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United States
Environmental Protection
Agency
Air & Toxics Division

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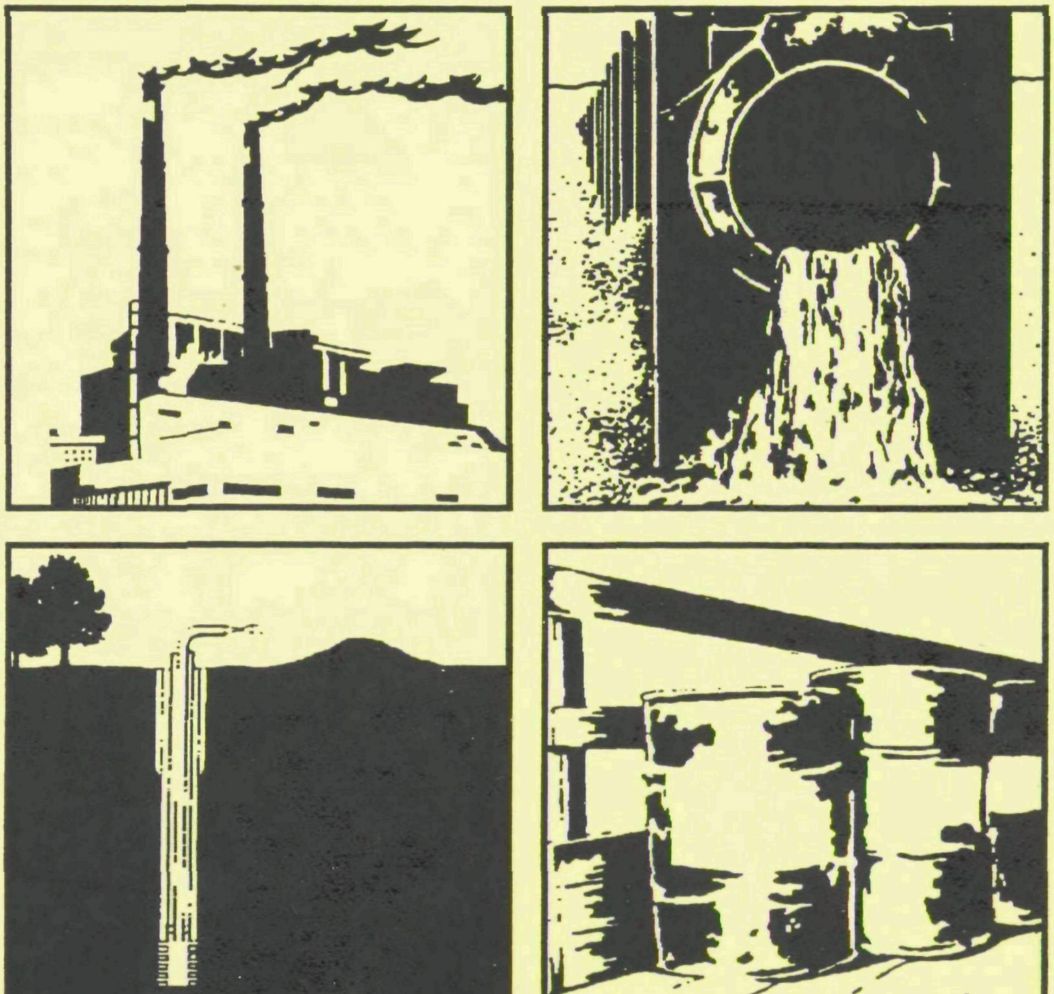
October 1990

EPA

Analysis of the Toxics Release Inventory Data

EPA Region 10



Analysis of the Toxics Release Inventory Data

EPA Region 10

October 1990

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Acknowledgements

The authors are indebted to the staff of the OTS Economics and Technology and Information Management Divisions, who provided downloaded sets of TRI data for analysis on personal computers to this and other EPA Regions, and who developed the Toxics Release Inventory: A National Perspective, on which many of the analyses here are based. In addition, the support of the Environmental Assistance and Existing Chemicals Assessment Divisions made the primary author's rotational assignment in Region 10 possible. The staff and management of the Region 10 Air and Toxic Substances Division, especially Philip Wong and Gil Haselberger, provided invaluable support, insights and editorial assistance in the development of the document.

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Analysis of the Toxics Release Inventory Data: EPA Region 10

Chapter 1: Introduction

Section 313 of the 1986 Emergency Planning and Community Right-to-Know Act (EPCRA) provides that manufacturing firms meeting certain criteria must annually report their use and releases of any of more than 300 chemicals and chemical classes. The TRI submissions represent a valuable new and unique source of information on chemical generation and release to all environmental media. The 1987 reporting year was the first mandated year these data were received by EPA and distributed to the public.

This report presents analyses of the first and second years' data for the four states in EPA Region 10 (Alaska, Idaho, Oregon, and Washington) and for the Region as a whole. The analyses presented include summaries of the data by chemical, industry category, facility and geographic area. Some of the most significant chemicals, industries, facilities, cities and counties are highlighted. In addition, concerns for the quality of the data reported, especially in this first year of reporting, are discussed.

This report has been prepared by EPA staff from both the Office of Toxic Substances and Region 10 Office. The primary author spent two months in the Regional Office to prepare the data analyses and the report itself. Regional staff provided much of the data interpretation, tabular summaries, and graphics.

Background

The Toxic Chemical Release Inventory data were collected under the provisions of Section 313 of EPCRA, also known as Title III of the Superfund Amendments and Reauthorization Act (SARA). The law is based on the premise that citizens have a "right to know" about toxic chemicals stored, manufactured, processed or released in their communities. Other portions of EPCRA focus on encouraging emergency planning for accidental releases and the health and safety information needed by local officials responding to plant emergencies such as fires.

Under Section 313, certain manufacturers must report to EPA and the States the amounts of more than 300 chemicals released directly to the air, water or land and the amounts transported to off-site facilities. These data must then be compiled by EPA in the Toxic Chemical

Release Inventory (TRI) and made available to the public in a computerized data base as well as by other means.

On June 19, 1989, the TRI data base was first made publicly accessible through the National Library of Medicine (NLM). The data base is open to users of NLM's TOXNET system through various telecommunication networks. Information on the NLM system can be obtained by contacting the National Library of Medicine, 8600 Rockville Pike, Bethesda, Maryland, 20894, telephone (301) 496-6531.

This report summarizes data reported primarily for the 1987 reporting year, extracted from the TRI data system as of March 15, 1989, and contained in the NLM data base. Release reports from facilities for the second reporting year (1988) were submitted to EPA in July 1989, but are presented only in Chapter 7 of this report because the data were released as this report was about to be printed. Some of the 1987 data used to show how Region 10 states compared to other states in the U.S. were obtained from the database subsequent to March 1989; the totals in these analyses are slightly different from most of the other data presented here due to retrieval from the evolving master data base at different times.

Reporting Provisions

Industrial facilities in selected business classifications which meet certain size criteria are required to report their total annual releases of specific chemicals. The reports are required by July 1 for the previous reporting year. Thus, the data for the 1987 reporting year were due July 1, 1988. Data for the 1988 reporting year were due July 1, 1989.

The criteria which trigger reporting requirements are:

1) The facility's primary business is classified in Standard Industrial Classification (SIC) Code Major Groups 20 through 39 (the manufacturing classes);

AND

2) The facility has at least 10 employees at that site;

AND

3) The facility manufactures or processes any one of the subject chemicals in amounts greater than:

75,000 lb/yr (1987 reporting year)

50,000 lb/yr (1988 reporting year)
25,000 lb/yr (1989 and later reporting years)

OR

"otherwise uses" any one of the subject chemicals in amounts greater than 10,000 lb/yr.

If all three criteria are met, the facility must file annual reports, for each chemical, on amounts released to each environmental medium: air, water, land, or transfer off-site to another facility for treatment or disposal. Table 1-1 lists short descriptions of the SIC Code Major Groups. It is important to note that facilities primarily engaged in the extraction or distribution of petroleum products are not considered part of the manufacturing classes, although petroleum refining facilities are included.

Table 1-1 Short Definitions of SIC Code Major Groups

20	Food and Kindred Products
21	Tobacco
22	Textile Mill Products
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials
24	Lumber and Wood Products, Except Furniture
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 Plastics Products
31	Leather and Leather Products
32	Stone, Clay, Glass and Concrete Products
33	Primary Metal Industries
34	Fabricated Metal Products, Except Machinery and Transportation Equipment
35	Machinery, Except Electrical
36	Electrical and Electronic Machinery, Equipment, and Supplies
37	Transportation Equipment
38	Measuring, Analyzing, and Controlling Instruments, Photographic, Medical and Optical Goods, Watches and Clocks
39	Miscellaneous Manufacturing Industries

For reporting purposes, "manufacture" includes production of a chemical as a byproduct of another industrial process within the scope of SIC Code Major Groups 20-39. For example, chloroform is often produced as a byproduct of wood pulp bleaching when chlorine compounds are used. Most pulp facilities do not intentionally produce chloroform for use or sale.

The identities of the chemicals and chemical classes subject to Section 313 reporting provisions are listed in Appendix A. There are more than 300 discrete substances listed and twenty chemical classes. Theses classes may include many individual chemicals. For example, "lead compounds" includes chemicals containing lead used in pesticides, as a gasoline additive, or in pigments. In Section 313 reports, all of these would be listed as "lead compounds" without identification of their specific chemical identities. For these compounds, the release or transfer amounts refer to the amount of the subject element contained in the overall substance. Thus, 5,000 pounds of "lead compounds" released to water may only contain 1,200 pounds of lead, and this amount is what would be listed as the release amount in a TRI report. This lack of information on the specific chemical identity may hamper evaluations of the toxicity and potential concerns of these releases.

Facilities meeting the above criteria for the subject chemicals must submit the release and other data on a reporting form known as the Form R. A separate Form R must be submitted for each TRI chemical at a facility which meets reporting thresholds. Thus, many facilities are required to submit multiple forms for their different chemicals. These forms include the name and location of the reporting facilities, the identity of the chemical, and the total annual releases to the environment for air, water, and land, as well as the amounts of chemicals transferred off-site.

"Releases" vs. "Transfers"

The chemical information reported includes the total annual release to each environmental medium from activities at the manufacturing or use site. If a facility releases effluent directly to surface waters, it must have been granted a permit under the provisions of the National Pollutant Discharge Elimination System (NPDES) regulations of the Clean Water Act. These releases are calculated "post-treatment," that is, after any wastewater treatment methods have been applied.

In contrast, transfers refer to chemicals routed to other facilities not at the same site. Two common examples of off-site transfers are: to a local publicly-owned treatment works (POTW) for treatment prior to discharge into surface waters, and transfer of hazardous waste to a licensed waste treatment or disposal facility. The estimated chemical quantities transferred to an off-site POTW are calculated "pre-treatment," i.e., before the effect of the treatment methods used by the POTWs.

Chemicals transferred to off-site facilities other than POTWs may undergo a variety of treatment methods. Most such treatment methods are designed to minimize or eliminate potential for release to the environment. For example, chemicals may be stored in specially constructed landfills with impermeable liners and leak detection systems to minimize the possibility of release to the soil. The actual release amounts of chemicals managed at these sites are often small and difficult to quantify. Because of this, the distinction between transfers and actual releases is maintained in the TRI data base and in this analysis. For the purpose of assessing overall chemical generation, the releases and transfers have been summed to generate a "total" field, but this amount should be used with caution in setting priorities, as it is not a truly accurate indicator of exposure or risk potential.

Data Quality Considerations

The 1987 reporting year was the first year the emissions data were reported. Because the TRI reporting regulations do *not* require that companies monitor the actual chemical concentrations in effluents or wastes, most of the data submitted are estimates. The quality of these estimates varies widely, depending on how much specific data are available to use in making calculations; on the industry and how well its releases have been studied; and on the level of experience and expertise of persons filling out the Form R.

In addition, EPA regulations provide that, for small quantities of chemicals, a range rather than a specific number may be reported. Thus, if a company releases about 300 pounds of a chemical to air, it could report this in the range 1-499. Similar reports may be received for releases and transfers of 500-999 lb. In the TRI data base and in the tables presented here, these ranges are represented by the midpoint value, i.e., 250 for the range 1-499, and 750 for 500-999.

Many different estimation methods are available, while there are usually little or no data to definitively identify one of these as the "best" method. As facilities become more experienced with the estimation methods, the quality of the submitted data is expected to improve. Data of the first reporting year, 1987, are likely to be the least reliable of the data to be reported annually.

Facilities must not only calculate the amounts of the chemicals manufactured or used, but must also account for the effects of their treatment methods on total releases. For example, if secondary wastewater treatment is used to treat process effluent, it will usually reduce the quantities of the chemicals in that effluent. In some cases, these reductions are substantial (90% or more). Errors may occur in calculating either the total amount of chemical manufactured or used, or the net effect of these treatment methods.

EPA has reviewed a subset of the 1987 submissions to identify frequently occurring reporting errors. Two common errors concern the reporting of acids and bases, and reports of releases to water. The review found that often very large reported release quantities of acids, such as sulfuric and hydrochloric acids, and bases such as sodium hydroxide, were erroneously high. This was due to reporters not assessing the effect of treatments such as neutralization that almost always occur before releases to water. In other findings, the review identified double-counting of releases to water and transfers to POTWs, and overestimation of chemical quantities landfilled or transferred offsite. In cases where facilities have both direct discharge pipes and sewer connections, TRI chemical releases may occur to either. Some facilities erroneously reported the same chemical release amounts to both media. In the case of landfills and off-site transfers, reporters are supposed to provide the amount of TRI chemical contained in the waste stream. In some cases, reporters entered the quantity of the entire waste on the reporting form, rather than the amount of the chemical in the waste. Other errors identified in the review include some underreporting, especially for fugitive air emissions.

Data Completeness Considerations

In the case of the TRI chemical classes, it will often be impossible to determine the specific chemical identities involved. For example, there are dozens of commonly used lead compounds, with varying degrees of toxicity. The TRI data may specify elemental lead (rarely), or the generic "lead compounds."

There are releases of many of the subject chemicals from other sources which do not report under TRI. For example, the common chemical benzene is emitted by many sources other than manufacturing plants, especially by gasoline service stations and automobiles. The solvent tetrachloroethylene is used widely in dry cleaning and consumer products such as spot removers as well as by industrial companies.

In many cases, the aggregate amounts of releases from other sources will be far higher than the releases reported by TRI facilities. Any risk evaluation of TRI facilities should include consideration of other nearby sources which are not reported under the provisions of EPCRA, but which may outweigh the exposure or risk potential of TRI sources.

The Changing TRI Data Base

Since the requirements to submit TRI data are new, many covered facilities did not file reports to meet the 1987 reporting year deadline. At this writing, a few 1987 as well as 1988 and 1989 reports are still being submitted as companies realize their error or are required to file as a result of compliance inspections. Other companies, in reviewing their data for 1988, realized they had made errors on the 1987 Form Rs, and have submitted revised data for 1987. As a result, the TRI data base is still changing. The report, The Toxics Release Inventory: A National Perspective, used 1987 data on releases and transfers taken from a retrieval on March 15, 1989. This report uses the same 1987 data insofar as possible. Some analyses use data extracted at different times, and may differ slightly. Chapter 7 contains a summary of the revised total releases and transfers by state for 1987, based on data extracted in the spring of 1990. If the reader were to log on to the EPA or NLM computerized data bases at this time, results would also be slightly different. The overall conclusions regarding chemicals, geographic areas, and facilities are unlikely to be significantly affected by these differences.

The original provisions of EPCRA listed 309 discrete chemical substances and 20 chemical classes. Since then, under the provisions which mandate inclusion of chemicals on the reporting list based on their toxicity concerns, EPA has received a number of petitions to remove chemicals from the list, or "delist" them. At this writing, EPA has granted petitions to delist seven chemicals, and has denied a number of petitions to delist. In addition, EPA has proposed to add nine chemicals to the reporting requirements. Table 1-2 displays the delisted chemicals, as well as those recently added to the reporting list. As these chemicals are added to or subtracted from the list, the total number of forms processed and the amounts of releases/transfers will be affected, in some cases significantly.

While certain analyses in this report include all chemicals for which data were reported, most focus on the ones most likely to continue to be reported. Thus, although sodium sulfate was the largest single chemical reported for 1987 in terms of total releases and transfers, it has since been "delisted" and was excluded from reporting requirements for 1988 and future reports. In its review of the sodium sulfate delisting petition, EPA found that available data and reasonable inferences concerning the chemical's potential toxicity did not warrant sufficient concern to continue reporting under the provisions of EPCRA. EPA recently delisted the frequently reported chemicals sodium hydroxide and aluminum oxide, again because of a finding that their toxicity did not meet the criteria defined in the law.

Table 1-2 Chemicals Added to or Removed from TRI Reporting

Chemicals Delisted from TRI Reporting

Chemical	Delisting Date	First Affected Reporting Year
Titanium Dioxide	6/20/88	1987
C.I. Acid Blue 9	10/07/88	1988
Melamine Crystal	3/29/89	1988
Sodium Sulfate (solution)	6/20/89	1988
Sodium Hydroxide (solution)	12/15/89	1989
Aluminum Oxide (non-fibrous)	2/14/90	1989

Chemicals Added to TRI List for the 1990 Reporting Year*

Chemical	CAS Number
Allyl alcohol	107-18-6
Creosote	8001-58-9
2,3-dichloropropene	78-88-6
m-dinitrobenzene	99-65-0
o-dinitrobenzene	528-29-0
p-dinitrobenzene	100-25-4
Dinitrotoluene	25321-14-6
Isosafrole	120-58-1
Toluene-diisocyanate mixed isomers	26471-62-5

* Not including a petition received from the Natural Resources Defense Council and signed by three state governors, which requests the addition of seven chlorinated fluorocarbons to the TRI reporting list:

trichlorofluoromethane (CFC-11)
dichlorodifluoromethane (CFC-12)
bromotrifluoromethane (Halon 1301)
dibromotetrafluoroethane (Halon 2402)
dichlorotetrafluoroethane (CFC-114)
(mono)chloropentafluoroethane (CFC-115)
bromochlorodifluoromethane (Halon 1211)

To provide continuity with future analyses of the data, in this report most summaries exclude chemicals which have been delisted from the reporting requirements for years after 1987. Melamine and C.I. Acid Blue 9 were not specifically excluded from the analyses because they were delisted prior to the 1987 reporting period, and the total quantity of releases and transfers reported for 1987 of these two chemicals combined was less than 5,000 pounds.

The TRI Data and Risk

Congress intended that the TRI data be made available to the public to foster efforts to reduce the total amounts of chemicals released to the environment. However, the data are not intended to provide a basis for assessing the significance of the exposure or risk potentially presented by the substances. Much additional information will be needed to perform such assessments. To many scientists, it is inappropriate to combine total chemical releases or releases and transfers, since the data represent very different chemicals, released to different media, or perhaps not released to the environment at all. This report uses a pragmatic approach to screening the chemicals, industries, facilities and geographic areas of interest. This does not mean that people living in these communities are necessarily at risk from these substances. The analysis is intended to be a "first cut" to identify where additional methods of analysis should be applied. *No conclusions regarding overall risk to human health or the environment can reasonably be drawn solely from these data.*

Additional information is available from a variety of sources concerning the toxicities of TRI chemicals. The most widely available of these is a series of fact sheets on the chemicals prepared by the State of New Jersey. These 2-5 page summaries describe what is known about the human health effects of these chemicals. EPA is preparing attachments to these fact sheets which summarize what is known about the toxicities of the chemicals to animals and plants. The Hazardous Substances Fact Sheets have been distributed along with TRI data to county libraries throughout the U.S. Additional copies for specific chemicals are available from:

TSCA Assistance Information Service
U.S. EPA (TS-799)
401 M Street, SW
Washington, DC 20460

EPA has prepared a data base listing reports prepared on these chemicals, and regulatory thresholds, such as Occupational Safety and Health Administration (OSHA) standards, EPA drinking water Maximum Contaminant Limits (MCLs), and others. This data base, called Roadmaps, is available from:

John Leitzke
U.S. EPA Office of Toxic Substances
TS-778
401 M Street, SW
Washington, DC 20460

These sources can provide some of the data needed to perform a more thorough evaluation of the significance of the TRI chemical releases summarized in this report. Many other publications provide information about how to use the available data in the evaluation of chemical risks, including:

Chemical Risk: A Primer, available from
American Chemical Society
Department of Governmental Relations and Science Policy
1155 16th Street, NW
Washington, DC 20036

Toxicology for the Citizen, available for $1.00 from
Center for Environmental Toxicology
Michigan State University
C231 Holden Hall
East Lansing, MI 48824

Putting Risks from Hazardous Substances in Perspective: A Guidebook (to be published in spring 1990), available from
Ann Fisher
Risk Communication Program (PM-221)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
(202) 382-5606

Chapter 2: A Regional Summary for 1987

In the 1987 reporting year, facilities subject to the provisions of TRI in EPA Region 10 reported the release of more than 577 million pounds of toxic chemicals directly to air and water, and more than 63 million pounds transferred off-site to other facilities, such as POTWs. Together, these releases and transfers totaled more than 640 million pounds of reported toxic chemicals in the first year of reporting (Figure 2-1). A total of 583 facilities submitted a total of 1984 individual reports on 129 chemicals or chemical classes, or an average of 3.4 chemicals per facility.

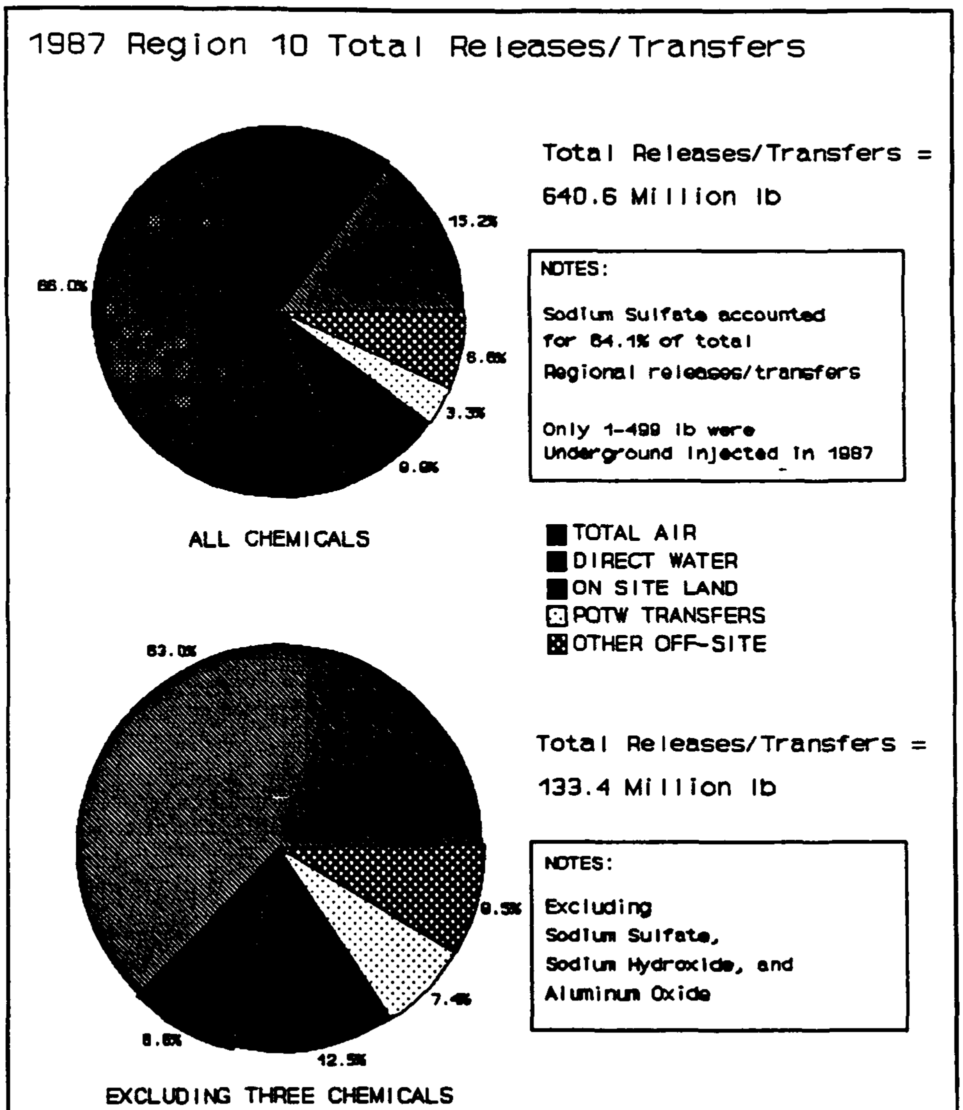

Figure 2-1 Region 10 Total Releases and Transfers for 1987

In the United States, more than 22 billion pounds of chemicals were reported to be released or transferred in 1987.

The Role of Sodium Sulfate

More than half of the total reported releases and transfers in the U.S. were of one chemical -- sodium sulfate. The large releases and transfers of this chemical overshadow the picture of other total chemical releases and transfers. Since the 1987 reporting year, EPA has published a finding that sodium sulfate does not meet the toxicity concerns listed by Congress in EPCRA. The chemical has been "delisted," or omitted from the requirement for annual reporting under section 313. EPA has been petitioned by several other groups to delist other chemicals.

One purpose of this analysis is to provide a baseline of data from the first reporting year to which subsequent reporting years may be compared. Because of this, most of the data reported here will exclude the totals for sodium sulfate. Many other analyses will exclude sodium sulfate, and the delisted chemicals sodium hydroxide and aluminum oxide.

How Region 10 Compares to Other Geographic Areas

The total 1987 releases and transfers reported for facilities in Region 10 was 640 million pounds, or 2.8% of the U.S. total. Figure 2-2 illustrates how the various EPA regions compare in terms of this total figure. For all chemicals reported, EPA Region 9, containing California, Nevada, and Arizona, ranks as the largest, with nearly 6 *billion* pounds, or nearly 27% of the U.S. total. This is due to the presence of a single facility in California which reported releases of 5.2 billion pounds of sodium sulfate.

When sodium sulfate is excluded from the analysis, the picture changes dramatically. Table 2-1 lists the total releases and transfers for EPA regions both with and without sodium sulfate.

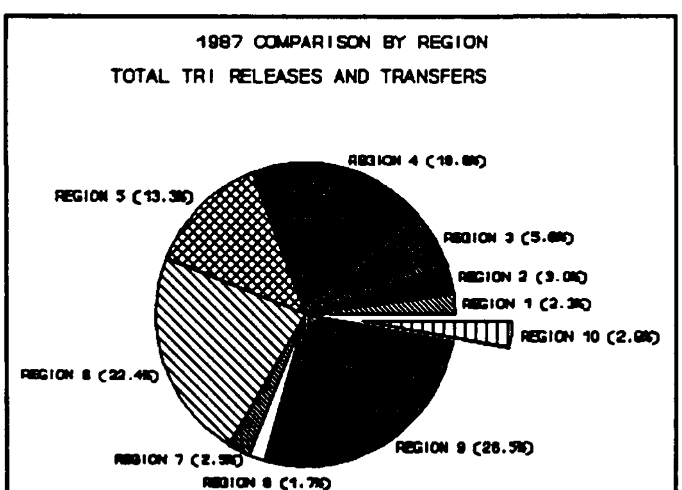

Figure 2-2 EPA Region Total Releases and Transfers for All Chemicals

Without sodium sulfate, Region 6,

Table 2-1 EPA Region Total Releases/Transfers

Total Releases with and without Sodium Sulfate Based on 1987 Data (Retrieved In April 1989)

	Total 1987 for All Chemicals			Non-Sodium Sulfate Releases		
REGION	Releases/ Transfers (Bill lb)	Percent of Total U.S.	Region Rank	Releases and Transfers (Bill lb)	Percent of Total U.S.	Region Rank
1	0.51	2.25	9	0.21	2.03	9
2	0.69	3.04	6	0.46	4.38	7
3	1.31	5.80	5	0.76	7.29	4
4	4.39	19.50	3	1.83	17.56	3
5	2.99	13.29	4	2.35	22.50	2
6	5.05	22.44	2	3.35	32.05	1
7	0.57	2.52	8	0.47	4.46	5
8	0.39	1.74	10	0.36	3.46	8
9	5.98	26.57	1	0.46	4.44	6
10	0.64	2.83	7	0.19	1.83	10
Total	22.52	100.00		10.44	100.00	

containing Texas and Louisiana, among other states, becomes the Region with the largest total releases and transfers. Region 10 drops to last place among EPA regions, with a total of 191 million pounds, about 1.8% of the U.S. total. Figure 2-3 illustrates the distribution of total releases and transfers for the various EPA Regions when sodium sulfate is omitted. The chart shows that almost three-fourths of nationwide reported releases and transfers occurred in just three Regions (4, 5, and 6).

Table 2-2 displays the data for the top five states in the U.S. on the basis of total releases and transfers for all chemicals. The states are ranked in order of these amounts to indicate relative standing.

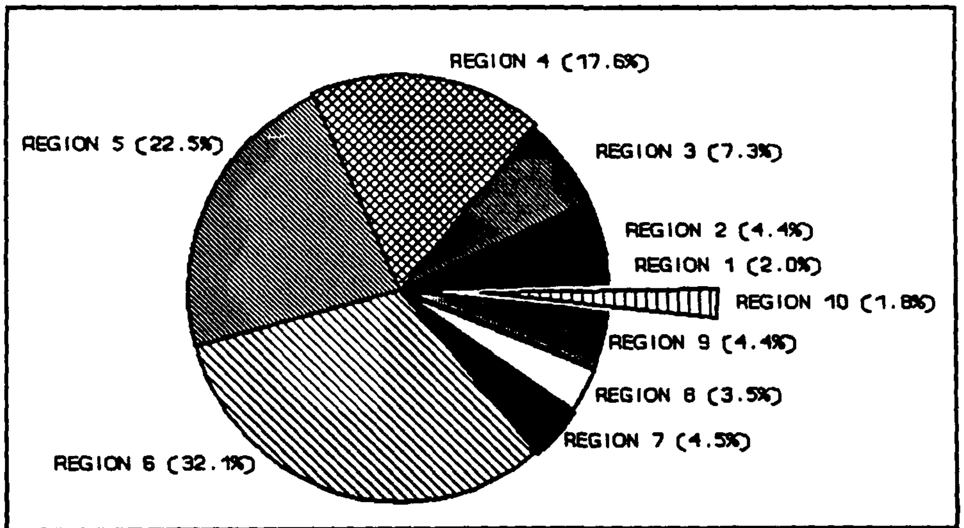

Figure 2-3 EPA Regions' Total Releases and Transfers without Sodium Sulfate

Table 2-2 Top Five States for Total TRI Releases and Transfers for All Chemicals

	Billion Pounds	Percent of US Total
CALIFORNIA	5.84	25.9%
TEXAS	2.80	12.4%
LOUISIANA	1.72	7.6%
ALABAMA	0.83	3.7%
MICHIGAN	0.74	3.3%
OTHER STATES	10.58	47.0%
US TOTAL	22.51	

When sodium sulfate is excluded from all states' data, the relative ranks for the states change significantly. Table 2-3 includes data for the top five states when sodium sulfate is omitted from the analysis.

Table 2-3 Top Five States for Total TRI Releases and Transfers without Sodium Sulfate

	Billion Pounds	Percent of US Total
TEXAS	1.96	18.7%
LOUISIANA	1.10	10.6%
MICHIGAN	0.69	6.6%
OHIO	0.57	5.4%
INDIANA	0.53	5.1%
OTHER STATES	5.60	53.6%
US TOTAL	10.44	

Figure 2-4 illustrates the relative sizes of releases and transfers in these top five states in comparison to those in Region 10.

Table 2-4 shows the release data for the individual states in Region 10 and how the total releases and transfers are affected when the above three chemicals are excluded from the analysis.

For example, Washington State had a total of 407.1 million pounds when all reported chemicals are included, but this drops to 82.2 million pounds when sodium sulfate is excluded, and to 41.7 million pounds when all sodium sulfate, sodium hydroxide and aluminum oxide are omitted, an overall 90 percent decline.

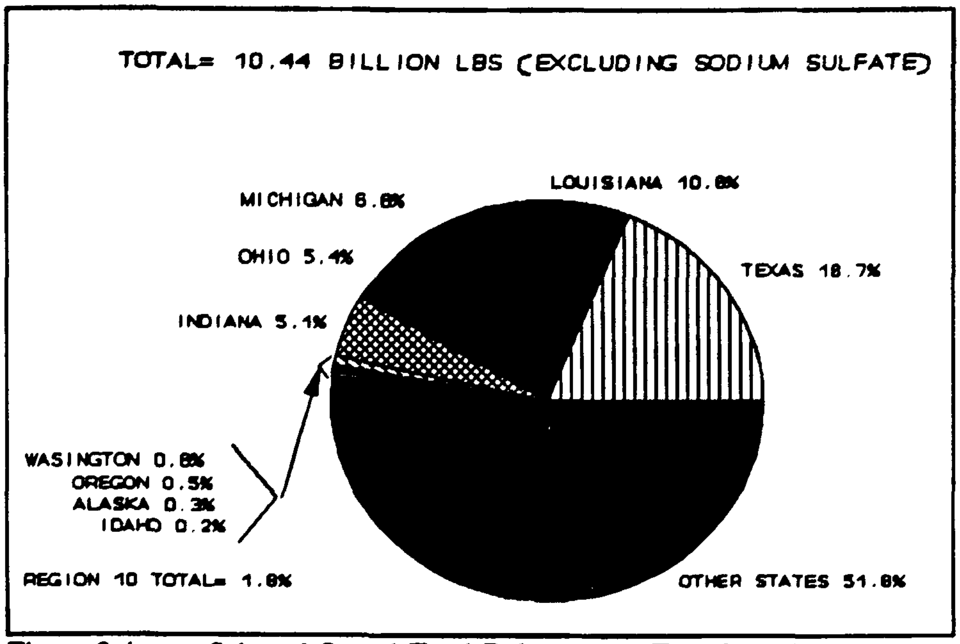

Figure 2-4 Selected States' Total Releases and Transfers without Sodium Sulfate

Table 2-4 Region 10 State Rankings

	For All Chemicals		Without Sodium Sulfate		State Rank	
	Billion Pounds	% US Total	Billion Pounds	% US Total	Without Sodium Sulfate	All Chemicals
Washington	0.41	1.8%	0.08	0.8%	28	17
Oregon	0.12	0.5%	0.05	0.5%	34	32
Alaska	0.07	0.3%	0.04	0.4%	37	42
Idaho	0.04	0.2%	0.02	0.2%	43	35
Region Total	0.64	2.8%	0.19	1.8%		
Other States	21.87	97.2%	10.25	98.2%		
U.S. TOTAL	22.51	100.0%	10.44	100.0%		

The releases for Alaska and Idaho are not as significantly affected by the omission, as neither of these states included facilities reporting large releases of these chemicals. Alaska's relatively high ranking is the result of large releases of ammonia from a single facility.

