IV. CHEMICAL RELEASE AND TRANSFER PROFILE

This section is designed to provide background information on the pollutant releases that are reported by this industry. The best source of comparative pollutant release information is the Toxic Release Inventory System (TRI). Pursuant to the Emergency Planning and Community Right-to-Know Act, TRI includes self-reported facility release and transfer data for over 600 toxic chemicals. Facilities within SIC Codes 20-39 (manufacturing industries) that have more than 10 employees, and that are above weight-based reporting thresholds are required to report TRI on-site releases and off-site transfers. The information presented within the sector notebooks is derived from the most recently available (1993) TRI reporting year (which then included 316 chemicals), and focuses primarily on the on-site releases reported by each sector. Because TRI requires consistent reporting regardless of sector, it is an excellent tool for drawing comparisons across industries.

Although this sector notebook does not present historical information regarding TRI chemical releases over time, please note that in general, toxic chemical releases have been declining. In fact, according to the 1993 Toxic Release Inventory Data Book, reported releases dropped by 42.7% between 1988 and 1993. Although on-site releases have decreased, the total amount of reported toxic waste has not declined because the amount of toxic chemicals transferred off-site has increased. Transfers have increased from 3.7 billion pounds in 1991 to 4.7 billion pounds in 1993. Better management practices have led to increases in off-site transfers of toxic chemicals for recycling. More detailed information can be obtained from EPA's annual Toxics Release Inventory Public Data Release book (which is available through the EPCRA Hotline at 1-800-535-0202), or directly from the Toxic Release Inventory System database (for user support call 202-260-1531).

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

TRI Data Limitations

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

The reader should also be aware that TRI "pounds released" data presented within the notebooks is not equivalent to a "risk" ranking for each industry. Weighting each pound of release equally does not factor in the relative toxicity of each chemical that is released. The Agency is in the process of developing an approach to assign toxicological weightings to each chemical released so that one can differentiate between pollutants with significant differences in toxicity. As a preliminary indicator of the environmental impact of the industry's most commonly released chemicals, the notebook briefly summarizes the toxicological properties of the top five chemicals (by weight) reported by each industry.

Definitions Associated With Section IV Data Tables

General Definitions

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

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

Data Table Column Heading Definitions

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

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

Releases to Air (Point and Fugitive Air Emissions) -- Include all air emissions from industry activity. Point emissions occur through confined air streams as found in

stacks, ducts, or pipes. Fugitive emissions include losses from equipment leaks, or evaporative losses from impoundments, spills, or leaks.

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

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

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

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

Transfers to POTWs -- are wastewaters transferred through pipes or sewers to a publicly owned treatments works (POTW). Treatment and chemical removal depend on the chemical's nature and treatment methods used. Chemicals not treated or destroyed by the POTW are generally released to surface waters or landfilled within the sludge.

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

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

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

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

IV.A. Toxic Release Inventory for the Wood Furniture and Fixtures Industry

Exhibits 13-15 illustrate the TRI releases and transfers for the entire furniture and fixtures industry (SIC 25). For the industry as a whole, solvents (such as toluene, methanol, xylene, methyl ethyl ketone, and acetone) comprise the largest number of TRI releases. The large number of solvent releases, both fugitive and point source emissions, result from the solvent-intensive finishing processes employed by this industry. In addition to being used as vehicle carriers, solvents are also used to clean the coatings application equipment.

The TRI database contains a detailed compilation of self-reported, facility-specific chemical releases. The top reporting facilities for this sector are listed below. Facilities that have reported only the SIC codes covered under this notebook appear in Exhibit 11. Exhibit 12 contains additional facilities that have reported the SIC code covered within this report, and one or more SIC codes that are not within the scope of this notebook. Therefore, Exhibit 12 includes facilities that conduct multiple operations — some that are under the scope of this notebook, and some that are not. Currently, the facility-level data do not allow pollutant releases to be broken apart by industrial process.

Exhibit 11
Top 10 TRI Releasing Furniture Manufacturing Facilities (SIC 25)

Rank	Total TRI Releases in Pounds	Facility Name	City	State
1	1,277,737	Broyhill Furniture Ind., Inc. Complex	Lenoir	NC
2	831,751	Broyhill Furniture Ind., Inc., Lenoir Furn. & Occas.	Lenoir	NC
3	723,669	Singer Furniture Co.	Lenoir	NC
4	700,675	Korn Ind., Inc.	Sumter	SC
5	688,907	Lane Co., Inc.	Altavista	VA
6	662,695	Okla Homer Smith Furniture Co., Inc.	Fort Smith	AR
7	661,059	Stanley Furniture Co.	Stanleytown	VA
8	642,385	J. D. Bassett Mfg. Co.	Bassett	VA
9	639,345	Peters-Revington Furniture	Delphi	IN
10	502,582	Bassett Superior Lines	Bassett	VA

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

Exhibit 12
Top 10 TRI Releasing Furniture and Fixtures Facilities

SIC Codes	Total TRI Releases in Pounds	Facility Name	City	State
2522, 2542, 2521	1,321,283	Steelcase Inc.	Grand Rapids	MI
2511	1,277,737	Broyhill Furniture Ind. Complex	Lenoir	NC
2542, 2541	939,055	Hadix, Inc.	Goodwater	AL
2511	831,751	Broyhill Furniture Ind., Inc. Lenoir Furn. & Occas.	Lenoir	NC
2522, 2542, 2521	809,096	Steelcase Inc.	Kentwood	NI
2511	723,669	Singer Furniture Co.	Lenoir	NC
2511	700,675	Korn Ind., Inc.	Sumter	SC
2511	688,907	Lane Co., Inc.	Altavista	VA
2511	662,695	Okla Homer Smith Furniture Co., Inc.	Fort Smith	AR
2511	661,059	Stanley Furniture Co.	Stanleytown	VA

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

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

Exhibit 13
TRI Reporting Furniture Manufacturing Facilities (SIC 25) by State

State	Number of Facilities	State	Number of Facilities
AL	7	MS	3
AR	8	NC	92
AZ	2	NE	2
CA	23	NH	1
CO	2	NY	14
CT	1	OH	4
FL	3	OK	2
GA	5	OR	3
IA	3	PA	9
IL	2	SC	5
IN	27	TN	13
KS	3	UT	2
KY	4	VA	32
MA	6	VT	3
ME	2	WA	3
MI	6	WI	10
MN	5	WV	1
MO	5		

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

Exhibit 14
Releases for Furniture Manufacturing Facilities (SIC 25) in TRI, by Number of Facilities (Releases reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Releases per Facility
Toluene	247	1456881	10541044	5	0	70819	12068749	48861
Methanol	178	908347	8166501	10	0	7347	9082205	51024
Xylene (Mixed Isomers)	174	742449	5085471	5	0	14064	5841989	33575
Methyl Ethyl Ketone	166	439743	4241878	5	0	21507	4703133	28332
Acetone	115	282555	3157999	5	0	28328	3468887	30164
N-Butyl Alcohol	99	151616	2208962	5	0	13531	2374114	23981
Methyl Isobutyl Ketone	55	206847	1293417	5	0	58491	1558760	28341
Glycol Ethers	26	68627	413901	0	0	0	482528	18559
1,1,1-Trichloroethane	25	262643	1334203	0	0	4900	1601746	64070
Ethylbenzene	21	120246	241345	0	0	0	361591	17219
Isopropyl Alcohol (Manufacturing)	11	9747	278413	0	0	0	288160	26196
Dichloromethane	6	102811	43894	0	0	0	146705	24451
Formaldehyde	6	30226	1086	0	0	0	31312	5219
Styrene	6	2744	42252	0	0	0	44996	7499
Di(2-Ethylhexyl) Phthalate	4	255	12458	0	0	0	12713	3178

