

SPILLS ACTION CENTRE

SUMMARY REPORT OF 1995 SPILLS

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EXECUTIVE SUMMARY

The Ontario Ministry of Environment and Energy's Spills Action Centre receives and initiates responses to reports of spills and other urgent environmental incidents on a 24-hour per day basis. This report is a summary of spills reported to the ministry during the calendar year of 1995.

In 1995 the Spills Action Centre documented 5 000 spills. This is nearly identical to the previous years total. Since 1988 (the first year the Spills Action Centre published a yearly report) the number of spills has varied from a low of 4 072 in 1988 to a high of 5 686 in 1990. Between 1988 and 1995, the average number of spills reported each year is 5 025.

Oils and fuels accounted for 59 percent of spilled materials; chemicals and chemical solutions accounted for 17 percent; wastes and waste waters 16 percent; gaseous materials 5 percent; while other and unknown materials accounted for the remaining 3 percent.

The majority of reported spills involved small volumes. Cumulatively (of spills where the volume was reported) 25 percent involved volumes less than 10 litres; 61 percent were less than 100 litres; and 89 percent were less than 1 000 litres.

About 31 percent of reported spills did not have any anticipated environmental impact, 50 percent had a possible environmental impact and 19 percent had a confirmed environmental impact. Of those with confirmed impact, nearly two-thirds involved soil contamination, and one-fifth involved water pollution. Sixteen spills had confirmed human health and safety concerns.

Five industrial sectors accounted for the majority of reported spills in 1995: transportation accounted for 16 percent; petroleum for 12 percent; chemical for 5 percent; general

manufacturing for 5 percent; and, metallurgical for 4 percent. Spills from electric utilities accounted for 15 percent, and sewage utilities accounted for 5 percent.

Motor vehicles were the largest source of spills, accounting for 25 percent of reported spills. Spills from manufacturing and processing facilities accounted for 19 percent of reported spills.

Equipment failure and operator error were the major reasons for spills. These values are generally consistent with those presented in previous years. This suggests that spills can be prevented through proper staff training and regular equipment maintenance.

In 1995, there were 229 spills to the Great Lakes system, 53 fewer than in 1994. 141 involved oil or chemical discharges including: 56 to Lake Ontario, 15 to the St. Clair River, 14 to the St. Lawrence River, 14 to Lake Huron, 14 to Lake Erie, 8 to Lake Superior, 7 to the Detroit River, 6 to the St. Marys River, 4 to the Niagara River, and 3 to the Welland Canal. Discharges of wastes and wastewaters accounted for the remaining 88 spills.

The ministry documents all reported occurrences on a computerized database management system called the *Occurrence Reporting Information System* (ORIS). The ministry uses this information to develop and modify pollution abatement programs and spill prevention initiatives as trends or concerns are identified. The ministry also shares this data with other agencies, such as Environment Canada and the International Joint Commission on the Great Lakes, to assist in identifying and evaluating common environmental concerns.

The ministry is currently working with Environment Canada under the *Canada-Ontario*

Agreements to prevent and control spills by improving federal and provincial spill prevention, preparedness, and response programs in priority areas across the province (such as the St. Clair River). The feasibility of a “one-window” approach to federal and provincial spill reporting is also being considered.

The ministry is actively involved in spill prevention and preparedness. The ministry's Contingency Planning Program provides advice and assistance to industry and other government agencies. The ministry maintains the *Province of Ontario Contingency Plan for Spills of Oil and other Hazardous Materials* which coordinates the provincial response to major spills.

INTRODUCTION

This report is the eighth annual summary of occurrences reported to the Ontario Ministry of Environment and Energy's Spills Action Centre. The purpose of this report is to provide a summarized review of spills reported to the Ministry during the calendar year of 1995 and to compare this information to that obtained in previous years.

Ontario's Spills Legislation

The Environmental Protection Act (EP Act) defines a spill, with reference to a pollutant, as:

"...a discharge into the natural environment, from or out of a structure, vehicle or other container, and that is abnormal in quantity or quality in light of all the circumstances of the discharge."
(Part X, Section 91(1)).

A spill is reportable if it causes or is likely to cause an adverse effect, such as injury or damage to property or to plant or animal life, harm or material discomfort to any person. The person who had control of the pollutant immediately prior to the spill and the person who spills, causes, or permits the spill must report the discharge to the ministry based on their determination of the likelihood of adverse effects.¹

Part X of the EP Act establishes:

- the requirement to immediately notify the ministry, the municipality in which the spill occurred and, in some cases, the owner of the pollutant and the person in control (if they are not already aware of the spill);

- the duty to clean up spills;
- the right for municipalities to respond to spills and to recover costs;
- a process, as a last resort, for the Minister of Environment and Energy to direct ministry staff or to order the discharger or anyone else to respond to spills;
- the right to compensation for costs and damages incurred; and,
- the Environmental Compensation Corporation to provide limited assistance in compensating certain victims of spills.

The Spills Action Centre

The primary role of the Spills Action Centre (SAC) is to receive and coordinate the response to reports of spills and other urgent environmental matters on a 24-hour per day basis. Industry, response agencies, and the general public use the Centre's province-wide, toll-free number (1-800-268-6060) to report spills and a variety of other environmental matters including a range of ministry-required notifications (other than spills), and environmental complaints from the general public.

The Centre's Contingency Planning Office maintains the *Province of Ontario Contingency Plan for Spills of Oil and other Hazardous Materials*, in addition to the Ministry's components of the *Province of Ontario Nuclear Emergency Plan*, the *Provincial Emergency Plan*, and the *Canada - United States Joint Marine Pollution Contingency Plan*. The Centre also promotes the development of industrial and municipal spill contingency plans.

¹ Refer to Appendix IV for a summary of adverse effects and the reporting exemptions.

Environmental Officers at the SAC evaluate all reported occurrences and decide what type of response is necessary. This may include any combination of the following:

- Providing immediate advice and direction to the person who reports an occurrence;
- Contacting suspected pollution sources in an attempt to verify and resolve the problem;
- Contacting other agencies or potentially affected parties as needed, for example, police, fire departments, municipal authorities, health officials, Canadian Coast Guard, US authorities, downstream water users, etc.;
- Contacting local Ministry of Environment and Energy personnel to initiate a field response;
- Notifying senior ministry management and coordinating Minister's orders or directions when necessary;
- Maintaining liaison with the agencies in charge of public safety in an emergency and coordinating the ministry's support for their efforts;
- Providing information on chemicals and cleanup techniques.

The Occurrence Report Information System

The ministry records all reported occurrences on a computerized database management system called the Occurrence Report Information System (ORIS). This system enables the Ministry to track the status of occurrences, and facilitates the preparation of data summaries. Each occurrence report consists of a text summary of the incident and several coded fields which simplify data retrieval. A sample occurrence report is included in Appendix I of this report.

Initial information on spills and emergencies is often incomplete and may change as more information becomes available. Since some incidents take a long time to resolve, the information presented in this report is a "snapshot" of the information that existed on ORIS at the time summaries were generated (April, 1995). However, it is expected that any changes to the information on ORIS will not have a significant effect on the summaries presented in this report.

SUMMARY OF 1995 SPILLS

This part of the report summarizes the number and type of spills reported to the Ministry of Environment and Energy during 1995. The report compares this information to the data from previous years.

Yearly Spill Totals

Between 1988 and 1990, the number of reported spills increased by 18 percent, rising from 4 072 in 1988 to 5 686 in 1990. Between 1991 and 1993, the number of reported spills decreased by more than 15 percent, falling to 4 841 in 1993. In 1994, the number of reported spills increased to 5 007. In 1995, the number of reported spills remained steady at 5 000. *Figure 1* depicts the change in the number of reported spills from 1988 to 1995.