Figure 2-5 displays the relative sizes of each Region 10 state's total releases and transfers, both with and without the three chemicals. Data presented in later chapters for each state will concentrate on the remaining chemicals, and will omit sodium sulfate, sodium hydroxide and aluminum oxide from most summaries. The Region 10 releases/transfers of other delisted chemicals were negligible, not exceeding 5,000 lb. total.

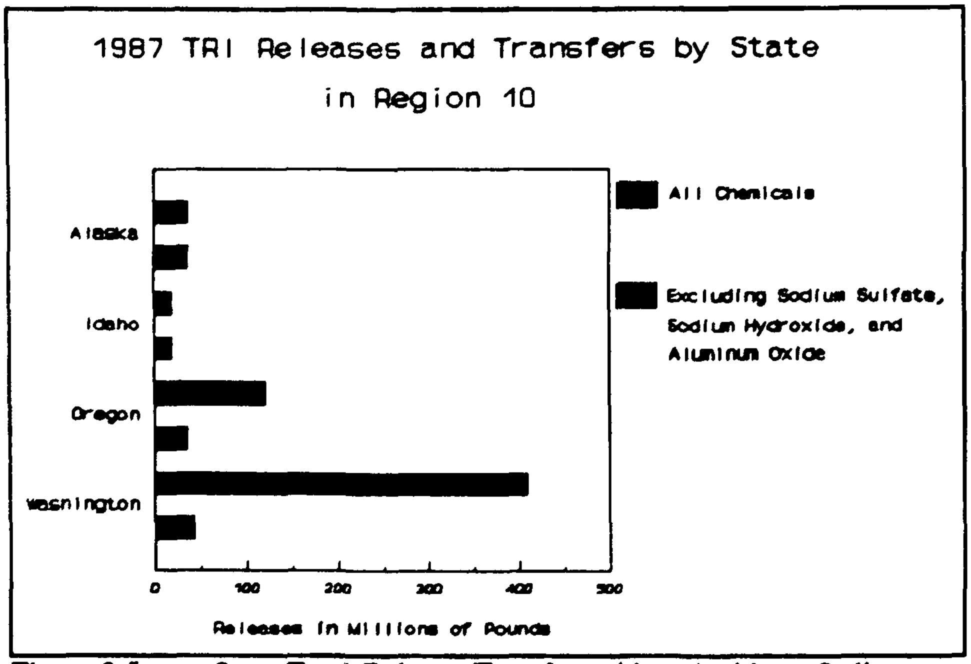

Figure 2-5 State Total Releases/Transfers with and without Sodium Sulfate, Sodium Hydroxide and Aluminum Oxide

Major Industry Categories in Region 10

Nationally, the chemical industry (SIC Code Major Group 28) contributed most to the nation's total TRI releases and transfers. Including all chemicals reported, the paper industry (SIC Code Major Group 26) is the most significant single industry in Region 10 when total releases and transfers are considered. Other major industries in the Region include chemicals (Major Group 28), petroleum (29), primary metals (33), and transportation equipment (37).

When sodium sulfate, sodium hydroxide and aluminum oxide are excluded, the chemical industry becomes the largest, with the paper industry declining to second place. Other major industries include transportation and primary metals. For this case, the total releases and transfers amount to 133 million pounds. Figure 2-6 illustrates the data, while Table 2-5 includes details on releases and transfers. These include data from facilities which reported but which listed SIC Code Major Groups outside 20-39, or who reported no SIC codes at all. In addition, the contractor for the Department of Energy's facility at Hanford, Washington, submitted information on its releases and transfers. It is also interesting to note that, once the three chemicals with extremely large releases to land and water are omitted, the largest fraction of releases occurs to air for the remaining chemicals.

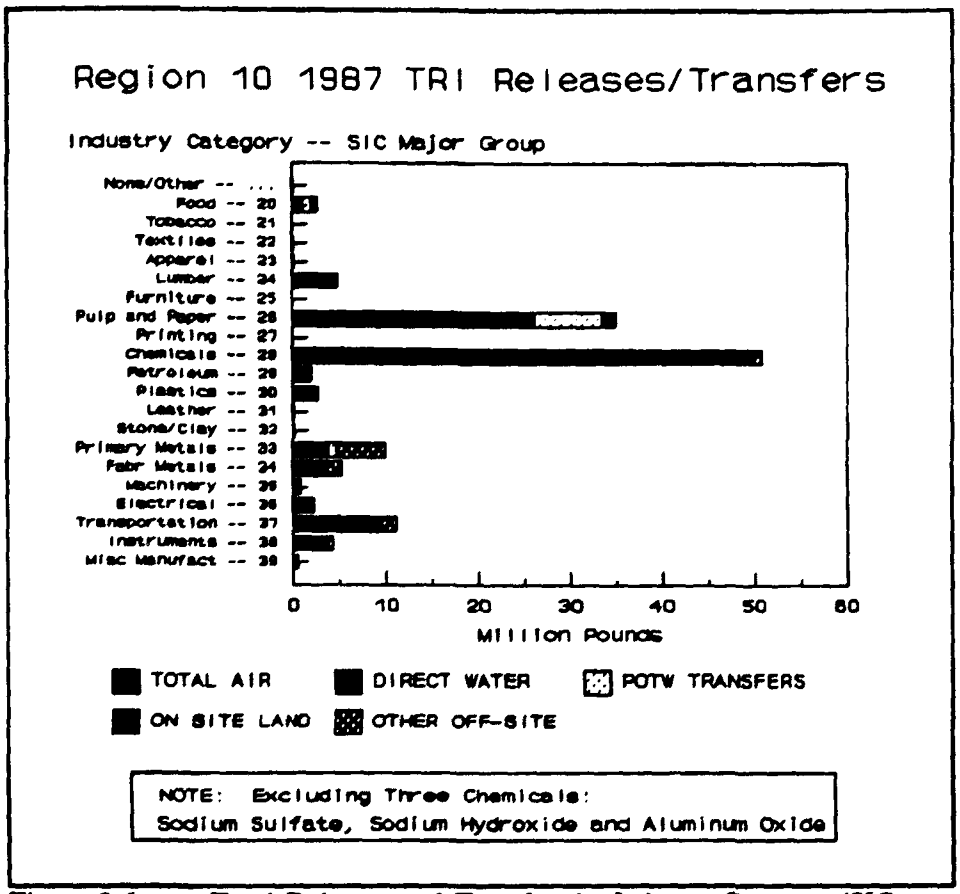

Figure 2-6 Total Releases and Transfers by Industry Category (SIC Code Major Group)

Table 2-5 Region 10 Releases and Transfers by Industry Category (SIC Code Major Group), Excluding Sodium Sulfate, Sodium Hydroxide and Aluminum Oxide

INDUSTRY CLASS	SIC	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
None/Not 20-39	0	90,145	1,000	0	15,000	5,039	111,184	0.1%
Food	20	583,443	443,300	685,250	887,570	43,400	2,642,963	2.0%
Tobacco	21	750	0	0	5,460	0	6,210	0.0%
Textiles	22	23,300	0	0	16,000	0	39,300	0.0%
Apparel	23	28,581	0	0	0	0	28,581	0.0%
Lumber	24	4,672,397	11,119	30,849	1,663	126,833	4,842,861	3.6%
Furniture	25	1,413	0	0	0	0	1,413	0.0%
Paper	26	15,910,761	10,226,878	928,235	7,325,833	576,972	34,968,679	26.2%
Printing	27	15,450	0	0	250	0	15,700	0.0%
Chemicals	28	36,766,067	260,617	12,959,685	51,788	835,621	50,874,028	38.2%
Petroleum	29	1,575,883	262,381	142,236	1,104	3,760	1,985,364	1.5%
Plastics	30	2,506,080	400	0	515	122,936	2,629,931	2.0%
Leather	31	1,250	0	0	72,800	17,500	91,550	0.1%
Stone/Clay	32	29,100	0	2,555	250	22,819	54,724	0.0%
Primary Metals	33	3,636,455	126,184	18,418	857,706	5,250,352	9,889,115	7.4%
Fabr. Metals	34	3,478,078	70,906	1,883	135,074	1,493,442	5,179,383	3.9%
Machinery	35	622,901	0	26,661	11,584	92,847	753,993	0.6%
Electrical	36	488,292	1,031	825,107	369,035	539,869	2,223,334	1.7%
Transportation	37	9,516,121	0	0	6,023	1,605,889	11,128,033	8.3%
Instruments	38	3,531,136	500	0	150,053	517,109	4,198,798	3.2%
Misc. Manuf.	39	496,553	0	12	900	35,250	532,715	0.4%
DOE -- Hanford	49	33,444	0	1,107,950	4,330	7,731	1,153,455	0.9%
TOTAL		84,007,600	11,404,316	16,728,841	9,912,938	11,297,369	133,351,314	100.00%

Major Chemicals in Region 10

Like the rest of the U.S., sodium sulfate accounted for the largest amounts of total releases and transfers in Region 10, with 447 million pounds, or 62% of the total. Other major chemicals in Region 10 include aluminum oxide, with almost 51 million pounds, ammonia with more than 37 million pounds, methanol with more than 15 million pounds, and sodium hydroxide, with about 9 million pounds. The chemicals in the Region with more than one million pounds of total releases and transfers, and their amounts, are listed in Table 2-6. Combined releases and transfers for these chemicals accounted for 97% of the Region's total. Nationally, the top five chemicals were sodium sulfate, aluminum oxide, ammonium sulfate, hydrochloric acid, and sulfuric acid, on the basis of total releases and transfers. As noted previously, some analysis has indicated that the total releases reported for acids and bases may be too high, and that typical widely used treatment methods will often greatly reduce such releases.

Table 2-7 lists the most frequently reported chemicals in order of the number of facilities submitting Form Rs. The five most frequently reported chemicals in the Region were sodium hydroxide, sulfuric acid,

Table 2-6 Region 10 TRI Chemicals with More than One Million Pounds of Releases/Transfers

CAS Number	Chemical Name	Total Air Releases	Direct Water Releases	Water Releases to POTW	On Site Land Disposal	Off Site Releases Exc POTW	Total Environmental Rel/Transfer
7757826	SODIUM SULFATE	1380212	4.1E+08	7616699	4808260	22957061	447427670
1344281	ALUMINUM OXIDE	12042255	652553	4600	32478690	5569690	50747788
7664417	AMMONIA	34176142	1948884	104367	811120	305601	37346114
67561	METHANOL	7142905	18750	7147417	792195	147735	15249002
1310732	SODIUM HYDROXIDE	260180	283700	3682396	2638553	2234845	9099674
7664939	SULFURIC ACID	535258	3753085	996066	2918280	680244	8882933
7647010	HYDROCHLORIC ACID	1266503	4505936	52950	133	419180	6244702
67641	ACETONE	4512594	169292	49515	11560	412139	5155100
78933	METHYL ETHYL KETONE	4458266	31	6643	1000	465857	4931797
108883	TOLUENE	4348719	588	1555	24330	208899	4584091
20199	ZINC COMPOUNDS	494578	10458	0	2505650	1428851	4439537
7723140	PHOSPHORUS	250	0	0	3985000	0	3985250
67663	CHLOROFORM	2991969	339781	160000	4700	148052	3644502
50000	FORMALDEHYDE	2593006	295095	41385	8140	71040	3008666
71556	1,1,1-TRICHLOROETHANE	2632692	2941	250	250	178222	2814355
100425	STYRENE	2569291	0	0	0	33661	2602952
7782505	CHLORINE	2213124	53586	97343	250	3826	2368379
20144	NICKEL COMPOUNDS	16507	2600	750	2201250	6350	2227457
10049044	CHLORINE DIOXIDE	1959546	0	0	0	0	1959546
75092	DICHLOROMETHANE	1566733	0	661	262	240132	1807788
7440666	ZINC (FUME OR DUST)	10342	76	750	570	1660272	1672010
79016	TRICHLOROETHYLENE	1590523	80	302	0	70514	1661419
20064	CHROMIUM COMPOUNDS	20522	13091	1670	1436750	151518	1623551
7664393	HYDROGEN FLUORIDE	1494181	12698	8695	0	48774	1564348
1330207	XYLENE (MIXED ISOMERS)	1344240	14679	1500	36767	117749	1514935
76131	FREON 113	1289738	0	757	0	117990	1408485
7697372	NITRIC ACID	27200	254	631262	4500	499208	1162424
7783202	AMMONIUM SULFATE (SOLUTION)	65	4000	219165	826663	60	1049953

Table 2-7 Chemicals Submitted by 10 or More Facilities, Ranked by Number of Submissions; With Data on Relative Toxicity from the Risk Screening Guide

Number of Submissions	Chemical Name	TPQ Rank	RQ Acute Rank	RQ Carc Rank	IRIS Carc Rank	RQ Chronic Rank	RQ Aquatic Tox Rank	Water Qual Chronic Rank
251	SODIUM HYDROXIDE		3				2	
135	SULFURIC ACID	3	2				2	
105	AMMONIA	2	3			2	1	
87	ACETONE						3	
85	CHLORINE	1	2				1	1
64	XYLENE (MIXED ISOMERS)		3				2	
62	HYDROCHLORIC ACID	2	3				3	
61	1,1,1-TRICHLOROETHANE		3			2	2	
61	TOLUENE		3			2	2	
55	PHOSPHORIC ACID		3				3	
54	METHANOL		3				3	
53	NITRIC ACID	3	2				2	
48	SODIUM SULFATE (SOLUTION)							
43	METHYL ETHYL KETONE		3			2	3	
43	FORMALDEHYDE	2	2	1		1	2	
35	STYRENE		3				2	
32	ALUMINUM OXIDE							
32	FREON 113							
31	DICHLOROMETHANE		3			2	3	
29	TRICHLOROETHYLENE		3	1	1	2	2	3
26	COPPER							1
25	HYDROGEN FLUORIDE	1	2			1	3	
23	CHROMIUM							
23	COPPER COMPOUNDS							
22	MANGANESE							
22	PHENOL	2	3			2	2	2
20	CHROMIUM COMPOUNDS							
19	N-BUTYL ALCOHOL		3					
18	GLYCOL ETHERS							
18	ETHYLENE GLYCOL							
17	METHYL ISOBUTYL KETONE		3					
15	LEAD COMPOUNDS							
14	CHLOROFORM	3	3	1	1		2	2
14	CHLORINE DIOXIDE							
13	BENZENE		3	1	1	2	1	
13	NAPHTHALENE		3				1	1
12	AMMONIUM SULFATE (SOLUTIO							
12	ETHYLBENZENE		3			3	2	
12	LEAD		3		1			1
12	PENTACHLOROPHENOL		1			2	1	1
11	MANGANESE COMPOUNDS							
11	ZINC COMPOUNDS							
10	ZINC (FUME OR DUST)					2		1
10	NICKEL COMPOUNDS							
10	NICKEL		1	1	1	1		1
10	CYCLOHEXANE		3				2	
10	1,2,4-TRIMETHYLBENZENE							0

*** Total ***
1786 Out of 1984 Total Submissions for All Chemicals

ammonia, acetone, and chlorine. The five most frequently reported chemicals nationally were sodium hydroxide, sulfuric acid, toluene, 1,1,1-trichloroethane, and hydrochloric acid. In Region 10, hydrochloric acid ranked seventh in total forms, while 1,1,1-trichloroethane was eighth and toluene was ninth.

Identifying the Most Significant Chemicals

Not all of the chemicals reportable under Section 313 are highly toxic. The Office of Toxic Substances, with review and input from other EPA offices, States, and public groups, has developed the Toxic Chemical Release Inventory Risk Screening Guide for TRI data. The Guide provides a series of methods for evaluating the potential for exposure and risk of various chemicals, facilities, and geographic areas relative to one another. That is, the Guide provides a way to set priorities for further study. The present TRI data alone cannot be used to develop risk estimates. Substantial amounts of non-TRI data, and a thorough review of TRI data quality, are needed before attempting to quantify risk to human health and the environment from TRI releases and transfers.

The Guide includes sets of data for TRI chemicals, including toxicity ranks and environmental fate information. The toxicity tables are based on data collected by EPA and evaluated by EPA scientists. The Guide also provides references to consult for additional information on the toxicity and regulatory status of TRI chemicals.

Other portions of EPCRA focus on different, but overlapping, lists of chemicals. Section 302 lists certain acutely hazardous chemicals. When companies manufacture or use more than specified amounts of these chemicals over the course of a year, provisions requiring company emergency planning and notification of local and state officials are triggered. These "threshold planning quantities" (TPQs) are based on a chemical's acute toxicity and potential for accidental release in typical conditions of industrial use.

Under the provisions of Section 304 of EPCRA, releases of certain chemicals above specified quantities are reportable each time they occur. These "reportable quantities" (RQs), in pounds, provide another way of relatively ranking the potential toxicity of the chemicals.

Many of the TRI chemicals are also subject to the provisions of Sections 302 and 304, so the TPQs and RQs for these substances provide a useful data collection. EPA has collected and evaluated other important toxicity information to be placed in the on-line Integrated Risk Information System (IRIS), and in developing EPA water quality standards. All of these sources were reviewed and used in developing the toxicity rankings in the Guide.

The toxicity rankings display the chemicals' *relative* toxicity potential in the form of "high-medium-low" classes, displayed in the Guide and in Table 2-7 as 1-2-3, with 1 being the highest. There are separate rankings for each of several toxicity effects of concern, including acute toxicity, chronic toxicity, carcinogenic potential, and freshwater acute and chronic toxicity to plants and animals. Users are encouraged to review the chemicals in their communities from a variety of toxicity perspectives. Some effects were not considered in developing these ranks, in particular, the potential a chemical may present for stratospheric ozone depletion. The chemical class of chlorofluorocarbons (CFCs) have one member, CFC (or Freon) 113, which is often reported in Region 10, primarily due to its use in the electronics industry. This chemical, along with other major CFCs, has been proposed for world-wide phase out in the future. The chemical 1,1,1,-trichloroethane is another chemical without any toxicity data present which is now considered to be a potentially significant stratospheric ozone depleter. Its effects, while less pronounced than CFCs, are compounded by its widespread use as a cleaning compound in many industries.

In this analysis, the focus is on chemicals with concern for carcinogenic potential. As noted in the Guide, the evidence for each chemical is different: some have strong evidence of activity, while others may have some positive evidence with many remaining uncertainties. In some cases, such evidence exists, but the chemicals are still under review within EPA, and no scientific consensus has been developed. An example of this situation is dichloromethane, which was included in over 30 reports from Region 10 facilities. Thus, the chemicals listed below are not an exhaustive list of potential carcinogens which are subject to TRI reporting.

The Guide encourages users to review the evidence for specific chemicals in detail as their analyses may require. For the purpose of risk screening, all such chemicals with some evidence of carcinogenicity may be considered of relatively high priority for further study. This study focuses on all chemicals identified in the Guide as having some carcinogenic potential.

A chemical's *toxicity* is not the only factor influencing risk. The Guide describes a process for evaluating the potential for *exposure* to humans and ecosystems from TRI releases as well. Such factors as facility location, size, proximity to water, density of surrounding populations and wind patterns can significantly influence exposure. Probably the largest single influence is the size and form of chemical releases. Chemicals released directly to air or water are more likely to come in contact with human or animal populations than those which are disposed of in landfills, or those transferred to off-site disposal facilities.

If releases occur in sparsely populated areas, there is more likely to be significant dilution, dispersion or biodegradation of chemicals prior to humans coming in contact with them. Some chemicals naturally degrade more rapidly than others. By using the total releases and transfers of TRI chemicals as a surrogate for exposure, the analysis presented here neglects several potentially important factors. However, this approach can still help the reader to identify a shorter list of facilities, locations or chemicals for further investigation.

Table 2-8 lists some potentially carcinogenic chemicals reported by TRI facilities in Region 10, ranked by the total amount of releases and transfers. The table also includes their identification numbers and indication of whether the chemical has been identified as a potential carcinogen based on data in the EPA Integrated Risk Information System (IRIS) or data collected in developing reportable quantity (RQ) values. In further studies of individual chemicals or facilities, the toxicity data may warrant review. In all, 18 potentially carcinogenic chemicals were reported as being released or transferred, and for 14 of these chemicals the total releases and transfers were greater than 1,000 pounds. It was not possible to evaluate the metal compound classes, since these may be composed of many chemicals, of which some may exhibit carcinogenic potential while others do not.

Major TRI Facilities in Region 10

For the 1987 reporting year, 583 facilities in Region 10 filed a total of 1984 reports on over 120 chemicals or chemical classes. As noted earlier, many of these chemicals are not considered highly toxic. Others,

Table 2-8 Potentially Carcinogenic Chemicals Reported in 1987 (lb.) and Toxicity Concern Ranks

CAS Number	Chemical Name	Total Air Releases	Direct Water Releases	Water Releases to POTWs	On Site Land Releases	Off-Site Transfers Not to POTW	Total Releases Transfers (All Media)	RQ PC	IRIS Carc
67663	CHLOROFORM	2991969	339781	160000	4700	148052	3644502	1	1
50000	FORMALDEHYDE	2593006	295095	41385	8140	71040	3008666	1	.
79016	TRICHLOROETHYLENE	1590523	80	302	0	70514	1661419	1	1
71432	BENZENE	459709	654	250	4700	374	465687	1	1
127184	TETRACHLOROETHYLENE	181286	0	0	0	1789	183075	1	.
1336363	POLYCHLORINATED BIPHENYLS	250	0	0	0	130012	130262	1	1
7439921	LEAD	6740	590	1950	1260	69633	80173	.	1
117817	DI(2-ETHYLHEXYL) PHTHALATE	40600	400	0	0	270	41270	1	.
79005	1,1,2-TRICHLOROETHANE	38000	0	0	0	750	38750	1	1
85687	BUTYL BENZYL PHTHALATE	383	0	0	0	31409	31792	.	1
95501	1,2-DICHLOROBENZENE	5940	7260	0	0	7260	20460	.	1
1332214	ASBESTOS (FRIABLE)	799	0	319	250	11266	12634	1	1
7440020	NICKEL	1893	0	500	1410	3433	7236	1	1
106898	EPICHLOROHYDRIN	1636	0	250	0	0	1886	1	.
302012	HYDRAZINE	0	0	0	20	870	890	1	.
58899	LINDANE	250	0	0	0	500	750	1	1
75218	ETHYLENE OXIDE	500	0	0	0	0	500	1	.
7440439	CADMIUM	4	0	0	0	0	4	1	1
*** Total ***		7,913,488	643,860	204,956	20,480	547,172	9,329,956		

however, represent a higher priority for further investigation. Based on the toxicity "high-medium-low" rankings of the Risk Screening Guide, several classes of substances could be selected for further study, e.g., those expected to be acutely toxic, potentially carcinogenic, or particularly toxic to aquatic organisms.

Table 2-9 shows the total releases and transfers for SIC Major Groups when only the potentially carcinogenic chemicals are considered. The dominant industries in this analysis are the paper (43% of total releases and transfers) and the lumber (25% of the total) industries. These chemicals are largely released to air, with nearly 85% of the total releases and transfers going to air (combining both stack and fugitive air releases). The same data are illustrated as a bar chart in Figure 2-7.

Table 2-10 lists the facilities releasing or transferring more than 30,000 pounds of potentially carcinogenic chemicals. These chemicals are not necessarily the only ones to be concerned about, but they provide an initial set of priority chemicals for analysis. These figures combine the releases and transfers of different chemicals to different environmental media, each with its own properties and potential toxicity concerns. The quality and amount of evidence of carcinogenicity for the chemicals varies widely, as may the potential for exposure to releases or transfers from these facilities. These summations are only intended to provide an initial method for screening facilities which may warrant further study. No specific conclusions regarding actual risk can reasonably be drawn from such crude data.

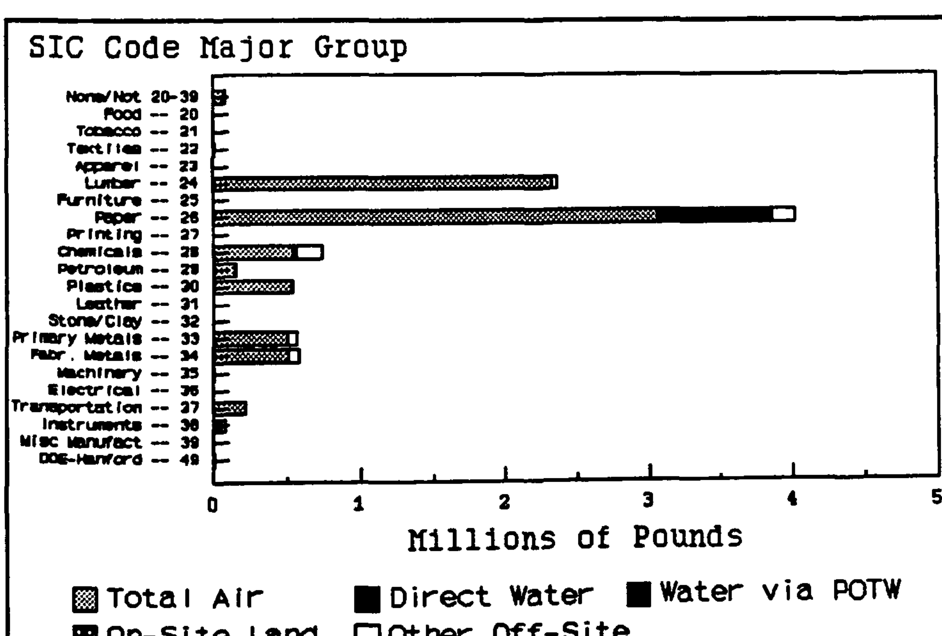

Figure 2-7 Region 10 Releases and Transfers of Potential Carcinogens by Industry Category (SIC Code Major Group)

Table 2-9 Region 10 Releases and Transfers of Potential Carcinogens by Industry Category (SIC Code Major Group), lb.

INDUSTRY CLASS	SIC	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Trans	Percent of Total
None/Not 20-39	0	74,033	250	0	0	1,779	76,062	0.8%
Food	20	500	0	0	250	250	1,000	0.0%
Tobacco	21	0	0	0	0	0	0	0.0%
Textiles	22	4,500	0	0	0	0	4,500	0.0%
Apparel	23	0	0	0	0	0	0	0.0%
Lumber	24	2,322,187	0	1,000	500	42,304	2,365,991	25.4%
Furniture	25	0	0	0	0	0	0	0.0%
Paper	26	3,057,027	639,959	7,840	160,000	149,818	4,014,644	43.0%
Printing	27	0	0	0	0	0	0	0.0%
Chemicals	28	539,166	2,517	4,000	12,999	179,181	737,863	7.9%
Petroleum	29	141,132	654	5,700	569	624	148,679	1.6%
Plastics	30	521,737	400	0	250	10,579	532,966	5.7%
Leather	31	0	0	0	0	0	0	0.0%
Stone/Clay	32	0	0	0	0	0	0	0.0%
Primary Metals	33	501,252	80	200	300	56,432	558,264	6.0%
Fabr. Metals	34	508,964	0	250	1,952	74,005	585,171	6.3%
Machinery	35	634	0	960	1,136	1,210	3,940	0.0%
Electrical	36	1,006	0	0	0	0	1,006	0.0%
Transportation	37	213,850	0	0	0	3,050	216,900	2.3%
Instruments	38	26,600	0	0	27,000	27,000	80,600	0.9%
Misc Manufact	39	0	0	0	0	0	0	0.0%
DOE-Hanford	49	900	0	530	0	940	2,370	0.0%
Total		7,913,488	643,860	20,480	204,956	547,172	9,329,956	

Reflecting the economic focus of the Region, most of the companies are involved in the production of paper, wood products, chemicals, petroleum refining or transportation equipment. Seven out of the top ten facilities are primarily engaged in producing paper and allied products.

The large areas of relatively pristine forest, atmospheric, freshwater and marine environments in the Region 10 coastal states highlight the advisability of performing further analysis on chemicals and/or facilities of possible concern. Additional analyses could focus on other effects of concern, such as aquatic toxicity, or could evaluate the impacts of large chemical loadings to estuaries from across a wide area.

Releases by City and County

Table 2-11 presents the cities in Region 10 with total releases and transfers of more than 1 million pounds for all chemicals except sodium sulfate, sodium hydroxide and aluminum oxide. Many of the locations are included because of relatively large releases from a single facility. For example, the Unocal facility in Kenai, Alaska, ranks as one of the largest releasers of ammonia in the U.S.

Table 2-10 Facilities With More Than 30,000 lb. of Total Releases or Transfers of Chemicals Ranked as Possible Carcinogens

Company Name	City	ST	Total Air Releases	Direct Water Releases	Water Releases to POTWs	On Site Land Disposal	Off Site Releases Excl POTWs	Total Environ Rel/Tran	Perc of Total
WEYERHAEUSER COMPANY	KLAMATH FALLS	OR	1,749,533	0	0	0	54	1,749,587	18.8%
POTLATCH CORPORATION	LEWISTON	ID	710,000	9,000	0	0	0	719,000	7.7%
SIMPSON TACOMA KRAFT	TACOMA	WA	380,490	89,000	0	0	9,974	479,464	5.1%
EVANITE FIBER CORP.	CORVALLIS	OR	467,600	400	0	0	270	468,270	5.0%
LONGVIEW FIBRE CO.	LONGVIEW	WA	103,600	307,000	0	0	0	410,600	4.4%
JAMES RIVER II, INC.	CLATSKANIE	OR	307,250	14,880	0	4,690	0	326,820	3.5%
BOISE CASCADE PAPERS	ST. HELENS	OR	160,200	0	160,000	0	0	320,200	3.4%
KALAMA CHEMICAL INC.	KALAMA	WA	317,000	0	0	0	0	317,000	3.4%
BOISE CASCADE PAPER	WALLA WALLA	WA	278,298	4,271	0	0	0	282,569	3.0%
WEYERHAEUSER COMPANY	LONGVIEW	WA	195,250	64,000	0	0	11,250	270,500	2.9%
JAMES RIVER II, INC.	CAMAS	WA	186,200	23,800	0	250	0	210,250	2.3%
WACKER SILTRONIC CORP.	PORTLAND	OR	207,000	80	50	0	0	207,130	2.2%
KETCHIKAN PULP CO.	KETCHIKAN	AK	150,000	54,000	0	0	0	204,000	2.2%
WEYERHAEUSER	EVERETT	WA	184,967	9,198	0	2,900	0	197,065	2.1%
JAMES RIVER CORP.	HALSEY	OR	171,200	8,500	0	0	10,961	190,661	2.0%
SCOTT PAPER COMPANY	EVERETT	WA	180,000	5,400	0	0	0	185,400	2.0%
OCCIDENTAL CHEMICAL	TACOMA	WA	77	922	0	0	176,891	177,890	1.9%
LARGE STRUCTURE BUS	PORTLAND	OR	162,210	0	0	0	144	162,354	1.7%
THE BOEING COMPANY	RENTON	WA	160,250	0	0	0	0	160,250	1.7%
SMURFIT NEWSPRINT CORP	OREGON CITY	OR	6,190	7,260	0	0	97,734	111,184	1.2%
OMARK INDUSTRIES	MILWAUKIE	OR	80,050	0	0	0	26,025	106,075	1.1%
MEDITE CORPORATION	MEDFORD	OR	63,700	0	250	0	42,000	105,950	1.1%
DAVIS WALKER CORP.	KENT	WA	65,250	0	250	0	23,050	88,550	0.9%
LOUISIANA-PACIFIC CORP	ATHOL	ID	83,531	0	0	0	0	83,531	0.9%
GEORGIA-PACIFIC RESINS	MILLERSBURG	OR	81,200	3	0	0	0	81,203	0.9%
WILLAMETTE IND DURAFL	ALBANY	OR	76,190	0	0	0	0	76,190	0.8%
ISLAND CITY PARTICLEBD	LEGRANDE	OR	74,576	0	0	0	0	74,576	0.8%
SMALL STRUCTURES BUS	CLACKAMAS	OR	56,813	0	0	0	17,118	73,931	0.8%
LYNN INDUSTRL COATINGS	BOISE	ID	71,956	0	0	0	1,779	73,735	0.8%
ROSEBURG FOREST PROD	RIDDLE	OR	73,500	0	0	0	0	73,500	0.8%
WILLAMETTE IND KORPINE	BEND	OR	66,280	0	0	0	0	66,280	0.7%
EMARK INC.	LEBANON	OR	54,137	0	250	0	10,309	64,696	0.7%
WESTERN PNEUMATIC TUBE	KIRKLAND	WA	64,000	0	0	0	0	64,000	0.7%
INDUSTRIAL PLATING	SEATTLE	WA	40,100	0	0	0	18,480	58,580	0.6%
BORDEN, INC. CHEMICAL	SPRINGFIELD	OR	48,839	0	9,500	0	0	58,339	0.6%
ASKO PROCESSING, INC.	SEATTLE	WA	47,996	0	0	0	4,480	52,476	0.6%
TEKTRONIX, INC.	BEAVERTON	OR	24,300	0	27,000	0	0	51,300	0.5%
TEMCO INC.	CLACKAMAS	OR	50,800	0	0	0	0	50,800	0.5%
GEORGIA-PACIFIC CORP.	TOLEDO	OR	21,000	28,350	0	0	0	49,350	0.5%
GERBER LENGEND BLADES	PORTLAND	OR	47,340	0	0	0	0	47,340	0.5%
BOEING AEROSPACE	KENT	WA	38,000	0	0	0	750	38,750	0.4%
NORTHWEST PLATING CO.	SEATTLE	WA	35,750	0	0	0	1,500	37,250	0.4%
ROSEBURG FOREST PROD	ROSEBURG	OR	32,934	0	0	0	0	32,934	0.4%
ROSEBURG FOREST PROD	COQUILLE	OR	31,500	0	0	0	0	31,500	0.3%
ARCO CHERRY POINT REFI	FERNDALE	WA	31,001	6	0	440	0	31,447	0.3%
Facilities > 30,000 lb.			7,438,058	626,070	197,300	8,280	452,769	8,722,477	93.5%
All Facilities			7,913,488	643,860	204,956	20,480	547,172	9,329,956	100.0%

In addition, some locations are included because of relatively high quantities of chemicals going to on-site land disposal or to off-site transfer. As mentioned previously, releases to permitted land disposal facilities, whether on- or off-site, may be assumed to present a smaller probability of exposure to significant chemical concentrations than releases made directly to air or water. Releases to POTWs can also be

Table 2-11 Region 10 Cities with TRI Releases/Transfers of More than One Million Lb., Excluding Sodium Sulfate, Sodium Hydroxide and Aluminum Oxide

ST	City Name	County	Total Air	Direct Water	On Site Land	Water via POTW	Other Off-Site	Total Rel/Trans
AK	KENAI	KENAI-COOK INLET	30,320,680	214,111	13,930	0	0	30,548,721
ID	SODA SPRINGS	CARIBOU	803,050	11,050	8,841,900	0	0	9,656,000
OR	ST. HELENS	COLUMBIA	1,095,630	23,000	0	7,325,818	4,618	8,449,066
OR	PORTLAND	MULTNOMAH	4,056,944	24,236	13,185	73,409	2,527,298	6,695,072
AK	KETCHIKAN	KETCHIKAN	1,383,500	5,007,500	0	0	0	6,391,000
WA	SEATTLE	KING	3,249,492	1,314	3,538	40,174	1,789,518	5,084,036
ID	POCATELLO	POWER	728,461	0	4,093,200	56,992	55,900	4,934,553
WA	LONGVIEW	COWLITZ	4,339,489	496,300	0	1,135	26,040	4,862,964
WA	COSMOPOLIS	GRAYS HARBOR	301,250	3,351,400	750	0	52,150	3,705,550
OR	WHITE CITY	JACKSON	3,471,309	0	0	120,615	6,818	3,598,742
WA	TACOMA	PIERCE	2,281,370	128,414	500	517	445,971	2,857,022
WA	RENTON	KING	2,724,854	0	27,466	1,100	51,211	2,804,631
WA	SPOKANE	SPOKANE	2,527,274	314	6,200	860	34,860	2,569,508
WA	EVERETT	SNOHOMISH	2,069,335	19,928	26,495	2,983	419,333	2,538,074
OR	KLAMATH FALLS	KLAMATH	2,215,359	0	0	0	54	2,215,413
OR	CLATSKANIE	CLATSOP	1,147,950	143,380	886,190	0	0	2,177,520
WA	KENT	KING	1,614,639	0	0	5,698	444,708	2,065,045
ID	LEWISTON	NEZ PERCE	1,709,450	108,000	0	12,918	37,371	1,867,739
OR	MCMINNVILLE	YAMHILL	27,202	0	0	250	1,840,000	1,867,452
WA	AUBURN	KING	1,081,292	56,795	0	7,068	705,482	1,850,637
WA	KENNEWICK	BENTON	1,346,517	14,843	2,050	0	0	1,363,410
ID	BOISE	ADA	361,088	499	818,907	26,334	125,936	1,332,764
WA	WALLA WALLA	WALLA WALLA	991,510	111,455	0	39,975	18,163	1,161,103
WA	RICHLAND	BENTON	34,194	0	1,107,950	9,790	7,731	1,159,665
WA	CAMAS	CLARK	941,450	79,200	13,800	0	49,800	1,084,250
OR	ALBANY	LINN	856,149	60,085	1,000	0	134,600	1,051,834
WA	VANCOUVER	CLARK	401,964	58,500	18	214,527	347,291	1,022,300
Media Totals								
	Cities >1 Million Lb.		72,081,402	9,910,324	15,857,079	7,940,163	9,124,853	114,914,071
	Large City Fraction							86.2%
	All Cities		84,007,600	11,404,316	16,728,841	9,912,938	11,297,369	133,351,314
	Media Fraction		63.0%	8.6%	12.5%	7.4%	8.5%	100.0%

expected to decrease, probably significantly, as a result of biological treatment.