Exhibit 14 (cont'd)
Releases for Furniture Manufacturing Facilities (SIC 25) in TRI, by Number of Facilities (Releases reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	Fugitive Air	Point Air	Water Discharges	Under-ground Injection	Land Disposal	Total Releases	Average Releases per Facility
Ethylene Glycol	4	616	26576	0	0	0	27192	6798
1,2,4-Trimethylbenzene	4	2159	39987	0	0	0	42146	10537
Trichloroethylene	3	1600	41781	0	0	0	43381	14460
Barium Compounds	2	0	0	0	0	518	518	259
Manganese	2	251	3	0	0	0	254	127
Methylenebis (Phenylisocyanate)	2	10	0	0	0	0	10	5
Naphthalene	2	6	113	0	0	0	119	60
Aluminum Oxide (Fibrous Form)	1	11	224	0	0	0	235	235
Ammonia	1	250	17000	0	0	0	17250	17250
Chromium	1	250	0	0	0	0	250	250
Copper	1	250	0	0	0	0	250	250
Cumene	1	6	114	0	0	0	120	120
Dibutyl Phthalate	1	6	110	0	0	0	116	116
Diethyl Sulfate	1	869	16516	0	0	0	17385	17385
Lead	1	250	0	0	0	0	250	250
Maleic Anhydride	1	0	0	0	0	0	0	0
Nickel	1	250	0	0	0	0	250	250
Phenol	1	1	19	0	0	0	20	20
Sulfuric Acid	1	0	0	0	0	0	0	0
Vinyl Acetate	1	1	1163	0	0	0	1164	1164
Totals	**313**	**4,792,523**	**37,206,430**	**40**	**0**	**219,505**	**42,218,498**	**134,883**

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

Exhibit 15
Transfers for Furniture Manufacturing Facilities (SIC 25) in TRI, by Number of Facilities (Transfers reported in pounds/year)

Chemical Name	# Facilities Reporting Chemical	POTW Discharges	Disposal	Recycling	Treatment	Energy Recovery	Total Transfers	Average Transfers per Facility
Toluene	247	3737	48124	400040	117454	746458	1315821	5327
Methanol	178	2114	33630	162308	25295	387147	610494	3430
Xylene (Mixed Isomers)	174	2869	43912	83315	43768	212406	386270	2220
Methyl Ethyl Ketone	166	1540	38830	176031	57181	530621	804953	4849
Acetone	115	1030	.	281800	33469	304307	620606	5397
N-Butyl Alcohol	99	531	250	40077	26163	81491	148762	1503
Methyl Isobutyl Ketone	55	260	1925	7812	67211	63094	140552	2555
Glycol Ethers	26	0	.	7455	1284	43794	52533	2021
1,1,1-Trichloroethane	25	0	5905	.	.	5608	11513	461
Ethylbenzene	21	255	31500	17979	165	10363	60262	2870
Isopropyl Alcohol (Manufacturing)	11	499	.	.	330	28509	29338	2667
Dichloromethane	6	0	.	.	10430	4000	14430	2405
Formaldehyde	6	250	.	.	.	.	250	42
Styrene	6	0	.	8520	.	131	8651	1442
Di(2-Ethylhexyl) Phthalate	4	0	.	.	.	1625	1625	406
Ethylene Glycol	4	0	.	.	.	.	0	0
1,2,4-Trimethylbenzene	4	0	.	.	0	3393	3393	848
Trichloroethylene	3	0	.	1331	.	.	1331	444
Barium Compounds	2	0	750	.	.	.	750	375
Manganese	2	0	.	.	.	.	0	0
Methylenebis (Phenylisocyanate)	2	0	.	.	.	.	0	0
Naphthalene	2	0	.	.	.	.	0	0
Aluminum Oxide (Fibrous Form)	1	0	.	.	.	.	0	0
Ammonia	1	0	.	.	.	.	0	0
Chromium	1	0	.	.	.	.	0	0
Copper	1	0	.	.	.	.	0	0
Cumene	1	0	.	.	.	.	0	0
Dibutyl Phthalate	1	0	.	.	.	.	0	0
Diethyl Sulfate	1	0	.	.	.	.	0	0
Lead	1	0	.	.	.	.	0	0
Maleic Anhydride	1	0	.	.	.	.	0	0
Nickel	1	0	.	.	.	.	0	0
Phenol	1	0	.	.	.	.	0	0
Sulfuric Acid	1	0	.	.	.	.	0	0
Vinyl Acetate	1	0	.	.	.	.	0	0
Totals	**313**	**13,085**	**204,826**	**1,186,668**	**382,750**	**2,422,947**	**4,211,534**	**13,455**

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

IV.B. Summary of the Selected Chemicals Released

The following is a synopsis of current scientific toxicity and fate information for the top chemicals (by weight) that facilities within this sector self-reported as released to the environment based upon 1993 TRI data. Because this section is based upon self-reported release data, it does not attempt to provide information on management practices employed by the sector to reduce the release of these chemicals. Information regarding pollutant release reductions over time may be available from EPA's TRI and 33/50 programs, or directly from the industrial trade associations that are listed in Section IX of this document. Since these descriptions are cursory, please consult the sources referenced below for a more detailed description of both the chemicals described in this section, and the chemicals that appear on the full list of TRI chemicals appearing in Section IV.A.

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

The top TRI releases for the furniture and fixtures industry (SIC 25) as a whole, include:

Toluene
Methanol
Xylene
Methyl ethyl ketone
Acetone
N-butyl alcohol
1 1,1-trichloroethane
Dichloromethane.

Summaries of some of these chemicals follow.

Toluene

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

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

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

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

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

Physical Properties. Toluene is a volatile organic chemical.

Methanol

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

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

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

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

Physical Properties. Methanol is highly flammable.

Xylene (Mixed Isomers)

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

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

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

Xylenes are moderately mobile in soils and may leach into groundwater, where they

may persist for several years.

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

Methyl Ethyl Ketone

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

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

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

Physical Properties. Methyl ethyl ketone is a flammable liquid.

Acetone

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

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

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

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

Acetone is highly volatile, and once it reaches the troposphere (lower atmosphere),

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

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

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

1,1,1-Trichloroethane

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

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

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

Environmental Fate. Releases of TCE to surface water or land will almost entirely volatilize. Releases to air may be transported long distances and may partially return to earth in rain. In the lower atmosphere, TCE degrades very slowly by photooxidation and slowly diffuses to the upper atmosphere where photodegradation is rapid.

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

IV.C. Other Data Sources

The Aerometric Information Retrieval System (AIRS) contains a wide range of information related to stationary sources of air pollution, including the emissions of a number of air pollutants which may be of concern within a particular industry. With the exception of volatile organic compounds (VOCs), there is little overlap with the TRI chemicals reported above. Exhibit 16 summarizes annual releases of carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter of 10 microns or less (PM10), total particulates (PT), sulfur dioxide (SO_2), and volatile organic compounds (VOCs).

Exhibit 16
Pollutant Releases (Short Tons/Year)

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

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

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

The following information is presented as a comparison of pollutant release and transfer data across industrial categories. It is provided to give a general sense as to the relative scale of releases and transfers within each sector profiled under this project. Please note that the following table does not contain releases and transfers for industrial categories that are not included in this project, and thus cannot be used to draw conclusions regarding the total release and transfer amounts that are reported to TRI. Similar information is available within the annual TRI Public Data Release book.

Exhibit 17 is a graphical representation of a summary of the 1993 TRI data for the Wood Furniture and Fixtures Industry and the other sectors profiled in separate notebooks. The bar graph presents the total TRI releases and total transfers on the left axis and the triangle points show the average releases per facility on the right axis. Industry sectors are presented in the order of increasing total TRI releases. The graph is based on the data shown in Exhibit 18 and is meant to facilitate comparisons between the relative amounts of releases, transfers, and releases per facility both within and between these sectors. The reader should note, however, that differences in the proportion of facilities captured by TRI exist between industry sectors. This can be a factor of poor SIC matching and relative differences in the number of facilities reporting to TRI from the various sectors. In the case of the Wood Furniture and Fixtures Industry, the 1993 TRI data presented here covers 313 facilities. These facilities listed SIC 25, Wood as a primary SIC code.

