

# Materials Release Reporting Synergism for Emergency Planning Priorities: An Evaluation of Data from Three Regulatory Programs

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Environmental regulations have evolved and expanded in a variety of directions since the 1960s, and now include preventative measures such as Clean Air Act 112r Catastrophic Release Planning, and, under the Superfund Amendments and Reauthorization Act, State Emergency Response Commissions that have emergency planning responsibilities that address air contaminant releases through toxic chemical contingency and response plans. Information is available from many existing programs, both state and federal, that can be used to evaluate potential air releases, including the Toxics Release Inventory, Risk Management Plans, and spill reporting requirements. A study was conducted to evaluate whether there is any regulatory consensus that can be used by the Connecticut State Emergency Response Commission for hazardous materials release response planning and control strategies. Three distinct regulatory programs were evaluated to determine whether one group of chemicals, industry sector, or geographic area exhibited a greater magnitude of, or similar types of, air contaminant releases. Based on 1998 Envirofacts data, it was concluded that for Connecticut: (1) there were no predominant chemicals reported under the various regulations studied; (2) most air emissions of concern are permitted; and (3) there appear to be no regulatory redundancies regarding the chemicals reported. This may not be true for other states, however, and an assessment, by state, of air pollution regulations affecting industrial facilities can be useful for evaluating reporting requirements and eliminating duplicative efforts. Although significant trends were not identified in this study, the emergency response planning data-

base has been increased, and Connecticut emergency planning professionals will be better able to define the potential effects of chemical releases.

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A variety of environmental regulations govern unpermitted air contaminant releases. All have attempted to control and regulate the important aspects of air emissions and air contaminant releases. In this regard, the scope of regulation has evolved over the last 35 years from a set of principles designed to guide states in controlling sources of air pollution (the 1967 Air Quality Act) to a series of detailed control requirements (the 1970, 1977, and 1990 Amendments) that the federal government either implements jointly with, or delegates to, states and local authorities. The Clean Air Act regulatory programs are divided into three main categories: ambient air quality, new source performance standards, and hazardous air pollutants/visibility impairment. The 1990 Amendments revised hazardous air pollution law to address concerns such as acid deposition, added a fourth program (a comprehensive operating permit under Title V) in order to consolidate all of the Clean Air Act requirements for a given source of air pollution, and mandated a federal focus on the prevention of chemical accidents as specified in Section 112r (Sullivan, 1997).

As part of the Superfund Amendments and Reauthorization Act, State Emergency Response Commissions were created. Two major responsibilities of these commissions included (1) overseeing state emergency planning activities, which ensure that toxic chemical release contingency and response plans have been developed by Local Emergency Planning Commissions, and (2) the annual reporting of releases into the environment under the Toxics Release Inventory program. Information that can be used to satisfy these requirements comes from many existing local, state, and federal regulatory

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programs. Valuable information regarding both actual and potential releases can be found in Toxics Release Inventory reports and the Clean Air Act 112r contingency planning requirements, respectively. In addition, there are both federal and state spill reporting requirements that document some air contaminant releases, and, finally, there are state compliance activities based on air toxics.

Recognizing and setting priorities can be a major undertaking for State Emergency Response Commissions. This is due to the large amount and varied uses of applicable regulatory programs, and the fact that the regulatory lists of materials themselves vary widely within these programs, as they are used for different purposes. As a result, the volume of information can be unwieldy; for example, in Connecticut alone, over 7,000 spills and/or releases are reported every year. As a result, the Connecticut State Emergency Response Commission is continually updating and revising Connecticut's hazardous materials release response and control strategies.

Three distinct regulatory bodies of information regarding releases and potential releases were evaluated in this study: Risk Management Planning under Section 112r of the Clean Air Act, Toxics Release Inventory reporting under Title III of the Superfund Amendments and Reauthorization Act, and Connecticut's spill reporting program. (Although the Connecticut air toxics regulations were also reviewed, they were not included in the results, because these regulations are used to control emissions rather than measure potential or actual air contaminant releases.) In the view of State Emergency Response Commission planning, it is important to define whether there is a particular material or industry that requires special attention. Each of the three regulatory programs has its particular "top ten" materials of concern. From a planning perspective, however, it would be beneficial if the three programs created a consensus regarding the most critical material or materials. The objective of this investigation was to compare these three data sources and determine whether there is any concurrence among the regulations that can be used to help Connecticut State Emergency Response Commissions in the establishment of their priorities and objectives, and to point out any particular situations that would require further investigation, additional regulation, or improved contingency planning.