Table 2-12 presents city summaries of the TRI data for chemicals which are ranked as potential carcinogens in the Risk Screening Guide. The list includes cities with at least 50,000 pounds of total chemical releases and transfers of these chemicals. This list is in many ways similar to the one for all chemicals, but in other ways it varies by including new cities, or ranking certain cities higher in the list. For example, the cities of Kenai, AK, and Soda Springs, ID, the two cities with the largest total releases and transfers in Table 2-11, do not appear at all in Table 2-12. Based on the chemicals considered in Table 2-12, other cities which drop low on the priority list include Pocatello, ID, and White City, OR. Cities which figure prominently in Table 2-12, but which were not included in Table 2-11, include Corvallis, West Linn, and Halsey, OR, and Kalama, WA.

Table 2-12 Cities in Region 10 Ranked by Total Releases and Transfers of Potential Carcinogens

ST	City Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
OR	KLAMATH FALLS	1,749,533	0	0	0	54	1,749,587	18.8%
ID	LEWISTON	710,250	9,000	0	1,700	15,100	736,050	7.9%
WA	LONGVIEW	302,320	371,000	0	850	11,570	685,740	7.3%
WA	TACOMA	396,716	89,922	0	0	188,615	675,253	7.2%
OR	CORVALLIS	467,600	400	0	0	270	468,270	5.0%
WA	EVERETT	380,567	14,598	2,900	0	2,300	400,365	4.3%
OR	PORTLAND	387,872	80	0	869	894	389,715	4.2%
OR	WEST LINN	307,250	14,880	4,690	0	19,149	345,969	3.7%
OR	ST. HELENS	160,450	0	0	160,000	0	320,450	3.4%
WA	KALAMA	317,000	0	0	0	0	317,000	3.4%
WA	WALLA WALLA	278,798	4,271	0	0	750	283,819	3.0%
WA	CAMAS	186,200	23,800	250	0	0	210,250	2.3%
AK	KETCHIKAN	150,000	54,000	0	0	0	204,000	2.2%
WA	SEATTLE	174,094	0	500	502	27,030	202,126	2.2%
OR	HALSEY	171,200	8,500	0	0	10,961	190,661	2.0%
WA	RENTON	160,634	0	960	0	960	162,554	1.7%
WA	KENT	118,596	0	0	2,150	23,800	144,546	1.5%
OR	CLACKAMAS	117,613	0	0	0	17,118	134,731	1.4%
OR	MILWAUKIE	89,056	0	0	0	40,172	129,228	1.4%
OR	MEDFORD	78,405	0	750	250	42,000	121,405	1.3%
OR	OREGON CITY	6,190	7,260	0	0	97,734	111,184	1.2%
OR	DILLARD	109,734	0	0	0	0	109,734	1.2%
OR	LEBANON	83,857	0	0	250	10,309	94,416	1.0%
ID	ATHOL	83,531	0	0	0	0	83,531	0.9%
WA	FERNDALE	79,001	506	2,190	0	0	81,697	0.9%
OR	MILLERSBURG	81,200	3	0	0	0	81,203	0.9%
OR	BEAVERTON	26,600	0	0	27,000	27,000	80,600	0.9%
OR	ALBANY	76,190	0	0	0	0	76,190	0.8%
OR	SPRINGFIELD	65,089	1,300	0	9,500	0	75,889	0.8%
ID	BOISE	71,956	0	0	1,136	1,779	74,871	0.8%
OR	LEGRANDE	74,576	0	0	0	0	74,576	0.8%
OR	BEND	66,280	0	0	0	0	66,280	0.7%
WA	KIRKLAND	64,000	0	0	0	0	64,000	0.7%
	Media Totals							
	Cities > 50,000 lb	7,592,358	599,520	12,240	204,207	537,565	8,945,890	95.9%
	All Cities	7,913,488	643,860	20,480	204,956	547,172	9,329,956	100.0%

Table 2-13 summarizes the TRI data for Region 10 counties with more than 1,000,000 pounds of total releases and transfers of TRI chemicals, excluding sodium sulfate, sodium hydroxide and aluminum oxide. The highlighted geographic areas, while similar to those in Table 2-12, also indicate that, when the data for adjacent cities are summed to the county level, new priorities may emerge. These data are also displayed as a map in Figure 2-8. The counties were separated into four groups, each with an approximately equal number of counties in them. Each group therefore contains one quarter of the total number of counties. Counties in the lowest quartile all had total releases and transfers of TRI chemicals less than 19,400 pounds.

Table 2-13 Region 10 Counties with TRI Releases/Transfers of More than One Million Lb., Excluding Sodium Sulfate, Sodium Hydroxide and Aluminum Oxide

ST	County	Total Air	Direct Water	On-Site Land	Water via POTW	Other Off-Site	Total Rel/Trans	Percent of Total
AK	KENAI-COOK INLET	30,320,680	214,111	13,930	0	0	30,548,721	22.9%
WA	KING	8,284,264	314	31,016	141,202	2,586,770	11,043,566	8.3%
ID	CARIBOU	803,800	11,050	8,841,900	0	0	9,656,750	7.2%
OR	COLUMBIA	1,095,630	23,000	0	7,325,818	4,618	8,449,066	6.3%
OR	MULTNOMAH	4,296,877	10,473	13,185	73,442	2,584,689	6,978,666	5.2%
AK	KETCHIKAN	1,383,500	5,007,500	0	0	0	6,391,000	4.8%
WA	COWLITZ	5,356,331	496,421	0	1,135	39,124	5,893,011	4.4%
ID	POWER	706,461	0	4,093,200	0	0	4,799,661	3.6%
WA	PIERCE	3,373,828	186,209	2,000	1,517	1,151,883	4,715,687	3.5%
WA	GRAYS HARBOR	617,543	3,655,100	750	20,000	54,000	4,347,393	3.3%
OR	JACKSON	3,614,115	0	2,800	120,865	72,969	3,810,749	2.9%
WA	SPOKANE	2,987,774	314	7,700	860	34,860	3,031,508	2.3%
WA	SNOHOMISH	2,158,716	20,928	26,995	2,233	432,433	2,641,305	2.0%
WA	BENTON	1,395,156	15,343	1,110,000	9,790	7,731	2,538,020	1.9%
OR	KLAMATH	2,215,359	0	0	0	54	2,215,413	1.7%
OR	CLATSOP	1,147,950	143,380	886,190	0	0	2,177,520	1.6%
OR	LINN	1,934,374	74,404	1,000	250	155,929	2,165,957	1.6%
WA	CLARK	1,364,714	142,950	19,618	214,527	402,815	2,144,624	1.6%
OR	CLACKAMAS	590,855	45,666	3,200	584,634	911,812	2,136,167	1.6%
OR	YAMHILL	213,574	9,300	19,709	250	1,864,642	2,107,475	1.6%
ID	NEZ PERCE	1,709,450	108,000	0	12,918	37,371	1,867,739	1.4%
ID	ADA	361,088	499	818,907	26,334	125,936	1,332,764	1.0%
OR	WASHINGTON	556,179	500	0	284,723	460,327	1,301,729	1.0%
WA	WALLA WALLA	1,038,940	111,455	0	39,975	18,163	1,208,533	0.9%
WA	WHATCOM	883,604	145,015	28,539	250	29,100	1,086,508	0.8%
Counties >1,000,000 pounds		78,410,762	10,421,932	15,920,639	8,860,723	10,975,226	124,589,532	93.4%
All Counties		84,007,600	11,404,316	16,728,841	9,912,938	11,297,369	133,351,314	100.0%

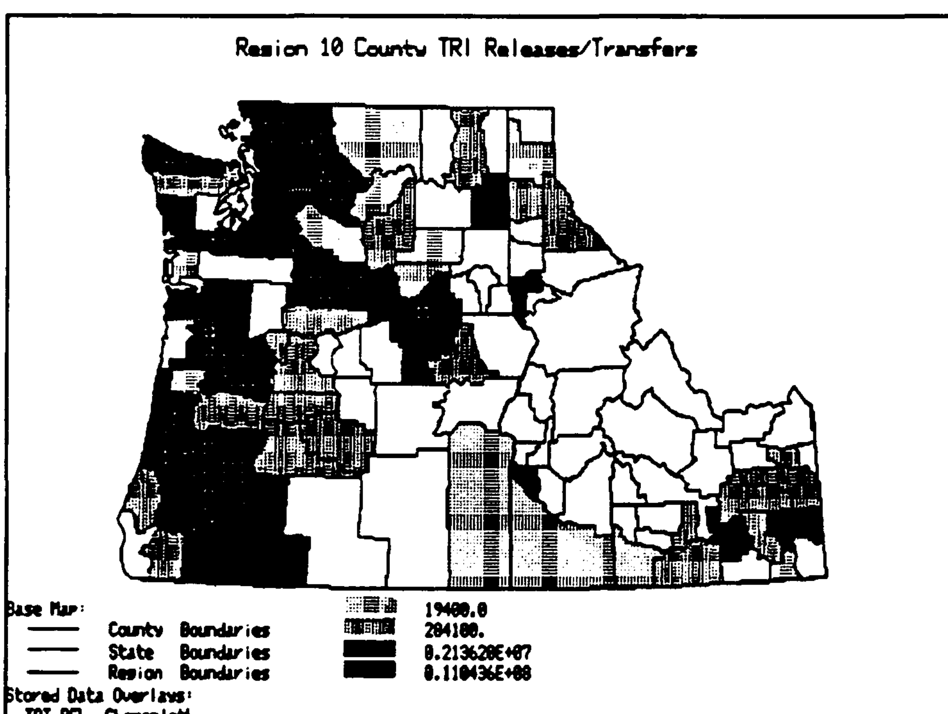

Figure 2-8 Region 10 Total Releases and Transfers by County

Table 2-14 Region 10 Counties with More Than 100,000 lb. Total Releases and Transfers of Potential Carcinogens

ST	County Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
OR	KLAMATH	1,749,533	0	0	0	54	1,749,587	18.8%
WA	COWLITZ	619,320	371,000	0	850	11,570	1,002,740	10.7%
ID	NEZ PERCE	710,250	9,000	0	1,700	15,100	736,050	7.9%
OR	CLACKAMAS	520,109	22,140	4,890	0	174,173	721,312	7.7%
WA	PIERCE	407,824	89,922	0	0	188,615	686,361	7.4%
WA	KING	517,324	0	1,460	2,652	51,790	573,226	6.1%
OR	BENTON	467,600	400	0	0	270	468,270	5.0%
OR	LINN	412,447	8,503	0	250	21,270	442,470	4.7%
WA	SNOHOMISH	382,644	14,848	2,900	0	2,300	402,692	4.3%
OR	MULTNOMAH	387,872	80	0	869	894	389,715	4.2%
OR	COLUMBIA	160,450	0	0	160,000	0	320,450	3.4%
WA	WALLA WALLA	278,798	4,271	0	0	750	283,819	3.0%
WA	CLARK	199,350	24,550	250	0	1,000	225,150	2.4%
AK	KETCHIKAN	150,000	54,000	0	0	0	204,000	2.2%
OR	JACKSON	101,705	0	750	250	42,500	145,205	1.6%
OR	WASHINGTON	73,940	0	0	27,000	27,000	127,940	1.4%
OR	DOUGLAS	109,734	0	0	0	0	109,734	1.2%
	Media Totals							
	Counties > 100,000 lb	7,248,900	598,714	10,250	193,571	537,286	8,588,721	92.1%
	All Counties	7,913,488	643,860	20,480	204,956	547,172	9,329,956	100.0%

Table 2-14 summarizes the TRI data for counties with more than 100,000 pounds of total releases and transfers of potential carcinogens. This list is significantly different from the previous table, although it is similar to the list of cities in Table 2-12. These data are displayed in a map in Figure 2-9. These counties were also grouped into four classes, but there are fewer in each class because many counties displayed in Figure 2-8 had no releases of these chemicals reportable under TRI.

It is important to remember that not everyone living in these counties or cities is equally exposed to these releases and transfers. Further, these data by themselves do not indicate what level of exposure or risk of contracting cancer may be present, or whether such levels are significant. This information is intended simply to summarize the geographic distribution of the releases and transfers of chemicals of special interest to indicate where follow up activities may be most fruitful.

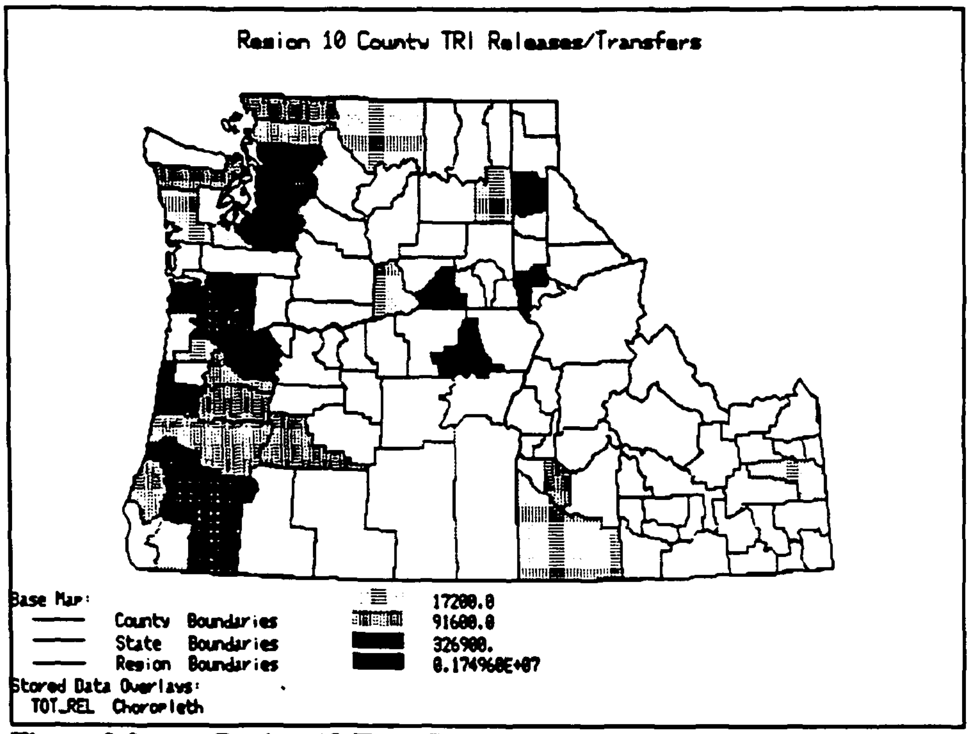

Figure 2-9 Region 10 Total Releases and Transfers of Potential Carcinogens by County

Chapter 3: Washington Summary for 1987

In 1987, 306 facilities submitted forms, and collectively reported releases and transfers of TRI chemicals in Washington State totalling more than 409 million pounds. However, when sodium sulfate, sodium hydroxide, and aluminum oxide are omitted, the total drops to 42 million pounds. Figure 3-1 displays a pie chart of the remaining total releases and transfers by release medium, e.g., releases to water, to off-site transfers, etc. In most cases, it is difficult to assess the ultimate destination and

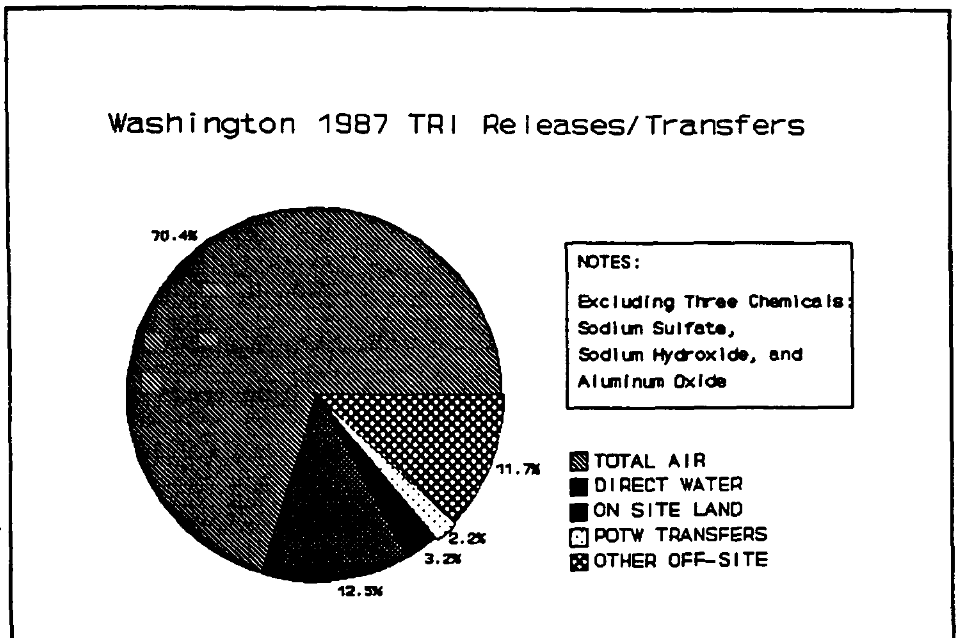

Figure 3-1 Washington TRI Releases/Transfers by Release Medium

release potential of the off-site transfers. While TRI submitters provide the name and address of receiving facilities, it is not always possible to unambiguously identify the receiving facilities and their specific locations, especially POTWs.

Table 3-1 lists the chemicals reported on by more than five facilities. The five most frequently reported chemicals were sodium hydroxide, sulfuric acid, ammonia, acetone and chlorine. Table 3-1 also includes the "high-medium-low" type ranking factors for chemical toxicity as discussed previously.

Table 3-1 TRI Chemicals for Washington with Toxicity Ranks from the Risk Screening Guide

Number of Reports	Chemical Name	TPQ Rank	RQ Acute Rank	RQ Carc Rank	IRIS Carc Rank	RQ Chronic Rank	RQ Aquatic Tox Rank	Water Qual Chronic Rank
120	SODIUM HYDROXIDE		3				2	
73	SULFURIC ACID	3	2				2	
58	AMMONIA	2	3			2	1	
49	ACETONE						3	
48	CHLORINE	1	2				1	1
38	XYLENE (MIXED ISOMERS)		3				2	
37	1,1,1-TRICHLOROETHANE		3			2	2	
36	HYDROCHLORIC ACID	2	3				3	
32	PHOSPHORIC ACID		3				3	
32	NITRIC ACID	3	2				2	
31	TOLUENE		3			2	2	
30	METHYL ETHYL KETONE		3			2	3	
27	SODIUM SULFATE (SOLUTION)							
25	METHANOL		3				3	
24	ALUMINUM OXIDE							
24	DICHLOROMETHANE		3			2	3	
22	STYRENE		3			2		
17	MANGANESE							
17	COPPER							1
16	FREON 113							
16	HYDROGEN FLUORIDE	1	2			1	3	
15	TRICHLOROETHYLENE		3	1	1	2	2	3
13	N-BUTYL ALCOHOL		3					
13	CHROMIUM							
13	CHROMIUM COMPOUNDS							
12	COPPER COMPOUNDS							
11	METHYL ISOBUTYL KETONE		3					
11	FORMALDEHYDE	2	2	1		1	2	
11	CHLORINE DIOXIDE							
9	GLYCOL ETHERS							
9	CHLOROFORM	3	3	1	1		2	2
9	LEAD		3		1			1
8	LEAD COMPOUNDS							
8	PHENOL	2	3			2	2	2
8	BENZENE		3	1	1	2	1	
7	ETHYLENE GLYCOL							
7	ETHYLBENZENE		3			3	2	
7	NAPHTHALENE		3				1	1
6	NICKEL		1	1	1	1		1
6	1,2,4-TRIMETHYLBENZENE							
6	PENTACHLOROPHENOL		1			2	1	1
1076	Total Submissions							

Table 3-2 displays chemicals reported with total releases and transfers larger than 50,000 pounds. The five chemicals with the largest total releases and transfers were sodium sulfate, aluminum oxide, sulfuric acid, methanol, and methyl ethyl ketone. As discussed previously, sodium sulfate has already been delisted, with aluminum oxide a likely delisting candidate, and sulfuric acid releases are likely to be overestimates. The next four highly ranked chemicals are sodium hydroxide (also delisted), ammonia, toluene, and acetone.

Table 3-2 Washington TRI Chemicals With More Than 50,000 lb. Total Releases/Transfers

Chemical Name	Total Air	Direct Water	Water via POTW	On-Site Land	Other Off-Site	Total Rel/Trans	Pct of Total
SODIUM SULFATE (SOLUTION)	199	297,960,622	959,240	3,811,130	22,926,461	325,657,652	79.5%
ALUMINUM OXIDE	11,050,445	349,750	350	21,672,129	5,110,069	38,182,743	9.3%
SULFURIC ACID	192,204	3,302,835	555,011	1,102,300	528,594	5,680,944	1.4%
METHANOL	4,092,006	17,300	27,718	31,795	69,127	4,237,946	1.0%
METHYL ETHYL KETONE	3,764,551	31	2,750	1,000	429,821	4,198,153	1.0%
SODIUM HYDROXIDE (SOLUTION)	137,361	120,439	2,178,731	825,042	484,503	3,746,076	0.9%
AMMONIA	2,451,273	1,089,020	12,962	4,350	115,651	3,673,256	0.9%
TOLUENE	2,196,664	506	677	24,250	94,488	2,316,585	0.6%
ACETONE	1,862,821	49,537	1,530	1,310	290,037	2,205,235	0.5%
1,1,1-TRICHLOROETHANE	2,048,776	47	0	0	120,423	2,169,246	0.5%
STYRENE	2,084,286	0	0	0	22,311	2,106,597	0.5%
CHLOROFORM	1,493,569	257,801	0	2,900	147,452	1,901,722	0.5%
DICHLOROMETHANE	1,298,296	0	398	262	239,882	1,538,838	0.4%
HYDROGEN FLUORIDE	1,206,818	6,498	0	0	39,634	1,252,950	0.3%
XYLENE (MIXED ISOMERS)	1,092,930	666	500	36,647	57,723	1,188,466	0.3%
CHLORINE	840,457	40,986	41,725	250	2,526	926,194	0.2%
HYDROCHLORIC ACID	492,667	2,061	6,265	132	341,580	842,705	0.2%
CHLORINE DIOXIDE	750,386	0	0	0	0	750,386	0.2%
N-BUTYL ALCOHOL	649,817	750	0	250	42,455	693,272	0.2%
TRICHLOROETHYLENE	512,060	0	2	0	28,580	540,642	0.1%
DIMETHYL PHTHALATE	539,748	0	0	0	0	539,748	0.1%
FREON 113	424,686	0	7	0	91,740	516,433	0.1%
NITRIC ACID	13,928	250	1,512	4,500	489,508	509,698	0.1%
BENZENE	431,618	506	0	4,500	27	436,651	0.1%
COPPER COMPOUNDS	1,300	275	86	1	377,477	379,139	0.1%
GLYCOL ETHERS	333,123	2,000	11,325	250	18,663	365,361	0.1%
ALUMINUM (FUME OR DUST)	15,479	0	0	21,692	321,692	358,863	0.1%
FORMALDEHYDE	59,550	260,750	3,000	500	570	324,370	0.1%
METHYL ISOBUTYL KETONE	215,980	0	250	250	18,300	234,780	0.1%
AMMONIUM SULFATE (SOLUTION)	65	4,000	203,165	4,006	60	211,296	0.1%
CYANIDE COMPOUNDS	161	0	64	0	210,006	210,231	0.1%
PHOSPHORIC ACID	750	134,981	33,204	0	30,088	199,023	0.0%
MANGANESE COMPOUNDS	250	0	0	750	163,600	164,600	0.0%
CHROMIUM COMPOUNDS	2,799	12,091	1,300	12,750	116,518	145,458	0.0%
COPPER	2,354	258	7,000	9,800	110,661	130,073	0.0%
Total All Chemicals	40,829,340	303,683,993	4,066,310	27,652,344	33,448,843	409,681,080	

Washington Industries

For the 1987 reporting year, the 306 Washington facilities which reported submitted 1,076 individual forms for 79 chemicals or chemical classes. Table 3-3 lists the total releases and transfers by industry class excluding sodium sulfate, sodium hydroxide and aluminum oxide, while Figure 3-2 displays the data for comparison. These charts show that the pulp and paper and transportation industries contribute by far the largest fraction of Washington's total releases and transfers, with about 32% and 24%, respectively. The contractor for the Department of Energy facility in Richland, Washington, submitted reports for TRI chemicals used at that federal facility.

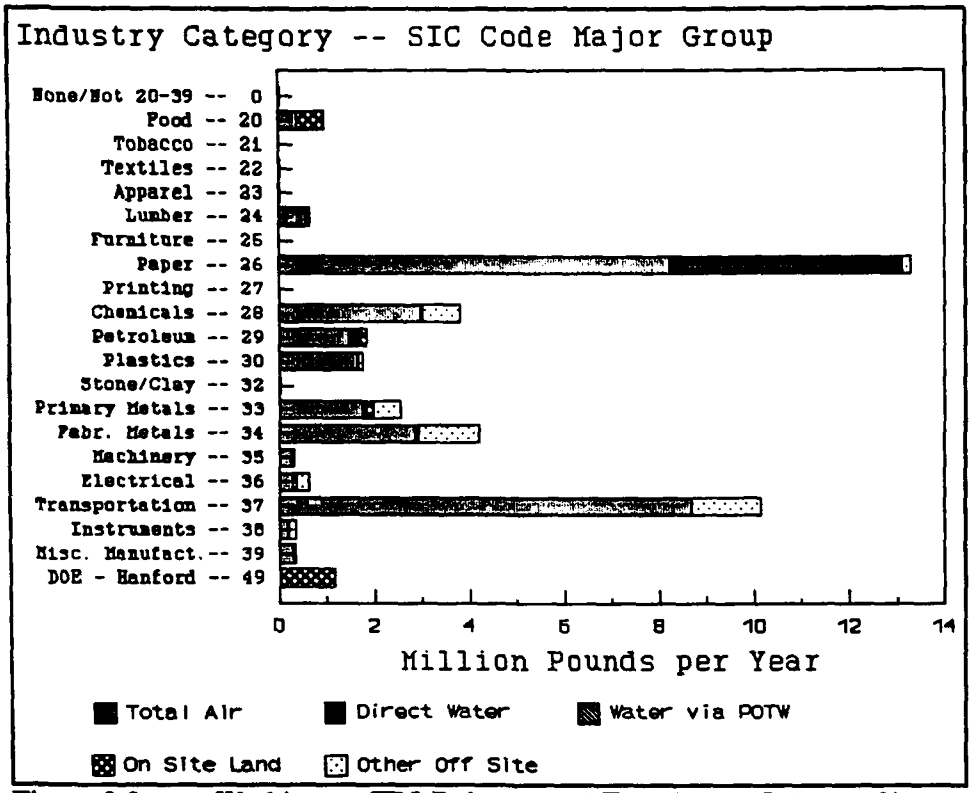

Figure 3-2 Washington TRI Releases and Transfers by Industry Class

Table 3-3 Washington State TRI Releases and Transfers by Industry Category

DESCRIPTION	SIC	Total Air	Direct Water	On-Site Land	Water via POTW	Other Off-Site	Total Rel/Trans	Percent of Total
None/Not 20-39	0	17239	1000	0	0	1250	19489	0.05%
Food	20	388236	4300	0	569160	250	961946	2.29%
Tobacco	21	750	0	0	5460	0	6210	0.01%
Textiles	22	23300	0	0	0	0	23300	0.06%
Apparel	23	28581	0	0	0	0	28581	0.07%
Lumber	24	604201	8790	6840	1413	25136	646380	1.54%
Furniture	25	1413	0	0	0	0	1413	0.00%
Paper	26	8220085	4855733	41045	15	171036	13287914	31.57%
Printing	27	250	0	0	0	0	250	0.00%
Chemicals	28	2966967	19730	6256	37071	772957	3803231	9.03%
Petroleum	29	1449702	246770	141556	250	3121	1841399	4.37%
Plastics	30	1650773	0	0	252	108057	1759082	4.18%
Stone/Clay	32	1000	0	2555	250	21619	25424	0.06%
Primary Metals	33	1709328	59064	3968	204637	570583	2547580	6.05%
Fabricated Metals	34	2842392	57045	1000	18166	1283730	4202333	9.98%
Machinery	35	247504	0	26661	0	30758	304923	0.72%
Electrical	36	290664	750	6200	68952	265624	632190	1.50%
Transportation	37	8670363	0	0	5845	1476667	10152875	24.12%
Instruments	38	186840	0	0	11288	154041	352169	0.84%
Misc Manufacturing	39	308303	0	12	900	35250	344465	0.82%
DOE - Hanford	49	33444	0	1107950	4330	7731	1153455	2.74%
TOTAL		29641335	5253182	1344043	927989	4927810	42094609	100.00%

Washington Counties

Table 3-4 displays summations of the 1987 data for Washington counties with more than 100,000 pounds of total releases and transfers. As expected, the counties with the largest totals are those which are the most populous and heavily industrialized, including King, Cowlitz and Pierce counties. More than 2,000,000 pounds of total releases and transfers were also reported in Benton, Clark, Grays Harbor, Snohomish and Spokane counties.

Table 3-4 Releases and Transfers for Selected Washington Counties, Excluding Three Chemicals

County Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
KING	8,284,264	314	31,016	141,202	2,586,770	11,043,566	26.2%
COWLITZ	5,356,331	496,421	0	1,135	39,124	5,893,011	14.0%
PIERCE	3,373,828	186,209	2,000	1,517	1,151,883	4,715,687	11.2%
GRAYS HARBOR	617,543	3,655,100	750	20,000	54,000	4,347,393	10.3%
SPOKANE	2,987,774	314	7,700	860	34,860	3,031,508	7.2%
SNOHOMISH	2,158,716	20,928	26,995	2,233	432,433	2,641,305	6.3%
BENTON	1,395,156	15,343	1,110,000	9,790	7,731	2,538,020	6.0%
CLARK	1,364,714	142,950	19,618	214,527	402,815	2,144,624	5.1%
WALLA WALLA	1,038,940	111,455	0	39,975	18,163	1,208,533	2.9%
WHATCOM	883,604	145,015	28,539	250	29,100	1,086,508	2.6%
YAKIMA	314,000	0	0	496,250	72,443	882,693	2.1%
THURSTON	712,712	0	205	0	750	713,667	1.7%
SKAGIT	382,284	110,050	112,767	0	4,293	609,394	1.4%
CLALLAM	70,691	350,000	0	0	20,000	440,691	1.0%
CHELAN	285,633	0	3,200	0	3,160	291,993	0.7%
STEVENS	237,961	0	1,000	0	0	238,961	0.6%
GRANT	63,601	0	0	0	68,000	131,601	0.3%
Media Totals:							
Counties >100,000 lb	29,527,752	5,234,099	1,343,790	927,739	4,925,525	41,959,155	99.6%
All Counties	29,641,335	5,253,182	1,344,043	927,989	4,927,810	42,094,609	100.0%

Washington Cities

Table 3-5 lists the Washington cities with total 1987 releases and transfers of more than 50,000 pounds. Generally, these parallel the county ranks, but indicate more specifically where the TRI releases are concentrated. While most of the high-volume releases are to air, the Weyerhaeuser facility in Cosmopolis reported releases of more than 3 million pounds of sulfuric acid to water. As discussed in Chapter 2, this level of release may not reflect the neutralization normally applied to acidic effluents to water. The ranks of the cities in this list are also somewhat different from the ranks contained in Table 2-12, which was based on total releases and transfers of potential carcinogens. For example, Seattle, which appears first on the list in Table 3-5, ranked seventh among Washington cities in Table 2-12. In the previous table, the first five Washington cities were Longview, Tacoma, Everett, Kalama, and Walla Walla.