Exhibit 17 bar graph

Exhibit 18
Toxic Release Inventory Data for Selected Industries

Industry Sector	SIC Range	# TRI Facilities	Releases		Transfers		Total Releases + Transfers	Average Release+ Transfers per Facility (pounds)
			Total Releases (10^6 pounds)	Average Releases per Facility (pounds)	1993 Total (10^6 pounds)	Average Transfers per Facility (pounds)	(10^6 pounds)	
Stone, Clay, and Concrete	32	634	26.6	41,895	2.2	3,500	28.2	46,000
Lumber and Wood Products	24	491	8.4	17,036	3.5	7,228	11.9	24,000
Furniture and Fixtures	25	313	42.2	134,883	4.2	13,455	46.4	148,000
Printing	2711-2789	318	36.5	115,000	10.2	732,000	46.7	147,000
Electronics/Computers	36	406	6.7	16,520	47.1	115,917	53.7	133,000
Rubber and Misc. Plastics	30	1,579	118.4	74,986	45.0	28,537	163.4	104,000
Motor Vehicle, Bodies, Parts and Accessories	371	609	79.3	130,158	145.5	238,938	224.8	369,000
Pulp and paper	2611-2631	309	169.7	549,000	48.4	157,080	218.1	706,000
Inorganic Chem. Mfg.	2812-2819	555	179.6	324,000	70.0	126,000	249.7	450,000
Petroleum Refining	2911	156	64.3	412,000	417.5	2,676,000	481.9	3,088,000
Fabricated Metals	34	2,363	72.0	30,476	195.7	82,802	267.7	123,000
Iron and Steel	3312-3313 3321-3325	381	85.8	225,000	609.5	1,600,000	695.3	1,825,000
Nonferrous Metals	**333, 334**	**208**	**182.5**	**877,269**	**98.2**	**472,335**	**280.7**	**1,349,000**
Organic Chemical Mfg.	2861-2869	417	151.6	364,000	286.7	688,000	438.4	1,052,000
Metal Mining	10	Industry sector not subject to TRI reporting						
Nonmetal Mining	14	Industry sector not subject to TRI reporting						
Dry Cleaning	7215, 7216, 7218	Industry sector not subject to TRI reporting						

Source: U.S. EPA, Toxics Release Inventory Database, 1993.

V. POLLUTION PREVENTION OPPORTUNITIES

The best way to reduce pollution is to prevent it in the first place. Some companies have creatively implemented pollution prevention techniques that improve efficiency and increase profits while at the same time minimizing environmental impacts. This can be done in many ways such as reducing material inputs, re-engineering processes to reuse by-products, improving management practices, and employing 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 Wood Furniture and Fixtures 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 also provides the context (in terms of type of industry and/or type of process affected) in which the pollution prevention technique can effectively be used.

The following discussion of pollution prevention initiatives is based mainly on the EPA document *Pollution Prevention Options in Wood Furniture Manufacturing* and identifies those steps in the manufacturing process for which pollution prevention initiatives can and have been implemented. Exhibit 19 provides examples of process modification, material substitution, waste reduction, and recycling options for finishing and gluing operations. The EPA document from which this exhibit was developed does not indicate the methods used to compute cost savings.

V.A. Identification of Pollution Prevention Activities in Use and Environmental and Economic Benefits of Each Pollution Prevention Activity

Pollution prevention techniques and processes currently used by the wood furniture and fixtures industry can be grouped into the following general categories:

- Production planning and sequencing
- Process or equipment modification
- Raw material substitution or elimination
- Loss prevention and housekeeping
- Waste segregation and separation
- Solvent recycling
- Training and supervision.

Each of these categories is discussed below briefly. Refer to Exhibit 19 for specific pollution prevention techniques and associated costs, savings, and other information.

Production planning and sequencing is used to ensure that only necessary operations are performed and that no operation is needlessly "undone" by a following operation. One example is to sort out reject parts prior to painting or finishing. A second example is to reduce the frequency of cleaning equipment by staining or painting all products of the same color at the same time. A third example is to schedule batch processing of lighter shades of paint prior to darker shades of paint so that equipment need not be cleaned between batches.

Process or equipment modification is used to reduce the amount of waste generated. Manufacturers can change to a paint application technique that is more efficient than spray gun systems, such as airless and air-assisted airless systems, electrostatic spray systems, or flat line finishing.

Several technologies currently in the development stage could potentially apply to the wood furniture industry. These technologies are in the areas of spray booth design and curing methods. The spray booth designs discussed in this section include the Classic System Campbell Spray Booth and the Mobile Zone. Both designs seek to reduce the volume of air exhausted.

Classic Systems has developed the Campbell spray booth, which the company indicates can reduce the volume of exhaust air by approximately 80 percent. The basic design of the Campbell spray booth involves the use of air curtains; the worker stands outside of the booth and sprays through the air curtain. The air curtain provides a barrier between the worker and the solvent emissions inside the booth resulting from coating the piece. A pilot system has been built, and a full-scale system has been designed.

Mobile Zones Associates has developed a device which, when installed on a spray booth, enables the worker(s) to spray coatings from a partially enclosed mobile work platform. The worker stands inside a "cab," the movement of which is controlled from inside the cab by the worker. Within the Mobile Zone cab, fresh ventilating air passes across the painter from an open "moving window" at his rear. The remaining section of the mobile work platform is ventilated using recirculated air. The Mobile Zone design contrasts with a conventional spray booth, in which the entire length of the booth is supplied with fresh ventilating air.

Ultraviolet (UV)-curable coatings are frequently used by flatline furniture coating operations. Since the pieces are flat, curing in a conventional UV-cure oven is straightforward. Although UV-curable coatings are also applied to case goods (nonflat pieces), the UV-curing process with such pieces is more difficult. In order for a UV-curable coating to cure, all coating must be exposed to the UV-light. The lamps in the UV-oven must be situated to ensure exposure to all areas of the case goods, including recessed areas, carvings, etc. The UV-lamp locations would need to be set for each type of case good depending on its configuration. Because furniture manufacturers typically produce many different types of case goods on a single line at any time, realignment of the UV-lamps for each type of case good is not feasible. However, if a manufacturer produces a single piece continuously for a length of time, the lamps could be arranged for that configuration. Then, after the lamps are adjusted, another type of piece could be produced for a length of time.

Biofiltration is a control technology which sends contaminated exhaust air through a biofilter for contaminant removal. The biofilter consists of organic matter, such as tree bark and compost, the pores of which are filled with water. Biologically active micro-organisms are present, partly free-floating in the water and partly attached to the organic matter.

Raw material substitution or elimination is the replacement of existing raw materials with other materials that produce less waste, or a non-toxic waste. Some examples include substituting water-based finishes for solvent-based finishes or replacing volatile liquid finishes with electrostatically-applied powder finishes.

Volatile organic compound (VOC) emissions from wood furniture finishing operations (primarily the hazardous air described in Section IV.B.) can be reduced by reformulating coating materials so that they contain fewer VOCs. Currently, in wood furniture finishing operations, VOC emissions result from the application and subsequent evaporation of finishing materials. Efforts are being made to reformulate the finishing materials used in the wood furniture industry so that they contain fewer VOCs.

Waterborne finishing materials are currently being used by some furniture manufacturers. The potential exists for waterborne coatings to be used by all

segments of the wood finishing industry. However, the waterborne coatings currently available are better suited to certain applications than others. For example:

- Open pore woods are considered easier to finish with waterborne coatings than filled pores
- Darker woods sometimes appear cloudy when finished with waterborne coatings, though the clarity has improved over the last ten years
- Waterborne finishes do not have the rubbability of nitrocellulose lacquers and the finish is therefore not as glossy where a glossy finish is required
- Waterborne coatings may require a modified drying method (increased airflow and temperature).