Spills To Land, Water, and Air

In 1995 there were 3 138 spills to land, 790 spills to water, and 423 spills to air. Spills which affected a combination of these media accounted for an additional 649 spills. Spills to land accounted for 63 percent of all spills; spills to water accounted for 16 percent; spills to air accounted for 8 percent; and spills to multiple-media accounted for 13 percent. *Table 1* shows

Figure 2 shows the relative percentages of these spills.

Spills By Municipal Location

Generally, municipalities with the largest population have the greatest number of reported spills. Evidence for this can be seen in municipalities such as Peel Region and York Region which, as their populations have increased, have had a corresponding increase in the number of reported spills. Due to the concentration of industrial activities, some municipalities, such as Lambton County and Hamilton-Wentworth Region, have a proportionately higher number of spills occur within their boundaries. *Table 2* shows the number of spills that occurred within each upper-tier municipality in 1995 and previous years.

TABLE 1
Spills By Receiving Medium – 1988 to 1995

MEDIUM	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Land	3 138	3 161	3 222	3 194	3 117	3 144	2 996	2 261
Land & Water	541	430	390	475	524	467	355	243
Water	790	920	801	965	1 050	1 305	1 135	969
Water & Air	21	8	15	13	18	23	8	5
Air	423	412	345	311	447	649	776	543
Air & Land	87	76	68	56	81	98	75	51
TOTAL	5 000	5 007	4 841	5 014	5 237	5 686	5 345	4 072

the number of spills and the affected media;

Figure 1
Reported Spills 1988 to 1995

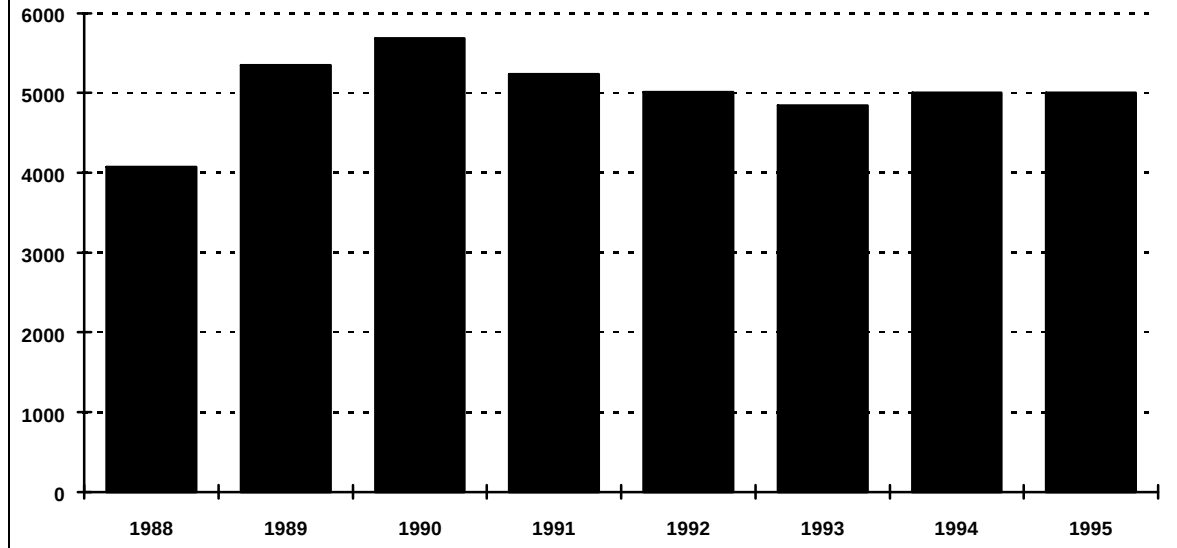


Figure 2
Spills By Receiving Medium

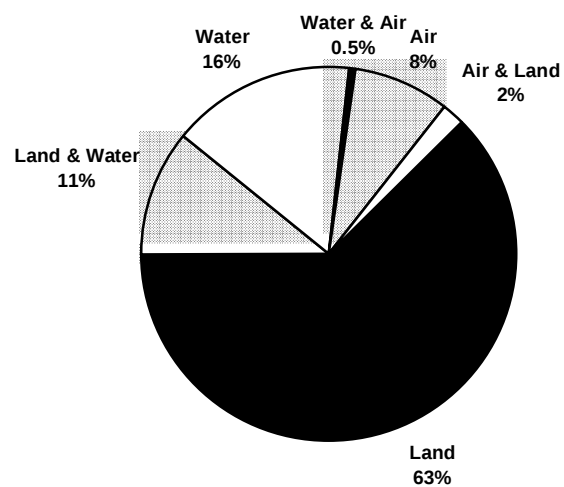


TABLE 2
Spills By Municipal Location

MUNICIPALITY	YEAR				
	1995	1994	1993	1992	1991
Metropolitan Toronto	603	495	495	529	559
Hamilton-Wentworth R.M.	312	328	290	355	498
Peel R.M.	299	282	242	218	192
Ottawa-Carleton R.M.	260	215	266	232	218
York R.M.	223	185	176	179	153
Niagara R.M.	205	244	247	233	302
Thunder Bay District	202	235	239	188	207
Simcoe County	184	172	138	148	129
Durham R.M.	173	155	125	150	141
Waterloo R.M.	150	154	127	132	135
Middlesex County	137	130	82	91	96
Halton R.M.	131	127	111	130	130
Haldimand-Norfolk R.M.	121	173	122	116	152
Cochrane District	120	88	84	95	104
Lambton County	115	135	150	177	236
Leeds & Grenville County	107	100	126	132	138
Essex County	105	101	88	79	83
Sudbury R.M.	102	181	181	202	124
Stormont, Dundas & Glengarry County	99	143	112	131	162
Kenora District	88	79	99	84	71
Hastings County	83	70	77	80	93
Nipissing District	83	78	85	77	86
Algoma District	77	113	85	111	169
Frontenac County	76	60	62	62	65
Wellington County	72	62	78	83	62
Muskoka D.M.	71	66	68	70	38
Peterborough County	59	41	53	68	71
Brant County	56	44	32	46	50
Renfrew County	56	62	78	97	65
Northumberland County	55	64	41	56	54
Huron County	46	35	37	45	35
Timiskaming District	45	62	51	36	46
Bruce County	44	45	64	62	49
Parry Sound District	43	45	47	55	40
Kent County	41	67	53	43	53
Victoria County	37	20	27	36	42
Prescott & Russell County	36	38	37	44	35
Sudbury District	36	31	57	46	48
Oxford County	34	36	39	36	53
Rainy River District	33	25	43	35	26
Perth County	32	28	22	22	35
Elgin County	27	26	28	28	31
Lanark County	26	37	36	35	39
Haliburton County	21	13	13	16	6
Lennox & Addington County	21	37	31	31	27
Prince Edward County	20	15	10	19	15
Grey County	19	45	52	42	48
Manitoulin District	7	5	11	9	9
Dufferin County	6	12	20	21	15
Out-of-Province	2	3	4	2	4
TOTALS	5000	5007	4841	5014	5239

Types and Volumes of Materials Spilled

The 5 000 spills reported in 1995 involved a total of 5 151 spilled materials. The total number of materials spilled exceeds the total number of reported spills because a number of spills involved more than one material.

For purposes of this summary, materials are divided into five groups: oils, chemicals, gases, wastes, and other materials. *Table 3* compares the number of spills by material group and year. *Figure 3* shows the percentage of spills by material group. *Figure 4* shows the number of spills by material group and volume.

Table 4 shows material groups summarized by the volume spilled. A large portion of reported spills involved small volumes. Cumulatively (where quantities were known), 25 percent of the spills involved volumes of less than 10 litres; 61 percent involved volumes less than 100 litres; 89 percent involved volumes less than 1 000 litres; and 96 percent involved volumes less than 10 000 litres. These figures are indicative of a continuing trend by industry and others to report small volume spills, some of which have a reporting exemption or are not likely to cause adverse effects.²

Figure 4 illustrates the distribution for the three major material categories - oils, chemicals, and wastes.