Table 3-5 Releases and Transfers for Selected Washington Cities

City Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
SEATTLE	3,249,492	1,314	3,538	40,174	1,789,518	5,084,036	12.1%
LONGVIEW	4,339,489	496,300	0	1,135	26,040	4,862,964	11.6%
COSMOPOLIS	301,250	3,351,400	750	0	52,150	3,705,550	8.8%
TACOMA	2,281,370	128,414	500	517	445,971	2,857,022	6.8%
RENTON	2,724,854	0	27,466	1,100	51,211	2,804,631	6.7%
SPOKANE	2,527,274	314	6,200	860	34,860	2,569,508	6.1%
EVERETT	2,069,335	19,928	26,495	2,983	419,333	2,538,074	6.0%
KENT	1,614,639	0	0	5,698	444,708	2,065,045	4.9%
AUBURN	1,081,292	56,795	0	7,068	705,482	1,850,637	4.4%
KENNEWICK	1,346,517	14,843	2,050	0	0	1,363,410	3.2%
WALLA WALLA	991,510	111,455	0	39,975	18,163	1,161,103	2.8%
RICHLAND	34,194	0	1,107,950	9,790	7,731	1,159,665	2.8%
CAMAS	941,450	79,200	13,800	0	49,800	1,084,250	2.6%
VANCOUVER	401,964	58,500	18	214,527	347,291	1,022,300	2.4%
KALAMA	884,502	121	0	0	9,254	893,877	2.1%
FERNDALE	595,427	134,715	28,539	0	2,700	761,381	1.8%
HOQUIAM	244,443	299,400	0	0	1,850	545,693	1.3%
ANACORTES	307,048	110,050	112,767	0	4,293	534,158	1.3%
SELAH	0	0	0	496,000	0	496,000	1.2%
PORT ANGELES	70,691	350,000	0	0	20,000	440,691	1.0%
MEAD	440,500	0	0	0	0	440,500	1.0%
YELM	423,171	0	0	0	0	423,171	1.0%
REDMOND	236,961	0	12	57,702	86,799	381,474	0.9%
BELLINGHAM	288,177	10,300	0	250	26,400	325,127	0.8%
OLYMPIA	289,541	0	205	0	750	290,496	0.7%
WENATCHEE	280,000	0	3,200	0	3,160	286,360	0.7%
KIRKLAND	97,046	0	0	6,475	139,470	242,991	0.6%
YAKIMA	239,000	0	0	250	2,533	241,783	0.6%
ADDY	237,961	0	750	0	0	238,711	0.6%
WOODINVILLE	90,360	0	0	5,250	50,750	146,360	0.3%
KELSO	132,340	0	0	0	3,830	136,170	0.3%
VASHON	94,000	0	0	900	10,200	105,100	0.2%
PUYALLUP	83,967	750	1,500	1,000	14,044	101,261	0.2%
MOSES LAKE	31,172	0	0	0	68,000	99,172	0.2%
ELMA	71,600	0	0	20,000	0	91,600	0.2%
BURLINGTON	75,236	0	0	0	0	75,236	0.2%
GRANGER	73,000	0	0	0	0	73,000	0.2%
MOXEE CITY	2,000	0	0	0	69,910	71,910	0.2%
PORT TOWNSEND	48,263	17,100	0	0	0	65,363	0.2%
Media Totals:							
Cities>50,000lb	29,241,036	5,240,899	1,335,740	911,654	4,906,201	41,635,780	98.9%
All Cities	29,641,335	5,253,182	1,344,043	927,989	4,927,810	42,094,609	100.0%

Chapter 4: Oregon Summary for 1987

For the 1987 reporting year, 217 facilities in Oregon submitted 693 individual forms with a total volume of releases and transfers of 120.6 million pounds. When sodium sulfate, sodium hydroxide and aluminum oxide are excluded, this total drops to 35.2 million pounds. Figure 4-1 displays a pie chart of these total releases and transfers by release

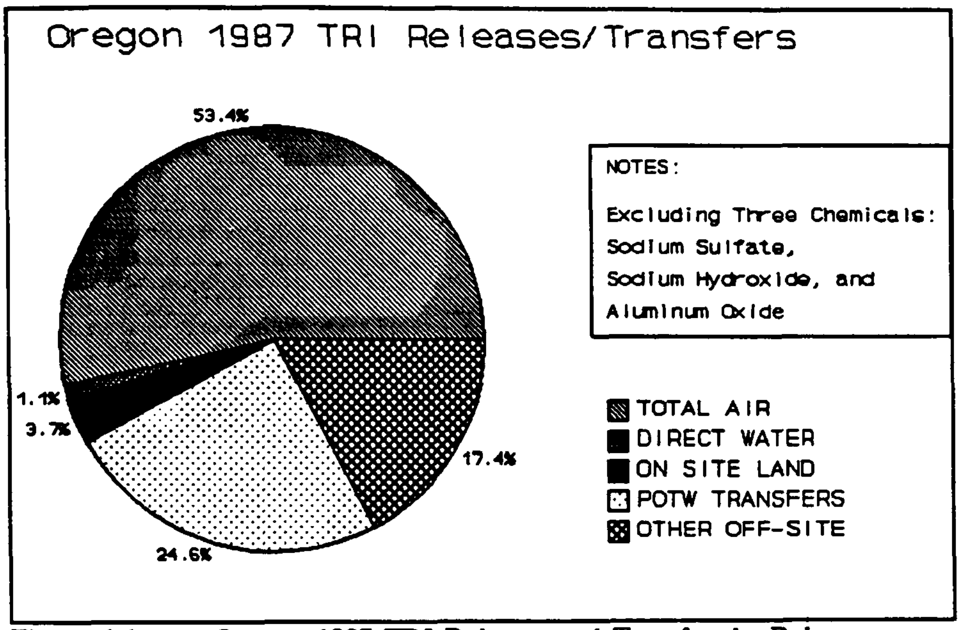

Figure 4-1 Oregon 1987 TRI Releases and Transfers by Release Medium

medium. Compared to the State of Washington, Oregon reports indicated a significantly higher proportion of releases and transfers to water, either directly or via a publicly-owned treatment works (POTW) sewage facility. The significance of these transfers to POTWs is often difficult to interpret, since many chemicals are substantially degraded by the biological treatments used at most major POTWs.

The five most frequently reported chemicals in Oregon were sodium hydroxide, ammonia, sulfuric acid, chlorine, and phosphoric acid. Table 4-1 lists the 67 chemicals reported on by more than a single facility. This table also provides summary information on the "high-medium-low" toxicity ranks for several types of health effects, taken from the EPA Risk Screening Guide. Appendix B provides additional information on the TRI chemicals and these toxicity ranks.

Table 4-1 TRI Chemicals Reported by More Than Five Facilities in Oregon

Number of Submissions	Chemical Name	TPQ Rank	RQ Acute Rank	RQ Carc Rank	IRIS Carc Rank	RQ Chronic Rank	RQ Aquatic Tox Rank	Water Qual Chronic Rank
100	SODIUM HYDROXIDE (SOLUTION)		3	.	.	.	2	.
45	SULFURIC ACID	3	2	.	.	.	2	.
32	ACETONE		.	.	.	.	3	.
29	FORMALDEHYDE	2	2	1	.	1	2	.
27	METHANOL		3	.	.	.	3	.
26	TOLUENE		3	.	.	2	2	.
25	AMMONIA	2	3	.	.	2	1	.
21	HYDROCHLORIC ACID	2	3	.	.	.	3	.
21	XYLENE (MIXED ISOMERS)		3	.	.	.	2	.
21	CHLORINE	1	2	.	.	.	1	1
20	1,1,1-TRICHLOROETHANE		3	.	.	2	2	.
17	SODIUM SULFATE (SOLUTION)		.	.	.	.	.	.
14	FREON 113		.	.	.	.	.	.
14	NITRIC ACID	3	2	.	.	.	2	.
14	PHOSPHORIC ACID		3	.	.	.	3	.
14	PHENOL	2	3	.	.	2	2	2
13	TRICHLOROETHYLENE		3	1	1	2	2	3
12	METHYL ETHYL KETONE		3	.	.	2	3	.
11	STYRENE		3	.	.	.	2	.
10	CHROMIUM		.	.	.	.	.	.
9	GLYCOL ETHERS		.	.	.	.	.	.
8	COPPER COMPOUNDS		.	.	.	.	.	.
8	COPPER		.	.	.	.	.	1
7	ALUMINUM OXIDE		.	.	.	.	.	.
7	ETHYLENE GLYCOL		.	.	.	.	.	.
7	DICHLOROMETHANE		3	.	.	2	3	.
7	HYDROGEN FLUORIDE	1	2	.	.	1	3	.
6	N-BUTYL ALCOHOL		3	.	.	.	.	.
6	LEAD COMPOUNDS		.	.	.	.	.	.
6	METHYL ISOBUTYL KETONE		3	.	.	.	.	.

*** Total ***
559 out of 693 Total Submissions

Table 4-2 displays the total releases and transfers reported for 39 chemicals with more than 100,000 pounds of releases and transfers. The chemicals with the largest amounts (when sodium sulfate, aluminum oxide and sodium hydroxide are excluded) were methanol (methyl alcohol), acetone, formaldehyde, toluene and zinc. These chemicals are a somewhat different list than for the U.S. as a whole, reflecting the different industrial makeup of Oregon industries, including the major role of the timber and wood products industries.

Table 4-2 Oregon TRI Chemicals with More Than 100,000 lb. Total Releases/Transfers

Chemical Name	Total Air	Direct Water	On Site Land	Water via POTW	Other Off Site	Total Rel/Trans	Percent of Total
SODIUM SULFATE (SOLUTION)	1,110,013	62,524,816	213,130	4,611,222	30,600	68,489,781	56.8%
ALUMINUM OXIDE	991,810	302,553	10,805,811	4,250	459,621	12,564,045	10.4%
METHANOL	2,940,899	1,450	760,400	7,119,699	78,608	10,901,056	9.0%
SODIUM HYDROXIDE (SOLUTION)	72,069	163,261	1,689,211	631,678	1,735,542	4,291,761	3.6%
ACETONE	2,543,628	20,755	10,250	47,735	41,302	2,663,670	2.2%
FORMALDEHYDE	2,444,775	34,095	7,640	37,249	70,470	2,594,229	2.2%
TOLUENE	2,124,126	0	0	856	114,388	2,239,370	1.9%
ZINC (FUME OR DUST)	9,450	40	570	250	1,600,570	1,610,880	1.3%
AMMONIA	659,347	220,895	470,070	68,250	189,950	1,608,512	1.3%
ZINC COMPOUNDS	128,251	8	0	0	1,400,001	1,528,260	1.3%
TRICHLOROETHYLENE	1,067,463	80	0	300	41,934	1,109,777	0.9%
CHLORINE	780,910	6,600	0	50,768	500	838,778	0.7%
CHLOROFORM	638,400	18,980	1,800	160,000	600	819,780	0.7%
METHYL ETHYL KETONE	692,170	0	0	3,893	22,110	718,173	0.6%
FREON 113	698,552	0	0	500	16,950	716,002	0.6%
SULFURIC ACID	123,466	250	230	439,688	151,650	715,284	0.6%
CHLORINE DIOXIDE	618,460	0	0	0	0	618,460	0.5%
METHYL ISOBUTYL KETONE	522,184	6,700	0	0	8,228	537,112	0.4%
1,1,1-TRICHLOROETHANE	475,896	394	0	250	53,636	530,176	0.4%
NITRIC ACID	12,770	0	0	488,000	9,700	510,470	0.4%
PHENOL	496,367	27	2,577	1,949	3,926	504,846	0.4%
LEAD COMPOUNDS	20,912	440	0	500	435,671	457,523	0.4%
STYRENE	439,005	0	0	0	10,600	449,605	0.4%
NICKEL COMPOUNDS	17,338	0	0	0	340,179	357,517	0.3%
XYLENE (MIXED ISOMERS)	222,939	13,813	0	750	48,413	285,915	0.2%
GLYCOL ETHERS	62,200	0	0	138,773	69,100	270,073	0.2%
DICHLOROMETHANE	268,437	0	0	263	250	268,950	0.2%
CHROMIUM COMPOUNDS	10,343	250	5,500	370	233,437	249,900	0.2%
HYDROGEN FLUORIDE	183,863	6,200	0	2,975	9,140	202,178	0.2%
COPPER COMPOUNDS	1,376	273	0	1,850	178,848	182,347	0.2%
MANGANESE COMPOUNDS	14,150	0	5,500	250	148,700	168,600	0.1%
HYDROCHLORIC ACID	41,826	3,875	1	31,185	77,600	154,487	0.1%
POLYCHLORINATED BIPHENYLS	250	0	0	0	120,038	120,288	0.1%
COMPOUND BETA	750	0	0	250	110,000	111,000	0.1%
BARIUM COMPOUNDS	1,000	750	0	0	109,200	110,950	0.1%
COPPER COMPOUNDS	8,114	0	0	0	101,340	109,454	0.1%
NAPHTHALENE	89,416	500	8,365	0	10,757	109,038	0.1%
ANTHRACENE	87,225	250	8,115	0	11,653	107,243	0.1%
N-BUTYL ALCOHOL	84,412	0	0	18,000	3,724	106,136	0.1%
Chemicals >100,000lb Rel/Trans	20,704,562	63,327,255	13,989,170	13,861,703	8,048,936	119,931,626	
TOTAL Releases (All Chemicals)	20,971,223	63,361,733	13,998,763	13,899,600	8,349,833	120,581,152	
Percent of Total	17.4%	52.5%	11.6%	11.5%	6.9%	100.0%	

Oregon Industries

For the 1987 reporting year, 217 facilities submitted 693 individual forms on 94 chemicals in Oregon. Table 4-3 lists the total releases and transfers by industry class excluding sodium sulfate, sodium hydroxide and aluminum oxide, while Figure 4-2 displays the data for comparison. These charts show that the paper and primary metals industries contribute by far the largest fraction of Oregon's total releases and transfers, with about 38% and 21%, respectively.

Table 4-3 Oregon TRI Releases/Transfers by Industry Category (SIC Code Major Group)

INDUSTRY CLASS	SIC	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
None/Not 20-39	0	750	0	0	0	2,010	2,760	0.0%
Food	20	68,280	1,000	359,000	50,510	43,150	521,940	1.5%
Tobacco	21	0	0	0	0	0	0	0.0%
Textiles	22	0	0	0	16,000	0	16,000	0.0%
Apparel	23	0	0	0	0	0	0	0.0%
Lumber	24	3,983,915	2,329	24,009	250	100,347	4,110,850	11.7%
Furniture	25	0	0	0	0	0	0	0.0%
Paper	26	4,658,971	255,641	887,190	7,325,818	405,936	13,533,556	38.4%
Printing	27	0	0	0	0	0	0	0.0%
Chemicals	28	2,012,940	30,838	5,079	14,717	54,664	2,118,238	6.0%
Petroleum	29	7,753	0	0	819	500	9,072	0.0%
Plastics	30	825,007	400	0	263	11,329	836,999	2.4%
Leather	31	1,250	0	0	72,800	17,500	91,550	0.3%
Stone/Clay	32	28,100	0	0	0	1,200	29,300	0.1%
Primary Metals	33	1,927,127	67,120	14,450	653,069	4,679,769	7,341,535	20.8%
Fabr. Metals	34	563,436	13,861	883	103,990	172,341	854,511	2.4%
Machinery	35	164,290	0	0	250	23,700	188,240	0.5%
Electrical	36	183,102	281	0	275,591	120,177	579,151	1.6%
Transportation	37	845,758	0	0	178	129,222	975,158	2.8%
Instruments	38	3,344,296	500	0	138,765	363,068	3,846,629	10.9%
Misc. Manufact.	39	188,250	0	0	0	0	188,250	0.5%
Total		18,803,225	371,970	1,290,611	8,653,020	6,124,913	35,243,739	
		53.4%	1.1%	3.7%	24.6%	17.4%	100.0%	

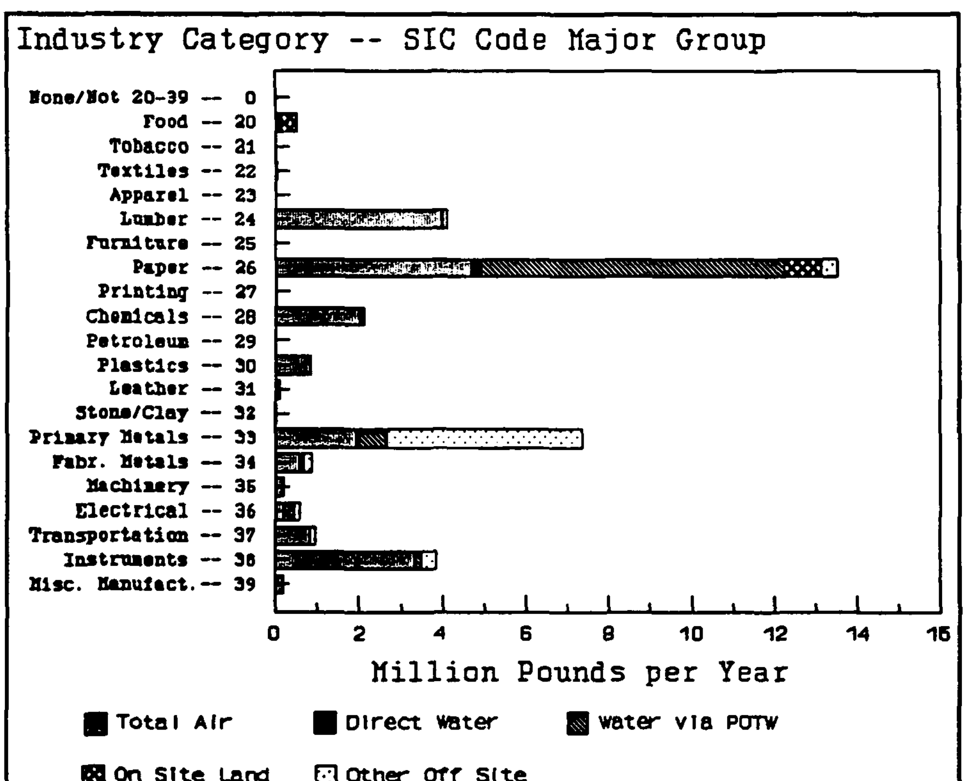

Figure 4-2 Oregon TRI Releases and Transfers by Industry Category

Oregon Counties

Table 4-4 displays the total 1987 releases and transfers for Oregon counties with more than 100,000 pounds of total releases and transfers. The largest releases occurred in the counties of Columbia, Multnomah (where the city of Portland is located), Jackson, Klamath, and Clatsop counties. Columbia is present primarily because of a very large (over 7 million pounds) release to POTW. The actual amount of chemical released to water after biological treatment there is likely to be somewhat less than this amount.

Table 4-4 Releases and Transfers for Selected Oregon Counties

County Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
COLUMBIA	1,095,630	23,000	0	7,325,818	4,618	8,449,066	24.0%
MULTNOMAH	4,296,877	10,473	13,185	73,442	2,584,689	6,978,666	19.8%
JACKSON	3,614,115	0	2,800	120,865	72,969	3,810,749	10.8%
KLAMATH	2,215,359	0	0	0	54	2,215,413	6.3%
CLATSOP	1,147,950	143,380	886,190	0	0	2,177,520	6.2%
LINN	1,934,374	74,404	1,000	250	155,929	2,165,957	6.1%
CLACKAMAS	590,855	45,666	3,200	584,634	911,812	2,136,167	6.1%
YAMHILL	213,574	9,300	19,709	250	1,864,642	2,107,475	6.0%
WASHINGTON	556,179	500	0	284,723	460,327	1,301,729	3.7%
LANE	726,859	17,847	4,527	10,760	20,316	780,309	2.2%
DOUGLAS	642,734	4,900	0	0	0	647,634	1.8%
BENTON	535,250	650	250	0	15,370	551,520	1.6%
MARION	167,667	1,000	19,000	234,518	5,600	427,785	1.2%
UMATILLA	28,250	0	340,000	16,000	0	384,250	1.1%
JEFFERSON	209,049	0	0	0	0	209,049	0.6%
HOOD RIVER	188,000	0	0	0	0	188,000	0.5%
DESCHUTES	164,105	0	0	13	1,000	165,118	0.5%
WASCO	151,558	4,800	0	0	0	156,358	0.4%
UNION	115,646	0	0	1,497	0	117,143	0.3%
Media Totals:							
Counties >100,000 lb	18,594,031	335,920	1,289,861	8,652,770	6,097,326	34,969,908	
Large County Fraction	98.9%	90.3%	99.9%	100.0%	99.5%	99.2%	
All Counties	18,803,225	371,970	1,290,611	8,653,020	6,124,913	35,243,739	
	53.4%	1.1%	3.7%	24.6%	17.4%	100.0%	

Oregon Cities

Table 4-5 displays the total 1987 releases and transfers for Oregon cities whose facilities collectively reported total releases and transfers of more than 50,000 pounds. As in earlier tables, these totals do not include data for sodium sulfate, sodium hydroxide or aluminum oxide. The high rank for the city of St. Helens is primarily due to reported releases of methanol to a POTW, while facilities in Portland reported large releases of methanol and toluene to air. In Table 2-12, which summarized releases and transfers of potential carcinogens in Region 10 cities, Klamath Falls was ranked highest of all Region 10 cities. Other Oregon cities which were ranked relatively highly in that table include Corvallis, Portland, West Linn, and St. Helens, primarily due to total air releases.

Table 4-5 Releases and Transfers for Selected Oregon Cities

City Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
ST. HELENS	1,095,630	23,000	0	7,325,818	4,618	8,449,066	24.0%
PORTLAND	4,056,944	24,236	13,185	73,409	2,527,298	6,695,072	19.0%
WHITE CITY	3,471,309	0	0	120,615	6,818	3,598,742	10.2%
KLAMATH FALLS	2,215,359	0	0	0	54	2,215,413	6.3%
CLATSKANIE	1,147,950	143,380	886,190	0	0	2,177,520	6.2%
MCMINNVILLE	27,202	0	0	250	1,840,000	1,867,452	5.3%
ALBANY	856,149	60,085	1,000	0	134,600	1,051,834	3.0%
MILWAUKIE	230,057	0	0	535,615	176,180	941,852	2.7%
MILLERSBURG	686,230	1,205	0	0	0	687,435	2.0%
BEAVERTON	335,471	500	0	159,923	161,737	657,631	1.9%
CLACKAMAS	203,158	0	0	48,519	349,405	601,082	1.7%
CORVALLIS	535,250	650	250	0	15,370	551,520	1.6%
DILLARD	535,800	0	0	0	0	535,800	1.5%
SPRINGFIELD	406,738	16,792	0	10,720	3,250	437,500	1.2%
OREGON CITY	7,884	27,210	0	0	337,234	372,328	1.1%
HERMISTON	28,250	0	340,000	0	0	368,250	1.0%
FOREST GROVE	26,758	0	0	50,750	271,200	348,708	1.0%
EUGENE	319,871	1,055	4,527	40	17,066	342,559	1.0%
SALEM	103,012	0	0	234,768	500	338,280	1.0%
HALSEY	308,138	13,114	0	0	11,020	332,272	0.9%
SHERIDAN	183,122	1,000	19,709	0	24,642	228,473	0.6%
GRESHAM	193,674	0	0	33	25,254	218,961	0.6%
MEDFORD	142,806	0	2,800	250	66,151	212,007	0.6%
CULVER	209,049	0	0	0	0	209,049	0.6%
TROUTDALE	170,505	50	0	0	36,300	206,855	0.6%
HOOD RIVER	188,000	0	0	0	0	188,000	0.5%
BEND	164,105	0	0	13	1,000	165,118	0.5%
THE DALLES	151,558	4,800	0	0	0	156,358	0.4%
LEBANON	83,857	0	0	250	10,309	94,416	0.3%
SHERWOOD	1,250	0	0	72,800	17,500	91,550	0.3%
PRINEVILLE	72,319	0	0	0	13,037	85,356	0.2%
GRANTS PASS	74,311	0	750	0	500	75,561	0.2%
CANBY	51,250	250	0	250	23,521	75,271	0.2%
ALOHA	64,950	0	0	1,000	9,140	75,090	0.2%
LEGRANDE	74,576	0	0	0	0	74,576	0.2%
RIDDLE	73,500	0	0	0	0	73,500	0.2%
TOLEDO	29,100	36,050	0	0	0	65,150	0.2%
Media Totals:							
Cities>50,000 lb.	18,525,092	353,377	1,268,411	8,635,023	6,083,704	34,865,607	
All Cities	18,803,225	371,970	1,290,611	8,653,020	6,124,913	35,243,739	
	53.4%	1.1%	3.7%	24.6%	17.4%	100.0%	

Chapter 5: Idaho Summary for 1987

For the 1987 reporting year, 52 facilities submitted 162 individual forms on 46 chemicals or chemical classes in Idaho. Figure 5-1 displays a pie chart of the total releases and transfers by release medium. Among the states in Region 10, Idaho is unusual in having a very high proportion of its total releases and transfers going to on-site land disposal. This is a reflection of the activities of the Monsanto Company, a chemical facility located in Soda Springs, which reported large releases of nickel, zinc and chromium compounds to on-site land disposal.

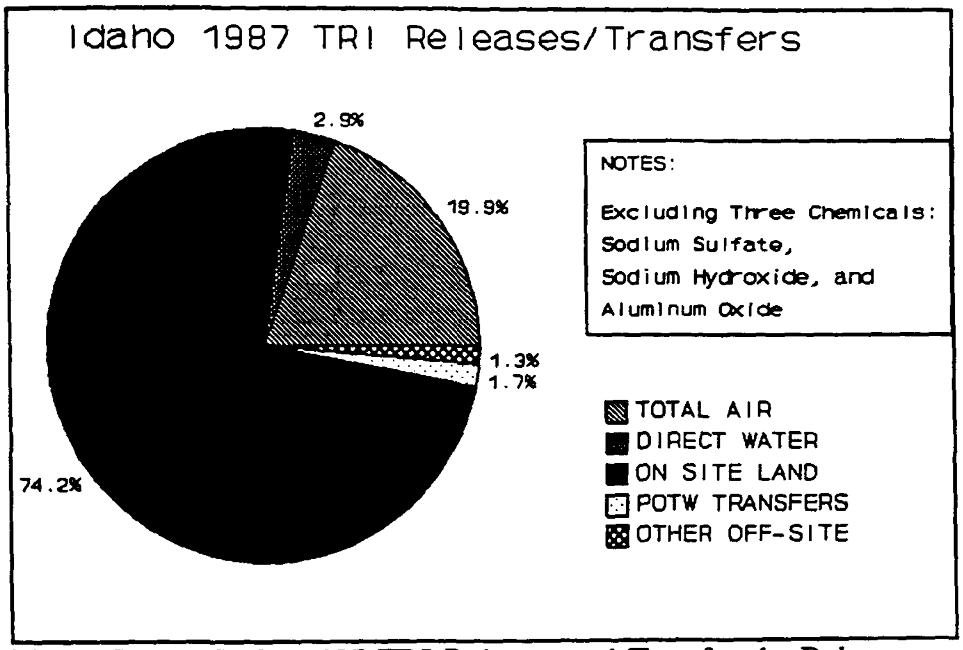

Figure 5-1 Idaho 1987 TRI Releases and Transfers by Release Medium

The five most frequently reported chemicals in Idaho were sodium hydroxide, ammonia, sulfuric acid, chlorine, and phosphoric acid. This list is similar to the most frequently reported chemicals in the Region as a whole. Table 5-1 lists the 27 chemicals for which reports were submitted by more than a single facility.

Table 5-1 TRI Chemicals Reported by Two or More Facilities in Idaho

Number of Submissions	Chemical Name	TPQ Rank	RQ Acute Rank	RQ Carc Rank	IRIS Carc Rank	RQ Chronic Rank	RQ Aquatic Tox Rank	Water Qual Chronic Rank
28	SODIUM HYDROXIDE (SOLUTION)		3	.	.	.	2	.
18	AMMONIA	2	3	.	.	2	1	.
14	SULFURIC ACID	3	2	.	.	.	2	.
13	CHLORINE	1	2	.	.	.	1	1
7	PHOSPHORIC ACID		3	.	.	.	3	.
6	ACETONE		.	.	.	.	3	.
6	NITRIC ACID	3	2	.	.	.	2	.
4	AMMONIUM SULFATE (SOLUTION)		.	.	.	.	.	.
4	SODIUM SULFATE (SOLUTION)		.	.	.	.	.	.
4	HYDROCHLORIC ACID	2	3	.	.	.	3	.
4	NICKEL COMPOUNDS		.	.	.	.	.	.
3	1,1,1-TRICHLOROETHANE		3	.	.	2	2	.
3	ETHYLENE GLYCOL		.	.	.	.	.	.
3	CHROMIUM COMPOUNDS		.	.	.	.	.	.
2	MANGANESE COMPOUNDS		.	.	.	.	.	.
2	COPPER COMPOUNDS		.	.	.	.	.	.
2	ZINC COMPOUNDS		.	.	.	.	.	.
2	PHOSPHORUS	1	2	.	.	.	1	.
2	CADMIUM COMPOUNDS		.	.	.	.	.	.
2	BARIUM COMPOUNDS		.	.	.	.	.	.
2	METHANOL		3	.	.	.	3	.
2	ISOPROPYL ALCOHOL (MANUFAC)		.	.	.	.	.	.
2	ANTIMONY COMPOUNDS		.	.	.	.	.	.
2	HYDROGEN FLUORIDE	1	2	.	.	1	3	.
2	FORMALDEHYDE	2	2	1	.	1	2	.
2	STYRENE		3	.	.	.	2	.
2	FREON 113		.	.	.	.	.	.

*** Total ***
143 out of 162 Total Submissions

Table 5-2 lists the 37 chemicals where releases and transfers totalled more than 10,000 pounds. Of these, 8 chemicals had more than 1 million pounds of total releases/transfers (compared to 15 in Washington and 11 in Oregon), and 24 totalled more than 100,000 lb. (compared to 35 in Washington and 39 in Oregon). The chemicals reported in the largest amounts were sodium sulfate, phosphorus, zinc compounds, nickel compounds, and sulfuric acid. Most of these substances were predominantly placed in on-site land disposal, where there should be limited potential for actual releases to the ambient environment to occur.

Table 5-2 Idaho TRI Chemicals with More Than 10,000 lb. Total Releases/Transfers

Chemical Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
SODIUM SULFATE (SOLUTION)	270,000	50,180,000	784,000	2,046,237	0	53,280,237	72.6%
PHOSPHORUS (YELLOW OR WHITE)	250	0	3,985,000	0	0	3,985,250	5.4%
ZINC COMPOUNDS	359,027	1,200	2,504,900	0	0	2,865,127	3.9%
NICKEL COMPOUNDS	16,257	1,000	2,200,500	750	3,500	2,222,007	3.0%
SULFURIC ACID	206,588	0	1,814,250	1,367	0	2,022,205	2.8%
AMMONIA	883,401	432,499	327,700	23,155	0	1,666,755	2.3%
CHROMIUM COMPOUNDS	17,600	750	1,418,500	0	0	1,436,850	2.0%
SODIUM HYDROXIDE (SOLUTION)	50,000	0	124,050	871,987	14,800	1,060,837	1.4%
AMMONIUM SULFATE (SOLUTION)	0	0	822,407	0	0	822,407	1.1%
CHLOROFORM	710,000	9,000	0	0	0	719,000	1.0%
CHLORINE DIOXIDE	590,700	0	0	0	0	590,700	0.8%
ACETONE	106,145	99,000	0	250	80,800	286,195	0.4%
CADMIUM COMPOUNDS	109,340	250	176,250	0	0	285,840	0.4%
BARIUM COMPOUNDS	500	1,000	180,250	250	250	182,250	0.2%
MANGANESE COMPOUNDS	1,000	250	180,250	0	0	181,500	0.2%
FREON 113	166,500	0	0	250	9,300	176,050	0.2%
PHOSPHORIC ACID	32,163	0	39,500	95,100	0	166,763	0.2%
LEAD COMPOUNDS	7,550	2,500	150,250	0	0	160,300	0.2%
COPPER COMPOUNDS	3,500	1,500	140,250	150	6,300	151,700	0.2%
ANTIMONY COMPOUNDS	1,000	2,600	140,250	250	250	144,350	0.2%
NITRIC ACID	500	0	0	141,750	0	142,250	0.2%
CHLORINE	101,255	6,000	0	4,850	800	112,905	0.2%
METHANOL	110,000	0	0	0	0	110,000	0.1%
HYDROGEN FLUORIDE	103,500	0	0	5,720	0	109,220	0.1%
1,1,1-TRICHLOROETHANE	90,020	0	0	0	4,163	94,183	0.1%
FORMALDEHYDE	83,531	0	0	1,136	0	84,667	0.1%
TETRACHLOROETHYLENE	71,956	0	0	0	1,779	73,735	0.1%
ISOPROPYL ALCOHOL (MANUFACT)	19,330	0	0	250	42,768	62,348	0.1%
ETHYLENE GLYCOL	1,039	0	0	33,848	20,500	55,387	0.1%
STYRENE	46,000	0	0	0	750	46,750	0.1%
COPPER	0	0	0	3,468	14,260	17,728	0.0%
HYDROCHLORIC ACID	2,010	0	0	15,500	0	17,510	0.0%
LEAD	250	0	0	1,700	15,100	17,050	0.0%
METHYL ETHYL KETONE	1,545	0	0	0	13,926	15,471	0.0%
XYLENE (MIXED ISOMERS)	1,000	0	0	250	11,600	12,850	0.0%
ACETAMIDE	250	0	0	0	12,400	12,650	0.0%
TRICHLOROETHYLENE	11,000	0	0	0	0	11,000	0.0%
Media Totals	4,175,707	50,737,549	14,988,307	3,249,868	258,557	73,409,988	
	5.7%	69.1%	20.4%	4.4%	0.4%	100.0%	

Idaho Industries

Table 5-3 lists the TRI data summarized by industry category. In Idaho, the industry categories reporting the largest total releases and transfers were the chemicals and paper industries. Reflecting Idaho's agricultural base, the food industry reported significantly higher releases and transfers than in Oregon, although they are close to the figures for the state of Washington. Without the contribution of the chemical industry, the overall picture of releases and transfers in Idaho would be substantially reduced to around 5 million pounds of total releases and transfers.

