✔	
J	Secondary Fiber Non-Deink	Tissue from Wastepaper (T) Paperboard from Wastepaper (E) • Corrugating Medium • Non-Corrugating Medium Wastepaper-Molded Products (W) Builders' Paper and Roofing Felt (40 CFR Part 431 Subpart A)			
K	Fine and Lightweight Papers from Purchased Pulp	Nonintegrated Fine Papers (R) • Wood Fiber Furnish • Cotton Fiber Furnish Nonintegrated Lightweight Papers (X) • Lightweight Papers • Lightweight Electrical Papers		✔	
L	Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp	Non-Integrated • Tissue Papers (S) • Filter and Non-Woven (Y) • Paperboard (Z)		✔	

Source: U.S. EPA, *Pulp and Paper NESHAP: A Plain English Description,* November, 1998, Pages 7 and 104.
[a]These subcategories are affected by the Cluster Rules (described below).

Cluster Rule

The cluster rule is an integrated, multi-media regulation to control the release of pollutants to two media (air and water) from one industry. The intent of the rule is to allow individual mills in particular segments of the industry to consider all regulatory requirements at one time. This combined rule allows mills to select the best combination of pollution prevention and control technologies that provide the greatest protection to human health and the environment. Because some air requirements that reduce toxic air pollutants also reduce mill wastewater toxic pollutant loadings (and water treatment requirements can reduce air impacts), the combined rules have a synergistic effect.

Some of the features of the coordinated rule include:

- Alternative emission limits
- Varying compliance periods (3-8 years)
- New and existing source controls
- Flexibility for evolving technologies
- Compliance dates coordinated with effluent limitations guidelines and standards

The rule sets new baseline limits for the releases of toxics and nonconventional pollutants to the air and water. There are three significant components:

- **Air Emissions Standards.** New and existing pulp and paper mills must meet air standards to reduce emissions of toxic air pollutants occurring at various points throughout the mills. Specifically, EPA requires mills to capture and treat toxic air pollutant emissions that occur during the cooking, washing, and bleaching stages of the pulp manufacturing process.

- **Water Effluent Limitations Guidelines and Standards.** New and existing standards in the bleached papergrade kraft and soda subcategory and the bleached papergrade sulfite subcategory must meet standards to reduce discharges of toxic and nonconventional pollutants. Specifically, EPA has set effluent limitations for toxic pollutants in the wastewater discharged directly from the bleaching process and in the final discharge from the mills.

- **Analytical Methods for 12 Chlorinated Phenolics and Adsorbable Organic Halides (AOXs)**. Samples of air emissions and water discharges from each mill must be tested using the laboratory methods included in the rule. The new methods will enable more timely and accurate measurements of releases of these pollutants to the environment and will be used to ensure compliance with air emission and water discharge permit limits.

Voluntary Advanced Technology Incentives Program (VATIP)

Mills in the Bleached Papergrade Kraft and Soda Subcategory have additional flexibility under the cluster rule. Mills may comply either with the baseline regulations, or with more stringent wastewater regulations under a more forgiving timetable. This latter arrangement, called the Voluntary Advanced Technology Incentives Program (VATIP), allows mills to undertake customized compliance and pollution reduction plans that further reduce environmental impacts.

Under the VATIP, each participating mill develops "Milestones Plans" for each fiber line that it enrolls in the program. Permit writers will use the Milestones Plan to incorporate enforceable interim requirements into the mill's discharge permit. Specific requirements for the Milestones Plan are found in 40 CFR 430.24(b) and (c), but the three basic components of a Milestones Plan are the following:

- A description of each technology component or process modification the mill intends to implement
- the master schedule showing the sequence of implementing new technologies and process modifications
- descriptions of the anticipated improvements in effluent quality.

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

Three of the components of EPCRA are directly relevant to the pulp and paper industry:

- Emergency Planning (§302(a)) - Businesses that produce, use or store "hazardous substances" must: 1) submit material safety data sheets or the equivalent, and 2) Tier I/Tier II annual inventory report forms to the appropriate local emergency planning commission. Those handling "extremely hazardous substances" also are required to submit a one-time notice to the state emergency response commission.
- Emergency Notification of Extremely Hazardous Substance Release (§304) - A business that unintentionally releases a reportable quantity of an extremely hazardous substance must report that release to the state emergency planning commission and the local emergency planning commission.
- Release Reporting (§313) - Manufacturing businesses with ten or more employees that manufactured, processed, or otherwise used a listed toxic chemical in excess of the "established threshold" must file annually a Toxic Chemical Release form with EPA and the state. Documentation supporting release estimates must be kept for three years.