More specifically, this study was used to determine whether, for Connecticut, there was one chemical, group of chemicals, industry sector, or geographic area that exhibited a greater magnitude of air contaminant releases. The following trends or parameters were studied: chemical similarities, company clusters, and specific geographic areas. The results of this

study have been presented to both the Environmental Policies Council of the Connecticut Business and Industry Association and the Connecticut State Emergency Response Commission for their evaluation, interpretation, and use in future planning initiatives.

## Regulatory Background

The regulations considered in this study include Section 112r of the Clean Air Act for Risk Management Planning, Section 313 of the Superfund Amendments and Reauthorization Act of 1986 for Toxics Release Inventory, and the Connecticut Department of Environmental Protection's Bureau of Waste Management/Oil and Chemical Spill Response Division's Emergency Response Program for spill reporting. These regulations are briefly summarized in Table 1, and described in the following paragraphs.

### Risk Management Plans

Section 112r of the 1990 Clean Air Act amendments mandated a new federal focus on the prevention of chemical accidents. The objective of Section 112r was to prevent serious chemical accidents that have the potential to affect public health and the environment. Under these requirements, industry has the obligation to prevent accidents, operate safely, and manage hazardous chemicals safely and responsibly. This regulation enhances the processes of risk management planning and public disclosure of risk by providing information that helps industry, government, and communities work together toward reducing risk to public health and the environment.

Under the requirements in Section 112r, regulated facilities must identify and assess their chemical hazards and carry out specific activities designed to reduce the likelihood and severity of accidental chemical releases. In order to satisfy these requirements, these facilities must develop and implement risk management programs that incorporate three elements: a hazard assessment, a prevention program, and an emergency response program. These programs are to be summarized by the Risk Management Plan, which will be made available to state and local governments, the public, and all other stakeholders. The Risk Management Plan requirements are based on the Occupational Safety and Health Act's Process Safety Management Standard, the chemical safety guidelines of the Center for Chemical Process Safety of the American Institute of Chemical Engineers, and similar standards of the American Petroleum Institute and the Chemical Manufacturers Association.

**Table 1.** Regulations addressing actual and potential air contaminant releases in Connecticut

Program	Authority	Regulation	Type of release	Objective
Risk Management Plans	Federal	Section 112r, 1990 Clean Air Act Amendments	Potential	Prevent serious chemical accidents that have the potential to affect public health and the environment
Toxics Release Inventory	Federal	Section 313, 1986 Superfund Amendments and Reauthorization Act	Actual	Develop local chemical emergency preparedness programs and receive and distribute information on hazardous chemicals present at facilities within local communities
Spill reporting	State and federal	Section 22a-450 of the Connecticut General Statutes and the National Oil and Hazardous Substance Pollution Contingency Plan	Actual	Receive spill incident reports, provide emergency response for spill incidents and hazardous materials releases, and provide spill incident preparedness training and technical assistance

The Risk Management Plan requirement includes any regulated facility that is defined as a stationary source with more than a specified threshold quantity of a listed regulated substance in a single process. Regulated facilities, depending on their compliance level, are required to conduct some or all of the following elements of risk management planning: an off-site consequence analysis, a five-year history of accidental releases of regulated substances, an integrated prevention program, an emergency response program, an overall management program for implementation, and a Risk Management Plan that is revised at least once every five years (US Environmental Protection Agency, 1996). Risk management planning is designed to address catastrophic releases that would cause serious damage, death, or harm to the environment. Most facilities have attempted to reduce their use of regulated substances such that they are below the threshold quantities and, thus, are not covered by risk management planning.

### Toxics Release Inventory

One part of the Superfund Amendments legislation finalized in 1986 was Title III, which is also known as the Emergency Planning and Community Right-to-Know Act. This act requires states to establish a process for developing local chemical emergency preparedness programs and to receive and distribute information on hazardous chemicals present at facilities within local communities (Sullivan, 1997). Section 313 of this act requires the owners or operators of certain manufacturing facilities to submit annual reports on the amounts of listed toxic chemicals their facilities release into the environment, either routinely (via a permit), through fugitive emissions, or as a result of an accident. This Toxics Release Inven-

tory reporting requirement includes releases to air, water, and land, as well as discharges to Publicly Owned Treatment Works and transfers to off-site locations for proper treatment, storage, or disposal. The information submitted provides a broad perspective of actual chemical releases for both communities and facilities.

The Toxics Release Inventory reporting requirement applies to facilities that are in the Standard Industrial Classification codes shown in Table 2. These facilities must also have the equivalent of ten or more full-time employees, and must manufacture, import, process, or otherwise use a listed toxic chemical in excess of the established threshold. The threshold levels are as follows: 10,000 pounds per calendar year for use of any of the listed toxic chemicals, and 25,000 pounds per calendar year for manufacture, import, or process of any of the listed toxic chemicals. There are some exemptions for certain uses of listed toxic chemicals. The Toxics Release Inventory is used to capture releases from large facilities only. It is very likely that many more facilities exist that emit toxics in significant quantities, but they do not meet the reporting requirements.