Table 5-3 Idaho TRI Releases/Transfers by Industry Category (SIC Code Major Group)

INDUSTRY CLASS	SIC	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
None/Not 20-39	0	72,156	0	0	15,000	1,779	88,935	0.5%
Food	20	126,927	438,000	326,250	267,900	0	1,159,077	6.1%
Tobacco	21	0	0	0	0	0	0	0.0%
Textiles	22	0	0	0	0	0	0	0.0%
Apparel	23	0	0	0	0	0	0	0.0%
Lumber	24	84,281	0	0	0	1,350	85,631	0.5%
Furniture	25	0	0	0	0	0	0	0.0%
Paper	26	1,648,200	108,000	0	0	0	1,756,200	9.3%
Printing	27	15,200	0	0	250	0	15,450	0.1%
Chemicals	28	1,581,760	11,549	12,935,100	0	8,000	14,536,409	76.6%
Petroleum	29	0	0	0	0	0	0	0.0%
Plastics	30	30,300	0	0	0	3,550	33,850	0.2%
Leather	31	0	0	0	0	0	0	0.0%
Stone/Clay	32	0	0	0	0	0	0	0.0%
Primary Metals	33	0	0	0	0	0	0	0.0%
Fabr. Metals	34	72,250	0	0	12,918	37,371	122,539	0.6%
Machinery	35	211,107	0	0	11,334	38,389	260,830	1.4%
Electrical	36	14,526	0	818,907	24,492	154,068	1,011,993	5.3%
Transportation	37	0	0	0	0	0	0	0.0%
Instruments	38	0	0	0	0	0	0	0.0%
Misc. Manufact.	39	0	0	0	0	0	0	0.0%
Total		3,784,551	557,549	14,080,257	316,894	242,728	18,981,979	100.0%
		19.9%	2.9%	74.2%	1.7%	1.3%	100.0%	

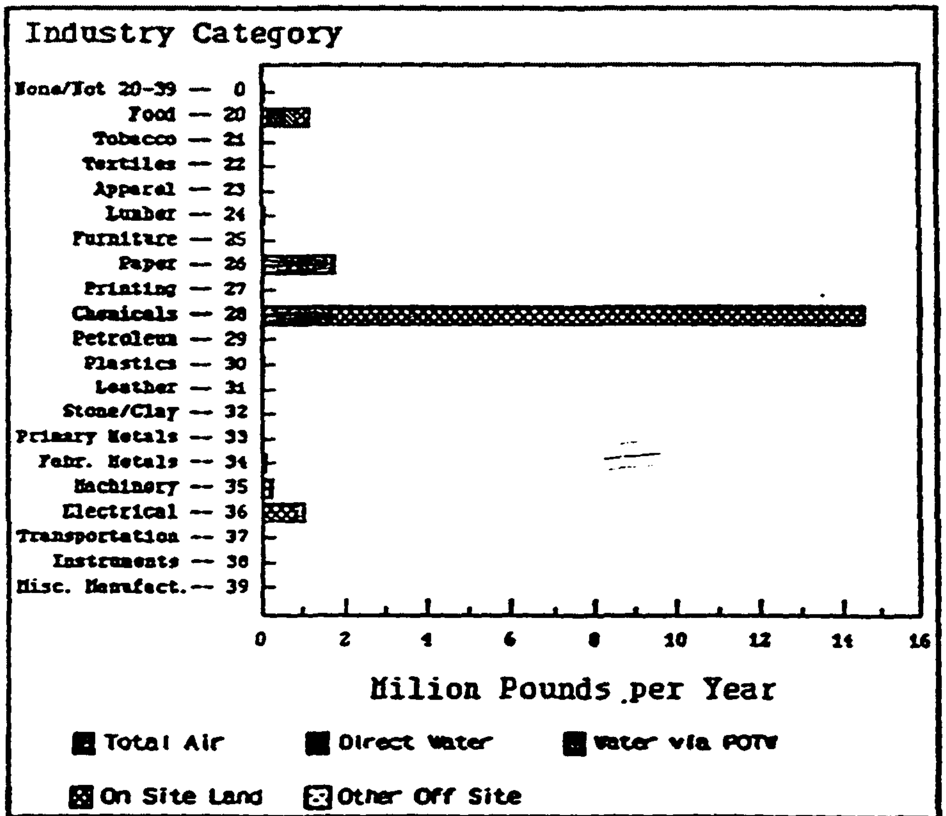

Figure 5-2 Idaho TRI Releases and Transfers by Industry Category

Idaho Counties

Table 5-4 summarizes the releases and transfers in counties with total amounts greater than 100,000 pounds. The five counties with the largest total releases and transfers were Caribou, Power, Nez Perce, Ada, and Canyon.

Table 5-4 Releases and Transfers for Selected Idaho Counties

County Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
CARIBOU	803,800	11,050	8,841,900	0	0	9,656,750	50.6%
POWER	706,461	0	4,093,200	0	0	4,799,661	25.2%
NEZ PERCE	1,709,450	108,000	0	12,918	37,371	1,867,739	9.8%
ADA	361,088	499	818,907	26,334	125,936	1,332,764	7.0%
CANYON	74,322	0	150,000	211,850	12,400	448,572	2.4%
MINIDOKA	18,050	240,000	26,000	0	0	284,050	1.5%
CASSIA	6,250	192,000	0	0	0	198,250	1.0%
BINGHAM	20,002	0	150,000	0	0	170,002	0.9%
BANNOCK	22,000	0	0	56,992	55,900	134,892	0.7%
Media Totals:							
Counties >100,000 lb	3,721,423	551,549	14,080,007	308,094	231,607	18,892,680	99.1%
All Counties	3,856,707	557,549	14,080,257	331,894	244,507	19,070,914	100.0%

Idaho Cities

Table 5-5 lists the Idaho cities with facilities reporting TRI releases and transfers, excluding sodium sulfate, sodium hydroxide, and aluminum oxide. The cities with the largest releases and transfers (over one million pounds), were Soda Springs, Pocatello, Lewiston, and Boise. Soda Springs and Pocatello were ranked high because of large amounts of chemicals placed in on-site land disposal. Lewiston was ranked high primarily because of large releases to air from a single facility. Boise facilities released a variety of chemicals to air and to on-site land disposal. Of these, Lewiston and Boise were also ranked high in Table 2-12, which summarized the releases and transfers of potential carcinogens in Region 10 cities. In Table 2-12, the city of Athol also appeared.

Table 5-5 Releases and Transfers for Selected Idaho Cities

City Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
SODA SPRINGS	803,050	11,050	8,841,900	0	0	9,656,000	50.6%
POCATELLO	728,461	0	4,093,200	56,992	55,900	4,934,553	25.9%
LEWISTON	1,709,450	108,000	0	12,918	37,371	1,867,739	9.8%
BOISE	361,088	499	818,907	26,334	125,936	1,332,764	7.0%
CALDWELL	22,250	0	150,000	189,600	0	361,850	1.9%
HEYBURN	3,550	240,000	26,000	0	0	269,550	1.4%
BURLEY	6,250	192,000	0	0	0	198,250	1.0%
ABERDEEN	20,000	0	150,000	0	0	170,000	0.9%
NAMPA	52,072	0	0	22,250	12,400	86,722	0.5%
ATHOL	83,781	0	0	0	0	83,781	0.4%
Media Totals:							
Cities > 50,000lb	3,789,952	551,549	14,080,007	308,094	231,607	18,961,209	99.4%
All Cities	3,856,707	557,549	14,080,257	331,894	244,507	19,070,914	100.0%

Chapter 6: Alaska Summary for 1987

In 1987, Alaska facilities submitted 53 reports on 46 chemicals. Figure 6-1 displays the proportion of TRI releases and transfers by release medium. Because of the small number of facilities in Alaska, the activities of a single facility may exert a strong influence on these proportions. However, the release of more than 30,000,000 pounds of ammonia to air from the Unocal facility is large even by national U.S. standards. This facility's activities overwhelmingly dominate the picture of TRI reports in Alaska.

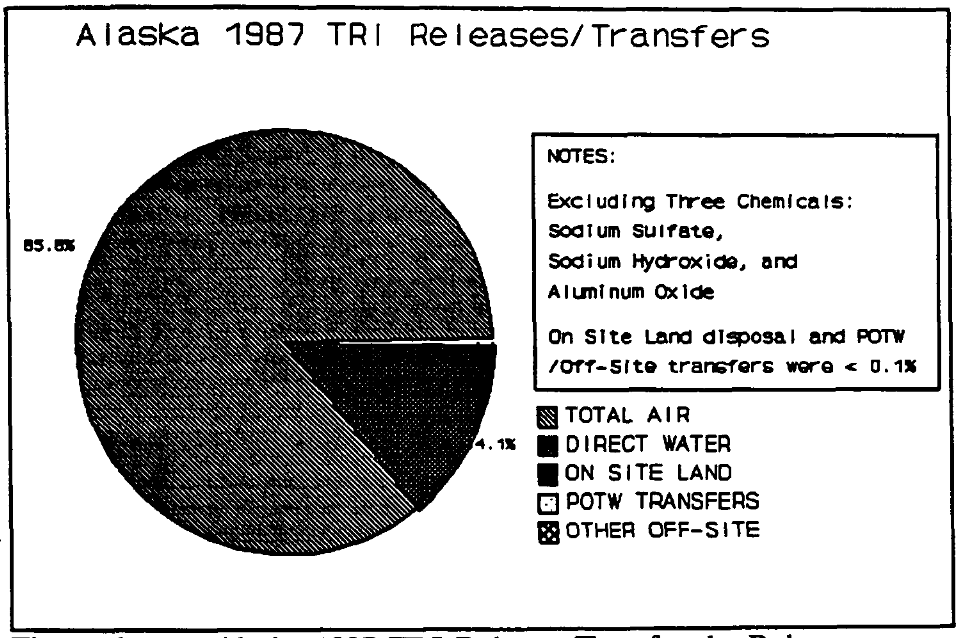

Figure 6-1 Alaska 1987 TRI Releases/Transfers by Release Medium

Table 6-1 presents the chemicals reported by Alaska facilities. No chemicals were reported on by more than four facilities, so the list includes only the chemicals reported on by at least two facilities. The six most frequently reported chemicals are ammonia, xylene, cyclohexane, toluene, benzene, and ethyl benzene (all had four reports). Most of these chemicals are a much smaller proportion of total TRI reports elsewhere in the U.S., and reflect the role of the petroleum refining and chemical industries in the state.

Table 6-1 TRI Chemicals Reported in Alaska by Two or More Facilities

Number of Submissions	Chemical Name	TPQ Rank	RQ Acute Rank	RQ Carc Rank	IRIS Carc Rank	RQ Chronic Rank	RQ Aquatic Tox Rank	Water Qual Chronic Rank
4	AMMONIA	2	3	.	.	2	1	.
4	XYLENE (MIXED ISOMERS)		3	.	.	.	2	.
4	CYCLOHEXANE		3	.	.	.	2	.
4	TOLUENE		3	.	.	2	2	.
4	ETHYLBENZENE		3	.	.	3	2	.
4	BENZENE		3	1	1	2	1	.
3	CHLORINE	1	2	.	.	.	1	1
3	SODIUM HYDROXIDE (SOLUTIO		3	.	.	.	2	.
3	SULFURIC ACID	3	2	.	.	.	2	.
3	NAPHTHALENE		3	.	.	.	1	1
2	1,2,4-TRIMETHYLBENZENE		.	.	.	.	.	.
2	CUMENE		3	.	.	.	.	.
2	PHOSPHORIC ACID		3	.	.	.	3	.
*** Total ***								
41 out of 53 Total Submissions								

Table 6-2 summarizes the TRI data on releases and transfers for each chemical with a total of at least 1,000 lb releases and transfers. The chemicals with the largest total releases and transfers were ammonia, hydrochloric acid, chlorine, sulfuric acid, and chloroform. Of these, the data for hydrochloric and sulfuric acid releases to water may be overestimated, as discussed previously.

Table 6-2 Alaska TRI Chemicals with More Than 1,000 lb. Total Releases and Transfers

Chemical Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
AMMONIA	30,182,121	206,470	9,000	0	0	30,397,591	82.3%
HYDROCHLORIC ACID	730,000	4,500,000	0	0	0	5,230,000	14.2%
CHLORINE	490,502	0	0	0	0	490,502	1.3%
SULFURIC ACID	13,000	450,000	1,500	0	0	464,500	1.3%
CHLOROFORM	150,000	54,000	0	0	0	204,000	0.6%
TOLUENE	27,929	82	80	22	23	28,136	0.1%
XYLENE (MIXED ISOMERS)	27,371	200	120	0	13	27,704	0.1%
BENZENE	26,647	148	200	0	97	27,092	0.1%
1,1,1-TRICHLOROETHANE	18,000	2,500	250	0	0	20,750	0.1%
CYCLOHEXANE	17,976	200	0	0	0	18,176	0.0%
ETHYLBENZENE	13,366	11	30	13	6	13,426	0.0%
ETHYLENE GLYCOL	0	7,000	250	0	0	7,250	0.0%
FORMALDEHYDE	5,150	250	0	0	0	5,400	0.0%
1,2,4-TRIMETHYLBENZENE	4,204	0	0	0	0	4,204	0.0%
Media Totals	31,706,266	5,220,861	11,430	35	139	36,938,731	
	85.8%	14.1%	0.0%	0.0%	0.0%	100.0%	

Table 6-3 Alaska Releases/Transfers by Industry Category (SIC Code Major Group)

INDUSTRY CLASS	SIC	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
None/Not 20-39	0	0	0	0	0	0	0	0.0%
Food	20	0	0	0	0	0	0	0.0%
Tobacco	21	0	0	0	0	0	0	0.0%
Textiles	22	0	0	0	0	0	0	0.0%
Apparel	23	0	0	0	0	0	0	0.0%
Lumber	24	0	0	0	0	0	0	0.0%
Furniture	25	0	0	0	0	0	0	0.0%
Paper	26	1,383,505	5,007,504	0	0	0	6,391,009	17.3%
Printing	27	0	0	0	0	0	0	0.0%
Chemicals	28	30,204,400	198,500	13,250	0	0	30,416,150	82.3%
Petroleum	29	118,428	15,611	680	35	139	134,893	0.4%
Plastics	30	0	0	0	0	0	0	0.0%
Leather	31	0	0	0	0	0	0	0.0%
Stone/Clay	32	0	0	0	0	0	0	0.0%
Primary Metals	33	0	0	0	0	0	0	0.0%
Fabr. Metals	34	0	0	0	0	0	0	0.0%
Machinery	35	0	0	0	0	0	0	0.0%
Electrical	36	0	0	0	0	0	0	0.0%
Transportation	37	0	0	0	0	0	0	0.0%
Instruments	38	0	0	0	0	0	0	0.0%
Misc. Manufact.	39	0	0	0	0	0	0	0.0%
Total		31,706,333	5,221,615	13,930	35	139	36,942,052	100.0%
		85.8%	14.1%	0.0%	0.0%	0.0%	100.0%	

Alaska Industries

Table 6-3 and Figure 6-2 show that there are only two major industry categories in Alaska which reported TRI chemical releases or transfers: the paper and chemical industries. Of these, the activities at the Unocal chemical facility contribute by far the largest to the TRI chemical releases for the state. Facilities which are engaged primarily in petroleum extraction and distribution are not required to report under the provisions of TRI, even if they release large quantities of the subject chemicals. Both sets of activities are classified outside SIC Code Major Groups 20-39.

Alaska Cities and Counties

As Table 6-4 shows, two cities' TRI releases and transfers are significantly higher than others, reflecting the presence of two major facilities, Unocal and Ketchikan Pulp Corporations. The sole contribution to two release media, POTW transfers and other off-site transfers, is made by the Mapco Petroleum facility located in North Pole.

Alaska does not have counties *per se*. Boroughs provide many of the same services as counties, but only have jurisdiction over a limited portion of the entire state, with the state government providing similar

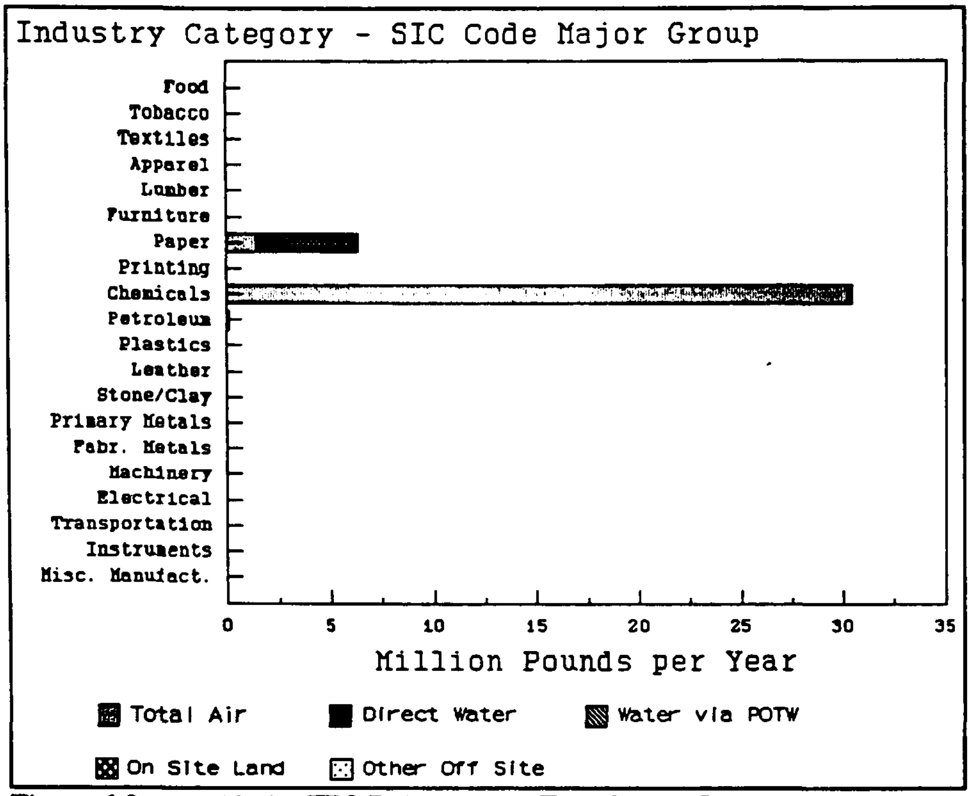

Figure 6-2 Alaska TRI Releases and Transfers by Industry Category

services for the remaining areas. In heavily populated areas, the city and borough boundaries are largely the same. Boroughs are also used in collecting Census population data, but the city and State governments provide a large fraction of government services. Cities in Alaska with large total releases and transfers include Kenai and Ketchikan. Of these, only Ketchikan appeared in Table 2-12, which ranked cities in Region 10 on the basis of total releases and transfers of potential carcinogens.

Table 6-4 Releases and Transfers for Selected Alaska Cities

City Name	Total Air	Direct Water	On Site Land	Water via POTW	Off Site Transfer	Total Rel/Transfer	Percent of Total
KENAI	30,320,680	214,111	13,930	0	0	30,548,721	82.7%
KETCHIKAN	1,383,500	5,007,500	0	0	0	6,391,000	17.3%
NORTH POLE	2,004	0	0	35	139	2,178	0.0%
ANCHORAGE	144	0	0	0	0	144	0.0%
SITKA	5	4	0	0	0	9	0.0%
Media Totals	31,706,333	5,221,615	13,930	35	139	36,942,052	
	85.8%	14.1%	0.0%	0.0%	0.0%	100.0%	

Chapter 7: Introduction to the 1988 TRI Data

TRI submissions are required each year for facilities meeting the threshold criteria; for reporting year 1988, these were due to EPA and states by July 1, 1989. EPA subsequently entered the data and released summaries on April 19, 1990, followed by a release of a subset of the data in diskette format. Some reporters also provided new or revised submissions for the 1987 reporting year, which were entered into the data base after the data presented in the other chapters of this report were retrieved. At this writing, the details of the revised 1987 information have not been released in PC-compatible diskette form. This chapter presents a brief analysis of these 1988 and revised 1987 data to provide a initial comparison of the two reporting years.

For the 1988 reporting year, the chemical sodium sulfate was no longer required to be reported. For the 1989 reporting year, whose reports were due by July 2, 1990, the chemicals sodium hydroxide and aluminum oxide have also been delisted. Including these two chemicals, 597 facilities in Region 10 submitted 2028 forms for 1988. The remaining analyses here will compare data for the two years with all three of these chemicals omitted.

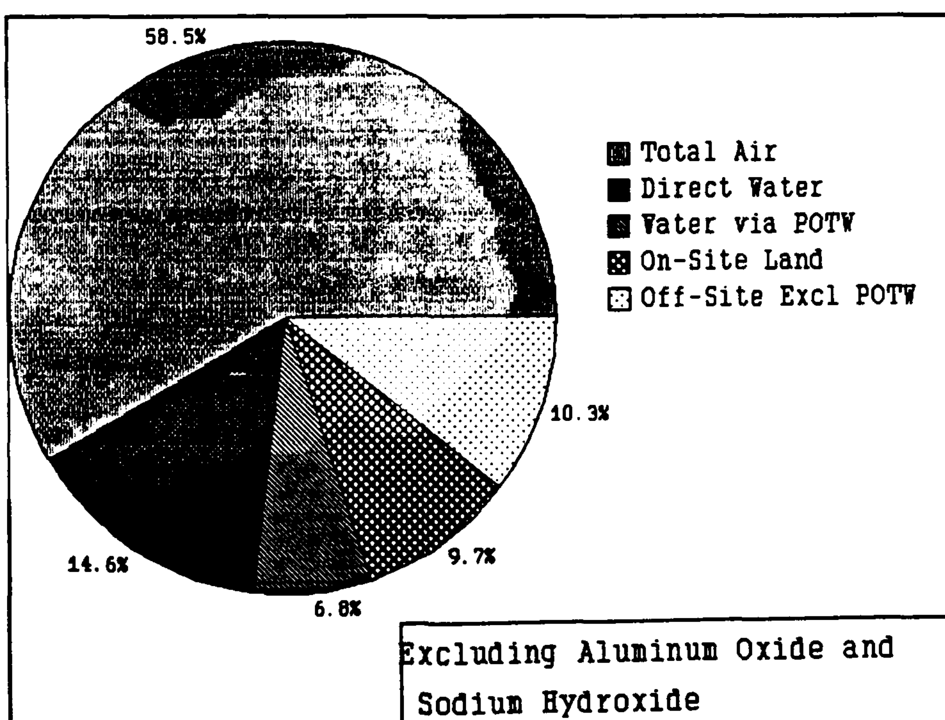

Figure 7-1 Region 10 1988 Releases/Transfers by Release Medium

Figure 7-1 displays the fraction of releases and transfers by medium for 1988. As in the 1987 reporting year, total air (fugitive and stack air emissions combined) accounted for the largest fraction of total releases and transfers when sodium sulfate, sodium hydroxide and aluminum oxide are excluded, with over 58% of the total.

The 1987 and 1988 total releases and transfers for states in Region 10 for TRI chemicals, excluding sodium hydroxide and aluminum oxide, are presented in Table 7-1. The overall regional 1988 total of releases and transfers was 125.5 million pounds, a decline of 4.2% from the revised 1987 reporting year total of 131.1 million pounds. However, as Table 7-1 shows, the changes on a state and release medium level varied widely.

Table 7-1 Region 10 1987 and 1988 Releases/Transfers by State, Excluding Sodium Sulfate, Aluminum Oxide and Sodium Hydroxide

State	Year	Total Air	Direct Water	Water via POTW	Undergnd Inject	On-Site Land	Off-Site Excl POTW	Total Releases & Transfers	Pct Change
Alaska	87	31,706,333	5,221,615	35	0	13,930	139	36,942,052	
	87Rev	31,324,172	4,763,515	0	0	13,930	14,389	36,116,006	
	88	21,996,215	4,274,455	1,000	1,018	1,467	202,310	26,476,465	-26.7%
Idaho	87	3,856,707	557,549	331,894	0	14,080,257	244,507	19,070,914	
	87Rev	3,870,922	551,799	361,894	0	12,266,257	244,507	17,295,379	
	88	3,982,578	296,220	515,514	1,400	10,173,306	136,595	15,105,613	-12.7%
Oregon	87	18,589,651	362,670	8,652,770	0	1,270,902	24,055	35,243,739	
	87Rev	19,576,823	371,720	8,679,082	0	1,274,922	6,212,451	36,114,998	
	88	19,887,098	303,696	7,067,786	1	1,032,032	5,313,630	33,604,243	-7.0%
Washington	87	29,641,335	5,253,182	927,989	250	1,344,043	4,927,810	42,094,609	
	87Rev	29,183,116	4,913,782	926,489	200	1,343,563	5,166,519	41,533,669	
	88	27,604,148	13,511,390	977,544	0	914,424	7,330,715	50,338,221	21.2%
Region Totals									
87		83,794,026	11,395,016	9,912,688	250	16,709,132	4,956,904	133,351,314	
87Revised		83,955,033	10,600,816	9,967,465	200	14,898,672	11,637,866	131,060,052	
88		73,470,039	18,385,761	8,561,844	2,419	12,121,229	12,983,250	125,524,542	-4.2%
Pct Change by Media		-12.5%	73.4%	-14.1%	1109.5%	-18.6%	11.6%	-4.2%	

Total releases and transfers for Alaska and Idaho declined from 1987 to 1988, but increased for Oregon and Washington. This increase could be the result of several factors, including the lowering of the reporting threshold from 75,000 to 50,000 lb., and better compliance with the law's requirements. Total regional reported releases to water increased from about 10.6 million to 18.4 million pounds, or about 73%, while total air releases declined about 12%. Washington facilities accounted for all of the additional water releases, while the amounts for other states declined. Oregon's air releases increased by over 1 million pounds, but the large reduction in Alaska's air releases overshadowed this change.

Except for reported increases in off-site transfers in Oregon and Washington, the overall revisions in the 1987 data due to additional and revised reports were not significant. This is likely to be true except in the case of specific facilities for the analyses presented in previous chapters. The same 1987 and 1988 total releases and transfers data are illustrated in Figure 7-2.

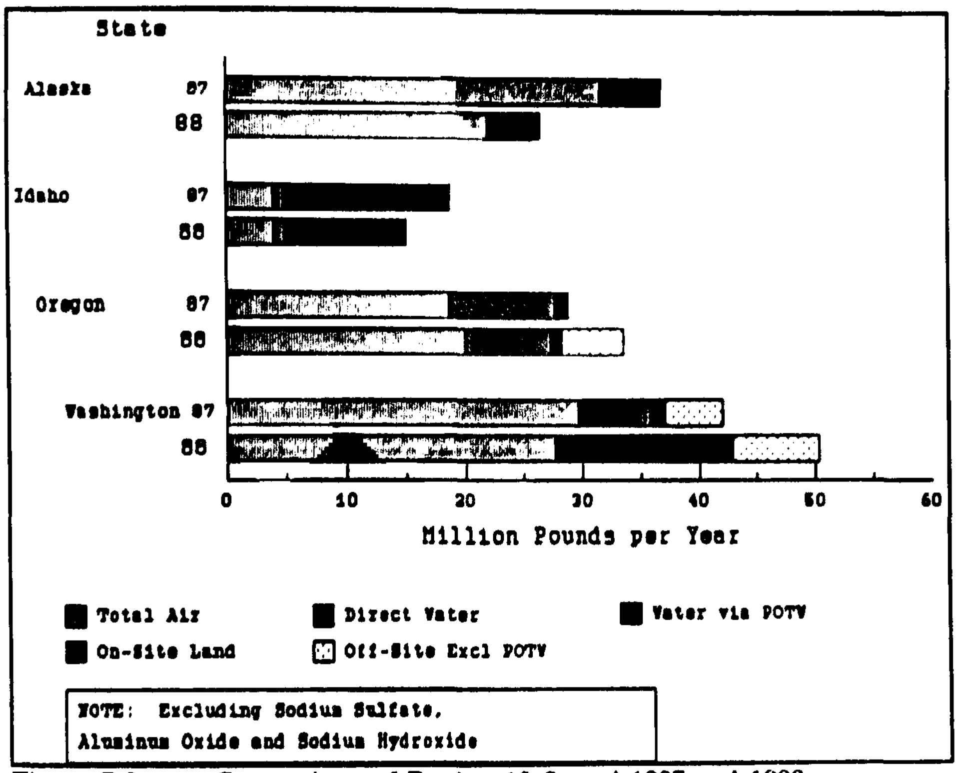

Figure 7-2 Comparison of Region 10 States' 1987 and 1988 Releases/Transfers

Highest Volume Chemicals for 1988

Table 7-2 displays the releases and transfers for chemicals totalling more than 1 million pounds. As in 1987, aluminum oxide releases were the highest (except for the now-delisted sodium sulfate). Chemicals with the ten highest total releases and transfers (excluding delisted chemicals) are: ammonia, methanol, ammonium sulfate, sulfuric acid, acetone, toluene, chloroform, phosphorus, methyl ethyl ketone, and copper compounds. In 1987, the corresponding chemicals, listed in Table 2-6, were ammonia, methanol, sulfuric acid, hydrochloric acid, acetone, methyl ethyl ketone, toluene, zinc compounds, phosphorus and chloroform. Chapter 1 discusses some reasons to suspect the accuracy of some large

Table 7-2: Region 10 1988 Chemicals with More Than One Million lb. Total Releases/Transfers

Chemical Name	Total Air	Direct Water	Water Via POTW	On-Site Land	Off-Site Excl POTW	Total Rel/Transfer	Pct of Total
ALUMINUM OXIDE	15,659,470	334,256	48,927	42,957,635	17,157,571	76,157,859	36.1%
AMMONIA	24,372,918	877,800	146,820	555,917	552,390	26,505,835	12.5%
METHANOL	7,309,524	2,031,413	6,133,503	647,730	198,696	16,320,866	7.7%
AMMONIUM SULFATE	510	5,900,250	375,350	5,875,500	550	12,152,160	5.8%
SODIUM HYDROXIDE	186,796	269,092	3,847,628	3,403,883	1,850,754	9,558,153	4.5%
SULFURIC ACID	638,159	6,422,978	529,456	655,461	729,998	8,976,052	4.2%
ACETONE	5,836,603	79,333	94,881	9,623	333,307	6,353,747	3.0%
TOLUENE	5,075,307	564	3,052	9,437	180,993	5,269,603	2.5%
CHLOROFORM	3,184,021	387,744	120,000	4,960	1,800	3,698,525	1.8%
PHOSPHORUS	0	0	0	3,694,100	0	3,694,100	1.7%
METHYL ETHYL KETONE	2,950,392	750	1,530	500	429,566	3,382,738	1.6%
COPPER COMPOUNDS	17,548	332	3,241	503	3,041,156	3,062,780	1.4%
HYDROCHLORIC ACID	802,655	1,992,948	49,505	71	76,509	2,921,688	1.4%
CHLORINE	2,425,885	50,970	65,931	100,000	3,412	2,646,198	1.3%
TRICHLOROETHYLENE	2,200,901	80	26	0	60,069	2,261,076	1.1%
1,1,1-TRICHLOROETHANE	2,148,439	501	487	0	100,001	2,249,428	1.1%
STYRENE	2,168,614	0	0	0	23,369	2,191,983	1.0%
XYLENE (MIXED ISOMERS)	2,036,580	20,513	1,500	17,508	90,079	2,166,430	1.0%
HYDROGEN FLUORIDE	2,030,226	270	25,390	0	63,122	2,119,008	1.0%
ZINC COMPOUNDS	17,076	16,552	531	203,542	1,843,448	2,081,149	1.0%
FREON 113	1,825,916	0	506	0	67,087	1,893,509	0.9%
DICHLOROMETHANE	1,723,743	0	390	250	102,861	1,827,244	0.9%
CHLORINE DIOXIDE	1,820,705	250	0	0	0	1,820,955	0.9%
FORMALDEHYDE	995,082	197,517	7,922	500	64,046	1,265,067	0.6%
GLYCOL ETHERS	726,785	18	217,280	8,236	193,725	1,146,044	0.5%
NITRIC ACID	25,164	75,974	274,050	64	635,750	1,010,930	0.5%
Chemicals >1 Million pounds	86,179,019	18,660,105	11,947,906	58,145,420	27,800,259	202,733,127	96.0%
All Chemicals	89,316,305	18,989,109	12,458,399	58,482,747	31,991,575	211,240,472	100.0%
Excl Sodium Hydroxide and Aluminum Oxide	73,470,039	18,385,761	8,561,844	12,121,229	12,983,250	125,524,460	59.4%

Note: A total of 2,419 lb. of TRI chemicals was underground injected in 1988.

releases of sulfuric acid to water, since much of these will normally be neutralized prior to release.

The lists of chemicals for 1987 and 1988 are similar, except for the large increase in ammonium sulfate releases and transfers. This substance is widely produced as a byproduct of chemical reactions, and the increased amounts may stem from better estimates of the mass of the chemical manufactured by these methods and subject to TRI reporting.