Ultraviolet (UV)-curable coatings are currently used in various segments of the wood finishing industry. UV-curable coatings can be applied using spray equipment, roll coaters, or curtain coaters. Therefore, the potential exists for UV-curable coatings to be used on case good as well as flat pieces, and progress in this direction has been made. However, as mentioned previously, curing of the three-dimensional pieces remains difficult because all of the coating materials must be exposed to the UV radiation. Problems arise in curing of recessed surfaces that do not get direct exposure to the radiation. Many studies are being conducted so that UV-curable materials may experience more widespread use in the future.

Polyurethane coatings are used in some segments of the wood finishing industry. Polyurethane materials can be spray applied, or applied by curtain or roll coat, and are cured in the conventional manner. Polyurethane coatings are characterized by a high-gloss look, which may not be desirable to certain segments of the wood furniture industry. Other limitations that prevent its widespread use include the need for a clean room environment, the short pot life (one to six hours), and the difficulty in repairing.

Polyester coatings are similar to polyurethanes in their uses and their limitations. The film properties of the polyester coatings are good; they provide good build and good chemical, mechanical, and heat resistance. However, application requires a clean room environment which can be very expensive and difficult to maintain.

Loss prevention and housekeeping is the performance of preventive maintenance and equipment and materials management so as to minimize opportunities for leaks, spills, evaporative losses, and other releases of potentially toxic chemicals. For example, spray guns can be cleaned by submerging only the front end of the gun in the cleaning solvent; or routine maintenance of spray gun equipment can prevent equipment from breaking down and leaking.

Waste segregation and separation involves avoiding the mixture of different types of

wastes and avoiding the mixture of hazardous wastes with non-hazardous wastes. This makes the recovery of hazardous wastes easier by minimizing the number of different hazardous constituents in a given waste stream. Also, it prevents the contamination of non-hazardous wastes. Specific examples include segregating spent solvents by solvent types, and segregating non-hazardous paint solids from hazardous paint solvents and thinners.

Solvent recycling is the use or reuse of a waste as an ingredient or feedstock in the production process on-site. Recycling in which a waste is recovered and reused in the production process on-site as an input is a form of pollution prevention. One example is the use of a small on-site still to recycle xylene or lacquer thinner.

Training and supervision provides employees with the information and the incentive to minimize waste generation in their daily duties. This might include ensuring that employees know and practice proper and efficient use of tools and supplies, and that they are aware of, understand, and support the company's pollution prevention goals.

Exhibit 19
Pollution Prevention Matrix

Process	Pollution Prevention Process	Economic and Environment Savings and Benefits	Payback Period
Application of finish and pre-finish coatings	Process Modification Implement alternatives to compressed air spray gun systems including: 1. Airless and air assisted airless	• Material consumption reduction: 15 % • Annual cost savings: $55,000 • Waste volume from spray booth cleanup reduction: 50 %	Payback period: 1 year

2. Electrostatic spray systems	• Annual cost savings: $150,000 • Waste savings/ reduction from wiping stain compared to conventional spray units: 25 %	Payback period: 2 years

3. Flat line finishing	• Annual savings in total coating costs: 20 - 30 % • Waste savings/ reduction in VOCs: 25 %	Payback period: 2 years

Material Substitution Substitution of solvent-based inks with water-based inks	• Annual cost savings in raw materials: $75,000 • Annual cost savings in disposal costs: $37,000	Information not available
Waste Reduction Replace water-based paint booth filters with dry filters. Dry filters will double paint booth life and allow more efficient treatment of wastewater.	• Annual cost savings: $1,500 • Waste savings/reductions: 3,000 gallons/year	Information not available

	Process Modification Train spray gun operators in proper spray techniques to minimize coating waste generation	• Annual cost savings: $50,000 to $70,000 • Finishing material required reduction: 8-10 %	Information not available

Exhibit 19 (cont'd)
Pollution Prevention Matrix

Process	Pollution Prevention Process	Economic and Environment Savings and Benefits	Payback Period
Application of finish and pre-finish coatings (continued)	Recycling Recycle spent solvents with recovery units including:		
	1. Small on-site solvent recovery still to recycle spent lacquer thinner	• Annual cost savings: $5,700	Payback period: 1 year
	2. Small in-house still to recycle methylene chloride	• Incentive was to avoid RCRA liability related to disposal	Payback period: 2 years
	3. In-house still to recycle xylene	Information not available	Payback period: 13 months
	4. Batch distillation unit to recover xylene from paint equipment cleaning	• Annual savings: $5,000	Payback period: 13 months

5. Batch distillation to recover isopropyl acetate generated during equipment cleaning	Information not available	Payback period: 2 years
6. Recovery system for solvents contained in air emissions	• Annual savings: $1,000	Information not available

	7. Small solvent recovery still to recover spent paint thinner from spray gun cleaning and excess paint batches	• Capital investment for a 15-gallon capacity still: $6,000 • Annual savings in new thinner: $3,600 • Annual disposal savings: $5,400 • Waste savings/reduction: 75% (745 gallon	Payback period: less than one year

Exhibit 19 (cont'd)
Pollution Prevention Matrix

Process	Pollution Prevention Process	Economic and Environment Savings and Benefits	Payback Period
8. Application of finish and pre-finish coatings (continued)	Solvent recovery system to recover and reuse spent methyl ethyl ketone.	• Annual savings: $43,000 • MEK recovery rate: 20 gallons/day (reflecting a 90% reduction in waste)	Information not available

Equipment cleaning	Process Modification Flush equipment first with dirty solvent before final cleaning with virgin solvent and use cleanup solvents in formulation of subsequent batches of paint	• Waste savings/reduction: 98% • Paint cleanup solvents reduction: from 25,000 to 400 gallons	Information not available

Source: Pollution Prevention Options in Wood Furniture Manufacturing, 1992.

V.B. Pollution Prevention Case Studies

Henredon Furniture Industries, located in California, applies stains and other finishes to chairs, benches, and a variety of other furniture items. Because the conventional spray guns that Henredon had been using were not meeting current regulations for VOC emissions, the company researched the feasibility of high-volume low-pressure (HVLP) spray guns.

Henredon tested guns by a variety of manufacturers to find those that best fit their needs. The HVLP guns ultimately selected operate on air pressures from 7 to 10 psi, which is within the definitions set by California's South Coast Air Quality Management District. The lower pressure results in less overspray and more efficient use of material.

The new HVLPs increased efficiency such that average material usage was reduced by 13 to 15 percent. Employee training on application techniques was also conducted to improve efficiency. The new guns improved product quality without slowing

production rates. Henredon is currently using the HVLP guns to apply lacquers, sealers, and stains at three plant locations.

Henredon saves approximately 18,512 gallons of raw material annually by using the more efficient guns. These savings equate to a reduction in VOC emissions of 126,060 pounds per year.

Purchase and installation cost between $350 and $500 per gun. Henredon figures to save approximately $119,673 per year in raw material usage, for an average payback period of 3.5 months.

Thomson Crown Wood Products, Inc., manufactures wood television cabinets. Parts of these cabinets were sprayed with finishing materials by an air-assisted airless spray gun, resulting in the production of VOCs and a large paint waste stream. To ameliorate this problem, Crown Wood proposed to test high-volume low-pressure (HVLP) spray guns and evaluate their success in reducing these waste streams.

Through in-house, on-line production testing, Crown Wood reviewed four different HVLP spray guns using penetrating stain (no-wipe), glaze, sap stain, equalizer, toner, shade, and water-based black paint. An HVLP spray gun manufactured by one company gave excellent performance during the penetrating stain and regular glaze applications. This gun was also highly recommended by the sprayers for its size, weight, triggering, and cleaning ease. However, because the sprayer did not hold a specific spray pattern very well, it could not be used for heavier finishes. Instead, an HVLP spray gun manufactured by another manufacturer, which also received good ratings by the sprayers, gave much more consistent coverage and spray pattern for the water-based black, sap stain, equalizer, shade, and toner finishes.