Facilities covered by Section 313 reporting requirements must use the Toxic Chemical Release Inventory Reporting Form (Form R) to report information specified in the regulation, including pollution prevention as specified by the Pollution Prevention Act of 1990 (Sullivan, 1997). The United States Environmental Protection Agency (USEPA) continues to expand the chemical and industry reporting requirements for the Toxics Release Inventory. This reporting basically represents an accounting of emissions, including permitted re-

**Table 2.** Industry categories used for Toxics Release Inventory reporting (Sullivan, 1997)

Standard Industrial Classification Code	Industry
Original <sup>a</sup>	
20	Food and kindred products
21	Tobacco products
22	Textile mill products
23	Apparel and other finished products made from fabrics
24	Lumber and wood products
25	Furniture and fixtures
26	Paper and allied products
27	Printing, publishing and allied industries
28	Chemicals and allied products
29	Petroleum refining and related industries
30	Rubber and miscellaneous plastic products
31	Leather and leather products
32	Stone, clay, glass and concrete products
33	Primary metal industries
34	Fabricated metal products
35	Industrial and commercial machinery and computer equipment
36	Electronic and other electrical equipment and components
37	Transportation equipment
38	Measuring, analyzing and controlling instruments; photographic, medical and optical goods; watches and clocks
39	Miscellaneous manufacturing
New industries <sup>b</sup>	
10	Metal mining (except 1011, 1081 and 1094)
12	Coal mining (except for extraction activities)
4931/4939	Electrical utilities that combust coal and/or oil
4953	RCRA subtitle C hazardous waste treatment and disposal facilities
5169	Chemicals and allied products wholesale distributors
5171	Petroleum bulk plants and terminals
7389	Solvent recovery services

<sup>a</sup>Original—Regulations included these industries beginning with data collected in 1988.

<sup>b</sup>New Industries—Regulations expanded to include these industries beginning with data collected in 1998.

leases, as facilities are not required to report quantities of chemicals used on site or impurities generated during processing. This regulation encourages facilities to reduce their use of listed toxic chemicals in order to minimize their reporting requirements and hopefully reduce adverse impacts to the environment.

### Spill Reporting

The Oil and Chemical Response Division of the Connecticut Department of Environmental Protection's Bureau of Waste Management is responsible for receiving spill incident reports in the state of Connecticut. They provide the following services: receive incident reports; provide 24-hour statewide

emergency response for spill incidents and releases of hazardous materials and petroleum products; provide containment equipment, a mobile analytical laboratory, and a mobile operations center; license spill cleanup contractors; and provide spill incident preparedness training and technical assistance (Connecticut Department of Environmental Protection, 2000). The Spill Response Division complies with both the federal spill regulations, specified by the National Oil and Hazardous Substances Pollution Contingency Plan, and the state spill requirements, specified in Section 22a-450 of the Connecticut General Statutes.

The National Oil and Hazardous Substances Pollution Contingency Plan regulates discharges of oil and releases into the

environment of hazardous substances and pollutants or contaminants that may present imminent and substantial danger to public health or welfare in the United States. This national contingency plan provides for efficient, coordinated, and effective response to these discharges, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act and the Clean Water Act. It provides for the following: a national response organization, contingency plan requirements, removal action procedures (including involving state agencies), and administrative record requirements.

The definitions for both discharge and release are very broad. Both definitions encompass any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil or hazardous substances. Discharge excludes any Clean Water Act permitted discharges. In addition to those activities listed under discharge, release also includes the discharging, injecting, escaping, leaching, or disposing of a hazardous substance. The definition of release excludes worker exposures, vehicle emissions, certain nuclear releases, and fertilizer applications (US Environmental Protection Agency, 2000d).

Comprehensive Environmental Response, Compensation, and Liability Act Sections 102 and 103 specify the requirements for certain parties to give notice of a release of a hazardous substance. Section 103(a) requires that any person in charge of a vessel or facility notify the National Response Center as soon as they have knowledge of any release of a hazardous substance equal to or greater than the reportable quantity for that substance (US Environmental Protection Agency, 2000c). Specific reportable quantities for each listed hazardous substance are established by the USEPA pursuant to section 102, and range from 1 pound to 500 pounds (Sullivan, 1997).