Region 10 1988 County Releases/Transfers

Table 7-3 presents total releases and transfers tabulated by county, excluding aluminum oxide and sodium hydroxide. The results are similar to Table 2-13, which presents these data for the 1987 reporting year. Grays Harbor County in Washington State has risen from tenth to fourth place, with total releases and transfers of nearly 8.6 million

Table 7-3: Counties in Region 10 with More than 1 Million lb. of TRI Releases/Transfers in 1988; Excluding Aluminum Oxide and Sodium Hydroxide

ST	County Name	Total Air	Direct Water	On-Site Land	Water via POTW	Off-Site Excl POTWs	Total Rel/Transfer	Pct of Total
AK	KENAI PENINSULA	20,768,619	169,715	1,157	0	0	20,939,509	16.7%
WA	KING	7,601,079	1,542	7,382	203,924	5,392,835	13,206,762	10.5%
WA	GRAYS HARBOR	869,278	7,601,400	500	12,000	70,200	8,553,378	6.8%
OR	COLUMBIA	2,078,465	0	0	6,367,418	3,421	8,449,304	6.7%
OR	MULTNOMAH	4,535,393	5,677	179,589	40,042	1,012,320	5,773,022	4.6%
AK	KETCHIKAN	1,205,500	4,072,740	0	0	200,560	5,478,800	4.4%
ID	CARIBOU	450,360	0	5,022,691	0	0	5,473,051	4.4%
WA	CLALLAM	140,271	4,813,420	0	0	23,000	4,976,691	4.0%
WA	COWLITZ	3,953,547	386,931	100	1,127	145,428	4,487,133	3.6%
WA	SNOHOMISH	3,921,683	49,380	21,950	17,490	452,457	4,462,960	3.6%
OR	JACKSON	3,694,148	0	2,200	29,344	70,137	3,795,829	3.0%
ID	POWER	7,525	0	3,721,400	0	0	3,730,325	3.0%
WA	PIERCE	2,299,880	119,990	9,807	1,552	220,607	2,651,836	2.1%
OR	YAMHILL	148,855	28,300	4,700	250	2,302,855	2,484,960	2.0%
OR	CLACKAMAS	1,116,141	23,917	3,250	50,161	1,141,998	2,335,467	1.9%
WA	BENTON	1,391,508	19,762	781,796	23,763	12,106	2,228,935	1.8%
ID	NEZ PERCE	2,020,950	38,800	80,000	8,750	42,425	2,190,925	1.7%
OR	LINN	1,964,596	85,707	2,080	0	133,301	2,185,684	1.7%
WA	SPOKANE	1,896,919	484	500	36,224	76,111	2,010,238	1.6%
OR	WASHINGTON	1,148,107	278	0	294,257	503,089	1,945,731	1.6%
WA	CLARK	1,078,069	81,247	6,280	327,824	42,918	1,536,338	1.2%
WA	WHATCOM	989,997	144,880	14,583	230,333	72,451	1,452,244	1.2%
ID	ADA	450,793	0	861,891	80,180	28,280	1,421,144	1.1%
OR	CLATSOP	726,500	20,950	577,010	0	0	1,324,460	1.1%
WA	WALLA WALLA	1,167,778	16,900	500	35,975	50,201	1,271,354	1.0%
OR	LANE	1,191,117	21,275	0	2,343	36,228	1,250,963	1.0%
ID	BANNOCK	648,043	0	220,740	87,008	61,934	1,017,725	0.8%
Counties > 1 Million pounds		67,465,121	17,703,295	11,520,106	7,849,965	12,094,862	116,634,768	92.9%
All Counties		73,470,039	18,385,761	12,121,229	8,561,844	12,983,250	125,524,542	100.0%

pounds, compared to a total of 4.3 million pounds in 1987. The largest fraction of these releases were to water directly from the reporting sites. Caribou County in Idaho declined from nearly 9.7 million pounds in 1987 to a total of 5.5 million in 1988, predominantly in on-site land disposal. Total releases to air from the Unocal facility on Alaska's Kenai Peninsula declined substantially from 30.3 to 20.8 million pounds, but still remain among the largest for a single facility's releases in the U.S. King County's air releases increased over 1 million pounds from 1987 to 1988, and reported transfers to off-site locations also increased over 5 million pounds.

Table 7-4 presents 1988 county total releases and transfers of chemicals identified as potential carcinogens in the TRI Risk Screening Guide. As discussed in Chapter 2, these are not necessarily the only chemicals to be concerned about, nor is this an exhaustive list of possible carcinogens. This table corresponds to Table 2-14, which reported similar data for the 1987 reporting year. Table 7-4 contains a new column for total environmental releases, which are the sum of releases directly from the reporting site to air, water, and land (including underground injection).

Table 7-4 Region 10 Counties with More than 100,000 lb. of 1988 Total Releases/Transfers of Potential Carcinogens

ST	County Name	Total Air	Direct Water	On-Site Land	Water via POTW	Other Off-Site	Total Env Rel	Total Rel/Trans	Pct of Total
WA	KING	1,171,877	0	250	1,713	33,878	1,172,127	1,207,718	13.5%
WA	COWLITZ	639,074	330,000	0	939	22,386	969,074	992,399	11.1%
OR	CLACKAMAS	232,376	0	250	0	612,629	232,626	845,255	9.5%
ID	NEZ PERCE	700,500	14,000	0	1,000	4,400	714,500	719,900	8.1%
WA	PIERCE	423,962	105,228	1	0	130,739	529,191	659,930	7.4%
OR	LINN	450,736	9,670	0	0	13,621	460,406	474,027	5.3%
WA	SNOHOMISH	390,005	20,950	2,900	0	50,250	413,855	464,105	5.2%
OR	MULTNOMAH	396,781	134	5,400	774	28,559	402,315	431,648	4.8%
AK	KETCHIKAN	180,300	31,400	0	0	200,560	211,700	412,260	4.6%
OR	BENTON	377,150	54	0	1	13,310	377,204	390,515	4.4%
WA	WALLA WALLA	279,000	4,300	0	0	0	283,300	283,300	3.2%
OR	COLUMBIA	160,450	0	0	120,000	0	160,450	280,450	3.1%
OR	CLATSOP	257,000	6,500	2,060	0	0	265,560	265,560	3.0%
ID	KOOTENAI	220,091	0	0	0	0	220,091	220,091	2.5%
WA	GRAYS HARBOR	160,500	9,250	0	0	250	169,750	170,000	1.9%
OR	JACKSON	101,648	0	250	500	42,500	101,898	144,898	1.6%
WA	CLARK	133,150	1,000	0	0	750	134,150	134,900	1.5%
OR	LANE	111,671	7,235	0	183	1,901	118,906	120,990	1.4%
Counties >100,000 lb.		6,386,271	539,721	11,111	125,110	1,155,733	6,937,103	8,217,946	92.1%
All Counties		7,011,748	586,508	13,022	129,710	1,179,019	7,611,546	8,920,275	100.0%

As discussed in Chapter 1, transfers of chemicals to POTWs and to other off-site locations should be reviewed with caution, since the exposure potential will usually be significantly less than for direct releases.

Several changes from the 1987 data presented in Table 2-14 are apparent. Klamath County, Oregon, no longer appears in the table, since its total releases and transfers of these chemicals have declined to below 100,000 pounds, down from its 1987 value of 1.7 million pounds. Most other counties in the table occupy similar ranks to those held in 1987, except that the total releases and transfers for King County, Washington, increased from about 573 thousand pounds to over 1.2 million pounds. Most releases and transfers of these chemicals are to air, except for Nez Perce County, ID, and Benton County, OR, which have more than half of the total releases and off-site transfers.

Major Industry Categories in 1988

Table 7-5 and Figure 7-3 present the 1988 releases and transfers tabulated by industry category, or SIC Code Major Group. The 1988 data are similar to those for 1987, with the paper and chemical industries dominant, followed by the transportation industry. The relative position of the paper and chemical industries changed in 1988,

Table 7-5 Region 10 1988 Releases and Transfers by Industry Category (SIC Code Major Group), Excluding Aluminum Oxide and Sodium Hydroxide, in pounds

SIC Code Major Group		Total Air	Direct Water	On-Site Land	Water via POTW	Other Off-Site	Total Env Releases	Total Rel/Trans	
None/Not 20-39	0	15,177	1,000	0	26,000	1,540	16,177	43,717	0.0%
Food	20	626,335	413,403	632,963	828,090	293,750	1,672,701	2,794,541	2.2%
Tobacco	21	510	0	0	23,697	0	510	24,207	0.0%
Textiles	22	0	0	0	12,000	0	0	12,000	0.0%
Apparel	23	16,821	0	0	0	540	16,821	17,361	0.0%
Lumber	24	5,671,478	44,416	92,864	1,203	162,775	5,808,758	5,972,736	4.8%
Furniture	25	118,863	0	0	0	7,400	118,863	126,263	0.1%
Paper	26	13,970,590	17,392,519	607,373	6,367,418	1,599,241	31,970,482	39,937,141	31.8%
Printing	27	22,136	0	0	0	1,101	22,136	23,237	0.0%
Chemicals	28	27,386,587	188,901	8,996,933	32,767	672,882	36,573,822	37,279,471	29.7%
Petroleum	29	1,194,910	252,746	82,990	2,000	62,731	1,531,664	1,596,395	1.3%
Plastics	30	2,778,057	10,054	0	1	40,051	2,788,111	2,828,163	2.3%
Leather	31	1,250	0	0	119,100	17,500	1,250	137,850	0.1%
Stone/Clay	32	46,087	18	8,736	268	31,550	54,841	86,659	0.1%
Primary Metals	33	3,807,024	79,789	180,825	371,951	3,851,157	4,067,638	8,290,746	6.6%
Fabr. Metals	34	2,956,613	1,022	500	129,197	1,091,950	2,958,135	4,179,282	3.3%
Machinery	35	936,229	500	4,612	16,930	113,241	941,341	1,071,512	0.9%
Electrical	36	1,029,988	643	853,000	461,393	655,957	1,883,631	3,000,981	2.4%
Transportation	37	8,667,926	750	5,400	18,687	4,157,318	8,674,076	12,850,081	10.2%
Instruments	38	3,681,952	0	0	151,076	192,781	3,681,952	4,025,809	3.2%
Misc. Manufac	39	540,684	0	0	0	17,679	540,684	558,363	0.4%
DOE Hanford	99	822	0	655,033	66	12,106	655,855	668,027	0.5%
Total		73,470,039	18,385,761	12,121,229	8,561,844	12,983,250	103,979,448	125,524,542	100.0%

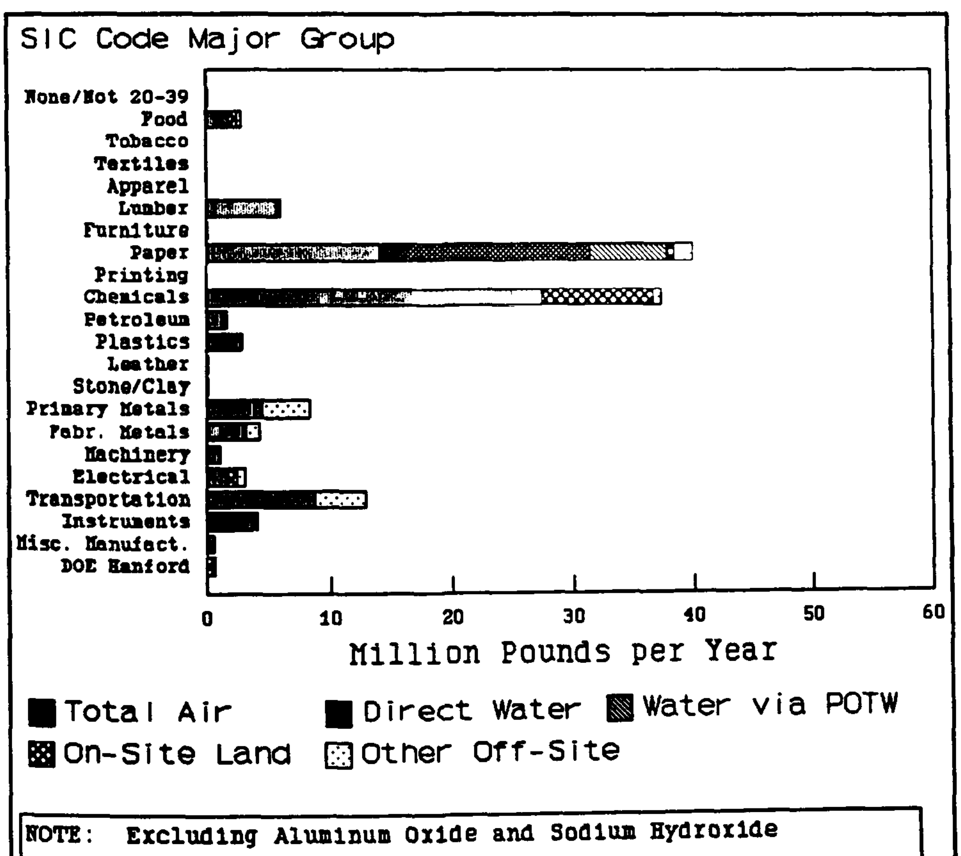

Figure 7-3 Region 10 1988 Releases and Transfers by Industry Category (SIC Code Major Group)

with paper now accounting for nearly 32% of the region's total releases and transfers. Table 2-5 contains corresponding data, and shows that the paper industry reported about 26% of the total releases and transfers for 1987. The paper industry increases were in direct water releases and in off-site transfers to other locations for processing or treatment, while releases and transfers to other media declined. In the chemical industry, totals to all media except off-site transfers declined from 1987 to 1988.

Table 7-6 and Figure 7-4 present total releases and transfers of chemicals listed in the TRI Risk Screening Guide as potentially carcinogenic. The table includes a new column for total environmental releases, which is the sum of air, direct water, land, and underground injection releases. As described in Chapter 2, the potential for exposure to the surrounding community is higher for direct releases to air, water and land, than from transfers off site to POTWs or other locations. Many such facilities accept wastes from other states, so these chemicals

Table 7-6 Region 10 1988 TRI Releases and Transfers of Potential Carcinogens by Industry Category (SIC Code Major Group), in pounds

SIC Code Major Group		Total Air	Direct Water	On-Site Land	Water via POTW	Other Off-Site	Total Env Releases	Total Rel/Trans	Pct of Tot
Food	20	500	0	0	0	0	500	500	0.0%
Tobacco	21	0	0	0	0	0	0	0	0.0%
Textiles	22	0	0	0	0	0	0	0	0.0%
Apparel	23	0	0	0	0	0	0	0	0.0%
Lumber	24	1,431,247	14,054	500	500	55,866	1,445,801	1,502,167	16.8%
Furniture	25	0	0	0	0	0	0	0	0.0%
Paper	26	2,600,683	569,076	4,960	120,000	961,489	3,174,719	4,256,208	47.7%
Printing	27	0	0	0	0	250	0	250	0.0%
Chemicals	28	476,803	2,657	1	3,822	25,733	479,461	509,016	5.7%
Petroleum	29	152,027	337	1,661	500	645	154,293	155,438	1.7%
Plastics	30	499,470	54	0	1	13,431	499,524	512,956	5.8%
Leather	31	0	0	0	0	0	0	0	0.0%
Stone/Clay	32	7	0	0	0	0	7	7	0.0%
Primary Metals	33	393,549	80	250	36	30,674	393,879	424,589	4.8%
Fabr. Metals	34	413,762	0	250	1,001	70,229	414,012	485,242	5.4%
Machinery	35	65,960	0	0	250	0	65,960	66,210	0.7%
Electrical	36	21,697	0	0	3,600	2,850	21,697	28,147	0.3%
Transportation	37	901,951	0	5,400	0	17,602	907,351	924,953	10.4%
Instruments	38	50,987	0	0	0	0	50,987	50,987	0.6%
Misc. Manufact.	39	0	0	0	0	0	0	0	0.0%
DOE Hanford	51	3,105	250	0	0	250	3,355	3,605	0.0%
Total		7,011,748	586,508	13,022	129,710	1,179,019	7,611,546	8,920,275	100.0%

may be transported some distance away from the plants which generate them.

In 1988, the proportion of industries contributing significantly to the total regional picture of releases and transfers changes slightly. The initial 1987 data (presented in Table 2-9) shows that the paper industry accounted for 43% of the total releases and transfers of these chemicals,

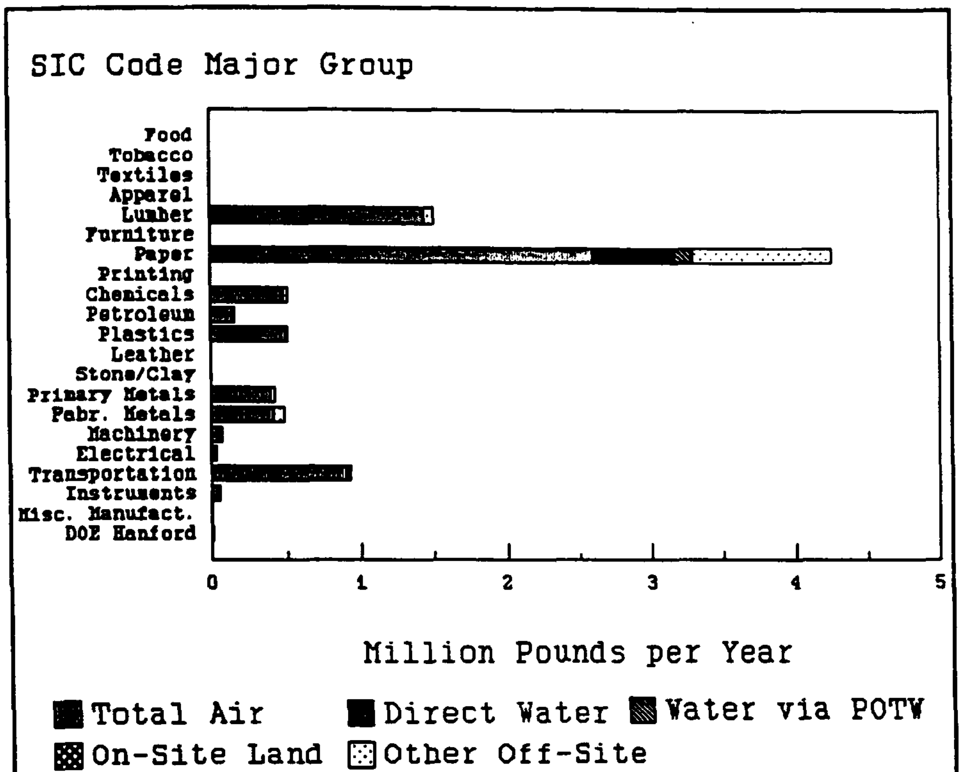

Figure 7-4 Region 10 1988 Releases and Transfers of Potential Carcinogens by Industry Category (SIC Code Major Group)

and that the lumber industry accounted for about 25% of the regional total. For the 1988 reporting year, the paper industry's share increased to nearly 48% of the total, while the lumber industry's share declined to about 17%. The paper industry substantially increased its off-site transfers, and decreased its releases to air, water, land and to POTWs. The chemical industry presents a similar picture, with decreases in air releases, but some increase in off-site transfers. Decreases to the media involved in on-site releases is likely to reduce overall exposure potential, at least for populations near the TRI reporting sites. The transportation industry's share increased substantially from about 2% to 10% of the 1988 total. Most of this change was due to increased releases to air.

Major TRI Facilities in 1988

For the 1988 reporting year, 134 facilities filed reports on the releases and transfers of potential carcinogens, compared to 117 such facilities for the 1987 reporting year. Table 7-7 displays the facilities first identified in Table 2-10 with more than 30,000 pounds of total 1987 releases and transfers of potential carcinogens. The current table displays the initial 1987 total air releases and total releases and transfers for reference, and includes the corresponding totals for 1988. These totals include the chemicals reported by those facilities which are identified as potential carcinogens in the Guide. As discussed in Chapter 2, these are not necessarily the only chemicals of high concern on the TRI list. Total air releases are identified separately because the largest overall releases occur to this medium, and because its potential for human exposure is generally higher than for other TRI releases and transfers.

Table 7-7 Companies Reporting More than 30,000 lb. of Potential Carcinogens in 1987, and Their 1988 TRI Totals for the Chemicals

Facility Name	City	ST	Total '87 Air Release	Total '87 Release & Transfers	Total '88 Air Release	Total '88 Release & Transfers	% of '88 Total	% Change in Total 87–88
WEYERHAEUSER COMPANY	Klamath Falls	OR	1,749,533	1,749,587	45,400	45,400	0.5%	-97.4%
POTLATCH CORPORATION	Lewiston	ID	710,000	719,000	700,000	714,000	8.0%	-0.7%
SIMPSON TACOMA KRAFT CO	Tacoma	WA	380,490	479,464	393,490	606,434	6.8%	26.5%
EVANITE FIBER CORPORATION	Corvallis	OR	467,600	468,270	364,900	365,515	4.1%	-21.9%
LONGVIEW FIBRE COMPANY	Longview	WA	103,600	410,600	127,700	387,700	4.3%	-5.6%
BOISE CASCADE PAPERS	St. Helens	OR	160,200	320,200	160,200	280,200	3.1%	-12.5%
KALAMA CHEMICAL INC.	Kalama	WA	317,000	317,000	298,300	298,300	3.3%	-5.9%
BOISE CASCADE PAPER GROUP	Walla Walla	WA	278,298	282,569	279,000	283,300	3.2%	0.3%
WEYERHAEUSER COMPANY	Longview	WA	195,250	270,500	210,500	302,550	3.4%	11.8%
JAMES RIVER II, INC.	Camas	WA	186,200	210,250	116,000	116,250	1.3%	-44.7%
WACKER SILTRONIC CORP	Portland	OR	207,000	207,130	24,300	24,404	0.3%	-88.2%
KETCHIKAN PULP COMPANY	Ketchikan	AK	150,000	204,000	180,300	412,260	4.6%	102.1%
WEYERHAEUSER EVERETT KRAFT	Everett	WA	184,967	197,065	194,200	206,800	2.3%	4.9%
JAMES RIVER CORP.	Halsey	OR	171,200	190,661	194,541	204,961	2.3%	7.5%
SCOTT PAPER COMPANY	Everett	WA	180,000	185,400	177,000	223,000	2.5%	20.3%
OCCIDENTAL CHEMICAL	Tacoma	WA	77	177,890	64	22,977	0.3%	-87.1%
LARGE STRUCTURE BUSINESS	Portland	OR	162,210	162,354	208,127	208,127	2.3%	28.2%
THE BOEING COMPANY	Renton	WA	160,250	160,250	184,500	184,500	2.1%	15.1%
SMURFIT NEWSPRINT CORP.	Oregon City	OR	6,190	111,184	0	590,482	6.6%	431.1%
OMARK INDUSTRIES	Milwaukie	OR	80,050	106,075	78,350	95,250	1.1%	-10.2%
MEDITE CORPORATION	Medford	OR	63,700	105,950	63,700	106,200	1.2%	0.2%
DAVIS WALKER CORPORATION	Kent	WA	65,250	88,550	0	739	0.0%	-99.2%
LOUISIANA-PACIFIC CORP.	Athol	ID	83,531	83,531	97,689	97,689	1.1%	16.9%
GEORGIA-PACIFIC RESINS	Millersburg	OR	81,200	81,203	78,900	78,900	0.9%	-2.8%
WILLIAMETTE IND. DURAFLAKE	Albany	OR	76,190	76,190	78,000	78,000	0.9%	2.4%
ISLAND CITY PARTICLEBOARD	Legrande	OR	74,576	74,576	56,100	56,100	0.6%	-24.8%
SMALL STRUCTURES BUSINESS	Clackamas	OR	56,813	73,931	133,381	138,628	1.6%	87.5%
LYNN INDUSTRIAL COATINGS	Boise	ID	71,956	73,735	36,100	53,880	0.6%	-26.9%
WILLAMETTE IND. KORPINE	Bend	OR	66,280	66,280	66,280	66,280	0.7%	0.0%
EMARK INC.	Lebanon	OR	54,137	64,696	99,295	112,166	1.3%	73.4%
WESTERN PNEUMATIC TUBE	Kirkland	WA	64,000	64,000	65,000	65,001	0.7%	1.6%
INDUSTRIAL PLATING CORP.	Seattle	WA	40,100	58,580	30,674	30,674	0.3%	-47.6%
BORDEN, INC. CHEMICAL	Springfield	OR	48,839	58,339	21,700	21,914	0.2%	-62.4%
ASKO PROCESSING, INC.	Seattle	WA	47,996	52,476	36,915	44,235	0.5%	-15.7%
TEKTRONIX, INC.	Beaverton	OR	24,300	51,300	35,287	35,287	0.4%	-31.2%
TEMCO INC.	Clackamas	OR	50,800	50,800	14,000	14,000	0.2%	-72.4%
GEORGIA-PACIFIC CORP.	Toledo	OR	21,000	49,350	11,000	23,000	0.3%	-53.4%
GERBER LEGENDARY BLADES	Portland	OR	47,340	47,340	34,900	34,900	0.4%	-26.3%
BOEING AEROSPACE	Kent	WA	38,000	38,750	18,750	19,000	0.2%	-51.0%
NORTHWEST PLATING CO.	Seattle	WA	35,750	37,250	*	*	*	*
ROSEBURG FOREST PRODUCTS	Coquille	OR	31,500	31,500	*	*	*	*
ARCO CHERRY POINT REFINERY	Ferndale	WA	31,001	31,447	31,250	31,750	0.4%	1.0%
Total for Facilities releasing > 30,000 lb.			7,024,374	8,289,223	4,945,793	6,680,753	74.9%	-19.4%
All Facilities			7,496,750	9,329,956	7,011,748	8,920,245	[illegible]0.0%	-4.4%

* Facilities which did not file TRI reports in 1988.

NOTE: Four facilities filed late 1987 reports as a result of EPA enforcement actions, with total releases and transfers warranting inclusion in this table. Pending resolution of the cases, the identities of these facilities must be withheld.

Several facilities have increased or decreased their releases and transfers of these chemicals substantially. Two facilities which reported total releases and transfers of over 30,000 lb. of these chemicals did not file TRI reports for 1988. This may indicate that these chemicals are no longer used at these sites, or that the quantities used no longer meet the reporting threshold criteria described in Chapter 1.

The facilities with the largest increases in total releases and transfers of these substances (over 50%), include the Ketchikan Pulp Company in Alaska, whose air releases increased about 20% but whose overall releases and transfers more than doubled. The Smurfit Newsprint Corporation of Oregon City also substantially increased its total releases and transfers, but decreased its total air releases. This could result from an increased reliance on off-site transfers to waste treatment facilities. The Small Structures Business subsidiary of Precision Castparts Corporation in Clackamas, OR, increased its overall releases and transfers by over 87%, with air releases more than doubling. Emark Incorporated of Lebanon, OR, also reported significant increases in both air releases and total releases and transfers, amounting to over 73% more than in 1987.

Several companies also reported significant decreases in the total releases and transfers of these substances from 1987 to 1988. These include the Weyerhaeuser Company of Klamath Falls, OR, which was ranked as the largest overall generator of these chemicals' releases and transfers. Weyerhaeuser's total releases and transfers at this site declined over 95%, to a total of 45,400 lb. This decreased figure is still high enough, however, to rank inclusion in the list of largest TRI reporters for these substances. The Wacker Siltronic Corporation in Portland also reduced its total releases and transfers substantially, by over 88%, to a total of about 24,000 lb., mostly to air. Occidental Chemical in Tacoma, WA, also reported major reductions of over 87% of total releases and transfers, with air releases (already a very small proportion of the total) declining slightly. Another major decrease in total releases and transfers was reported by the Davis Walker Corporation in Kent, WA, with a 99% decrease. This includes the elimination of air releases of these substances in 1988, and total releases and transfers of less than 750 lb. Other companies which featured reductions in total releases and transfers of more than 50% include Borden Inc, in Springfield, OR; Temco, Incorporated in Clackamas, OR; Georgia-Pacific Corporation in Toledo, OR; and Boeing Aerospace in Kent, WA.

Ten facilities which did not report large releases of these chemicals for 1987 filed reports for 1988 which listed more than 30,000 lb. total releases and transfers. Table 7-8 lists these facilities, together with their

Table 7-8 Region 10 Facilities Reporting More Than 30,000 lb. Total Releases/Transfers of Potential Carcinogens in 1988, but Less Than 30,000 lb. in 1987

Facility	City	ST	Total '88 Air Release	Total '88 Release & Transfer	Total '87 Air Release	Total '87 Release & Transfer
JAMES RIVER II. INC.	CLATSKANIE	OR	257,000	265,560	0	0
ITT RAYONIER INC.	HOQUIAM	WA	160,500	170,000	250	500
POST FALLS PARTICLEBOARD	POST FALLS	ID	110,000	110,000	0	0
ST. MARIES PLYWOOD	SAINT MARIES	ID	81,000	81,000	0	0
OREGON OVERLAY DIV.	PORTLAND	OR	69,040	71,717	0	0
WEYERHAEUSER FOREST PRODUCTS	SPRINGFIELD	OR	51,300	51,300	0	0
ART BRASS PLATING INC.	SEATTLE	WA	45,000	45,001	3,603	3,604
OREGON STEEL MILLS INC.	PORTLAND	OR	25,000	44,000	250	250
LASKO PROCESSING INC.	SEATTLE	WA	12,377	33,605	21,178	21,678
ALASKA PULP CORP.	SITKA	AK	0	32,000	0	0

1988 total air releases, total releases and transfers, and the corresponding initial 1987 data. All of the facilities reported substantial increases in the releases and transfers of these chemicals from 1987 to 1988.

Chapter 8: Conclusions

The TRI data represent an important new source of data on the generation and release of chemicals to the environment. The public dissemination of the data has fostered additional discussions on the significance of these releases, and resulted in increased emphasis on pollution prevention activities. While the data are an extremely useful tool, they also have important limitations. These releases, for many chemicals, are not the only ones to be concerned about, and may represent a relatively small fraction of total environmental releases for some chemicals. Not all of the many significant environmental problems involve toxic chemicals. The TRI data allow users to put new information to use in selecting priorities for environmental action.

The analyses of TRI data in this report illustrate the potential for using this information in targeting particular geographic areas, environmental media, industry categories and individual facilities for further investigation. These investigations could include additional data collection to allow more complete assessment of potential exposures and risks from these chemical releases, and ultimately to make a determination whether emissions reductions are warranted. The rationale for such reductions could include the economic advantages of reducing releases of useful chemicals, the desire of many facilities to be "good neighbors" to their towns and cities, or revisions to Federal or State regulatory requirements.

Among other findings, the data presented here show that the states in the Pacific Northwest have relatively low aggregate releases and transfers of TRI chemicals. In 1987, the Region ranked last among all EPA Regions in total TRI releases and transfers for the chemicals now on the reporting list. The states of Washington, Oregon, Idaho and Alaska all have relatively low total releases and transfers. Indeed, the ranks for Alaska and Idaho largely reflect the impact of one or a few facilities whose total releases significantly add to the state's total. Without these, or with reduced emissions, these states would rank much lower among states of the U.S.

The mix of industrial activities in the Pacific Northwest states differs significantly from most other states in the U.S., and the TRI emissions data reflect this. For example, the proportion of releases from the paper industry is significantly higher for states in Region 10 than for the U.S. as a whole. In particular, when selected chemical toxicity concerns are taken into account, the paper industry represented the largest industrial major group releasing the chemicals of concern. This and related findings illustrate which industries may achieve the greatest public health benefits through emission reductions.

The list of chemicals included in TRI reporting is changing. The original list was adopted by the Congress and promulgated in EPCRA. As EPA publishes findings based on reviews of health and environmental effects for these and other chemicals, substances are being added to and dropped from the list. In particular, three substances which figure prominently in overall totals of TRI reports and release quantities have been delisted because of lack of toxicity concerns. Other substances have been proposed for addition to the list.

Not all chemicals remaining on the list have the same type or degree of toxicity concerns, and the potential for exposure to the releases and transfers varies widely. In some cases, the toxicity data are incomplete. The data base is also changing, as new or revised reports are received. This report presents a mixture of 1987 and 1988 data, based on two "snapshots" of the master data base taken at two points in time. Future analyses of these two year's data may include different specific information, but the overall picture is likely to remain as presented here. However, these issues highlight the care which must be taken in reviewing the data, particularly the simple tabulations presented here.

The TRI data can be used in a wide variety of similar analyses, and represent a new and unique source of data for use in environmental decision-making. The public availability of the data fosters public involvement in these decisions, and represents a major step in the evolution of the debate on environmental pollution prevention.

Although the data in raw form have many significant limitations, they may still be extremely useful in advancing society's environmental goals. While the data tell us little concerning the quantitative risks presented by these chemical releases, they fill an important gap in the array of information needed to develop reasonable estimates of such risks. By using the TRI data in risk-based screening assessments, users are able to more appropriately target scarce resources on some of the more significant potential risks. After weighing these findings in conjunction with other environmental and economic data, these resources can be then focused on the geographic areas, chemicals, environmental media, and industries where the greatest environmental benefits can be achieved.

Appendix A: Chemicals and Classes Subject to EPCRA 313 Reporting

Alphabetical Chemical List

CAS Number	Chemical Name
75-07-0	Acetaldehyde
60-35-5	Acetamide
67-64-1	Acetone
75-05-8	Acetonitrile
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
309-00-2	Aldrin {1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-(1.alpha., 4.alpha.,4a.beta.,5.alpha., 8.alpha.,8a.beta.)-}
**107-18-6	Allyl Alcohol
107-05-1	Allyl chloride
7429-90-5	Aluminum (fume or dust)
1344-28-1	Aluminum oxide
117-79-3	2-Aminoanthraquinone
60-09-3	4-Aminoazobenzene
92-67-1	4-Aminobiphenyl
82-28-0	1-Amino-2-methylanthraquinone
7664-41-7	Ammonia
6484-52-2	Ammonium nitrate (solution)
7783-20-2	Ammonium sulfate (solution)
62-53-3	Aniline
90-04-0	o-Anisidine
104-94-9	p-Anisidine
134-29-2	o-Anisidine hydrochloride
120-12-7	Anthracene
7440-36-0	Antimony
7440-38-2	Arsenic
1332-21-4	Asbestos (friable)
7440-39-3	Barium
98-87-3	Benzal chloride
55-21-0	Benzamide
71-43-2	Benzene
92-87-5	Benzidine
98-07-7	Benzoic trichloride (Benzotrichloride)
98-88-4	Benzoyl chloride
94-36-0	Benzoyl peroxide
100-44-7	Benzyl chloride
7440-41-7	Beryllium
92-52-4	Biphenyl
111-44-4	Bis(2-chloroethyl) ether
542-88-1	Bis(chloromethyl) ether
108-60-1	Bis(2-chloro-1-methylethyl) ether
103-23-1	Bis(2-ethylhexyl) adipate
75-25-2	Bromoform {Tribromomethane}

** These chemicals have been proposed for addition to the Section 313 list. These chemicals will be subject to reporting for the 1990 reporting year with the first reports due by July 1, 1991.

* C.I. is an abbreviation for Color Index.