TABLE 3
Spills By Material Group

MATERIAL GROUP	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Oils	3 024	2 848	2 852	3 060	2 965	3 144	2 831	2 136
Chemicals	872	871	864	784	982	1 031	1 118	798
Gases	277	325	305	326	472	717	864	546
Wastes	846	931	865	942	948	1 032	763	602
Other	68	135	66	65	92	30	32	24
Unknown	64	66	43	34	32	37	81	96
TOTALS	5 151	5 176	4 995	5 211	5 491	5 991	5 689	4 202

TABLE 4
Spills By Material Group And Volume

MATERIAL GROUP	VOLUME (Litres)						Unknown
	0 to 10	10 to 100	100 to 1 000	1 000 to 10 000	10 000 to 100 000	More than 100 000	
Oils	649	991	659	91	12	-	622
Chemicals	196	168	174	69	17	1	247
Gases	6	25	14	3	-	4	225
Wastes	29	76	111	78	51	44	457
Other	2	7	14	6	4	2	33
Unknown	3	-	5	2	-	-	54
TOTALS	885	1 267	977	249	84	51	1 638

² Refer to Appendix IV for a summary of the exemptions.

Figure 3
Spills By Material Group

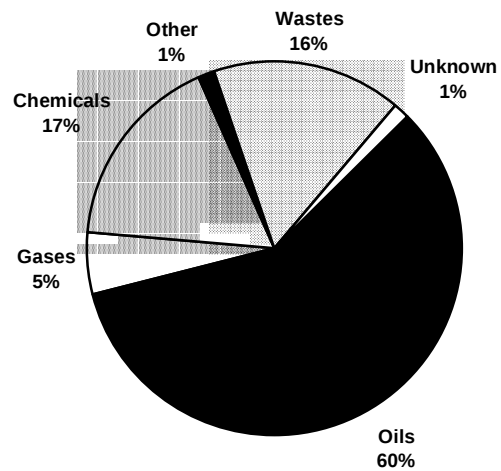
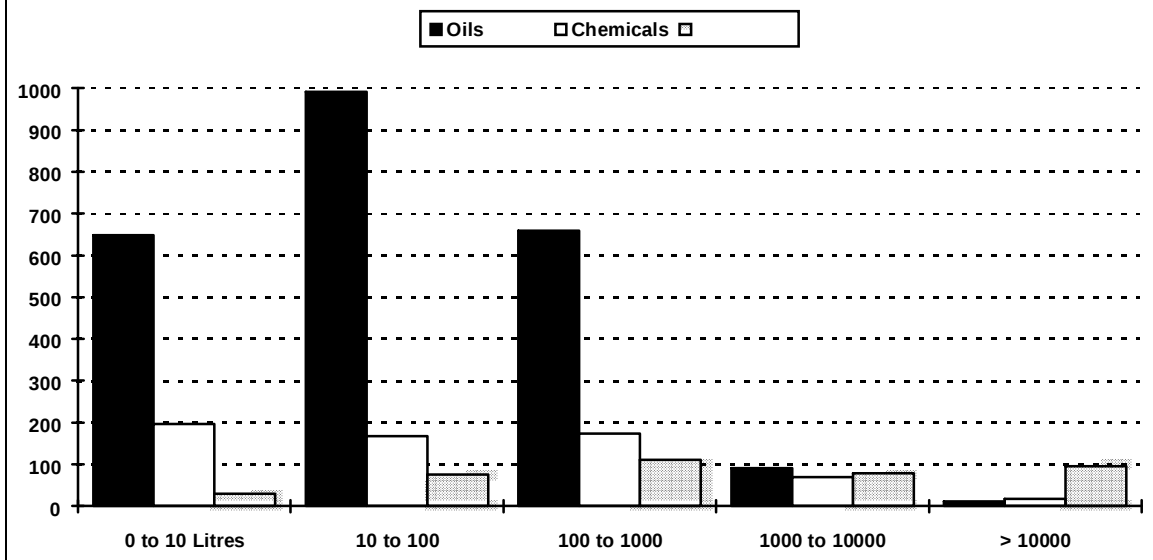


Figure 4
Spills By Material Group and Volume



Oils

In 1995, 3 024 of the materials spilled were oils, accounting for 59 percent of all spilled materials. Many of these spills involved operating fuels that spilled as a result of transportation accidents, and fuel leaks from fixed storage facilities.

About 79 percent of all oil spills had a reported volume. Cumulatively, 24 percent of these spills were less than 10 litres each, 68 percent were less than 100 litres, and 95 percent were less than 1 000 litres. As the data in *Table 4* shows, spills of oils involving volumes between 10 and 100 litres was the single largest grouping, accounting for 28 percent of all spilled materials (where the volume spilled was known). The second largest grouping was spills of oils involving volumes between 100 and 1 000 litres. Many of these spills were discharges from motor vehicle fuel tanks and residential furnace oil storage tanks.

Chemicals

In 1995, 872 of the materials spilled were chemicals. This accounts for 17 percent of all spilled materials.

About 72 percent of all chemical spills had a volume reported. Cumulatively, 31 percent of these spills were less than 10 litres each, 58 percent were less than 100 litres, and 86 percent were less than 1 000 litres.

Gases

In 1995, 277 of the materials spilled were in gaseous form. This accounts for 5 percent of all spilled materials. It is difficult to quantify the volume of gas emitted to air in a spill; few such reports contain volume information. In 1995, only 19 percent of the gaseous spills had a known volume.

Wastes

In 1995, 846 of the materials spilled were wastes. This accounts for 16 percent of all spilled materials. This category includes materials that were considered wastes prior to the spill. They may have originated as byproducts of industrial processes or may involve unusually high concentrations of pollutants in otherwise normal wastewater discharges.

About 46 percent of all waste spills were of a known volume. Cumulatively, 9 percent of these spills were less than 10 litres each, 26 percent were less than 100 litres, 46 percent were less than 1 000 litres, and 71 percent were less than 10 000 litres.

A relatively higher percentage of waste spills (as compared to the oil and chemical categories) involved volumes larger than 1 000 litres. Spills involving wastes often involve large volumes because this category includes wastewater discharges wherein the material of concern may constitute a relatively small portion of the total volume spilled.

Other Materials

Spills of other materials, not included in the four groups mentioned above, accounted for approximately 1 percent of all spilled materials. Fewer than 1 percent of all spilled materials were not identified and were documented as unknown.

Environmental Impact

The spills summarized in this report involve a wide range of materials, quantities, and circumstances, all of which can contribute to the impact of the spill on the environment. In order to provide some measure of the seriousness of a spill, the Ministry documents the likelihood of an environmental impact resulting from each spill.

In 1995, an environmental impact was confirmed for 19 percent of all spills. 50 percent had potential environmental impacts, and the remaining 31 percent did not have anticipated environmental impacts. *Table 5* summarizes the likelihood of impact for the spills where a confirmed or possible impact was identified; this information is illustrated in *Figure 5*.

The environmental impact data field is an indicator of the immediate impact of a spill, regardless of the volume or the type of material. It is not an accurate indicator of the full extent of the impact. For example, a spill that has a confirmed impact of soil contamination may involve a spill of a small volume of a non-hazardous material, necessitating the removal of a few shovels-full of contaminated soil. A spill of a larger volume may involve the removal of several hundred cubic metres of contaminated soil, however the impact for both

would be *soil contamination*. The true extent of environmental impact for individual spills depends on a number of factors, including the volume and type of substance spilled, the location, and the season. Combining the individual impacts of each spill does not provide a realistic measure of the cumulative impacts of all spills on the environment.