With the new HVLP spray guns, Crown Wood has experienced material reductions of 65 percent for equalizer, 65 percent for stain, 54 percent for toner, 35 percent for glaze, 35 percent for no-wipe, and 53 percent for water-based black finishes. These reductions total over 13,300 gallons per year, which also results in reductions in VOCs and paint waste.

A total of $137,448 per year is the estimated savings from purchasing the new spray guns. Costs associated with paint waste reduction have not been determined, but a reduction in the amount of clean-up waste was evident. The cost of the project was $21,350.

In July 1992, Crown Wood altered its printing process room to incorporate the lay-down or roll-on finishing top and end panels of the outside cabinet. With this process modification, 60 percent of the spraying operation is now diverted to the printing room. Along with paint waste and VOC discharges, this new application procedure reduced finishing purchases by 50 percent.

Ethan Allen, Inc., manufactures dining and bedroom furniture. Coating procedures in the finishing operations produced approximately 37,000 pounds of hazardous waste annually. To reduce the quantity and disposal cost of this waste, the company made the equipment substitutions and cleanup changes discussed below.

Some of the modifications resulted directly from employee suggestions. The company implemented a cost reduction program to facilitate employee involvement in waste/cost reduction activities. Employees submit waste/cost reduction ideas, which are evaluated by a cost reduction committee, and valid suggestions are assigned for savings calculations.

Three main components of the coating operation generate the hazardous waste: overspraying collection systems, material transport systems, and equipment cleanup procedures.

Overspray Collection Systems

- Metal filters replaced paper/cardboard filters for all the coating operations. The metal filters are cleaned in a tank in which solvent is circulated with a diaphragm pump. The waste solvent/coating mix is distilled, and only the overspray is drummed for disposal. The cleaning solvent is reused. The metal filters used for lacquer and sealer overspray are hand wiped, and the dust is sent-off site for recycling.
- A fabricated, sloped polyethylene-lined trough replaced absorbent wood shavings used to catch overspray. In the wiping stain booths, the trough is squeezed into a pan, and only the liquid overspray is drummed for disposal.
- High-volume, low-pressure (HVLP) spray guns replaced conventional air-assisted spray gun equipment. As a result, the quantity of overspray to be filtered is reduced, and spraying efficiency is increased. Also, each operator is required to attend an annual technical training session. Training is provided by a representative of the spray gun manufacturer.

Material Transport Systems

- Polyethylene covers replaced cardboard covers for pallets used to transport products through coating operations. The overspray is peeled off the polyethylene cover and drummed for disposal.
- The racks used to transport material on the conveyor system are cleaned periodically during the boiler watchman's free time. Thus, the employee's time is utilized, and the racks can be reused. This procedure lengthens the life of the racks, which must be cleaned or disposed of as a solid hazardous waste.

Cleanup Operations

- A solvent distillation unit was installed to recover usable solvents and reduce

hazardous waste generation. A seven-gallon batch still, which is run twice daily, recovers five gallons of reusable solvent for every seven gallons of cleanup waste.

These equipment substitutions and changes in cleanup procedures resulted in the elimination of 25,900 pounds of hazardous waste annually, for an estimated cost savings of $129,465 per year. The following exhibit lists the process, cost of implementation, quantity of waste reduction, and annual cost savings.

Exhibit 20
Ethan Allen Pollution Prevention Case Study Summary

Process	Capitol Investment, $	Waste Reduction, lbs/year	Savings, $/year
Metal Filters	7,000	10,000	48,125
Lacquer and Sealer Recycle	1,500	2,300	6,150
Polyethylene Trough	400	6,100	38,430
HVLP Spray Guns (12 guns @ $250)	3,000	Material Use Reduction: Sap Stain 27% Sealer 20% Lacquer 11%	Material Use Savings: 15,000 to 20,000
Polyethylene Pallet Covers	2,050	3,700	7,450
Rack Cleaning	200	1,900	8,250
Solvent Distillation	4,500	1,900	3,200
Total	$68,650	25,900	$129,465

Source: North Carolina Department of Environment, Health, and Natural Resources Pollution Prevention Program.

VI. SUMMARY OF FEDERAL STATUTES AND REGULATIONS

This section discusses the Federal statutes and regulations that may apply to this sector. The purpose of this section is to highlight, and briefly describe the applicable Federal requirements, and to provide citations for more detailed information. The 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 regulations

The descriptions within Section IV are intended solely for general information. Depending upon the nature or scope of the activities at a particular facility, these summaries may or may not necessarily describe all applicable environmental requirements. Moreover, they do not constitute formal interpretations or clarifications of the statutes and regulations. For further information, readers should consult the Code of Federal Regulations and other state or local regulatory agencies. EPA Hotline contacts are also provided for each major statute.

VI.A. General Description of Major Statutes

Resource Conservation And Recovery Act

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

Regulations promulgated pursuant to Subtitle C of RCRA (40 CFR Parts 260-299) establish a "cradle-to-grave" system governing hazardous waste from the point of generation to disposal. RCRA hazardous wastes include the specific materials listed in the regulations (commercial chemical products, designated with the code "P" or "U"; hazardous wastes from specific industries/sources, designated with the code "K"; or hazardous wastes from non-specific sources, designated with the code "F") or materials which exhibit a hazardous waste characteristic (ignitibility, corrosivity, reactivity, or toxicity and designated with the code "D").

Regulated entities that generate hazardous waste are subject to waste accumulation, manifesting, and recordkeeping standards. Facilities that treat, store, or dispose of hazardous waste must obtain a permit, either from EPA or from a State agency which EPA has authorized to implement the permitting program. Subtitle C permits contain general facility standards such as contingency plans, emergency procedures, recordkeeping and reporting requirements, financial assurance mechanisms, and unit-

specific standards. RCRA also contains provisions (40 CFR Part 264 Subpart S and §264.10) for conducting corrective actions which govern the cleanup of releases of hazardous waste or constituents from solid waste management units at RCRA-regulated facilities.

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

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

- **Identification of Solid and Hazardous Wastes** (40 CFR Part 261) lays out the procedure every generator should follow to determine whether the material created is considered a hazardous waste, solid waste, or is exempted from regulation.
- **Standards for Generators of Hazardous Waste** (40 CFR Part 262) establishes the responsibilities of hazardous waste generators including obtaining an ID number, preparing a manifest, ensuring proper packaging and labeling, meeting standards for waste accumulation units, and recordkeeping and reporting requirements. Generators can accumulate hazardous waste for up to 90 days (or 180 days depending on the amount of waste generated) without obtaining a permit.
- **Land Disposal Restrictions** (LDRs) are regulations prohibiting the disposal of hazardous waste on land without prior treatment. Under the LDRs (40 CFR 268), materials must meet land disposal restriction (LDR) treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Wastes subject to the LDRs include solvents, electroplating wastes, heavy metals, and acids. Generators of waste subject to the LDRs must provide notification of such to the designated TSD facility to ensure proper treatment prior to disposal.
- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of the used oil. For parties that merely generate used oil, regulations establish storage standards. For a party considered a used oil marketer (one who generates and sells off-specification used oil directly to a used oil burner), additional tracking and paperwork requirements must be satisfied.
- **Tanks and Containers** used to store hazardous waste with a high volatile organic concentration must meet emission standards under RCRA. Regulations (40 CFR Part 264-265, Subpart CC) require generators to test the waste to determine the concentration of the waste, to satisfy tank and container emissions standards, and to inspect and monitor regulated units. These

regulations apply to all facilities who store such waste, including generators operating under the 90-day accumulation rule.

- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substance are regulated under Subtitle I of RCRA. Subtitle I regulations (40 CFR Part 280) contain tank design and release detection requirements, as well as financial responsibility and corrective action standards for USTs. The UST program also establishes increasingly stringent standards, including upgrade requirements for existing tanks, that must be met by 1998.
- **Boilers and Industrial Furnaces** (BIFs) that use or burn fuel containing hazardous waste must comply with strict design and operating standards. BIF regulations (40 CFR Part 266, Subpart H) address unit design, provide performance standards, require emissions monitoring, and restrict the type of waste that may be burned.