74-83-9	Bromomethane {Methyl bromide}
106-99-0	1,3-Butadiene
141-32-2	Butyl acrylate
71-36-3	n-Butyl alcohol
78-92-2	sec-Butyl alcohol
75-65-0	tert-Butyl alcohol
85-68-7	Butyl benzyl phthalate
106-88-7	1,2-Butylene oxide
123-72-8	Butyraldehyde
4680-78-8	C.I. Acid Green 3*
569-64-2	C.I. Basic Green 4*
989-38-8	C.I. Basic Red 1*
1937-37-7	C.I. Direct Black 38*
2602-46-2	C.I. Direct Blue 6*
16071-86-6	C.I. Direct Brown 95*
2832-40-8	C.I. Disperse Yellow 3*
3761-53-3	C.I. Food Red 5*
81-88-9	C.I. Food Red 15*
3118-97-6	C.I. Solvent Orange 7*
97-56-3	C.I. Solvent Yellow 3*
842-07-9	C.I. Solvent Yellow 14*
492-80-8	C.I. Solvent Yellow 34* (Auramine)
128-66-5	C.I. Vat Yellow 4*
7440-43-9	Cadmium
156-62-7	Calcium cyanamide
133-06-2	Captan {1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-}
63-25-2	Carbaryl {1-Naphthalenol, methylcarbamate}
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
463-58-1	Carbonyl sulfide
120-80-9	Catechol
133-90-4	Chloramben {Benzoic acid, 3-amino-2,5-dichloro-}
57-74-9	Chlordane {4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-}
7782-50-5	Chlorine
10049-04-4	Chlorine dioxide
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate {Benzeneacetic acid,4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-hydroxy-,ethyl ester}
75-00-3	Chloroethane {Ethyl chloride}
67-66-3	Chloroform
74-87-3	Chloromethane {Methyl chloride}
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene

** These chemicals have been proposed for addition to the Section 313 list. These chemicals will be subject to reporting for the 1990 reporting year with the first reports due by July 1, 1991.

* C.I. is an abbreviation for Color Index.

1897-45-6	Chlorothalonil {1,3-Benzenedicarbonitrile, 2,4,5,6-tetrachloro-}
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
**8001-58-9	Creosote
120-71-8	p-Cresidine
1319-77-3	Cresol (mixed isomers)
108-39-4	m-Cresol
95-48-7	o-Cresol
106-44-5	p-Cresol
98-82-8	Cumene
80-15-9	Cumene hydroperoxide
135-20-6	Cupferron {Benzeneamine, N-hydroxy-N-nitroso, ammonium salt}
110-82-7	Cyclohexane
94-75-7	2,4-D {Acetic acid, (2,4-dichlorophenoxy)-}
1163-19-5	Decabromodiphenyl oxide
2303-16-4	Diallate {Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester}
615-05-4	2,4-Diaminoanisole
39156-41-7	2,4-Diaminoanisole sulfate
101-80-4	4,4'-Diaminodiphenyl ether
25376-45-8	Diaminotoluene (mixed isomers)
95-80-7	2,4-Diaminotoluene
334-88-3	Diazomethane
132-64-9	Dibenzofuran
96-12-8	1,2-Dibromo-3-chloropropane {DBCP}
106-93-4	1,2-Dibromoethane {Ethylene dibromide}
	84-74-2 Dibutyl phthalate
25321-22-6	Dichlorobenzene (mixed isomers)
95-50-1	1,2-Dichlorobenzene
541-73-1	1,3-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
91-94-1	3,3'-Dichlorobenzidine
75-27-4	Dichlorobromomethane
107-06-2	1,2-Dichloroethane {Ethylene dichloride}
540-59-0	1,2-Dichloroethylene
75-09-2	Dichloromethane {Methylene chloride}
120-83-2	2,4-Dichlorophenol
78-87-5	1,2-Dichloropropane
**78-88-6	2,3-Dichloropropene
542-75-6	1,3-Dichloropropylene
62-73-7	Dichlorvos {Phosphoric acid, 2,2-dichloroethenyl dimethyl ester}

** These chemicals have been proposed for addition to the Section 313 list. These chemicals will be subject to reporting for the 1990 reporting year with the first reports due by July 1, 1991.

* C.I. is an abbreviation for Color Index.

115-32-2	Dicofol {Benzenemethanol, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.- (trichloromethyl)-}
1464-53-5	Diepoxybutane
111-42-2	Diethanolamine
117-81-7	Di-(2-ethylhexyl) phthalate {DEHP}
84-66-2	Diethyl phthalate
64-67-5	Diethyl sulfate
119-90-4	3,3'-Dimethoxybenzidine
60-11-7	4-Dimethylaminoazobenzene
119-93-7	3,3'-Dimethylbenzidine {o-Tolidine}
79-44-7	Dimethylcarbamyl chloride
57-14-7	1,1-Dimethyl hydrazine
105-67-9	2,4-Dimethylphenol
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfate
**99-65-0	m-Dinitrobenzene
**528-29-0	o-Dinitrobenzene
**100-25-4	p-Dinitrobenzene
534-52-1	4,6-Dinitro-o-cresol
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
606-20-2	2,6-Dinitrotoluene
**25321-14-6	Dinitrotoluene (mixed isomers)
117-84-0	n-Dioctyl phthalate
123-91-1	1,4-Dioxane
122-66-7	1,2-Diphenylhydrazine {Hydrazobenzene}
106-89-8	Epichlorohydrin
110-80-5	2-Ethoxyethanol
140-88-5	Ethyl acrylate
100-41-4	Ethylbenzene
541-41-3	Ethyl chloroformate
74-85-1	Ethylene
107-21-1	Ethylene glycol
151-56-4	Ethyleneimine {Aziridine}
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
2164-17-2	Fluometuron {Urea, N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]-}
50-00-0	Formaldehyde
76-13-1	Freon 113 {Ethane, 1,1,2-trichloro-1,2,2-trifluoro-}
76-44-8	Heptachlor {1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene}
118-74-1	Hexachlorobenzene
87-68-3	Hexachloro-1,3-butadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
1335-87-1	Hexachloronaphthalene
680-31-9	Hexamethylphosphoramide
302-01-2	Hydrazine

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10034-93-2	Hydrazine sulfate
7647-01-0	Hydrochloric acid
74-90-8	Hydrogen cyanide
7664-39-3	Hydrogen fluoride
123-31-9	Hydroquinone
78-84-2	Isobutyraldehyde
67-63-0	Isopropyl alcohol (manufacturing-strong acid process, no supplier notification)
80-05-7	4,4'-Isopropylidenediphenol
**120-58-1	Isosafrole
7439-92-1	Lead
58-89-9	Lindane {Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha., 3.beta.,4.alpha.,5.alpha.,6.beta.)-}
108-31-6	Maleic anhydride
12427-38-2	Maneb {Carbamodithioic acid, 1,2-ethanediylbis-, manganese complex}
7439-96-5	Manganese
7439-97-6	Mercury
67-56-1	Methanol
72-43-5	Methoxychlor {Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-}
109-86-4	2-Methoxyethanol
96-33-3	Methyl acrylate
1634-04-4	Methyl tert-butyl ether
101-14-4	4,4'-Methylenebis(2-chloroaniline) {MBOCA}
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzenamine
101-68-8	Methylenebis (phenylisocyanate) {MBI}
74-95-3	Methylene bromide
101-77-9	4,4'-Methylenedianiline
78-93-3	Methyl ethyl ketone
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide
108-10-1	Methyl isobutyl ketone
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
90-94-8	Michler's ketone
1313-27-5	Molybdenum trioxide
505-60-2	Mustard gas {Ethane, 1,1'-thiobis[2-chloro-}
91-20-3	Naphthalene
134-32-7	alpha-Naphthylamine
91-59-8	beta-Naphthylamine
7440-02-0	Nickel
7697-37-2	Nitric acid
139-13-9	Nitrilotriacetic acid
99-59-2	5-Nitro-o-anisidine
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl

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1836-75-5	Nitrofen {Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-}
51-75-2	Nitrogen mustard {2-Chloro-N-(2-chloroethyl)-N-methylethanamine}
55-63-0	Nitroglycerin
88-75-5	2-Nitrophenol
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
156-10-5	p-Nitrosodiphenylamine
121-69-7	N,N-Dimethylaniline
924-16-3	N-Nitrosodi-n-butylamine
55-18-5	N-Nitrosodiethylamine
62-75-9	N-Nitrosodimethylamine
86-30-6	N-Nitrosodiphenylamine
621-64-7	N-Nitrosodi-n-propylamine
4549-40-0	N-Nitrosomethylvinylamine
59-89-2	N-Nitrosomorpholine
759-73-9	N-Nitroso-N-ethylurea
684-93-5	N-Nitroso-N-methylurea
16543-55-8	N-Nitrosonornicotine
100-75-4	N-Nitrosopiperidine
2234-13-1	Octachloronaphthalene
20816-12-0	Osmium tetroxide
56-38-2	Parathion {Phosphorothioic acid, o, o-diethyl-o-(4-nitrophenyl) ester}
87-86-5	Pentachlorophenol {PCP}
79-21-0	Peracetic acid
108-95-2	Phenol
106-50-3	p-Phenylenediamine
90-43-7	2-Phenylphenol
75-44-5	Phosgene
7664-38-2	Phosphoric acid
7723-14-0	Phosphorus (yellow or white)
85-44-9	Phthalic anhydride
88-89-1	Picric acid
1336-36-3	Polychlorinated biphenyls {PCBs}
1120-71-4	Propane sultone
57-57-8	beta-Propiolactone
123-38-6	Propionaldehyde
114-26-1	Propoxur {Phenol, 2-(1-methylethoxy)-, methylcarbamate}
115-07-1	Propylene {Propene}
75-55-8	Propyleneimine
75-56-9	Propylene oxide
110-86-1	Pyridine
91-22-5	Quinoline
106-51-4	Quinone
82-68-8	Quintozene {Pentachloronitrobenzene}
81-07-2	Saccharin (manufacturing, no supplier notification) {1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide}

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94-59-7	Safrole
7782-49-2	Selenium
7440-22-4	Silver
100-42-5	Styrene
96-09-3	Styrene oxide
7664-93-9	Sulfuric acid
100-21-0	Terephthalic acid
79-34-5	1,1,2,2-Tetrachlroethane
127-18-4	Tetrachloroethylene {Perchloroethylene}
961-11-5	Tetrachlorvinphos {Phosphoric acid, 2-chloro-1-(2,3,5-trichlorophenyl) ethenyl dimethyl ester}
7440-28-0	Thallium
62-55-5	Thioacetamide
139-65-1	4,4'-Thiodianiline
62-56-6	Thiourea
1314-20-1	Thorium dioxide
7550-45-0	Titanium tetrachloride
108-88-3	Toluene
584-84-9	Toluene-2,4-diisocyanate
91-08-7	Toluene-2,6-diisocyanate
**26471-62-5	Toluenediisocyanate (mixed isomers)
95-53-4	o-Toluidine
636-21-5	o-Toluidine hydrochloride
8001-35-2	Toxaphene
68-76-8	Triaziquone {2,5-Cyclohexadiene-1,4-dione, 2,3,5-tris(1-aziridinyl)-}
52-68-6	Trichlorfon {Phosphonic acid,(2,2,2-trichloro-1-hydroxyethyl)-,dimethyl ester}
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
1582-09-8	Trifluralin {Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-}
95-63-6	1,2,4-Trimethylbenzene
126-72-7	Tris(2,3-dibromopropyl) phosphate
51-79-6	Urethane (Ethyl carbamate)
7440-62-2	Vanadium (fume or dust)
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride
1330-20-7	Xylene (mixed isomers)
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene
87-62-7	2,6-Xylidine
7440-66-6	Zinc (fume or dust)

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12122-67-7	Zineb {Carbamodithioic acid, 1,2-ethanediylbis-, zinc complex}

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List By CAS Number

CAS Number	Chemical Name
50-00-0	Formaldehyde
51-28-5	2,4-Dinitrophenol
51-75-2	Nitrogen mustard {2-Chloro-N-(2-chloroethyl)-N-methylanamine}
51-79-6	Urethane {Ethyl carbamate}
52-68-6	Trichlorfon {Phosphonic acid,(2,2,2-trichloro-1-hydroxyethyl)-, dimethyl ester}
53-96-3	2-Acetylaminofluorene
55-18-5	N-Nitrosodiethylamine
55-21-0	Benzamide
55-63-0	Nitroglycerin
56-23-5	Carbon tetrachloride
56-38-2	Parathion {Phosphorothioic acid, o,o-diethyl-o-(4-nitrophenyl)ester}
57-14-7	1,1-Dimethyl hydrazine
57-57-8	beta-Propiolactone
57-74-9	Chlordane {4,7-Methanoindan,1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-}
58-89-9	Lindane {Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha., 3.beta., 4.alpha.,5.alpha.,6.beta.)-}
59-89-2	N-Nitrosomorpholine
60-09-3	4-Aminoazobenzene
60-11-7	4-Dimethylaminoazobenzene
60-34-4	Methyl hydrazine
60-35-5	Acetamide
62-53-3	Aniline
62-55-5	Thioacetamide
62-56-6	Thiourea
62-73-7	Dichlorvos {Phosphoric acid, 2,2-dichloroethenyl dimethyl ester}
62-75-9	N-Nitrosodimethylamine
63-25-2	Carbaryl {1-Naphthalenol, methylcarbamate}
64-67-5	Diethyl sulfate
67-56-1	Methanol
67-63-0	Isopropyl alcohol (manufacturing-strong acid process, no supplier notification)
67-64-1	Acetone
67-66-3	Chloroform
67-72-1	Hexachloroethane
68-76-8	Triaziquone {2,5-Cyclohexadiene-1,4-dione, 2,3,5-tris(1-aziridinyl)-}
71-36-3	n-Butyl alcohol
71-43-2	Benzene

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71-55-6	1,1,1-Trichloroethane {Methyl chloroform}
72-43-5	Methoxychlor {Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-}
74-83-9	Bromomethane {Methyl bromide}
74-85-1	Ethylene
74-87-3	Chloromethane {Methyl chloride}
74-88-4	Methyl iodide
74-90-8	Hydrogen cyanide
74-95-3	Methylene bromide
75-00-3	Chloroethane {Ethyl chloride}
75-01-4	Vinyl chloride
75-05-8	Acetonitrile
75-07-0	Acetaldehyde
75-09-2	Dichloromethane {Methylene chloride}
75-15-0	Carbon disulfide
75-21-8	Ethylene oxide
75-25-2	Bromoform {Tribromomethane}
75-27-4	Dichlorobromomethane
75-35-4	Vinylidene chloride
75-44-5	Phosgene
75-55-8	Propyleneimine
75-56-9	Propylene oxide
75-65-0	tert-Butyl alcohol
76-13-1	Freon 113 {Ethane, 1,1,2-trichloro-1,2,2-trifluoro-}
76-44-8	Heptachlor {1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene}
77-47-4	Hexachlorocyclopentadiene
77-78-1	Dimethyl sulfate
78-84-2	Isobutyraldehyde
**78-88-6	2,3-Dichloropropene
78-87-5	1,2-Dichloropropane
78-92-2	sec-Butyl alcohol
78-93-3	Methyl ethyl ketone
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
79-06-1	Acrylamide
79-10-7	Acrylic acid
79-11-8	Chloroacetic acid
79-21-0	Peracetic acid
79-34-5	1,1,2,2-Tetrachloroethane
79-44-7	Dimethylcarbamyl chloride
79-46-9	2-Nitropropane
80-05-7	4,4'-Isopropylidenediphenol
80-15-9	Cumene hydroperoxide
80-62-6	Methyl methacrylate

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81-07-2	Saccharin (manufacturing, no supplier notification) {1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide}
81-88-9	C.I. Food Red 15*
82-28-0	1-Amino-2-methylanthraquinone
82-68-8	Quintozene {Pentachloronitro-benzene}
84-66-2	Diethyl phthalate
84-74-2	Dibutyl phthalate
85-44-9	Phthalic anhydride
85-68-7	Butyl benzyl phthalate
86-30-6	N-Nitrosodiphenylamine
87-62-7	2,6-Xylidine
87-68-3	Hexachloro-1,3-butadiene
87-86-5	Pentachlorophenol {PCP}
88-06-2	2,4,6-Trichlorophenol
88-75-5	2-Nitrophenol
88-89-1	Picric acid
90-04-0	o-Anisidine
90-43-7	2-Phenylphenol
90-94-8	Michler's ketone
91-08-7	Toluene-2,6-diisocyanate
91-20-3	Naphthalene
91-22-5	Quinoline
91-59-8	beta-Naphthylamine
91-94-1	3,3'-Dichlorobenzidine
92-52-4	Biphenyl
92-67-1	4-Aminobiphenyl
92-87-5	Benzidine
92-93-3	4-Nitrobiphenyl
94-36-0	Benzoyl peroxide
94-59-7	Safrole
94-75-7	2,4-D {Acetic acid, (2,4-dichlorophenoxy)-}
95-47-6	o-Xylene
95-48-7	o-Cresol
95-50-1	1,2-Dichlorobenzene
95-53-4	o-Toluidine
95-63-6	1,2,4-Trimethylbenzene
95-80-7	2,4-Diaminotoluene
95-95-4	2,4,5-Trichlorophenol
96-09-3	Styrene oxide
96-12-8	1,2-Dibromo-3-chloropropane {DBCP}
96-33-3	Methyl acrylate
96-45-7	Ethylene thiourea
97-56-3	C.I. Solvent Yellow 3*
98-07-7	Benzoic trichloride {Benzotrichloride}
98-82-8	Cumene
98-87-3	Benzal chloride
98-88-4	Benzoyl chloride
98-95-3	Nitrobenzene
99-59-2	5-Nitro-o-anisidine
**99-65-0	m-Dinitrobenzene
100-02-7	4-Nitrophenol
100-21-0	Terephthalic acid

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**100-25-4	p-Dinitrobenzene
100-41-4	Ethylbenzene
100-42-5	Styrene
100-44-7	Benzyl chloride
100-75-4	N-Nitrosopiperidine
101-14-4	4,4'-Methylenebis(2-chloroaniline) {MBOCA}
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzenamine
101-68-8	Methylenebis(phenylisocyanate) {MBI}
101-77-9	4,4'-Methylenedianiline
101-80-4	4,4'-Diaminodiphenyl ether
103-23-1	Bis(2-ethylhexyl) adipate
104-94-9	p-Anisidine
105-67-9	2,4-Dimethylphenol
106-42-3	p-Xylene
106-44-5	p-Cresol
106-46-7	1,4-Dichlorobenzene
106-50-3	p-Phenylenediamine
106-51-4	Quinone
106-88-7	1,2-Butylene oxide
106-89-8	Epichlorohydrin
106-93-4	1,2-Dibromoethane {Ethylene dibromide}
106-99-0	1,3-Butadiene
107-02-8	Acrolein
107-05-1	Allyl chloride
107-06-2	1,2-Dichloroethane {Ethylene dichloride}
107-13-1	Acrylonitrile
**107-18-6	Allyl alcohol
107-21-1	Ethylene glycol
107-30-2	Chloromethyl methyl ether
108-05-4	Vinyl acetate
108-10-1	Methyl isobutyl ketone
108-31-6	Maleic anhydride
108-38-3	m-Xylene
108-39-4	m-Cresol
108-60-1	Bis(2-chloro-1-methylethyl) ether
108-88-3	Toluene
108-90-7	Chlorobenzene
108-95-2	Phenol
109-86-4	2-Methoxyethanol
110-80-5	2-Ethoxyethanol
110-82-7	Cyclohexane
110-86-1	Pyridine
111-42-2	Diethanolamine
111-44-4	Bis(2-chloroethyl) ether
114-26-1	Propoxur {Phenol, 2-(1-methylethoxy)-, methylcarbamate}
115-07-1	Propylene (Propene)
115-32-2	Dicofol {Benzenemethanol, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-(trichloromethyl)-}
117-79-3	2-Aminoanthraquinone

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117-81-7	Di(2-ethylhexyl) phthalate {DEHP}
117-84-0	n-Dioctyl phthalate
118-74-1	Hexachlorobenzene
119-90-4	3,3'-Dimethoxybenzidine
119-93-7	3,3'-Dimethylbenzidine {o-Tolide}
120-12-7	Anthracene
**120-58-1	Isosafrole
120-71-8	p-Cresidine
120-80-9	Catechol
120-82-1	1,2,4-Trichlorobenzene
120-83-2	2,4-Dichlorophenol
121-14-2	2,4-Dinitrotoluene
121-69-7	N,N-Dimethylaniline
122-66-7	1,2-Diphenylhydrazine {Hydrazobenzene}
123-31-9	Hydroquinone
123-38-6	Propionaldehyde
123-72-8	Butyraldehyde
123-91-1	1,4-Dioxane
126-72-7	Tris(2,3-dibromopropyl) phosphate
126-99-8	Chloroprene
127-18-4	Tetrachloroethylene {Perchloroethylene}
128-66-5	C.I. Vat Yellow 4*
131-11-3	Dimethyl phthalate
132-64-9	Dibenzofuran
133-06-2	Captan {1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(trichloromethy)thio]-}
133-90-4	Chloramben {Benzoic acid, 3-amino-2,5-dichloro-}
134-29-2	o-Anisidine hydrochloride
134-32-7	alpha-Naphthylamine
135-20-6	Cupferron {Benzeneamine, N-hydroxy-N-nitroso, ammonium salt}
139-13-9	Nitrilotriacetic acid
139-65-1	4,4'-Thiodianiline
140-88-5	Ethyl acrylate
141-32-2	Butyl acrylate
151-56-4	Ethyleneimine (Aziridine)
156-10-5	p-Nitrosodiphenylamine
156-62-7	Calcium cyanamide
302-01-2	Hydrazine
309-00-2	Aldrin {1,p5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro-(1.alpha., 4.alpha.,4a.beta.,5.alpha., 8.alpha.,8a.beta.)-}
334-88-3	Diazomethane
463-58-1	Carbonyl sulfide
492-80-8	C.I. Solvent Yellow 34* {Auramine}

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505-60-2	Mustard gas {Ethane,1,1'-thiobis{2-chloro-}
510-15-6	Chlorobenzilate {Benzeneacetic acid,4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-hydroxy-,ethyl ester}
**528-29-0	o-Dinitrobenzene
532-27-4	2-Chloroacetophenone
534-52-1	4,6-Dinitro-o-cresol
540-59-0	1,2-Dichloroethylene
541-41-3	Ethyl chloroformate
541-73-1	1,3-Dichlorobenzene
542-75-6	1,3-Dichloropropylene
542-88-1	Bis(chloromethyl) ether
569-64-2	C.I. Basic Green 4*
584-84-9	Toluene-2,4-diisocyanate
593-60-2	Vinyl bromide
606-20-2	2,6-Dinitrotoluene
615-05-4	2,4-Diaminoanisole
621-64-7	N-Nitrosodi-n-propylamine
624-83-9	Methyl isocyanate
636-21-5	o-Toluidine hydrochloride
680-31-9	Hexamethylphosphoramide
684-93-5	N-Nitroso-N-methylurea
759-73-9	N-Nitroso-N-ethylurea
842-07-9	C.I. Solvent Yellow 14*
924-16-3	N-Nitrosodi-n-butylamine
961-11-5	Tetrachlorvinphos {Phosphoric acid, 2-chloro-1-(2,3,5-trichlorophenyl)ethenyl dimethyl ester}
989-38-8	C.I. Basic Red 1*
1120-71-4	Propane sultone
1163-19-5	Decabromodiphenyl oxide
1313-27-5	Molybdenum trioxide
1314-20-1	Thorium dioxide
1319-77-3	Cresol (mixed isomers)
1330-20-7	Xylene (mixed isomers)
1332-21-4	Asbestos (friable)
1335-87-1	Hexachloronaphthalene
1336-36-3	Polychlorinated biphenyls {PCBs}
1344-28-1	Aluminum oxide
1464-53-5	Diepoxybutane
1582-09-8	Trifluralin {Benzeneamine, 2,6- dinitro-N,N-dipropyl-4-(trifluoromethyl)-}
1634-04-4	Methyl tert-butyl ether
1836-75-5	Nitrofen {Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-}
1897-45-6	Chlorothalonil {1,3-Benzenedicar bonitrile, 2,4,5,6-tetrachloro-}
1937-37-7	C.I. Direct Black 38*
2164-17-2	Fluometuron {Urea, N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]-}
2234-13-1	Octachloronaphthalene

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2303-16-4	Diallate {Carbamothioc acid, bis (1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester}
2602-46-2	C.I. Direct Blue 6*
2832-40-8	C.I. Disperse Yellow 3*
3118-97-6	C.I. Solvent Orange 7*
3761-53-3	C.I. Food Red 5*
4549-40-0	N-Nitrosomethylvinylamine
4680-78-8	C.I. Acid Green 3*
6484-52-2	Ammonium nitrate (solution)
7429-90-5	Aluminum (fume or dust)
7439-92-1	Lead
7439-96-5	Manganese
7439-97-6	Mercury
7440-02-0	Nickel
7440-22-4	Silver
7440-28-0	Thallium
7440-36-0	Antimony
7440-38-2	Arsenic
7440-39-3	Barium
7440-41-7	Beryllium
7440-43-9	Cadmium
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
7440-62-2	Vanadium (fume or dust)
7440-66-6	Zinc (fume or dust)
7550-45-0	Titanium tetrachloride
7647-01-0	Hydrochloric acid
7664-38-2	Phosphoric acid
7664-39-3	Hydrogen fluoride
7664-41-7	Ammonia
7664-93-9	Sulfuric acid
7697-37-2	Nitric acid
7723-14-0	Phosphorus (yellow or white)
7782-49-2	Selenium
7782-50-5	Chlorine
7783-20-2	Ammonium sulfate (solution)
8001-35-2	Toxaphene
**8001-58-9	Creosote
10034-93-2	Hydrazine sulfate
10049-04-4	Chlorine dioxide
12122-67-7	Zineb {Carbamodithioic acid, 1,2-ethanediylbis-,zinc complex}
12427-38-2	Maneb {Carbamodithioic acid, 1,2-ethanediylbis-, manganese complex}
16071-86-6	C.I Direct Brown 95*
16543-55-8	N-Nitrosonornicotine
20816-12-0	Osmium tetroxide
**25321-14-6	Dinitrotoluene (mixed isomers)
25321-22-6	Dichlorobenzene (mixed isomers)
25376-45-8	Diaminotoluene (mixed isomers)
**26471-62-5	Toluenediisocyanate (mixed isomers)
39156-41-7	2,4-Diaminoanisole sulfate

** These chemicals have been proposed for addition to the Section 313 list. These chemicals will be subject to reporting for the 1990 reporting year with the first reports due by July 1, 1991.

* C.I. is an abbreviation for Color Index.

Section 313 Chemical Categories

Section 313 requires emissions reporting on the chemical categories listed below, in addition to the specific chemicals listed above. The metal compounds listed below, unless otherwise specified, are defined as including any unique chemical substance that contains the named metal (e.g., antimony, copper, etc.) as part of that chemical's structure.

Chemical categories are subject to the 1 percent de minimis concentration unless the substance involved meets the definition of an OSHA carcinogen.

Antimony Compounds - Includes any unique chemical substance that contains antimony as part of that chemical's infrastructure.

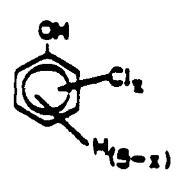
Arsenic Compounds - Includes any unique chemical substance that contains arsenic as part of that chemical's infrastructure.

Barium Compounds - Includes any unique chemical substance that contains barium as part of that chemical's infrastructure.

Beryllium Compounds - Includes any unique chemical substance that contains beryllium as part of that chemical's infrastructure.

Cadmium Compounds - Includes any unique chemical substance that contains cadmium as part of that chemical's infrastructure.

Chlorophenols -



where x = 1 to 5

Chromium Compounds - Includes any unique chemical substance that contains chromium as part of that chemical's infrastructure.

Cobalt Compounds - Includes any unique chemical substance that contains cobalt as part of that chemical's infrastructure.

Copper Compounds - Includes any unique chemical substance that contains copper as part of that chemical's infrastructure.

Cyanide Compounds - $X^+ CN^-$ where $X = H^+$ or any other group where a formal dissociation may occur. For example KCN or $Ca(CN)_2$.

Glycol Ethers - Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol.

$R\text{-}(OCH_2CH_2)_n\text{-}OR'$
Where n = 1,2,or 3
R = alkyl or aryl groups
R'= R, H, or groups which, when removed, yield glycol ethers with the structure:
$R\text{-}(OCH_2CH_2)_n\text{-}OH$

Polymers are excluded from this category.

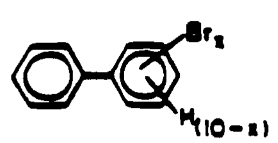
Lead Compounds - Includes any unique chemical substance that contains lead as part of that chemical's infrastructure.

Manganese Compounds - Includes any unique chemical substance that contains manganese as part of that chemical's infrastructure.

Mercury Compounds - Includes any unique chemical substance that contains mercury as part of that chemical's infrastructure.

Nickel Compounds - Includes any unique chemical substance that contains nickel as part of that chemical's infrastructure.

Polybrominated Biphenyls (PBBs)



where x = 1 to 10

Selenium Compounds - Includes any unique chemical substance that contains selenium as part of that chemical's infrastructure.

Silver Compounds - Includes any unique chemical substance that contains silver as part of that chemical's infrastructure.

Thallium Compounds - Includes any unique chemical substance that contains thallium as part of that chemical's infrastructure.

Zinc Compounds - Includes any unique chemical substance that contains zinc as part of that chemical's infrastructure.

Appendix B: Toxicity Ranks for EPCRA 313 Chemicals[1]

This appendix lists toxicity indices from several EPA sources for TRI chemicals. Several official measures of chemical toxicological potency are presented because no single index considers all factors relevant to the characterization of a chemical's toxicity potential. These EPA toxicity indices were selected for inclusion in the Guide because they:

- Were developed by expert toxicologists using original scientific papers.
- Are toxicity-based rankings, and do not include factors such as technical feasibility or economics.
- Consider all relevant toxic effects and routes of exposure when taken together.
- Are peer-reviewed, EPA-endorsed, and readily available.

For purposes of risk screening, the toxicity values for each index have been aggregated into three toxicological potency groups, with Group 1 representing the highest degree of concern:

TOXICITY INDEX	TOXICOLOGICAL POTENCY GROUPS		
	Group 1	Group 2	Group 3
TPQ[2] (lbs)	1; 10; 100	500	1,000; 10,000
RQ[3] (lbs)	1; 10; 100	1,000	5,000
Rfd mg/kg/day	<0.01	0.01–0.10	≥1.0
Cancer potency	All		
WQC mg/L	<1	1–10	≥10

1 Adapted from Appendix A, "Title III Toxicological Potency Indices." U.S. EPA, 1989. Toxic Chemical Release Inventory: Risk Screening Guide: Volume 2 -- Appendices.

2 TPQ (Threshold Planning Quantity): Based on acute inhalation toxicity concerns only; use other values for chronic toxicity or ecotoxicity evaluations.

3 RQ (Reportable Quantity): More than one RQ may be assigned to each chemical depending on the toxic effect under consideration.

The toxicity value ranges for the EPA toxicity indices were assigned to each of the three toxicological potency groups in the following manner. All carcinogens were placed into Group 1. Since, in the RQ process, carcinogens are allocated to a 1, 10, or 100 pound RQ level (see description of RQ process below), these three RQ levels defined the Group 1 toxicity value range. Chemicals in RQ levels of 1, 10, or 100 pounds for each of the other end effects, i.e., acute toxicity (listed in Table B-1 as ACUTE), chronic toxicity (CTX), or aquatic toxicity (AQTX), were assigned to toxicological potency Group 1. Chemicals in the 1,000 pound RQ level were assigned to toxicological potency Group 2, and in the 5,000-pound RQ level to Group 3. Where possible, the value ranges for the measure of toxicity used to assign chemicals to RQ levels for each of the above listed end effects (e.g., LD_{50} and LC_{50} values for acute toxicity) were used as a guide to the determination of Group 1, 2, and 3 toxicity value ranges for the other EPA toxicity indices.

Clearly, the determinations of the appropriate number of toxicological potency groups and the ranges of toxicity values to assign to each group are arbitrary. Other schemes for presenting the relative toxicological potency of chemicals could be developed. Any scheme that attempts to integrate multiple EPA toxicity indices will have inherent flaws due to the different factors, or weighting of factors, considered in the generation of each toxicity index.

Reportable Quantities (RQs)

In the case of an accidental spill or release, the National Response Center (NRC), the State Emergency Response Committee (SERC), and the Local Emergency Planning Committee (LEPC) must be notified if any hazardous chemical is released at a level greater than or equal to its reportable quantity (RQ). This notification is required under CERCLA and EPCRA. Currently about two-thirds of the Section 313 chemicals have assigned RQs. If a chemical does not yet have an RQ, it may be that these numbers are still under consideration.

There are five levels of RQs: 1, 10, 100, 1,000, and 5,000 pounds. Since this quantity is used to trigger reporting, the lower a substance's RQ is, the higher the concern for potential toxic effects, and the more often reporting will be triggered. An RQ is assigned to a chemical based on a consideration of the chemical's intrinsic chemical, physical, and toxicological properties. The lowest RQ in any category becomes the primary RQ for that substance. This primary RQ can be adjusted further upon consideration of the chemical's tendency to degrade in the environment. Although RQ determinations are not a definite indication of how hazardous a chemical will be at its reportable level, they may be used as indicators of a chemical's overall relative potential to cause toxicological and/or ecological effects at a given exposure level.

In assigning an overall RQ for a substance, up to six individual RQs are calculated separately for aquatic toxicity, acute mammalian toxicity, chronic toxicity, potential carcinogenicity, reactivity, and ignitability. Four of these are based on health or ecological effects (aquatic toxicity, acute mammalian toxicity, chronic toxicity, and potential carcinogenicity).

The acute toxicity of a substance is assessed based on the LD_{50} or LC_{50} of a substance administered by the oral, dermal, or inhalation route. Each of the five RQ levels has an LD_{50} value range for both acute oral and acute dermal toxicity, and an LC_{50} range for acute inhalation toxicity. The RQ level chosen for the acute toxicity category is the lowest of the RQs derived from the available acute toxicity data.

The chronic toxicity RQ is determined by a composite score assigned to a substance based on both minimum effective dose levels (oral, dermal, and inhalation) and the severity of the effects caused by repeated or continuous exposure. Teratogenic effects are considered as chronic effects.