Figure 6 illustrates the environmental impact of spills which had confirmed or possible impacts. The figure shows that the largest confirmed impact was soil contamination. The figure also shows that a significant proportion of spills were identified as having a possible or confirmed water pollution impact. Only a small number of spills posed a threat to human health and safety.

TABLE 5
Nature of Environmental Impact

IMPACT	CONFIRMED	POSSIBLE
Soil Contamination	622	1 035
Water Pollution	201	846
Air Pollution	52	329
Multi-Media Pollution	42	211
Vegetation Damage	11	5
Human Health/Safety	16	15
Injury to Wild Life	7	4
Other Impact	20	52
TOTAL	971	2 497

Figure 5
Environmental Impact

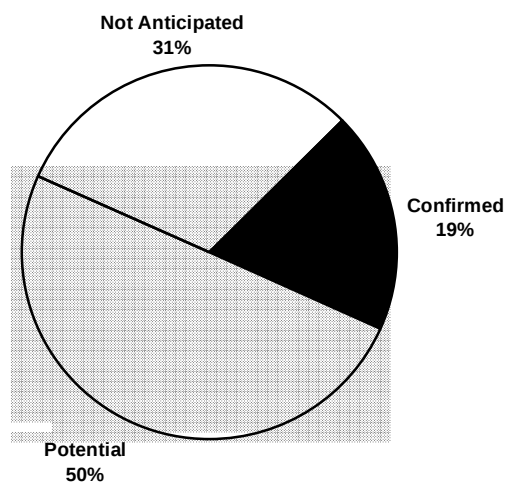
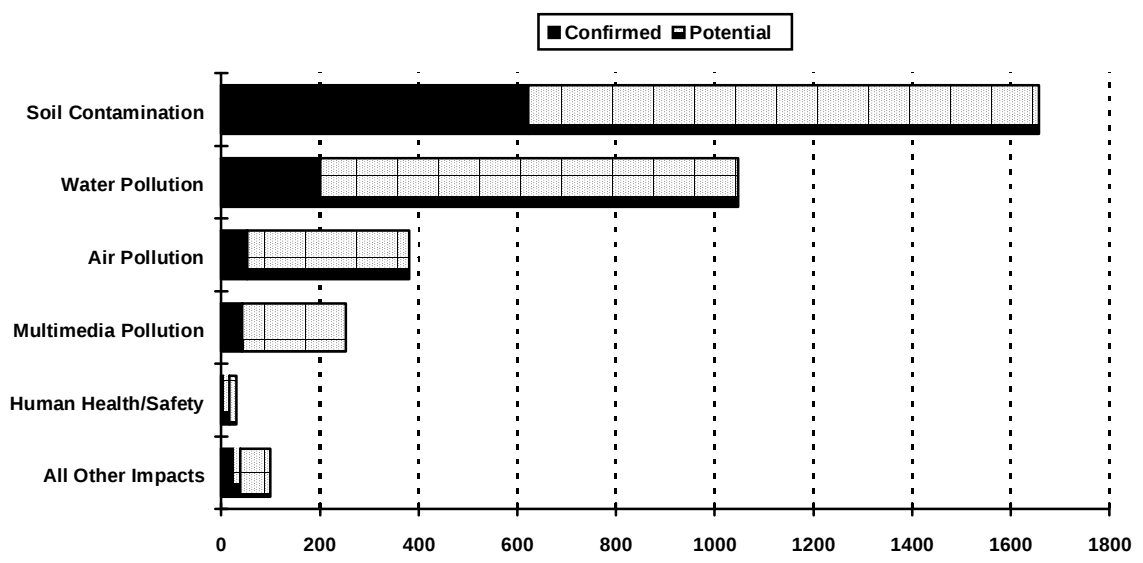


Figure 6
Nature of Environmental Impact



Spill Cleanup

Part X of the Environmental Protection Act requires that spills be cleaned up promptly and to the extent practicable. It places the primary cleanup responsibility on the discharger; that is, the person who owned and/or had control of the pollutant immediately prior to the spill. In most cases, spills are cleaned up by the person responsible for the discharge, or a contractor hired by them. Part X establishes the right for municipalities to respond to spills. Municipal authorities often do clean up spills, particularly if the spill occurs on municipal roads or into a municipal drainage system or watercourse.

The average cleanup success rate for the period 1991 to 1993 is summarized in *Table 6* and in *Figures 7* and *8*. The exact figures for 1994 and 1995 are not available due to a computer coding problem in ORIS. However, based on the information that is available, the cleanup success rate does not appear to have changed significantly in 1995.

The success of cleanup efforts is dependent upon a number of factors, including the properties of the spilled material, the accessibility of the spill site, the availability of expertise and resources, and the time required to mobilize a response. Environmental factors play a role as well, since weather and light conditions, and the type of soil or watercourse affected can further complicate or aid the success of the cleanup. Typically, spills to land have a much higher cleanup success rate than do spills to surface waters. Most spills to air are normally impossible to clean up because they usually involve gaseous materials.

TABLE 6
Spill Cleanup 1991-1993

YEAR	CLEANUP		
	None	Partial	Full
1991	1 828	804	2 377
1992	1 614	1 084	2 165
1993	1 751	1 083	2 007
3-Year Average	35%	20%	45%

Figure 7
Spill Cleanup

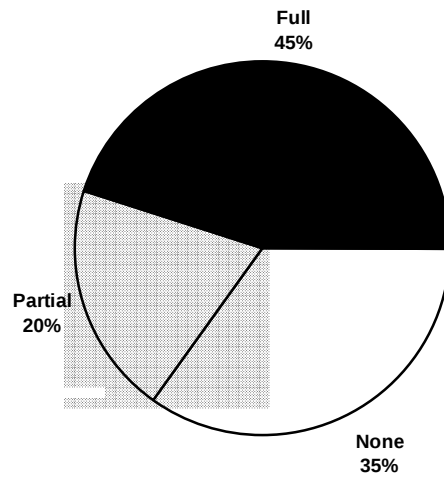
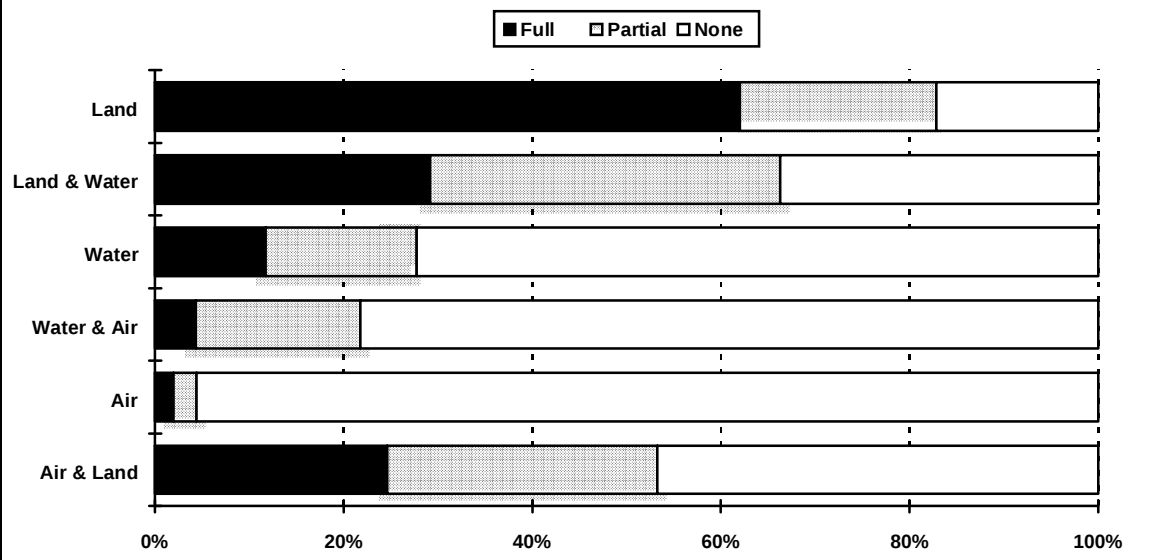


Figure 8
Spill Cleanup By Medium



Spills By Sector And Source

The industrial sectors with the largest numbers of reported spills in 1995 were transportation³, petroleum, chemical, metallurgical, and general manufacturing sectors. Collectively, spills from these five sectors accounted for 42 percent of all reported spills in 1995. Electric utilities, sewage utilities and private residents accounted for the majority of non-industrial sector spills. *Figure 9* summarizes spills by the various industrial and service sectors. *Table 7* lists the number of spills for these sectors from 1988 to 1995.