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

Comprehensive Environmental Response, Compensation, And Liability Act

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

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

EPA implements **hazardous substance responses** according to procedures outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). The NCP includes provisions for permanent cleanups, known as remedial actions, and other cleanups referred to as "removals." EPA generally takes remedial actions only at sites on the National Priorities List (NPL), which currently includes approximately 1300 sites. Both EPA and states can act at other sites;

however, EPA provides responsible parties the opportunity to conduct removal and remedial actions and encourages community involvement throughout the Superfund response process.

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

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III), a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by State and local governments. EPCRA required the establishment of State emergency response commissions (SERCs), responsible for coordinating certain emergency response activities and for appointing local emergency planning committees (LEPCs).

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

- **EPCRA §302** requires facilities to notify the SERC and LEPC of the presence of any "extremely hazardous substance" (the list of such substances is in 40 CFR Part 355, Appendices A and B) if it has such substance in excess of the substance's threshold planning quantity, and directs the facility to appoint an emergency response coordinator.
- **EPCRA §304** requires the facility to notify the SERC and the LEPC in the event of a release exceeding the reportable quantity of a CERCLA hazardous substance or an EPCRA extremely hazardous substance.
- **EPCRA §§311 and 312** require a facility at which a hazardous chemical, as defined by the Occupational Safety and Health Act, is present in an amount exceeding a specified threshold to submit to the SERC, LEPC, and local fire department material safety data sheets (MSDSs) or lists of MSDSs and hazardous chemical inventory forms (also known as Tier I and II forms). This information helps the local government respond in the event of a spill or release of the chemical.
- **EPCRA §313** requires manufacturing facilities included in SIC codes 20 through 39, which have ten or more employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report. This report, commonly known as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media, and allows EPA to compile the national Toxic Release Inventory (TRI) database.

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

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

Clean Water Act

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

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

A NPDES permit may also include discharge limits based on Federal or State water quality criteria or standards, that were designed to protect designated uses of surface waters, such as supporting aquatic life or recreation. These standards, unlike the technological standards, generally do not take into account technological feasibility or costs. Water quality criteria and standards vary from State to State, and site to site, depending on the use classification of the receiving body of water. Most States follow EPA guidelines which propose aquatic life and human health criteria for many of the 126 priority pollutants.

Storm Water Discharges

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

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

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

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

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

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

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

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

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

Category vii: Steam electric power generating facilities.

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

Category ix: Sewage treatment works.

Category x: Construction activities except operations that result in the disturbance

of less than five acres of total land area.

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

Pretreatment Program

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

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

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

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

Safe Drinking Water Act

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

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

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

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

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

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) granted EPA authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks which may be posed by their manufacture, processing, and use. TSCA provides a variety of control methods to prevent chemicals from posing unreasonable risk.

TSCA standards may apply at any point during a chemical's life cycle. Under TSCA §5, EPA has established an inventory of chemical substances. If a chemical is not already on the inventory, and has not been excluded by TSCA, a premanufacture

notice (PMN) must be submitted to EPA prior to manufacture or import. The PMN must identify the chemical and provide available information on health and environmental effects. If available data are not sufficient to evaluate the chemical's effects, EPA can impose restrictions pending the development of information on its health and environmental effects. EPA can also restrict significant new uses of chemicals based upon factors such as the projected volume and use of the chemical.

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

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

Clean Air Act

The Clean Air Act (CAA) and its amendments, including the Clean Air Act Amendments (CAAA) of 1990, are designed to "protect and enhance the nation's air resources so as to promote the public health and welfare and the productive capacity of the population." The CAA consists of six sections, known as Titles, which direct EPA to establish national standards for ambient air quality and for EPA and the States to implement, maintain, and enforce these standards through a variety of mechanisms. Under the CAAA, many facilities will be required to obtain permits for the first time. State and local governments oversee, manage, and enforce many of the requirements of the CAAA. CAA regulations appear at 40 CFR Parts 50-99.

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. Geographic areas that meet NAAQSs for a given pollutant are classified as attainment areas; those that do not meet NAAQSs are classified as non-attainment areas. Under §110 of the CAA, each State must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet Federal air quality standards.

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

Under Title I, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented towards

controlling particular hazardous air pollutants (HAPs). Title III of the CAAA further directed EPA to develop a list of sources that emit any of 189 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 174 categories and developed a schedule for the establishment of emission standards. The emission standards will be developed for both new and existing sources based on "maximum achievable control technology" (MACT). The MACT is defined as the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors.

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

Title IV establishes a sulfur dioxide emissions program designed to reduce the formation of acid rain. Reduction of sulfur dioxide releases will be obtained by granting to certain sources limited emissions allowances, which, beginning in 1995, will be set below previous levels of sulfur dioxide releases.

Title V of the CAAA of 1990 created a permit program for all "major sources" (and certain other sources) regulated under the CAA. One purpose of the operating permit is to include in a single document all air emissions requirements that apply to a given facility. States are developing the permit programs in accordance with guidance and regulations from EPA. Once a State program is approved by EPA, permits will be issued and monitored by that State.

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

EPA's Control Technology Center, at (919) 541-0800, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at (800) 296-1996, provides general information about regulations promulgated under Title VI of the CAA, and EPA's EPCRA Hotline, at (800) 535-0202, answers questions about accidental release prevention under CAA §112(r). In addition, the Technology Transfer Network Bulletin Board System (modem access (919) 541-5742)) includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

Exhibit 21 provides an overview of the statues and certain regulations applicable to the wood furniture manufacturing industry. The information contained in this matrix is based on data from the American Furniture Manufacturers Association document, *Environmental Guide for the Furniture Industry.*

Exhibit 21
Impacts of Environmental Statutes on the Wood Furniture Manufacturing Industry

Statute & Section	Drying (ovens, boilers)	Machining (sawing, planing, sanding)	Assembly (gluing, veneer application)	Pre-finishing/ Finishing (all coating applications)	Cleanup/ Shipping (cleanup, equipment maintenance, warehousing)
Resource Conservation and Recovery Act					
Section 6921 (3)(A) (Hazardous Waste)	Boiler water treatment chemicals may be regulated	N/A	Unused commercial chemical products may be regulated	Unused commercial chemical products and potentially ignitable non-liquid wastes are likely to be regulated	Solvent cleanup solutions, burning of potentially ignitable wastes, and chemical storage and spills may be regulated
Section 6941 (Solid Waste) State/Local Regulations	Non-hazardous boiler ash may be regulated	Wood waste may be regulated	Wood and adhesive waste may be regulated	N/A	Equipment maintenance materials may be regulated
Section 6991 (USTs)	Underground fuel tanks may be regulated	N/A	Adhesive and solvent under-ground storage tanks may be regulated	Solvent under-ground storage tanks are likely to be regulated	N/A
Comprehensive Environmental Response, Compensation, and Liability Act					
CERCLA	N/A	N/A	N/A	Potential spill and disposal problems are likely to occur	Potential spill and disposal problems may occur

Source: AFMA Environmental Guide for the Furniture Industry.