Connecticut General Statutes Section 22a-450 regulates the report of a discharge, spill, loss, seepage, or filtration. It requires the persons in charge of various vessels, terminals, establishments, or operators of vehicles, trailers, or other machines "which by accident, negligence or otherwise causes the discharge, spillage, uncontrolled loss, seepage or filtration of oil or petroleum or chemical liquids or solid, liquid or gaseous products, or hazardous wastes which poses a potential threat to human health or the environment, shall immediately report to the commissioner such facts as the commissioner by regulation may require" (State of Connecticut, 1999). This reporting requirement includes: location, quantity and type of substance, date of occurrence of event, and responsible party. Any person failing to make this report can be fined. The Connecticut General Statutes do not specify a reportable quantity; therefore, all quantities are expected to be reported.

## Facilities Evaluated

To develop an understanding of any overlap between the various air contaminant release regulations affecting Connecticut, a number of facilities were evaluated for both potential and actual air contaminant releases. A search of USEPA's Envirofacts database revealed that in 1998 there were 729 Toxics Release Inventory regulated facilities and 57 Risk Management Plan regulated facilities in the state of Connecticut (US Environmental Protection Agency, 2000a). A review of both of these lists revealed that the two lists had 20 facilities in common. Of these 20 facilities, 16 had reported air emissions, and eight of these 16 had Clean Air Act Title V air permits. Title V air permits are facility-wide permits that bring together all applicable state and federal air pollution control requirements in a single permit for regulated facilities, in accordance with the federal Clean Air Act. A comparison of chemical similarities was then performed for these 16 facilities, which determined that there were 11 chemicals that appeared on both the Risk Management Plan and Toxics Release Inventory lists, and 69 chemicals that appeared on the Toxics Release Inventory list only.

## Data Analyses

### Chemical Comparison

Tables 3, 4, and 5 list the chemicals reported by the 16 facilities through both the Risk Management Plan and the Toxics Release Inventory. The data show that there are eight chemicals reported on both the Risk Management Plan and Toxics Release Inventory lists for the eight facilities with Title V air permits (see Table 5), but there is no one chemical common to every facility. The most frequent occurrence is two facilities for each of four different chemicals: acrylonitrile, ammonia, carbon disulfide, and chloroethane. There are 62 chemicals reported on the Toxics Release Inventory list for these Title V facilities (see Table 3), but there is no one chemical released in common at every facility. The most frequent occurrence is four facilities reporting one chemical category, zinc compounds. The next most frequent commonality was three facilities, regarding six different chemicals: ethylbenzene, hydrochloric acid, methanol, nitrate compounds, phosphoric acid, and styrene.

For the eight facilities without Title V air permits, there are five chemicals reported on both the Risk Management Plan and Toxics Release Inventory lists for these facilities (see Table 5), but there is no one chemical in common at every facility.

**Table 3.** Chemicals reported for Toxics Release Inventory regulations at Connecticut facilities in 1998 (US Environmental Protection Agency, 2000a,b)

Chemical	Facility number*
Acetonitrile	15
Acrylamide	7
Acrylic acid	6, 14
Ammonia (see Table 5)	4, 12
Aniline	11
Barium compounds	1, 15
Butyl acrylate	6
n-Butyl alcohol	1, 6, 7, 15
Carbon tetrachloride	11
Chlorine (see Tables 4 and 5)	15
1-Chloro-1,1-difluoroethane	14
Chloromethane	15
Chromium compounds	10
Cobalt	16
Copper compounds	2, 10, 12
p-Cresol	11
Cumene	14
Cyanide compounds	5
Cyclohexanol	11
Dichloromethane	2, 12, 15
Diethanolamine	13
Di(2-ethylhexyl) phthalate	2
Diisocyanates	11
Dimethylamine	2, 11
n,n-Dimethylaniline	11
Diphenylamine	11
Ethyl acrylate	6
Ethylbenzene	1, 7, 11, 14
Ethylene glycol	1, 7, 10, 12
Formaldehyde (see Table 5)	11
Formic acid	7
Glycol ethers	1, 2, 8, 12
n-Hexane	15
Hydrochloric acid	5, 7, 11, 15
Maleic anhydride	7
Manganese compounds	15
2-Mercaptobenzothiazole	2
Methanol	1, 7, 11, 13, 15
Methyl ethyl ketone	6, 15
Methyl isobutyl ketone	1, 15
Methyl methacrylate	7
Methyl tert-butyl ether	15
4,4'-Methylenedianiline	11
n-Methylolacrylamide	7
n-Methyl-2-pyrrolidone	12
Molybdenum trioxide	2
Naphthalene	1, 7