The RQ method ranks carcinogenic potential through a two-stage combined weight-of-evidence and carcinogenic potency approach. During the first stage, evidence from animal and human studies are evaluated and the substance is assigned to a category according to a set of prescribed rules. The weight-of-evidence categories include Group A (known human carcinogen–evidence in humans is sufficient), Group B (probable human carcinogen–evidence in humans is limited or inadequate, but animal evidence is sufficient), Group C (possible human carcinogen–inadequate or no evidence in humans and animal evidence is limited), Group D (not classifiable), or Group E (evidence of noncarcinogenicity for humans). During the second stage, a quantitative assessment of the animal data (for Groups A, B and C) is made by estimating the dose of the substance that causes a 10 percent increase in tumor incidence above control levels. This estimated dose is termed the ED_{10}. A potency factor (F) is calculated from the reciprocal of the ED_{10}. Substances are assigned to potency groups of 1 (high), 2, or 3, depending on the magnitude of F. The weight-of-evidence and potency classifications for a given substance are combined through the use of a matrix that allows a designation of potential carcinogens into hazard categories of high, medium, or low resulting in RQs of 1, 10, and 100 pounds respectively.

The aquatic toxicity RQ is based on the chemical's toxicity to freshwater fish. Data from acute toxicity (96-hour) tests on a predetermined set of representative species are evaluated. The toxicity range within which the preponderance of LC_{50} values occurs is then translated to specific RQ values using the table below:

Aquatic Toxicity			RQ (Pounds)
LC_{50}	< 0.1 mg/L		1
0.1 mg/L	≤ LC_{50}	< 1 mg/L	10
1 mg/L	≤ LC_{50}	< 10 mg/L	100
10 mg/L	≤ LC_{50}	< 100 mg/L	1,000
100 mg/L	≤ LC_{50}	< 500 mg/L	5,000

For information about adjustments to RQs, see the Federal Register, May 25, 1983, p. 12552; April 4, 1985, p. 13456; September 29, 1986, p. 34534; March 16, 1987, p. 8140. For a comprehensive description of how RQs are set and used, see: U.S. EPA. 1985. Technical Background Document to Support Rulemaking Pursuant to CERCLA, Section 102, Volumes I, II and III.

Threshold Planning Quantities (TPQs)

Threshold planning quantities have been set for each of the 366 Extremely Hazardous Substances listed under EPCRA Section 302. Under Section 302, facilities maintaining any of the Extremely Hazardous Substances at or above their TPQ must inform the SERC. TPQs are based upon a relative rank list of their toxicological risk. In addition to evaluating the chemicals' acute toxicity, the threshold planning system takes into account their tendency to become airborne. Each chemical is assessed on the basis of "level of concern" for toxicity, and its ability to disperse. (Gases, powdered solids, and volatile liquids rank higher in concern than brick solids and non-volatile liquids of equal toxicity.) These factors are combined to give a ranking score for the chemical. That score is then translated to a TPQ of 1, 10, 100, 500, 1,000, or 10,000 pounds. The lower the number, the higher the concern for acute toxicity and ability to disperse.

One discrepancy is apparent in the toxicity tables (at the end of this Appendix). Eleven chemicals have been assigned to potency Group 1 for acute toxicity under the RQ scheme, and these same chemicals are relegated to potency Group 3 for TPQs. This is because acute toxicity RQs depend solely on animal toxicity data, while TPQs are based on a chemical's potential for becoming airborne as well as its toxicity. These 11 chemicals received low RQs, indicating a relatively high potential to cause toxicological effects. However, these chemicals are less likely than other chemicals to become airborne and disperse in the atmosphere; therefore, they are assigned relatively higher TPQs.

For more information on TPQs, see the Federal Register, April 22, 1987, p. 13377.

Reference Doses (RfDs)

Reference Doses (RfDs) are used in determining the threshold dose below which no observable effects are assumed to occur. They are estimates (with uncertainty spanning perhaps an order of magnitude) of a daily, lifetime human exposure to a substance that is likely to be without appreciable risk of deleterious effects, including effects to sensitive subpopulations. An RfD is a measure of human chronic exposure. RfDs are determined after a thorough review and assessment of all the available health effects data for a chemical. To calculate the RfD, the *lowest* reliable NOAEL (No-Observed-Adverse-Effect Level), or the *highest* dose at which no adverse effect was observed in the test species, is determined from the dose-response curve for the toxicant. That value is then divided by a number of uncertainty factors that account for differences between human and animal response, and the uncertainty in extrapolating from the dose-response curve. Reference doses are expressed in units of mg of substance per kg body weight per day (mg/kg/day).

$$RfD = NOAEL/UF$$

Reference doses are useful in quantitative risk assessment since they provide important benchmarks against which to compare exposure. RfDs are not used to assess the carcinogenic potential of a substance because cancer effects are thought to have no threshold. They provide a means to qualitatively compare the overall noncarcinogenic hazard potential of substances: the lower the RfD, the more toxic the chemical.

For more information, see the background document for IRIS, which provides short descriptions of the toxicity values listed in the data base: U.S. EPA. 1987. Integrated Risk Management System: Supportive Documentation. Volume 1. Office of Health and Environmental Assessment, Office of Research and Development.

Cancer Potency

Cancer potency is the expression of the relationship between the tumorigenic response to a carcinogen and the administered dose to the target or test organism. EPA expresses cancer potency using unit risk factors. The unit risk factor translates the estimated cancer potency into a probability of contracting cancer as a result of exposure to a unit dose of a carcinogen over a lifetime (70 years). In general, the lower the cancer potency, the lower the unit risk factor.

Much of EPA's risk assessment is based on information gathered from animal studies in which a group of animals is given a dose of a substance and its response to that dose is measured and recorded. The doses and their corresponding responses are plotted on a graph, producing a line called a dose-response curve. This provides a quantitative picture of the effect of a substance at different doses. However, in order to see any changes in body chemistry or physiology, scientists must often administer doses far greater than the dose to which any human may be exposed. To relate the response at high doses to potential effects at low doses, scientists *extrapolate*, or extend the dose-response curve, to the low end of the dose range, and attempt to predict the response. Extrapolation is based on trends observed at high doses. Often mathematical models are used for this purpose.

To determine the risk posed by carcinogenic substances, EPA uses an extrapolation model called the linear multistage procedure. This model provides a basis for extrapolating from high dose effects in the curve to the effects potentially posed by low doses. The unit risk factor is the upper bound of the cancer potency of that chemical, obtained from the low dose-response curve generated by the model. This numerical risk estimate is coupled with the EPA classification of the qualitative weight of evidence to more fully characterize the carcinogenic risk of a substance. (See page A-3 for a discussion of EPA weight-of-evidence categories.)

For more information, see the EPA Guidelines for Carcinogen Risk Assessment in the Federal Register, September 24, 1986, p. 33992.

See also: U.S. EPA, National Air Toxics Clearinghouse. 1987. Qualitative and Quantitative Carcinogen Risk Assessment. (EPA 450/5-87-003). The document provides a comprehensive summary of the basic principles and assumptions associated with carcinogen risk assessment, including a discussion of mathematical modeling and the cancer potency factor.

Aquatic Water Quality Criteria (WQC)

Aquatic water quality criteria are estimates of the ambient concentration of a chemical in surface waters (freshwater or marine waters) that will not cause adverse effects to the most sensitive aquatic organisms. These concentrations are based on information concerning the toxicity of the substance and its tendency to bioaccumulate. The numerical criteria address acute and chronic aquatic life effects with two separate criteria concentrations: the Criterion Maximum Concentration (CMC) protects against acute effects, while the Criterion Continuous Concentration (CCC) protects against chronic effects. These concentrations are based on toxicity studies conducted with at least three test organisms, one each representing fish, invertebrate, and plant species. The CMC is a 1-hour maximum exposure, and the CCC gives the maximum average concentration allowable over a 4-day period. Since these are *average* concentrations, the actual concentration at any time may exceed the criteria; however, the average cannot be exceeded, and the CMC and CCC cannot be exceeded more than once in three years. States should take site-specific factors into account to establish a lower frequency for exceeding the criteria, such as the occurrence of large spills or the importance of the indigenous species. States may also choose to calculate their own criteria concentrations based on tests conducted at specific water bodies.

In addition to aquatic water quality criteria, EPA publishes water quality criteria for protection of human health. These are estimates of ambient concentrations of chemicals that will not cause toxicity to humans who drink water or consume fish from that site. For carcinogens, the criteria provide estimates of the incremental cancer risk associated with a particular concentration of the chemical in water. However, because a number of other indices are available to address human health concerns, the human health water quality criteria are not included in this risk screening procedure.

> For more information, see the Federal Register, November 28, 1980, p. 79341. Revisions are proposed in the Federal Register, February 7, 1984, p. 4553.
>
> See also: U.S. EPA, Office of Water. Technical Support Document for Water Quality-based Permitting for Toxic Pollutants. The document describes water quality standards, human health hazard assessment, and exposure assessment.

Table B-1 Table of Toxicity Ranks for EPCRA §313 Chemicals

CHEMICAL NAME	CAS Number	TPQ	RQ Acute	RQ CTX	RFD Inhal	RFD Oral	RQ PC	IRIS Carc	RQ AqTx	WQC Acute	WQC CTX
Acetaldehyde	75070		3	.	.	.	.	.	2	.	.
Acetamide	60355		.	.	.	.	.	.	.	.	.
Acetamide, N-9H-fluoren-2-yl-	53963		3	.	.	.	1	.	.	.	.
Acetone	67641		.	.	.	2	.	.	3	.	.
Acetonitrile	75058		3	2	2	1	.	.	3	.	.
2,4-D Acid	94757		2	2	.	.	.	.	1	.	.
Acrolein	107028	2	1	.	.	.	.	1	1	1	1
Acrylamide	79061	3 *	3	.	.	.	.	.	.	.	.
Acrylic acid	79107		3	.	.	.	.	.	.	.	.
Acrylonitrile	107131	3	2	1	.	.	1	1	1	2	2
Aldrin	309002	2 *	2	.	.	1	1	1	1	1	.
Allyl chlorid	107051		2	.	.	.	.	.	2	.	.
Aluminum (fume or dust)	7429905		.	.	.	.	.	.	.	.	.
Aluminum oxide	1344281		.	.	.	.	.	.	.	.	.
2-Aminoanthraquinone	117793		.	.	.	.	.	.	.	.	.
4-Aminoazobenzene	60093		.	.	.	.	.	.	.	.	.
4-Aminobiphenyl	92671		.	.	.	.	.	.	.	.	.
1-Amino-2-methylanthraquinone	82280		.	.	.	.	.	.	.	.	.
Ammonia	7664417	2	3	2	2	3	.	.	1	.	.
Ammonium nitrate (solution)	6484522		.	.	.	.	.	.	.	.	.
Ammonium sulfate (solution)	7783202		.	.	.	.	.	.	.	.	.
Aniline	62533	3	2	.	.	.	.	.	2	.	.
o-Anisidine	90040		.	.	.	.	.	.	.	.	.
p-Anisidine	104949		.	.	.	.	.	.	.	.	.
o-Anisidine hydrochloride	134292		.	.	.	.	.	.	.	.	.
Anthracene	120127		.	.	.	.	.	.	.	.	.
Antimony	7440360		.	.	.	1	.	.	.	2	2
Arsenic	7440382		.	.	.	1	1	1	.	.	.
Asbestos	1332214		.	1	.	.	1	1	.	.	.
Barium	7440393		.	.	1	2	.	.	.	.	.
Benzal chloride	98873	2	3	.	.	.	.	.	.	.	.
Benzamide	55210		.	.	.	.	.	.	.	.	.
Benzenamine, 2-methyl-, hydrochloride	636215		3	.	.	.	1	.	.	.	.
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		.	.	.	.	1	.	.	.	.
Benzenamine, N,N-dimethyl-4-phenylazo	60117		3	.	.	.	1	.	.	.	.
Benzene	71432		3	2	.	.	1	1	1	2	.
Benzene, 1,2-dichloro-	95501		3	2	2	2	.	1	1	.	.
Benzene, 1,2-methylenedioxy-4-allyl-	94597		3	.	.	.	1	.	.	.	.
Benzene, 1,3-dichloro-	541731		.	2	.	.	.	1	1	.	.
Benzene, 1,4-dichloro-	106467		3	2	2	.	.	1	1	.	.
Benzene, 1-methyl-2,4-dinitro-	121142		3	1	.	.	1	.	2	.	.
Benzene, 1-methyl-2,6-dinitro-	606202		3	1	.	.	1	.	2	.	.
Benzene, 1-methylethyl-	98828		3	.	.	.	.	.	.	.	.
Benzene, chloro-	108907		3	2	1	2	.	.	1	.	.
Benzene, dimethyl-	1330207		3	.	.	.	.	.	2	.	.
Benzene, hexachloro	118741		3	1	.	1	1	1	.	.	.
Benzene, hexahydro-	110827		3	.	.	.	.	.	2	.	.
Benzene, m-dimethyl-	108383		.	.	.	.	.	.	.	.	.
Benzene, methyl-	108883		3	2	.	.	.	.	2	.	.
Benzene, o-dimethyl-	95476		.	.	.	.	.	.	.	.	.
Benzene, p-dimethyl-	106423		.	.	.	.	.	.	.	.	.
Benzene, pentachloronitro-	82688		3	2	.	.	1	.	.	.	.
1,2-Benzenedicarboxylic acid anhydride	85449		3	.	.	.	.	.	.	.	.
1,2-Benzenedicarboxylic acid,[bis(2-ethylhexyl)]ester	117817		3	.	.	.	1	.	.	.	.
1,2-Benzenedicarboxylic acid, diethyl ester	84662		3	3	.	.	.	.	2	.	.
Benzidine	92875		3	1	.	1	1	1	1	2	.
1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	81072		.	.	.	.	1	.	.	.	.
p-Benzoquinone	106514		3	.	.	.	.	.	1	.	.
Benzotrichloride	98077	1	2	.	.	.	1	.	.	.	.
Benzoyl chloride	98884		.	.	.	.	.	.	2	.	.
Benzoyl peroxide	94360		.	.	.	.	.	.	.	.	.
Benzyl chloride	100447	2	2	.	.	.	1	.	1	.	.
Beryllium	7440417		.	.	.	1	1	1	2	1	1

CHEMICAL NAME	CAS Number	TPQ	RQ Acute	RQ CTX	RFD Inhal	RFD Oral	RQ PC	IRIS Carc	RQ AqTx	WQC Acute	WQC CTX
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dichloro-	91941		3	0	0	0	1	0	0	0	0
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy-	119904		3	0	0	0	1	0	0	0	0
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl-	119937		3	.	.	.	1	.	.	.	.
Biphenyl	92524		.	.	.	.	.	.	.	.	.
Bis(2-chloroisopropyl) ether	108601		3	2	.	.	.	.	.	.	.
Bis(2-ethylhexyl) adipate	103231		.	.	.	.	.	.	.	.	.
Bromoform	75252		3	1	.	2	.	1	2	.	.
Butadiene	106990		.	.	.	.	.	.	.	.	.
1-Butanamine, N-butyl-N-nitroso-	924163		3	.	.	.	1	.	.	.	.
1-Butanol	71363		3	.	.	.	.	.	.	.	.
2-Butanone	78933		3	2	.	.	.	.	3	.	.
Butyl acrylate	141322		.	.	.	.	.	.	.	.	.
sec-Butyl alcohol	78922		.	.	.	.	.	.	.	.	.
tert-Butyl alcohol	75650		.	.	.	.	.	.	.	.	.
Butyl benzyl phthalate	85687		.	.	.	2	.	1	1	.	.
1,2-Butylene oxide	106887		.	.	.	.	.	.	.	.	.
Butyraldehyde	123728		.	.	.	.	.	.	.	.	.
C.I. Acid Blue 9, diammonium salt	2650182		.	.	.	.	.	.	.	.	.
C.I. Acid Blue 9, disodium salt	3844459		.	.	.	.	.	.	.	.	.
C.I. Acid Green 3	4680788		.	.	.	.	.	.	.	.	.
C.I. Basic Green 4	569642		.	.	.	.	.	.	.	.	.
C.I. Basic Red 1	989388		.	.	.	.	.	.	.	.	.
C.I. Direct Black 38	1937377		.	.	.	.	.	.	.	.	.
C.I. Direct Blue 6	2602462		.	.	.	.	.	.	.	.	.
C.I. Direct Brown 95	16071866		.	.	.	.	.	.	.	.	.
C.I. Disperse Yellow 3	2832408		.	.	.	.	.	.	.	.	.
C.I. Food Red 15	81889		.	.	.	.	.	.	.	.	.
C.I. Food Red 5	3761533		.	.	.	.	.	.	.	.	.
C.I. Solvent Orange 7	3118976		.	.	.	.	.	.	.	.	.
C.I. Solvent Yellow 14	842079		.	.	.	.	.	.	.	.	.
C.I. Solvent Yellow 3	97563		.	.	.	.	.	.	.	.	.
C.I. Solvent Yellow 34 (Auramine)	492808		.	.	.	.	1	.	.	.	.
C.I. Vat Yellow 4	128665		.	.	.	.	.	.	.	.	.
Cadmium	7440439		3	.	.	1	1	1	.	1	1
Calcium cyanamide	156627		.	.	.	.	.	.	.	.	.
Captan	133062		3	2	.	.	.	.	1	.	.
Carbamic acid, ethyl ester	51796		3	.	.	.	1	.	.	.	.
Carbamide, N-ethyl-N-nitroso-	759739		3	.	.	.	1	.	.	.	.
Carbamide, N-methyl-N-nitroso-	684935		3	.	.	.	1	.	.	.	.
Carbamide, thio-	62566		3	.	.	.	1	.	.	.	.
Carbamoyl chloride, dimethyl-	79447		3	.	.	.	1	.	.	.	.
Carbaryl	63252		3	.	.	.	.	.	1	.	.
Carbon disulfide	75150	3	2	1	.	.	.	.	3	.	.
Carbon tetrachloride	56235		3	1	.	1	1	1	2	3	.
Carbonyl sulfide	463581		. .	.	.	.	.	.	.	.	.
Catechol	120809		.	.	.	.	.	.	.	.	.
2-Chloroacetophenone	532274		.	.	.	.	.	.	.	.	.
Chloramben	133904		.	.	.	.	.	.	.	.	.
Chlordane	57749	3	2	.	.	1	1	1	1	1	1
Chlorinated Phenols	.		.	.	.	.	.	.	.	.	.
Chlorinated fluorocarbon (Freon 113)	76131		.	.	.	.	.	.	.	.	.
Chlorine	7782505	1	2	.	.	.	.	.	1	1	1
Chlorine dioxide	10049044		.	.	.	.	.	.	.	.	.
Chloroacetic acid	79118	1 *	2	1	.	1	.	.	.	.	.
Chloroethane	75003		3	.	.	.	.	.	3	.	.
Chloroform	67663	3	3	.	.	2	1	1	2	3	2
Chloromethyl ether	542881	1	1	.	.	.	1	.	.	.	.
Chloromethyl methyl ether	107302	1	2	1	.	.	1	1	3	.	.
Chloroprene	126998		.	.	.	.	.	.	.	.	.
Chlorothalonil	1897456		.	.	.	.	.	.	.	.	.
Chromium	7440473		.	.	.	.	.	.	.	.	.
Cobalt	7440484		.	.	.	.	.	.	.	.	.
Copper	7440508		.	.	.	3	.	.	.	1	1
p-Cresidine	120718		.	.	.	.	.	.	.	.	.
m-Cresol	108394		.	.	.	2	.	.	.	.	.
o-Cresol	95487	3 *	.	.	.	2	.	.	.	.	.
p-Cresol	106445		.	.	.	2	.	.	.	.	.
Cresol(s)	1319773		3	1	.	.	.	.	1	.	.

CHEMICAL NAME	CAS Number	TPQ	RQ Acute	RQ CTX	RFD Inhal	RFD Oral	RQ PC	IRIS Carc	RQ AqTx	WQC Acute	WQC CTX
Cupferron	135206		.	.	.	.	.	.	.	.	.
Decabromodiphenyl oxide	1163195		.	.	.	.	.	.	.	.	.
Di-n-propylnitrosamine	621647		3	.	.	.	1	.	.	.	.
Diallate	2303164		3	.	.	.	1	.	.	.	.
2,4-Diaminoanisole	615054		.	.	.	.	.	.	.	.	.
2,4-Diaminoanisole sulfate	39156417		.	.	.	.	.	.	.	.	.
4,4'-Diaminodiphenyl ether	101804		.	.	.	.	.	.	.	.	.
Diaminotoluene	95807		3	.	.	.	1	.	.	.	.
Diaminotoluene	25376458		3	.	.	.	1	.	.	.	.
Diazomethane	334883		.	.	.	.	.	.	.	.	.
Dibenzofuran	132649		.	.	.	.	.	.	.	.	.
1,2-Dibromo-3-chloropropane	96128		2	.	.	.	1	.	.	.	.
Dibutyl phthalate	84742		3	2	.	.	.	.	1	.	.
Dichlorobenzene (mixed)	25321226		.	2	.	.	.	.	1	2	1
Dichlorobromomethane	75274		3	.	.	.	.	.	.	.	.
1,2-Dichloroethane	107062		3	2	.	.	1	1	3	1	3
Dichloroethyl ether	111444	3	2	.	.	.	1	.	3	.	.
1,1-Dichloroethylene	75354		2	2	.	1	1	1	3	.	.
1,2-Dichloroethylene	540590		.	.	.	.	.	.	.	.	.
2,4-Dichlorophenol	120832		3	2	.	1	.	.	1	2	1
1,2-Dichloropropane	78875		3	.	.	.	.	1	3	.	.
1,3-Dichloropropene	542756		3	1	.	.	.	.	1	.	.
Dichlorvos	62737	3	2	.	.	.	.	.	1	.	.
Dicofol*	115322		3	.	.	.	.	.	1	.	.
Diepoxybutane	1464535	2	2	.	.	.	1	.	.	.	.
Diethanolamine	111422		.	.	.	.	.	.	.	.	.
1,4-Diethylene dioxide	123911		3	.	.	.	1	.	3	.	.
Diethyl sulfate	64675		.	.	.	.	.	.	.	.	.
alpha,alpha-Dimethylbenzylhydroperoxide	80159		2	.	.	.	.	.	.	.	.
Dimethylhydrazine	57147	3	2	.	.	.	1	.	.	.	.
2,4-Dimethylphenol	105679		3	.	.	.	.	.	1	2	.
Dimethyl phthalate	131113		3	.	.	.	.	.	.	.	.
Dimethyl sulfate	77781	2	1	.	.	.	1	.	2	.	.
Dinitrocresol	534521	1 *	1	1	.	.	.	.	1	.	.
2,4-Dinitrophenol	51285		2	1	.	.	.	.	1	.	.
1,2-Diphenylhydrazine	122667		3	1	.	.	1	1	1	1	.
Dioctyl phthalate	117840		.	.	.	.	.	.	.	.	.
Epichlorohydrin	106898	3	2	1	.	.	1	.	2	.	.
Ethanamine, N-ethyl-N-nitroso-	55185		3	.	.	.	1	.	.	.	.
Ethane, 1,1,1,2,2,2-hexachloro-	67721		3	2	.	1	1	.	1	1	1
Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	72435		3	.	2	2	.	.	1	.	.
Ethane, 1,1,2,2-tetrachloro-	79345		3	2	.	.	1	1	1	.	2
Ethane, 1,1,2-trichloro-	79005		3	.	.	1	1	1	2	.	2
Ethane, 1,2-dibromo-	106934		2	.	.	.	1	.	2	.	.
Ethanethioamide	62555		.	.	.	.	1	.	3	.	.
Ethenamine, N-methyl-N-nitroso-	4549400		2	.	.	.	1	.	.	.	.
Ethene, 1,1,2,2-tetrachloro-	127184		3	2	.	.	1	.	2	.	.
2-Ethoxyethanol	110805		3	2	2	2	.	.	3	.	.
Ethyl 4,4'-dichlorobenzilate	510156		3	.	.	.	1	.	.	.	.
Ethyl acrylate	140885		3	.	.	.	.	.	3	.	.
Ethyl chloroformate	541413		.	.	.	.	.	.	.	.	.
Ethylbenzene	100414		3	3	.	2	.	.	2	3	.
Ethylene	74851		.	.	.	.	.	.	.	.	.
Ethylene glycol	107211		.	.	.	3	.	.	.	.	.
Ethylene oxide	75218	3	2	.	.	.	1	.	2	.	.
Ethyleneimine	151564	2	1	.	.	.	1	.	.	.	.
Ethylenethiourea	96457		.	.	.	.	1	.	3	.	.
Fluometuron	2164172		.	.	.	.	.	.	.	.	.
Formaldehyde	50000	2	2	1	.	.	1	.	2	.	.
2,5-Furandione	108316		3	.	.	.	.	.	3	.	.
Glycol Ethers	.		.	.	.	.	.	.	.	.	.
Heptachlor	76448		2	.	.	1	1	1	1	1	1
Hexachloro-1,3-butadiene	87683		2	2	.	1	1	1	1	1	1
Hexachlorocyclopentadiene	77474	1	3	1	1	1	.	.	1	1	1
Hexachloronaphthalene	1335871		.	.	.	.	.	.	.	.	.
Hexamethylphosphoramide	680319		.	.	.	.	.	.	.	.	.
Hydrazine	302012	3	.	.	.	.	1	.	.	.	.
Hydrazine sulfate	10034932		.	.	.	.	.	.	.	.	.

CHEMICAL NAME	CAS Number	TPQ	RQ Acute	RQ CTX	RFD Inhal	RFD Oral	RQ PC	IRIS Carc	RQ AqTx	WQC Acute	WQC CTX
Hydrochloric acid (Hydrogen chloride (gas only)	7647010	2	3	.	.	.	.	.	3	.	.
Hydrocyanic acid	74908	1	1	.	.	.	.	.	1	.	.
Hydrogen fluoride	7664393	1	2	1	.	.	.	.	3	.	.
Hydroquinone	123319	2 *	3	2	.	2	.	.	.	.	.
Isobutyraldehyde	78842		.	.	.	.	.	.	.	.	.
Isopropyl alcohol (mfg.-strong acid processes)	67630		.	.	.	.	.	.	.	.	.
4,4'-Isopropylidenediphenol	80057		.	.	.	.	.	.	.	.	.
Lead	7439921		3	.	.	.	.	1	.	1	1
Lindane	58899	3 *	2	.	1	1	1	1	1	1	1
Maneb	12427382		.	.	.	.	.	.	.	.	.
Manganese	7439965		.	.	1	2	.	.	.	.	.
Mechlorethamine	51752	1	1	.	.	.	1	.	.	.	.
Melamine	108781		.	.	.	.	.	.	.	.	.
Mercury	7439976		1	.	.	1	.	.	1	1	1
Methane, chloro	74873		3	2	.	.	1	1	3	.	.
Methane, dibromo-	74953		2	.	.	.	.	.	3	.	.
Methane, dichloro-	75092		3	2	.	2	.	.	3	.	.
Methane, iodo-	74884		3	.	.	.	1	.	.	.	.
Methanol	67561		3	.	.	.	.	.	3	.	.
2-Methoxyethanol	109864		.	.	1	1	.	.	.	.	.
Methyl acrylate	96333		.	.	.	.	.	.	.	.	.
Methyl bromide	74839	3	2	.	.	.	.	.	3	.	.
Methyl chloroform	71556		3	2	.	.	.	.	2	.	.
Methyl isobutyl ketone	108101		3	.	2	2	.	.	.	.	.
Methyl isocyanate	624839	2	1	.	.	.	.	.	.	.	.
Methyl methacrylate	80626		3	2	.	.	.	.	3	.	.
Methyl tert-butyl ether	1634044		.	.	.	.	.	.	.	.	.
Methylene bis(phenylisocyanate) (MBI)	101688		.	.	.	.	.	.	.	.	.
4,4'-Methylene bis(N,N-dimethyl) benzenamine	101611		.	.	.	.	.	.	.	.	.
4,4'-Methylene dianiline	101779		.	.	.	.	.	.	.	.	.
Methylhydrazine	60344	2	2	.	.	.	.	.	.	.	.
Michler's ketone	90948		.	.	.	.	.	.	.	.	.
Molybdenum trioxide	1313275		.	.	.	.	.	.	.	.	.
Mustard gas	505602	2	1	1	.	.	1	.	.	.	.
N,N-Dimethylaniline	121697		.	.	.	.	.	.	.	.	.
N-Nitrosodiphenylamine	86306		3	.	.	.	.	1	1	.	.
N-Nitrosomorpholine	59892		.	.	.	.	.	.	.	.	.
N-Nitrosonornicotine	16543558		.	.	.	.	.	.	.	.	.
N-Nitrosopiperidine	100754		3	.	.	.	1	.	.	.	.
Naphthalene	91203		3	.	.	2	.	.	1	2	1
1-Naphthylamine	134327		3	.	.	.	.	.	1	.	.
2-Naphthylamine	91598		3	.	.	.	1	.	1	.	.
Nickel	7440020		1	1	.	2	1	1	.	2	1
Nitric acid	7697372	3	2	.	.	.	.	.	2	.	.
Nitrilotriacetic acid	139139		.	.	.	.	.	.	.	.	.
5-Nitro-o-anisidine	99592		.	.	.	.	.	.	.	.	.
Nitrobenzene	98953	3	3	.	1	1	.	.	2	3	.
4-Nitrobiphenyl	92933		.	.	.	.	.	.	.	.	.
Nitrofen	1836755		.	.	.	.	.	.	.	.	.
Nitroglycerine	55630		.	.	.	.	.	.	.	.	.
o-Nitrophenol	88755		3	.	.	.	.	.	1	.	.
p-Nitrophenol	100027		3	.	.	.	.	.	1	.	.
2-Nitropropane	79469		2	.	.	.	1	.	.	.	.
Nitrosodimethylamine	62759	3	2	.	.	.	1	.	.	.	.
p-Nitrosodiphenylamine	156105		.	.	.	.	.	.	.	.	.
Octachloronaphthalene	2234131		.	.	.	.	.	.	.	.	.
Osmium tetroxide	20816120		2	.	.	.	.	.	.	.	.
1,2-Oxathiolane, 2,2-dioxide	1120714		3	.	.	.	1	.	.	.	.
Parathion	56382	1	1	1	.	1	.	1	1	1	1
Pentachlorophenol	87865		1	2	.	2	.	.	1	1	1
Peracetic acid	79210	2	2	.	.	.	.	.	.	.	.
Phenol	108952	2 *	3	2	.	2	.	.	2	3	2
Phenol, 2,4,5-trichloro-	95954		3	2	.	.	.	.	1	.	.
Phenol, 2,4,6-trichloro	88062		3	.	.	.	1	.	1	.	1
p-Phenylenediamine	106503		.	.	.	.	.	.	.	.	.
2-Phenylphenol	90437		.	.	.	.	.	.	.	.	.
Phosgene	75445	1	1	.	.	.	.	.	3	.	.
Phosphoric acid	7664382		3	.	.	.	.	.	3	.	.

CHEMICAL NAME	CAS Number	TPQ	RQ Acute	RQ CTX	RFD Inhal	RFD Oral	RQ PC	IRIS Carc	RQ AqTx	WQC Acute	WQC CTX
Phosphorus	7723140	1	2	.	.	.	.	.	1	.	.
Picric acid	88891		.	.	.	.	.	.	.	.	.
Polybrominated Biphenyls (PBBs)	.		.	.	.	.	.	.	.	.	.
Polychlorinated Biphenyls (PCBs)	1336363		.	.	.	.	1	1	1	1	1
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		3	.	.	.	1	.	.	.	.
Propiolactone, beta-	57578	2	1	.	.	.	1	.	.	.	.
Propionaldehyde	123386		.	.	.	.	.	.	.	.	.
Propoxur	114261		.	.	.	.	.	.	.	.	.
Propylene (Propene)	115071		.	.	.	.	.	.	.	.	.
Propylene oxide	75569	3	3	.	.	.	.	.	3	.	.
Propyleneimine	75558	3	2	.	.	.	1	.	.	.	.
Pseudocumene	95636		.	.	.	.	.	.	.	.	.
Pyridine	110861		3	1	.	.	.	.	3	.	.
Quinoline	91225		3	.	.	.	.	.	2	.	.
Selenium	7782492		1	.	1	1	.	.	.	1	1
Silver	7440224		3	2	.	.	.	.	.	1	1
Sodium hydroxide	1310732		3	.	.	.	.	.	2	.	.
Sodium sulfate (solution)	7757826		.	.	.	.	.	.	.	.	.
Styrene	100425		3	.	.	.	.	.	2	.	.
Styrene oxide	96093		.	.	.	.	.	.	.	.	.
Sulfuric acid	7664939	3	2	.	.	.	.	.	2	.	.
Terephthalic acid	100210		.	.	.	.	.	.	.	.	.
Tetrachlorvinphos	961115		.	.	.	.	.	.	.	.	.
Thallium	7440280		2	.	.	1	.	.	.	2	1
4,4'-Thiodianiline	139651		.	.	.	.	.	.	.	.	.
Thorium dioxide	1314201		.	.	.	.	.	.	.	.	.
Titanium tetrachloride	7550450	1	1	1	.	.	.	.	.	.	.
Toluene 2,4-diisocyanate	584849	2	1	.	.	.	.	.	1	.	.
Toluene 2,6-diisocyanate	91087	1	.	.	.	.	.	.	.	.	.
o-Toluidine	95534		3	.	.	.	1	.	.	.	.
Toxaphene (Camphechlor)	8001352	2 *	2	.	.	.	1	1	1	1	1
Triaziquone	68768		.	.	.	.	.	.	.	.	.
1,2,4-Trichlorobenzene	120821		3	2	1	2	.	.	1	.	.
Trichloroethylene	79016		3	2	.	.	1	1	2	3	3
Trichlorophon	52686		3	1	.	.	.	.	2	.	.
Trifluralin	1582098		.	.	.	.	.	.	.	.	.
Vanadium (fume or dust)	7440622		.	.	.	1	.	.	.	.	.
Vinyl acetate monomer	108054	3	3	.	.	.	.	.	2	.	.
Vinyl bromide	593602		.	.	.	.	.	.	.	.	.
Vinyl chloride (monomer)	75014		1	2	.	.	1	1	3	.	.
2,6-Xylidine	87627		.	.	.	.	.	.	.	.	.
Zinc	7440666		.	2	.	2	.	.	.	1	1
Zineb	12122677		.	.	.	.	.	.	.	.	.