Exhibit 21 (cont'd)
Impacts of Environmental Statutes on the Wood Furniture Manufacturing Industry

Statute & Section	Drying (ovens, boilers)	Machining (sawing, planing, sanding)	Assembly (gluing, veneer application)	Pre-finishing/ Finishing (all coating applications)	Cleanup/ Shipping (cleanup, equipment maintenance, warehousing)
Emergency Planning and Community Right-to-Know Act, SARA Title III					
Sections 301-303	N/A	N/A	Adhesives may be regulated	Finishing materials are likely to be regulated	Finishing and maintenance materials are likely to be regulated
Section 304	N/A	N/A	Adhesives spills may be regulated	Finishing materials spills are likely to be regulated	Maintenance materials spills may be regulated
Sections 311-312	N/A	N/A	Adhesives may be regulated	Finishing materials are likely to be regulated	Finishing and maintenance materials are likely to be regulated
Section 313	N/A	N/A	Emissions from solvent-based adhesives may be regulated	Hazardous finishing materials are likely to be regulated	Hazardous chemical emissions disposal may be regulated
Clean Water Act					
Wastewater Discharge Permitting Program	Wastewater discharge from boilers, compressors, cooling water, and drying kiln condensate may be regulated	N/A	Adhesive wash and water discharge may be regulated	Wastewater discharge from water-wash spray booths and rag laundering are likely to be regulated	N/A
SPCC Planning	N/A	N/A	Adhesive management may be regulated	Finishing oil management is likely to be regulated	Storage and use of fuels and lube oils may be regulated

Source: AFMA Environmental Guide for the Furniture Industry.

Exhibit 21 (cont'd)
Impacts of Environmental Statutes on the Wood Furniture Manufacturing Industry

Statute & Section	Drying (ovens, boilers)	Machining (sawing, planing, sanding)	Assembly (gluing, veneer application)	Pre-finishing/ Finishing (all coating applications)	Cleanup/ Shipping (cleanup, equipment maintenance, warehousing)
Clean Water Act (continued)					
Storm Water Discharge Permitting Program	Wood storage may be regulated	Wood particulates in runoff are likely to be regulated	Adhesive storage may be regulated	Finishing materials management is likely to be regulated	Fuel and maintenance chemical management and material storage may be regulated
Clean Air Act					
Section 7411 (NSPS)	May apply to certain boilers	N/A	N/A	N/A	N/A
Section 7411 (New Source Review)	Permit required before construction of new source	Permit required before construction of new source	Permit required before construction of new source	Permit required before construction of new source	Permit required before construction of new source
Section 7411 (Control Techniques Guidelines)	N/A	N/A	N/A	Draft form scheduled for release in August, 1995	N/A
Section 7501 (Nonattain-ment Areas)	Sources in CO, SO_2 , NO_X, O_3 (VOC), PM_{10}, or Pb nonattain-ment areas may be subject to additional requirements	Sources in PM_{10} nonattainment areas may be subject to additional requirements	N/A	Sources in O_3 (VOC) and PM_{10} nonattainment areas may be subject to additional requirements	N/A
Section 7412 (Hazardous Air Pollutants)	N/A	N/A	Currently being finalized; scheduled for release in November, 1995	Currently being finalized; scheduled for release in November, 1995	N/A
Section 7410 (a)(2) (Operating Permits Program)	Permit required for all major and certain non-major sources	Permit required for all major and certain non-major sources	Permit required for all major and certain non-major sources	Permit required for all major and certain non-major sources	Permit required for all major and certain non-major sources

Exhibit 21 (cont'd)
Impacts of Environmental Statutes on the Wood Furniture Manufacturing Industry

Statute & Section	Drying (ovens, boilers)	Machining (sawing, planing, sanding)	Assembly (gluing, veneer application)	Pre-finishing/ Finishing (all coating applications)	Cleanup/ Shipping (cleanup, equipment maintenance, warehousing)
Clean Air Act (continued)					
Section 7411 (Enhanced Monitoring)	Certain boilers may be subject to enhanced monitoring requirements depending on the magnitude of emissions	Large operations may be subject to enhanced monitoring requirements	Sources may be subject to enhanced monitoring requirements depending on the magnitude of emissions	Sources may be subject to enhanced monitoring requirements depending on the magnitude of emissions	N/A
Spill Reporting					
Spill Reporting	Boiler fuels may be regulated	N/A	Adhesives and solvents may be regulated	Toxic finishing materials are likely to be regulated	Maintenance chemicals and oils may be regulated

Source: AFMA Environmental Guide for the Furniture Industry.

VI.B. Industry-specific Regulatory Requirements

Clean Air Act (CAA)

The Clean Air Act as amended in 1990 established the basis for the EPA to set new requirements for hazardous air pollutants (HAPs) that apply to emissions of 189 toxic chemicals listed in the Clean Air Act. EPA recently proposed Maximum Available Control Technology (MACT) standards for the wood furniture manufacturing industry.

In addition, the Agency is developing a control techniques guideline (CTG) for the industry to reduce the emissions of VOCs. While a CTG is not a rule, States generally follow the CTG guidance in developing rules for facilities located in ozone non-attainment areas and the ozone transport region. A preliminary draft model rule containing a preview of the reasonably available control technologies (RACT) that will be recommended in the draft CTG has been made publicly available for the wood furniture industry. A more detailed discussion of both the draft CTG and the MACT standards can be found in the following section pertaining to pending regulatory requirements.

The Economic Incentive Program (EIP) rules, promulgated on April 7, 1994 (59 FR 16690), provide general information on using innovative strategies to meet the Clean Air Act requirements, including RACT. (The RACT applicability threshold for this model rule is 10 tons for a wood furniture facility located in an extreme ozone nonattainment area and 25 tons per year for a wood furniture facility located in a marginal, moderate, serious, or severe ozone nonattainment area or in the ozone transport region; EPA Method 24 is used as the basis for evaluating VOC data on coatings). The EIP rule contains a range of options for States to use in incorporating economic incentives and/or innovative strategies into their State Implementation Plans (SIPs).

Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. Although the furniture industry does not tend to generate listed hazardous wastes, it may produce characteristic hazardous wastes. The wood furniture manufacturing industry uses many solvents. Spent solvents and solvent still bottoms are often characterized as hazardous wastes. In addition, furniture manufacturing facilities may generate ignitable or toxic wastes. Many wastes generated from the use of paints, wood treatments, stains, varnishes, and adhesives may be ignitable or might fail the Toxicity Characteristic Leaching Procedure (TCLP) test.

If a facility generates 100 kilograms or more of hazardous waste (or one kilogram of acutely hazardous waste) per month, it may be subject to accumulation time limits, storage restrictions, personnel training requirements, manifesting, and land disposal restrictions for these wastes.

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

Furniture manufacturers may store extremely hazardous substances (EHS) and hazardous chemicals. If so, facilities would be subject to the emergency planning and hazardous chemical inventory provisions of EPCRA. If they release an EHS or a CERCLA hazardous substance such as toluene or acetone, they may need to report it under the emergency release reporting requirements of SARA Title III. The Toxic Chemical Release Inventory affects only relatively large furniture companies that use toxic chemicals, such as toluene disocyanate or methylene chloride, above 10,000 pounds annually.

Clean Water Act (CWA)

The Clean Water Act (CWA) regulates discharges of various pollutants into the surface waters of the U.S. or to publicly owned treatment works (POTWs). The effluent provisions of 40 CFR Part 429, Subpart L, regulate facilities which conduct wood finishing activities such as staining and dipping, and require that sources not

discharge untreated process wastewater into navigable waters.

CWA regulations also regulate wood furniture manufacturers both with water wash spray booths (40 CFR Part 429, Subpart P) and without wash spray booths (40 CFR 429 Subpart O). Both Subparts require that sources not discharge process wastewater pollutants directly into navigable waters. Both effluent limitations greatly restrict the amount of effluent from process wastewaters which may be released into POTWs and require monitoring and recordkeeping activities. For sources discharging to POTWs, Subpart P requirements are similar to those in Subpart O with the exception that pH levels and levels of solids that settle are regulated for the best practicable technology requirements.

VI.C. Pending and Proposed Regulatory Requirements

Information contained in this section was obtained from the *Fact Sheet on the Proposed MACT and CTG for the Wood Furniture Finishing Industry* developed and distributed by the Small Business Ombudsman of North Carolina. The Clean Air Act as amended in 1990 established the basis for the EPA to set new requirements for HAPs and to develop control techniques guidance (CTG) to reduce VOC emissions. The EPA recently proposed a MACT standard for the wood furniture manufacturing industry, which applies to 189 toxic chemicals listed in the Clean Air Act as HAPs. To help States meet the ambient air quality standard for ozone, the Agency is also developing a CTG for the industry to reduce emissions of VOCs.