**Table 3.** Continued

Chemical	Facility number*
Nickel	15, 16
Nickel compounds	2, 5, 10, 11
Nitrate compounds	2, 5, 7, 15
Nitric acid	4, 5, 7, 9, 10
Nitrobenzene	1
Phenol	11
1,3-Phenylenediamine	11
Phosphoric acid	7, 10, 11, 15
Phthalic anhydride	7, 11
Potassium dimethyldithiocarbamate	11
Propargite	11
Propargyl alcohol	11
Propylene	15
Propylene oxide	11
Sodium dimethyldithiocarbamate	2
Sodium nitrite	15
Styrene	7, 11, 14
Sulfuric acid (see Table 4)	7
Tetrachloroethylene	9
Thiourea	13
Toluene	6, 7, 15
Triethylamine	7, 15
o-Xylene	11
Xylene (mixed isomers)	1, 6, 7
Zinc compounds	1, 2, 5, 11, 14, 15

\*Facilities (Title V permits in bold):

- 1—King Industries, Inc., Norwalk;
- 2—**Vanderbilt Chemical Corp., Bethel;**
- 3—**H. P. Hood, Inc., Suffield;**
- 4—**Hamilton Standard, Windsor Locks;**
- 5—Metal Finishing Tech., Inc., Forestville;
- 6—StanChem, Inc., East Berlin;
- 7—**CYTEC Industries, Inc., Wallingford;**
- 8—**Northeast Graphics, Inc., North Haven;**
- 9—H. Krevit & Co., Inc., New Haven;
- 10—MacDermid, Inc., Waterbury;
- 11—**Uniroyal Chem. Co., Inc., Naugatuck;**
- 12—BIC Corporation, Milford;
- 13—Sybron Chemicals, Inc., Norwich;
- 14—**Dow Chemical, Gayles Ferry;**
- 15—**Pfizer, Inc., Groton;** and
- 16—Wyman-Gordon Investment Castings, Groton.

The most frequent occurrence is two facilities reporting one chemical, formaldehyde. There are 32 chemicals reported on the Toxics Release Inventory list for these facilities (see Table 3), but there is no one chemical in common at every facility. The most frequent commonality is three facilities, regarding two different chemicals, ethylene glycol and nitric acid. The next most frequent commonality was two facilities for each of seven different chemicals: n-butyl alcohol, copper com-

**Table 4.** Chemicals reported for Risk Management Plan regulations at Connecticut facilities in 1998 (US Environmental Protection Agency, 2000a,b)

Chemical	Facility number*
Chlorine (see Tables 3 and 4)	5
Phosphorous trichloride	11
Propane (see Table 5)	8
Sulfuric acid (see Table 3)	1

\*Facilities (Title V permits in bold):

1—King Industries, Inc., Norwalk;

5—Metal Finishing Tech., Inc., Forestville;

8—Northeast Graphics, Inc., North Haven; and

11—Uniroyal Chem. Co., Inc., Naugatuck.

pounds, glycol ethers, methanol, nickel compounds, xylene, and zinc compounds.

### Toxics Release Inventory Statistics

The 1998 Toxic Release Inventory for Connecticut from the Envirofacts database was reviewed (US Environmental Protection Agency, 2000b). This inventory presents summary information tables for all releases and management activities, along with the top ten facilities and top ten chemicals released (by Standard Industrial Classification codes) for the entire state. Table 6 presents the top ten chemical releases for Connecticut in 1998 for the original Standard Industrial Classification codes. Table 7 presents the top ten chemical releases for Connecticut in 1998 for the seven new Standard Industrial Classification codes. These chemicals are ranked by total pounds released to all media but also show the amount of air emissions released (in pounds) for these chemicals, and the percentage the air releases represent of the total pounds released to all media. For the original Standard Industrial Classification codes, the following observations were made:

- Six out of ten of the top ten chemicals listed are mainly air releases;
- There are no chemicals on the top ten list that are on the combined Risk Management Plan/Toxics Release Inventory chemical list in this study (see Table 5); and
- Except for trichloroethylene, all of the top ten chemicals were reported on the Toxics Release Inventory list.

For the seven new Standard Industrial Classification codes, the following observations were made:

- Three out of ten of the top ten chemicals are mainly air releases;
- There are no chemicals on the top ten list that are on the combined Risk Management Plan/Toxics Release Inventory chemical list in this study (see Table 5); and

**Table 5.** Chemicals reported for Risk Management Plan and Toxics Release Inventory regulations at Connecticut facilities in 1998 (US Environmental Protection Agency, 2000a,b)

Chemical	Facility number*
Acrylonitrile	7, 14
Ammonia (see Table 3)	3, 10, 15
Bromine	15
1,3-Butadiene	14
Carbon disulfide	2, 11
Chlorine (see Tables 3 and 4)	9
Chloroethane	11, 14
Formaldehyde (see Table 3)	7, 10, 13
Hydrofluoric acid	16
Propane (see Table 4)	4
Vinyl acetate monomer	6

\*Facilities (Title V permits in bold):

2—Vanderbilt Chemical Corp., Bethel;

3—H. P. Hood, Inc., Suffield;

4—Hamilton Standard, Windsor Locks;

6—StanChem, Inc., East Berlin;

7—CYTEC Industries, Inc., Wallingford;

9—H. Krevit & Co., Inc., New Haven;

10—MacDermid, Inc., Waterbury;

11—Uniroyal Chem. Co., Inc., Naugatuck;

13—Sybron Chemicals, Inc., Norwich;

14—Dow Chemical, Gayles Ferry;

15—Pfizer, Inc., Groton; and

16—Wyman-Gordon Investment Castings, Groton.