When combined, the spills of the seven sectors identified in *Table 7* account for 62 percent of all reported spills in 1995. The petroleum sector and electrical utilities had an increase in the number of reported spills, while the transportation and metallurgical sectors had a

decrease.

The source categories with the largest number of reported spills were motor vehicle, manufacturing facility, storage facility, electric transformer, service station, and sewage system. Together, these six categories accounted for 79 percent of all reported spills in 1995. *Table 8* provides a comparison of these sectors' spills from 1988 to 1995. *Figure 10* is a summary of spills arranged by the source of the discharge.

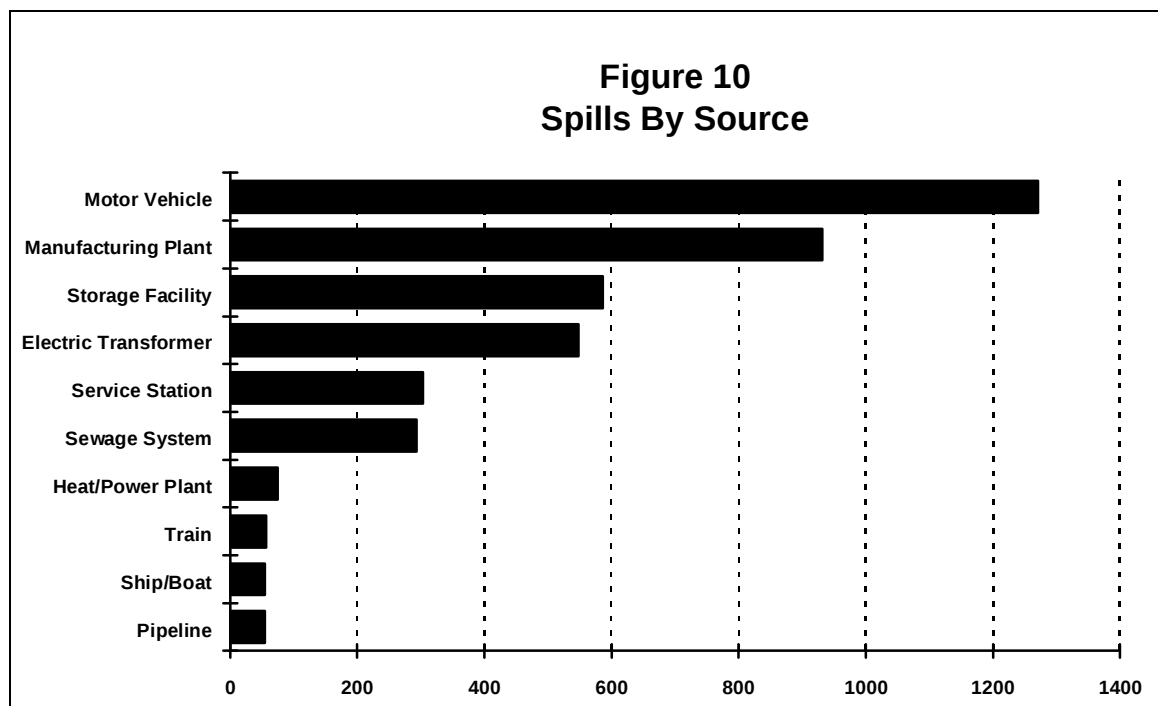
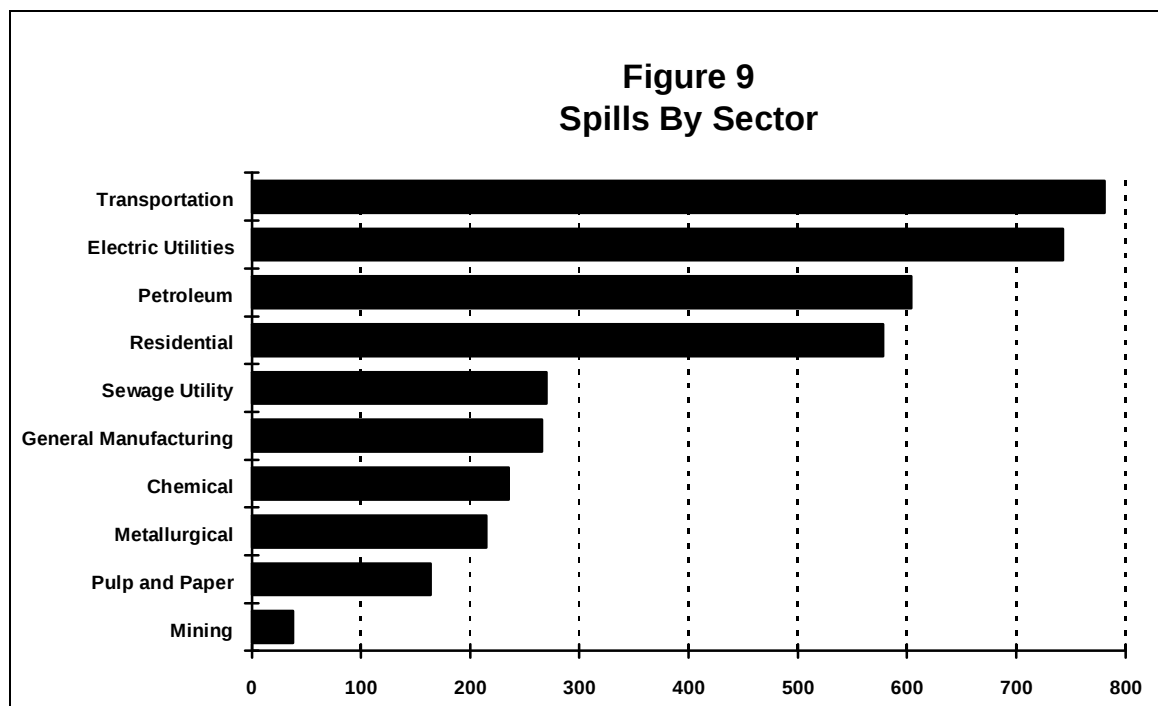
TABLE 7
Spills By Sector – 1988 to 1995

SECTOR	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Transportation	781	876	846	801	776	834	726	467
Electric Utilities	743	547	502	601	711	525	566	508
Petroleum	604	509	491	632	700	712	654	561
Sewage Utilities	270	342	248	282	248	296	250	198
General Manufacturing	266	276	263	264	342	394	446	319
Chemical	235	223	279	261	343	492	454	334
Metallurgical	215	325	271	281	414	476	504	460
All Others (Combined)	1 886	1 909	1 941	1 892	1 703	1 957	1 745	1 225

TABLE 8
Spills By Source – 1988 to 1995

SOURCE	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Motor Vehicle	1 271	1 321	1 457	1 419	1 364	1 412	1 127	718
Manufacturing Facility	931	1 072	1 001	968	1 305	1 571	1 572	1 284
Storage Facility	586	570	477	508	524	659	372	243
Electric Transformer	548	368	362	393	412	407	334	313
Service Station	303	187	176	218	269	316	263	217
Sewage System	293	365	278	349	268	307	274	230
All Others (Combined)	1 068	1 124	1 090	1 159	1 095	1 014	1 403	1 067

³ The transportation sector includes companies and individuals whose *only* business is providing transportation services.