Resource Conservation and Recovery Act (RCRA)

The pulp and paper industry generates hazardous wastes, but most are associated with wastewater, which is rendered non-hazardous in wastewater

treatment or neutralization units within manufacturing facilities, and therefore is not subject to RCRA requirements. Also, black liquor is exempt as a solid waste if it is reclaimed in a recovery furnace and reused in the pulping process. Therefore, most of the industry's RCRA requirements are those described in the general regulations outlined in Section VI.A.

VI.C. Pending and Proposed Regulatory Requirements

Clean Water Act

Effluent Guidelines and Standards for the Pulp, Paper, and Paperboard Category, Phase II

EPA will consider revising the technology-based effluent limitations guidelines and standards for 8 of the 12 subcategory for this industrial category: Unbleached Kraft; Semi-Chemical; Mechanical Pulp; Non-Wood Chemical Pulp; Secondary Fiber Deink; Secondary Fiber Non-Deink; Fine and Lightweight Papers from Purchased Pulp; and Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp. EPA proposed guidelines and standards for these subcategories as part of the Pulp and Paper Rules (also known as the Cluster Rules) in December 1993. The Agency intends to develop these revised effluent limitations in close coordination with the Office of Air Quality Planning and Standards. This is a long-term action; no definite schedule had been set at the time of the publication of this document. (Don Anderson, Office of Water, 202-566-1021)

Effluent Guidelines and Standards for the Pulp, Paper, and Paperboard Point Source Category, Dissolving Kraft and Dissolving Sulfite Subcategories (Phase III)

In 1993, EPA proposed revised effluent limitations, guidelines and standards and best management practices regulations for the Dissolving Kraft and Dissolving Sulfite Subcategories (also known as Phase III of the Cluster Rules). There are five mills in these subcategories in the U.S. EPA anticipates that the final rule will set limits for adsorbable organic halides (AOX), chemical oxygen demand (COD), chloroform, dioxin, furan, and 12 specific chlorinated phenolics. The rule is expected to be proposed in mid-2003 and finalized in 2004. (Don Anderson, Office of Water, 202-566-1021)

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

This rulemaking affects existing facilities that use cooling water intake structures, and whose intake flow levels exceed a minimum threshold EPA will determine. Pulp and paper manufacturing facilities are explicitly listed as affected facilities. The rule will require that the location, design, construction, and capacity of cooling water intake structures reflect the best

technology available for minimizing adverse environmental impact. The final rule is anticipated before December, 2004. (Deborah Nagle, Office of Water, 202-566-1063 or J.T. Morgan, Office of Water, 202-564-7684)

Clean Air Act

Guidelines for Best Available Retrofit Technology (BART)

As required by the Clean Air Act, EPA issued a regional haze rule aimed at protecting visibility in 156 federal areas. The rule seeks to reduce the visibility impairment caused by many sources over a wide area. The haze rule requires states to establish goals for improving visibility in national parks and wilderness areas and to develop long-term strategies for reducing emissions of air pollutants that impair visibility. Guidelines for BART were proposed to amend the haze rule. The guidelines are for states in developing their plans for setting air pollution limits for utilities and other industrial plants built between 1962 and 1977 that have the potential to emit more than 250 tons a year of visibility impairing pollution. These facilities fall into 26 categories, including pulp mills. Many of these facilities have previously been exempt from federal pollution control requirements under the Clean Air Act. Some of the guidelines may affect emissions from boilers and recover boilers. This proposed rule only provides guidelines for states in developing their implementation plans. In most parts of the country, the plans are due in 2008. (Tim Smith, Office of Air and Radiation, 919-541-4718)

Interstate Ozone Transport, NOX State Implementation Plan Call (NOX SIP Call)

EPA has issued several actions and rulemakings related to reducing the regional transport of ozone, including the final Regional Transport of Ozone Rule ("NOx SIP call") requiring 22 eastern States and the District of Columbia to submit State Implementation Plans that address the regional transport of ground-level ozone through reductions in nitrogen oxides (a precursor to ozone). While most of the NOx SIP call was upheld, certain aspects of EPA's plan were remanded by court decisions, including a definition dealing with industrial boilers and cogeneration. In February of 2002, EPA proposed rules on a number of remanded items, including rules for certain industrial boilers that may be present at pulp and paper mills. EPA's NOx SIP call potentially affects industrial boilers that burn at least 50 percent fossil fuels. However, states are free to develop plans for reducing nitrogen oxides at sources other than industrial boilers or at industrial boilers that burn less than 50 percent fossil fuels. Pulp and paper mills in the eastern states should monitor their state implementation plans. Implementation of state plans will likely begin in 2003 in some States or 2004 for other States. (Kevin Culligan, Office of Air and Radiation, 202-564-9172)