- All of the top ten chemicals were reported on the Toxics Release Inventory list by facilities in this study.

Table 8 presents the top ten facilities with releases in Connecticut for 1998 for the original Standard Industrial Classification codes. Table 9 presents the top ten facilities with releases in Connecticut for 1998 for the seven new Standard Industrial Classification codes. These facilities are listed by total pounds released to all media, are grouped in the table by geographical location, and also show the amount of air emissions released for these chemicals. For the original Standard Industrial Classification codes, the following observations were made:

- Eight out of ten of these facilities show mainly air releases;
- Four of these top ten facilities are part of this study; and
- There appear to be two geographic clusters for air contaminant releases, around New London (two facilities), and in south central Connecticut (eight facilities).

For the seven new Standard Industrial Classification codes, the following observations were made:

- All ten of these facilities show mainly air releases;
- None of these top ten facilities are part of this study; and

**Table 6.** Connecticut 1998 Toxics Release Inventory—top ten chemical releases, for original Standard Industrial Classification Codes\* (US Environmental Protection Agency, 2000b)

Chemical	Air emissions	Total releases in Connecticut	Air percent of total (%)	Chemical on Risk Management Plan/Toxics Release Inventory list of facilities in study	Reported on Toxic Release Inventory list by facilities in study
1. Dichloromethane	779,833	788,041	98.96	No	Yes
2. Toluene	661,922	662,664	99.89	No	Yes
3. Methanol	573,276	593,604	96.58	No	Yes
4. Copper	23,127	532,952	4.34	No	Yes
5. Nitrate compounds	173	528,793	0.03	No	Yes
6. Zinc compounds	5,167	422,481	1.22	No	Yes
7. 1-Chloro-1,1-difluoroethane	354,505	354,505	100.00	No	Yes
8. Trichloroethylene	298,823	298,823	100.00	No	No
9. Chromium	2,186	292,893	0.75	No	Yes
10. Methyl ethyl ketone	267,793	273,694	97.84	No	Yes

Air emission and total releases in Connecticut measured in lb.  
\*See Table 2.

**Table 7.** Connecticut 1998 Toxics Release Inventory—top ten chemical releases, for seven new Standard Industrial Classification Codes\* (US Environmental Protection Agency, 2000b)

Chemical	Air emissions	Total releases in Connecticut	Air percent of total (%)	Chemical on Risk Management Plan/Toxics Release Inventory list of facilities in study	Reported on Toxic Release Inventory list by facilities in study
1. Sulfuric acid	669,000	669,000	100.00	No	Yes
2. Hydrochloric acid	551,000	551,000	100.00	No	Yes
3. Copper compounds	3	221,982	0.001	No	Yes
4. Chromium compounds	763	194,794	0.39	No	Yes
5. Zinc compounds	3	161,596	0.002	No	Yes
6. Nitrate compounds	0	152,728	0.00	No	Yes
7. Nitric acid	1,839	119,142	1.54	No	Yes
8. Nickel compounds	19,483	102,807	18.95	No	Yes
9. Nickel	1,400	76,400	1.83	No	Yes
10. Methyl tert-butyl ether	61,989	68,053	91.09	No	Yes

Air emissions and total releases in Connecticut measured in lb.  
\*See Table 2.

- There appear to be two geographic clusters for air contaminant releases, around New London (two facilities), and in the greater New Haven–Bridgeport area (seven facilities).