Sector and Source Combinations

A summary of the typical combinations of sector and source codes provides additional information. There are a possible 238 sector and source code combinations, of which 13 combinations account for 65 percent of all spills. By adding the remaining spills which involve motor vehicles, storage facilities and manufacturing plants, 77 percent of all spills are accounted for. *Table 9* lists the major combinations of source and sector codes used in 1995⁴.

The highlights of the combined sector and source data presented in *Table 9* are:

- The *transportation-motor vehicle* combination accounted for almost 13 percent of all spills. These included spills of cargo and operating fluids, primarily from tankers and transport trucks. In total, spills from motor vehicles accounted for 25 percent of all spills.
- If the spills at the manufacturing facilities of the *chemical, metallurgical, and pulp and paper sectors* are combined, they account for 11 percent of all spills.
- The *electric utility-transformer* combination accounted for almost 11 percent of all spills. Typically, these spills involve small amounts of oil spilled when transformers fail or are accidentally ruptured. Cleanup of these spills is a routine matter for most utilities.
- The *sewage utilities-sewage systems* combination accounted for 5 percent of all spills. These spills include sewage bypasses caused by equipment failure at sewage plants and pumping stations, and breaks in sewage forcemains.

- There were 266 spills from *residential-storage facilities* representing about 5 percent of all spills. This combination includes spills of furnace oil from residential storage tanks.
- There were 260 spills involving the *petroleum-service station* combination. An additional 114 spills occurred at *petroleum-storage facilities*. The service stations are typically retail outlets for vehicle fuels, while the storage depots are usually privately operated sites where fuels are stored in bulk quantities. Spills at these sites typically involve leaks of petroleum products from storage tanks, fuel draining from hoses, and overflows that occur while vehicle tanks are being filled.

In some cases, the Ministry is unable to determine the source of a spill. Typically, these occurrences involve spills to remote roads, ditches, or watercourses; some of these occurrences involve the illegal dumping of materials. The source and sector was not known for 292 spills (approximately 6 percent of all spills) reported in 1995.

⁴ Refer to Appendix III for a complete table of all the sector and source combinations.

TABLE 9
Spills By Sector and Source

SECTOR	SOURCE	SPILLS	% •
Transportation •	Motor Vehicle	626	12.5
Electric Utilities •	Transformer	535	10.7
Residential •	Storage Facility	266	5.3
Petroleum •	Service Station	260	5.2
Sewage Utilities •	Sewage System	248	5.0
General Manufacturing •	Manufacturing Facility	228	4.6
Residential •	Motor Vehicle	227	4.5
Chemical •	Manufacturing Facility	208	4.2
Metallurgical •	Manufacturing Facility	189	3.8
Pulp & Paper •	Manufacturing Facility	155	3.1
Petroleum •	Storage Facility	114	2.3
Petroleum •	Motor Vehicle	108	2.2
Electric Utilities •	Motor Vehicle	79	1.6
All Other Sectors (Combined)	Motor Vehicle	231	4.6
All Other Sectors (Combined)	Storage Facility	209	4.2
All Other Sectors (Combined)	Manufacturing Facility	151	3.0

Spills By Cause And Reason

Each occurrence report uses codes to summarize the cause and reason for each spill. The "cause" describes how a spill occurred and the "reason" clarifies the cause by identifying the primary contributing factor. For example, a typical combination is *transportation accident* (cause) due to *adverse road conditions* (reason).

Table 10 summarizes the major cause codes for spills reported in 1995. Together, these eight codes account for 84 percent of all spills. Figure 11 illustrates the major causes attributed to spills in 1995. Container leaks, pipe or hose leaks, and container overflows caused nearly half of all spills.

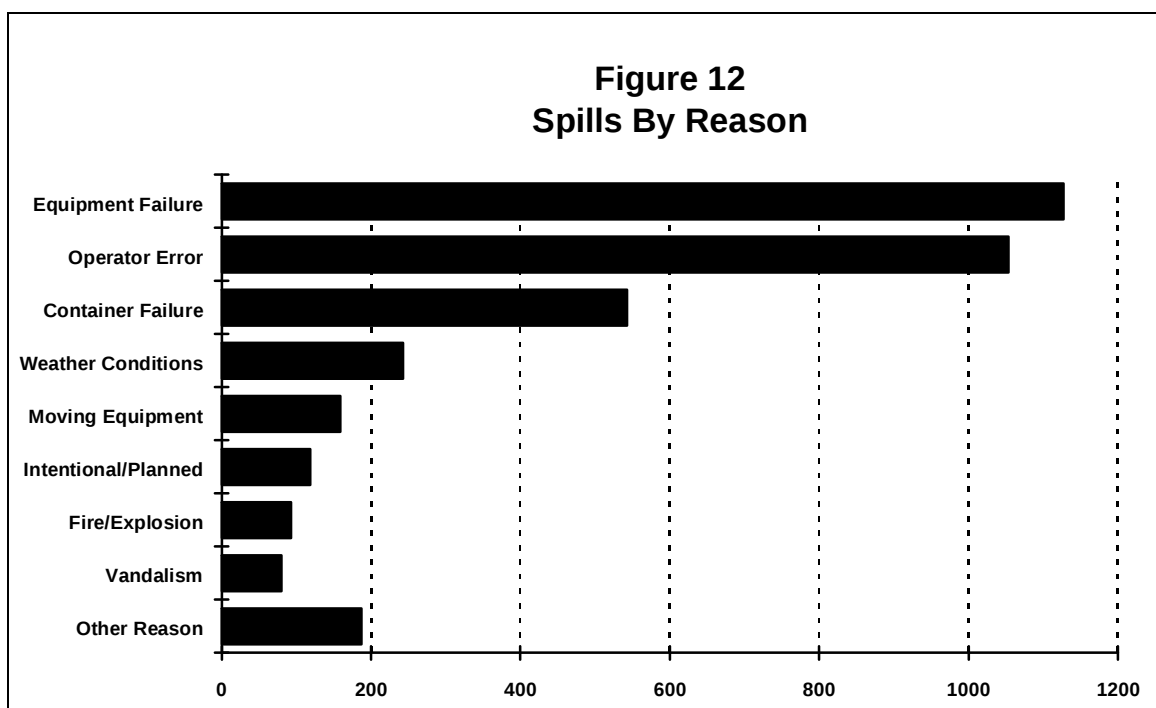
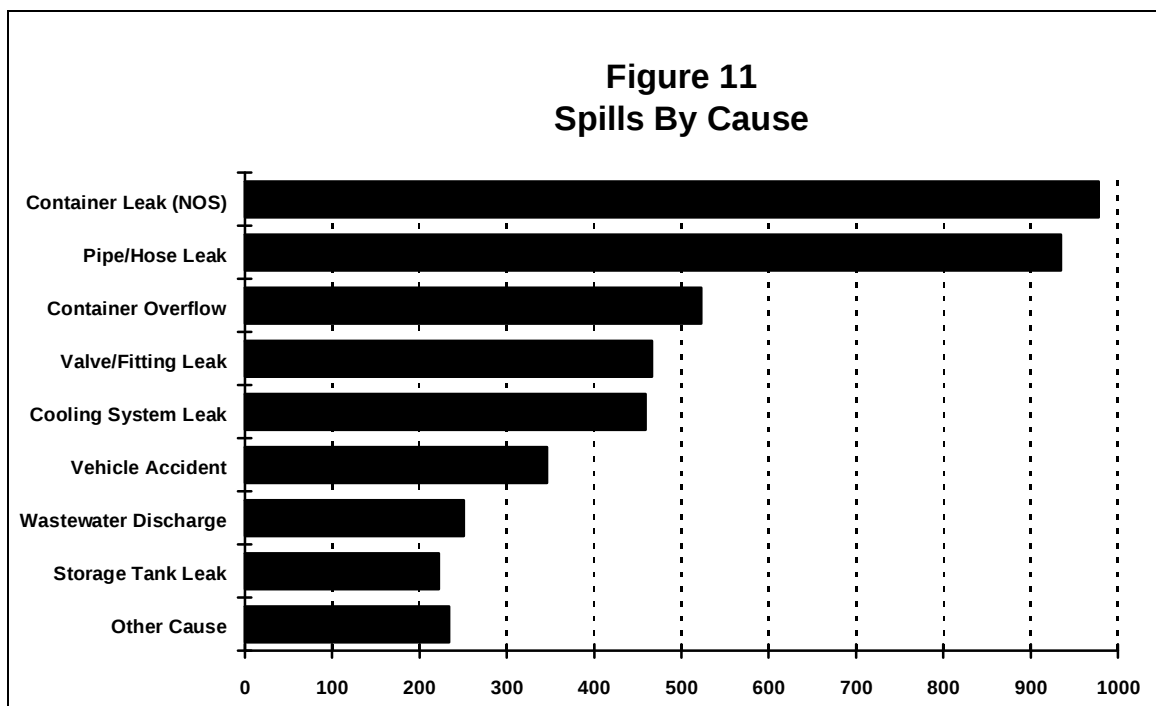
Table 11 summarizes the most frequently reported reasons for spills in 1995. Together, these six codes account for 65 percent of all spills. Figure 11 illustrates the major causes attributed to spills in 1995. Operator error and equipment failure were the major reasons for spills. These values are generally consistent with those presented in previous years. This suggests that spills can be prevented through proper staff training and regular equipment maintenance.