The MACT and CTG are concerned with two different types of emissions. The MACT will regulate emissions of HAPs from all wood furniture surface coating operations nationwide. The CTG will address emissions of VOCs from wood furniture finishing, cleaning, and washoff operations at facilities located in ozone non-attainment areas or in the ozone transport region.

The MACT standard will apply to "major sources" in the wood furniture manufacturing industry. A major source is one that emits or has the potential to emit 10 tons per year (tpy) of an individual HAP or 25 tpy of a combination of HAPs per year. The recommended application of the CTG is for sources that emit or have the potential to emit 10 tpy of VOCs in an extreme non-attainment area and 25 tpy per year of VOCs in any other ozone non-attainment area and in the ozone transport region.

Sources using or agreeing to use no more that 250 total gallons per month, or 3,000 gallons per rolling 12-month period, of finishing, contact adhesives, and cleaning materials are not major sources and are exempted from the MACT standard.

The MACT standard proposes numerical emission limits for surface coating operations including finishing, gluing, and peelable spray booth coating. Finishes include stains, washcoats, basecoats, fillers, sealers, glazes, highlighters, enamels, and topcoats. The CTG preliminary draft proposes numeric emissions limits for finishing and cleaning operations and for strippable booth coatings.

In addition to numeric emissions limits, the MACT standard and CTG propose work practice standards that include inspection and maintenance of equipment, good housekeeping practices such as closed tops on solvent and mixing containers, procedures to account for solvent use, and some limitations on the use of conventional air spray guns, promoting the use of more efficient spray guns.

A source may be affected by both the MACT and CTG. For example, if a wood furniture manufacturer is located in an ozone non-attainment area, uses VOCs and potentially emits greater than 25 tons per year of total VOC emissions, and is a major source for HAPs, the facility would be subject to both requirements.

The following implementation/compliance schedule is proposed with respect to the MACT and CTG:

- A preliminary draft model rule to reduce VOCs was distributed to State and local air agencies in June 1994. This preliminary rule contains emission limits based on RACT for reducing VOCs. RACT requirements may vary among states and local governments as some will set more stringent requirements to accommodate their specific air quality problems.
- Under a court-ordered deadline, the MACT standard was proposed November 21, 1994. November 1995 is the scheduled date for final adoption.
- Sources emitting more than 50 tpy of HAPs will have until November 21, 1997 to comply with the final rule.
- Sources emitting less than 50 tpy of HAPs will have approximately three years to comply with the final rule. This date will probably be November 1998.

Compliance with the MACT standard can be achieved with compliant coatings; that is, either non-HAP coatings or those meeting the limits, such as 1.0 lb of HAP per pound of solid. High-solids coatings and water-based coatings have fewer VOCs and HAPs, and are becoming more readily available. Although add-on control may also be used to meet the standards, the use of less solvent and fewer toxics in coatings and finishes is likely to be the route most manufacturers take towards compliance (and may be more economical).

The basis for the recommended standards for finishing operations is the use of low-HAP materials or control devices such as incinerators. For cleaning operations, the standards are based on use of low-VOC strippable coatings for spray booths.

In addition to numeric standards, the proposed rules minimize evaporative emissions through work practices covering storage, transfer, and applications in finishing, contact adhesive, cleaning, and washoff operations. These practices include employee training, inspection and maintenance, and housekeeping measures (such as "containers should be closed when not in use").

Exhibits 22 and 23 provide an overview of the proposed MACT emissions limits and work practice standards for the MACT and CTG. This information was obtained from the *Fact Sheet on the Proposed MACT and CTG for the Wood Furniture Finishing Industry*.

Exhibit 22
Summary of Proposed MACT Emission Limit

Emission Point	Existing Source	New Source
Finishing Operations		
(1) Achieve a weighted average HAP content across all coatings (maximum lb VHAP/lb solids)	1.0[a]	0.8[a]
(2) Use compliant finishing materials (maximum lb VHAP/lb solids)		
- stains	1.0[a]	1.0[a]
- washcoats	1.0[a,b]	0.8[a,b]
- sealers	1.0[a]	0.8[a]
- topcoats	1.0[a]	0.8[a]
- basecoats	1.0[a,b]	0.8[a,b]
- enamels	1.0[a,b]	0.8[a,b]
- thinners (maximum percent HAP allowable)	10.0	10.0
(3) As an alternative, use add-on control device	1.0[c]	0.8[c]
(4) Use a combination of (2) and (3)	1.0	0.8
Cleaning Operations		
Strippable spray booth material (max VHAP content = lb VOC/lb solids)	0.8	0.8
Contact Adhesive Operations		
(1) Use compliant contact adhesives (max VHAP content, as applied (lb VHAP/lb solids)		
(i) For foam adhesives used in products that meet flammability requirements	1.8	0.2
(ii) For all other adhesives (including foam adhesives used in products not meeting flammability requirements); or	1.0	0.2
(2) Use a control device	1.0[d]	0.2[d]

Source: Fact Sheet on the Proposed MACT and CTG for the Wood Furniture Finishing Industry.

a The limits refer to the HAP content of the coating as applied.

b Compliant washcoats, basecoats, and enamels must be used if they are purchased premade; that is, they are not formulated on-site by thinning other finishing materials. If they are formulated on-site, they must be formulated with compliant finishing materials and thinners containing no more than three percent HAP by weight.

c The control device must operate at an efficiency equivalent to no greater than 1.0 lbs. (or 0.8 lbs.) of HAP being emitted from the affected emission <N> source per pound of solids used.

d The control device must operate at an efficiency that is equivalent to no more than 1.0 lbs. Volatile HAP (VHAP) emitted from the affected emission point per pound of solids used.

Exhibit 23
Summary of Work Practice Standards for the Proposed MACT and CTG

Emission Source	Work Practice
Finishing Operations	
Transfer Equipment Leaks	• Develop written inspection and maintenance plan to address and repair leaks. The plan must identify a minimum inspection frequency of one per month and procedures for addressing malfunctions.
Storage containers including mixing equipment	• When such containers are used for VOC- or HAP-containing materials, keep covered when not in use.
Application equipment	• Limit use of conventional air spray guns and encourage use of more efficient technology.
Finishing materials	• Demonstrate usage of HAPs of potential concern have not increased except as allowed by the standards; document in the formulation assessment (MACT only).
Cleaning Operations	
Gun/line cleaning	• Collect cleaning solvent into a closed container. • Cover all containers associated with cleaning when not in use.
Spray booth cleaning	• Do not use solvents unless cleaning conveyors or metal filters.
Wash-off tanks/general cleaning	• Do not use chemicals that are known, probable, or possible carcinogens, as identified in section 112(g), in concentrations subject to MSDS reporting, as required by OSHA (MACT only). • Keep wash tank covered when not in use. • Minimize dragout by tilting and/or rotating part to drain as much solvent as possible and allowing sufficient time to dry. • Maintain log of the quantity and type of solvent used for washoff cleaning as well as the quantity of waste shipped off site and the fate of this waste (recycling or disposal). • Maintain a log of the number of pieces washed off and the reason for washoff.
Miscellaneous	
Operator training	• All operators shall be trained on proper application, cleanup, and equipment use. • The training program shall be written and retained on site.
Implementation plan	• Develop a plan to implement work practice standards. • Maintain plan on site.

Source: Fact Sheet on the Proposed MACT and CTG for the Wood Furniture Finishing Industry.

The work practice standards apply to both existing and new major sources. Air guns will be allowed only in the following instances:

- when used in conjunction with coatings less than 1.0 lb. VOC/lb. of solids
- for touch up and repair under limited conditions
- when spray is automated
- when add-on controls are used
- if the cumulative application is less than 5 percent of total gallons of coating applied
- if the permitting agency determines other application technology is economically or technically infeasible.