### Spill Reports

To evaluate spills in Connecticut in 1998, data from the Connecticut Department of Environmental Protection Bureau of Waste Management's Division of Oil and Chemical Spill

Response were reviewed. These data are provided in a 54-page report that presents spills in the state of Connecticut for that calendar year by the following categories: biomedical, chemical, dielectric, gas emission, hazardous waste, other, petroleum, and sewage-related (Connecticut Department of Environmental Protection, 1998). The report provides the following information: incidents reported, total gallons, total cubic yards, total feet, total drums, total pounds, and total responses. Table 10 presents the top ten substances with re-



**Table 8.** Connecticut 1998 Toxics Release Inventory—top ten facilities with on-site releases (separated into geographical clusters), for original Standard Industrial Classification Codes\* (US Environmental Protection Agency, 2000b)

Facility	Air emissions	Total on-site releases	Air percent of total (%)	Facility reported on Risk Management Plan/Toxics Release Inventory study list
Pfizer, Inc., Groton	350,880	602,345	58.25	Yes
Dow Chemical, Gales Ferry	579,063	579,077	99.99	Yes
Habasit ABT, Inc., Middletown	120,100	120,100	100.00	No
Olin Corp., Waterbury	177,000	177,057	99.97	No
CYTEC Industries, Inc., Wallingford	192,690	375,759	51.28	Yes
Uniroyal Chem. Co., Inc., Naugatuck	248,211	248,211	100.00	Yes
US Surgical, North Haven	170,040	170,040	100.00	No
Carlson Products Co., Derby	139,000	139,000	100.00	No
Spongex Intl., Shelton	239,073	239,073	100.00	No
Vitramon, Inc., Monroe	115,360	115,368	99.99	No

Air emissions and total on-site releases measured in lbs.

\*See Table 2.

**Table 9.** Connecticut 1998 Toxics Release Inventory—top ten facilities with on-site releases (separated into geographical clusters), for seven new Standard Industrial Classification Codes\* (US Environmental Protection Agency, 2000b)

Facility	Air emissions	Total on-site releases	Air percent of total (%)	Facility reported on Risk Management Plan/Toxics Release Inventory study list
Montville Station, Uncasville	129,000	129,000	100.00	No
AES Thames, Inc., Uncasville	79,917	79,956	99.95	No
Gulf Oil/New Haven Term., New Haven	46,795	46,835	99.91	No
New Haven Harbor Station, New Haven	199,400	199,400	100.00	No
Northeast Petroleum Term., New Haven	80,223	80,223	100.00	No
Devon Station, Milford	70,000	70,000	100.00	No
Bridgeport Harbor Station, Bridgeport	519,000	519,000	100.00	No
Motiva Bridgeport Term., Bridgeport	34,400	34,405	99.99	No
Norwalk Harbor Station, Norwalk	148,701	148,701	100.00	No
Middletown Station, Middletown	113,000	113,000	100.00	No

Air emissions and total on-site emissions measured in lbs.

\*See Table 2.

porting values totaling over 1,000 (regardless of measurement units) for the chemical, petroleum, and sewage release categories. The gas emission category is not shown in Table 10 because it provided a minimal amount of information as, of the 53 items listed, only propane (which is also listed in the chemical category) reported quantities over 1,000 pounds spilled. All other entries reported minimal or zero spill amounts.

The spill report data were included in this study because spills from all media are expected to be reported to the state of Connecticut. As can be seen by the information presented in Table 10, the only top-ten chemical in common with the combined Risk Management Plan/Toxics Release Inventory list is chlorine, and it is not clear from the report whether this was considered to be an air emission. Within the entire chemical cat-

egory there are six chemicals in common with the Risk Management Plan/Toxics Release Inventory list, and 23 chemicals in common with the Toxics Release Inventory list, and the majority of the spills were less than 100 gallons. A review of the federal reportable quantities for the 11 chemicals on the Risk Management Plan/Toxics Release Inventory list revealed the following: three chemicals with a reportable quantity of 1 pound, two chemicals with a reportable quantity of 10 pounds, two chemicals with a reportable quantity of 100 pounds, two chemicals with a reportable quantity of 500 pounds, and two chemicals with no reportable quantity.

It appears that most of the spill reports are for solid wastes, and not air releases. This may be a result of facilities believing that they are covered under the Toxics Release Inventory re-