TABLE 10
Spills By Cause – 1988 to 1995

CAUSE	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Container Leak (NOS)	978	930	949	1 025	1 002	1 109	712	472
Pipe or Hose Leak	935	951	1 120	996	974	803	595	291
Container Overflow	523	449	399	390	533	672	492	455
Valve or Fitting Leak	466	444	336	370	431	419	407	319
Cooling System Leak	459	373	398	453	464	441	387	260
Motor Vehicle Accident	346	336	345	339	306	338	428	394
Wastewater Discharge	251	361	250	317	346	387	547	361
Storage Tank Leak	222	333	359	377	369	388	330	237

TABLE 11
Spills By Reason – 1988 to 1995

REASON	YEAR							
	1995	1994	1993	1992	1991	1990	1989	1988
Equipment Failure	1127	1 064	1121	1 235	1 124	1 327	1 028	892
Operator Error	1053	1 078	1058	1 172	1 343	985	760	533
Container Failure	543	698	721	576	743	794	671	334
Weather Conditions	243	127	136	178	124	145	84	107
Damage By Equipment	159	119	160	148	210	239	199	44
Intentional/Planned	119	101	128	107	127	190	208	120



Cause and Reason Combinations

On each occurrence report, the cause and reason codes are used together to indicate why and how a spill occurred. An examination of the cause and reason codes used in 1995 reveals that, of a possible 506 combinations, thirteen accounted for approximately 45 percent of all occurrences. *Table 12* summarizes these combinations⁵.

TABLE 12
Spills By Cause and Reason

CAUSE	REASON	SPILLS•
Pipe or Hose Leak	Equipment Failure	373
Container Overflow	Error	276
Valve or Fitting Leak	Equipment Failure	223
Other Container Leak	Error	213
Pipe or Hose Leak	Container Failure	169
Pipe or Hose Leak	Error	169
Motor Vehicle Accident	Error	163
Cooling System Leak	Equipment Failure	144
Other Container Leak	Equipment Failure	135
Other Container Leak	Container Failure	109
Cooling System Leak	Weather Conditions	101
Storage Tank Leak	Container Failure	96
Container Overflow	Equipment Failure	96

⁵ Refer to Appendix IV for a complete table of all the cause and reason combinations.

SPILLS TO THE GREAT LAKES SYSTEM

The Great Lakes are a vital component of Ontario's ecosystem. They contain about 20 percent of the world's fresh water. This section of the report focuses on oils and chemicals that spilled directly to the waters of the Great Lakes system. Although spills constitute a small fraction of total pollution loadings to the Great Lakes, the immediate impact of some spills can have a significant local impact. Shore-based facilities, ships and effluent pipes are all potential discharge points for contaminants.

In 1995, there were 141 spills of oils and chemicals (including chemical solutions) to the Great Lakes system, 23 fewer than in 1994.

Figure 13 shows the number of spills to each of the Great Lakes, and their connecting channels, for 1995; *Table 13* summarizes these spills by watercourse and sector.

In addition to the 141 spills of oils and chemicals, there were 88 spills of wastes or wastewater, bringing the total number of spills to the Great Lakes to 229, 53 fewer than in 1994.

TABLE 13
Spills of Oils and Chemicals to the Great Lakes

SECTOR	WATERCOURSE									TOTAL
	Lake Superior	St. Marys River	Lake Huron	St. Clair River	Detroit River	Lake Erie	Welland Canal/ Niagara River	Lake Ontario	St. Lawrence River	
Chemical				4				2	1	7
Construction					1	3		1		5
General Mfg.			1	3			2	6	1	13
Government			1					1		2
Electric Utilities			3	1		1	3	11	1	20
Metallurgical		2						6		8
Petroleum				2		2				4
Pulp & Paper	6						1		4	11
Residential			4				1	5	2	12
Retail									1	1
Service								1		1
Sewage Utilities					1			4		5
Transportation	1	2	3	4	1	5		7	1	24
Other	1		1		1			4	3	10
Unknown		2	1	1	3	3		8		18
	8	6	14	15	7	14	7	56	14	141