**Table 10.** 1998 spill reporting in Connecticut (Connecticut Department of Environmental Protection, 1998)

Category	Top ten substances (over 1,000 measuring units)	Largest incident	Incidents reported
Chemical	1. Wastewater	100,225 gal	6
	2. Mix liquor	60,000 gal	1
	3. Fertilizer and fluids from 18-wheel	10,000 cu yd	1
	4. Wastewater, dyes, solvents	8,000 gal	1
	5. Cooling water/non-contact/small amounts of algae control	7,000 gal	1
	6. Antifreeze	1,272 gal	6,287
	7. Hazardous waste	3,000 gal	5,700
	8. Chlorine	5,501 gal	7
	9. Paint processed water	4,000 gal	1
	10. Nickel plating scrubber solution, 99% water	3,000 gal	1
Petroleum	(tie) Paper stock and water	3,000 gal	1
	1. Mineral oil	200,318 gal	7
	2. #2 Fuel oil	68,468 gal	2,827
	3. Gasoline	23,827 gal	720
	4. Diesel fuel and gasoline	4,000 gal	16
	5. Diesel fuel	22,896 gal	518
	6. Oil based emulsion	20,000 gal	1
	7. #2 Fuel oil and water	9,999 gal	2
	8. Aviation fuel	5,487 gal	50
	9. #2 Fuel oil and gasoline	4,000 gal	16
Sewage release	10. Hydraulic oil	3,695 gal	371
	1. Raw sewage	11,998,413 gal	83
	2. Sewage	100,110 gal	6
	3. Secondary unchlorinated treated effluent	45,000 gal	1
	4. Process wastewater	7,000 gal	1
	5. Sludge	5,000 gal	1
	6. Sanitary wastewater	2,400 gal	1
Most unusual	7. Sewage, gray color, no solids involved	1,000 gal	1
	Two portable potties overturned, leaking sewage and chemicals into Niantic River		
	Boat battery		
	Car in brook; unknown if any product is leaking at this time		
	Dark brown sudsy fluid		
	Green substance being discharged from a pipe to the river		
	Junk yard fire		
	Manure		
	Milk and diesel fuel		
	Raid and Easyoff		
Soapy water			

porting requirement for air releases and do not need to report air releases as spills to the Connecticut Department of Environmental Protection. Air contaminant releases, however, are expected to be reported as spills under current state regulation. The only odors specifically reported in the chemical category included the following: antifreeze and paint, chemicals/solvent odor, chlorine, gasoline, oil, pesticide, and unknown. Each of these listings had only one incident reported. Based on the method of data presentation in the spill

reporting tables, it is difficult to identify any specific releases to the air.

## Conclusions

Based on a review of the data from the three regulatory programs studied, there do not appear to be specific chemicals that are predominant in reporting under the air pollution and

spill reporting regulations effective in the state of Connecticut. This shows that, in Connecticut, there appear to be no regulatory redundancies regarding chemicals reported as actual or potential uncontrolled or controlled air contaminant releases; however, the air contaminant releases that do occur seem to be clustered into various geographic locations. In addition, the reporting of chemical spills in Connecticut seems to be somewhat disorganized, and it is not clear what type of media each spill represents. Spill reporting appears to address non-permitted releases that have no apparent relation to Risk Management Plan and Toxics Release Inventory reporting data even though unpermitted air contaminant releases should be reported, according to state regulation.

The majority of air contaminant releases regulated in Connecticut seem to be potential and actual permitted releases appearing in both the Risk Management Plan and Toxics Release Inventory reporting, respectively (although not necessarily for the same chemicals, as can be seen by the data review). It was anticipated at the beginning of this study that certain chemicals would be reported for all three regulations with regards to air contaminant releases; however, this was not substantiated. Although significant trends were not identified in this study, the emergency response planning database has been increased, and additional perspective has been provided that will enable Connecticut emergency planning professionals to be better able to define the potential effects of chemical releases.

For State Emergency Response Commission planning of hazardous materials release response and control strategies, it is important to define whether there is a particular chemical or industry that requires special attention. In this regard, there does not appear to be a consensus regarding critical materials of concern, as shown by this study of the three regulatory programs selected for review. In addition, the format for reporting spills within Connecticut was found to be confusing, and would require some revision to provide more useful data and a clearer understanding of the type of spill and the media affected. At the least, clarification of the spill regulations and education of the public as to what is required in spill reporting could greatly improve the information collected by the Connecticut Department of Environmental Protection under that specific program.

It is recommended that the spectrum of air pollution regulations required of facilities in Connecticut and in other states be re-evaluated to consider a process that would streamline reporting requirements and be beneficial to those commissions and regulatory bodies charged with the responsibility

of hazardous materials release response and control strategies. In addition, regulatory requirements should be coordinated so that emissions can be uniformly and consistently reported.

## Commentary

It was expected that a regulatory reporting consistency would be identified during this study of air contaminant releases. If this consistency had been found, then composite assessments could have been performed, and policies and procedures could have been adjusted to encompass the entire range of air pollution regulations. The fact that no critical materials or industries were identified during this study emphasized that, from a contingency management and emergency planning viewpoint, more general and consistent policies and procedures may be appropriate for regulating air contaminant releases. This study and the information revealed is important for policy makers and regulators that are establishing emergency planning priorities to consider. Other than the clustering of industrial sources in large metropolitan areas, however, few of the anticipated overlaps and commonalities were observed in Connecticut. Performing this type of data evaluation can be a valuable tool for emergency planning professionals nationwide (such as State Emergency Response Commissions), because it helps them define the breadth and scope of both actual and potential chemical releases for the individual state of concern.

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