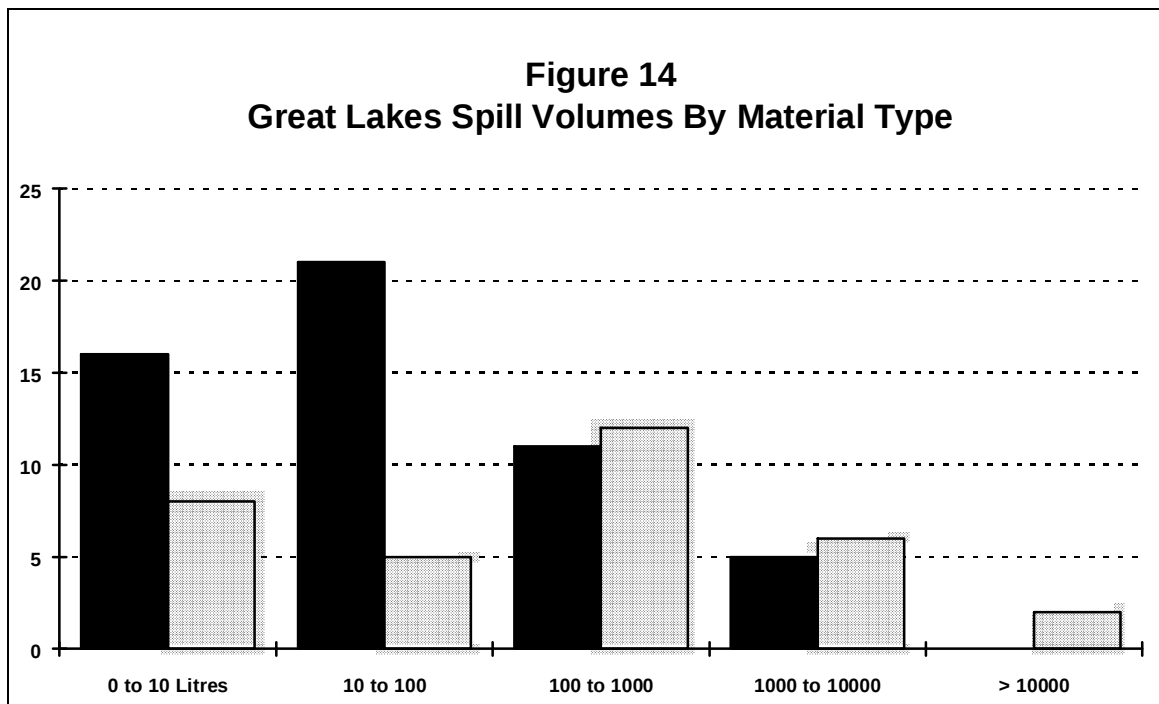
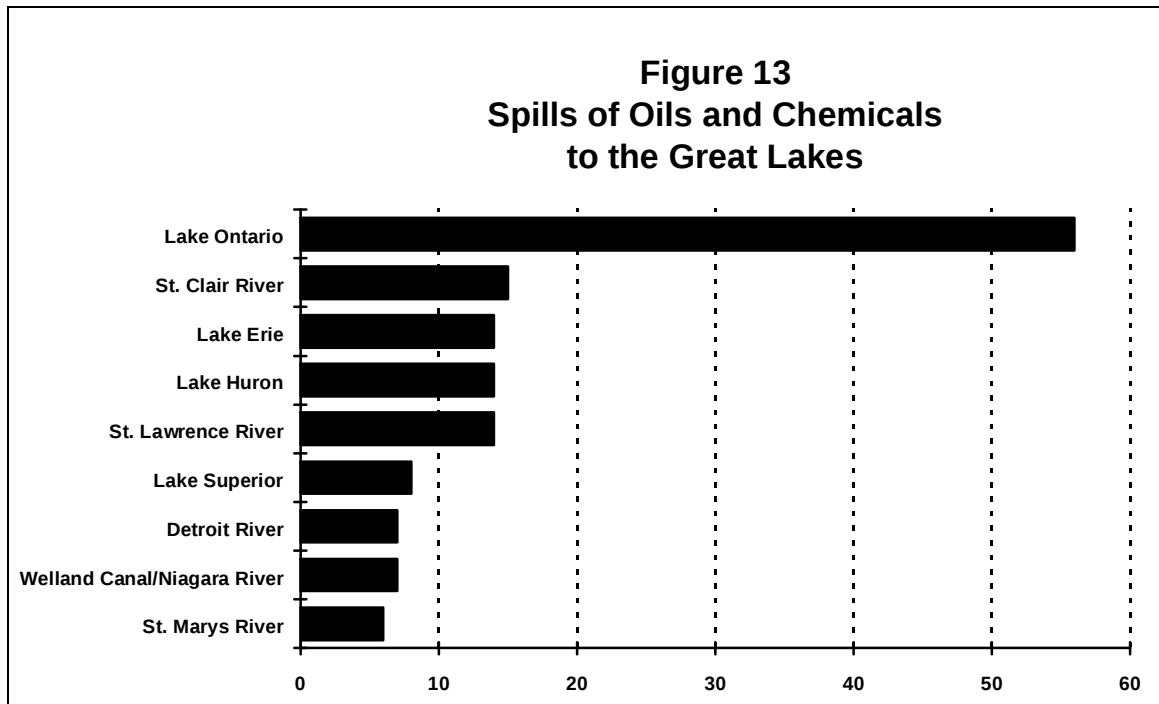


Table 14 and Figure 14 summarize the total number of materials spilled in the oil and chemical groupings. Figure 14 reflects the number of oil and chemical spills to the Great Lakes in volume groups. Of the spills where the volume was reported, 85 percent involved volumes less than 1 000 litres.

Spills by Watercourse

Lake Superior

There were 8 spills of oils and chemicals to Lake Superior in 1995. Six of these were from operations of the pulp and paper sector.

St. Marys River

There were 6 spills of oils and chemicals to St. Marys River in 1995, two each from the metallurgical sector and transportation sector, and two where the sector was not determined.

Lake Huron and Georgian Bay

There were 14 spills of oils and chemicals to Lake Huron and Georgian Bay in 1995. Three were from electric utility operations and three were from transportation sector sources.

St. Clair River, Lake St. Clair and Detroit River

There were 22 spills of oils and chemicals to these waters in 1995. Five were from transportation sector sources, four spills occurred at chemical sector sites, three spills were from general manufacturing operations, and two were from petroleum sector operations.

Lake Erie

There were 14 spills of oils and chemicals to Lake Erie in 1995. Five were from transportation sector sources, two were from petroleum sector operations, and one was from electric utilities' operations.

TABLE 14
Spills of Oils and Chemicals to the Great Lakes by Volume Spilled

MATERIAL AND VOLUME (litres)		WATERCOURSE									TOTAL
		Lake Superior	St. Marys River	Lake Huron	St. Clair River	Detroit River	Lake Erie	Welland Canal/ Niagara River	Lake Ontario	St. Lawrence River	
OILS	Unknown		4	8	1	4	5		19	2	43
	0-10			4	5		3	1	3		16
	10-100			2	3		4	1	8	3	21
	100-1 000		1		2			2	4	2	11
	1 000 - 10 000		1						3	1	5
	> 10 000										
CHEMICALS	Unknown	4			2	1	1	1	9	2	20
	0-10	3				1	1		2	1	8
	10-100				3				2		5
	100-1 000	2		1	1	1		2	4	1	12
	1 000 - 10 000	1							3	2	6
	> 10 000	1							1		2
TOTAL		11	6	15	17	7	14	7	58	14	149

Note: the 149 spilled materials summarized in Table 14 were the result of the 141 spill events shown in Table 13. i.e., eight of the 141 reported spills involved two spilled materials.

Niagara River and Welland Canal

There were seven spills of oils and chemicals to these watercourses in 1995, including three from electric utilities' operations and two from general manufacturing facilities.

Lake Ontario

There were 56 spills of oils and chemicals to Lake Ontario in 1995. This included eleven spills from electric utilities, seven from transportation sector sources, six from metallurgical sector operations, six from general manufacturing sector sources, and five from private or residential sources (mainly watercraft).

St. Lawrence River

There were 14 spills of oils and chemicals to the St. Lawrence River in 1995. Four spills were from pulp and paper facilities, and two were from private or residential sources.

PLANNING FOR SPILL CONTINGENCIES

The Ministry of Environment and Energy is actively involved in planning for spill contingencies. The Ministry's Contingency Planning Program provides advice and assistance to industry, government agencies, and others who may have, or respond to, environmental spills. Industries are encouraged to develop spill contingency plans in order to prepare themselves for the eventuality of a spill. In some instances however, the resources of the discharger may be insufficient to deal with a major spill. Several contingency plans are in place to provide a mechanism to deal with such spills when they occur, and these are outlined below.

The Canada/United States Water Quality Agreement

Under the *Canada/United States Water Quality Agreement* signed by the Prime Minister of Canada and the President of the United States, the two countries agreed to establish mechanisms to deal with spills, pollution monitoring and pollution abatement in waters shared by the two countries. The Agreement calls for a joint contingency plan which organizes the national, provincial/state, and local resources to deal with spills.

The Canada/United States Joint Marine Pollution Contingency Plan

The *Joint Canada/United States Marine Pollution Contingency Plan* establishes the mechanism, as required by the Canada/United States Water Quality Agreement, under which both countries will respond to spills which affect or may affect the other. This plan depends on supporting plans at the federal, provincial/state, and municipal levels. Under this plan, the coast guard of the country in which the spill originates is in charge and MOEE, through the Province of

Ontario Spill Contingency Plan, acts in a support role and gives advice on environmental matters. The Ministry's field support is provided through the Regional offices and MOEE's executive support on the International Joint Response Team is provided by the Spills Action Centre. This team is made up of representatives of the responding agencies from both countries and provides an advisory service to the coast guard in charge.

The Canadian Marine Contingency Plan

The *Canadian Marine Contingency Plan* deals with spills from vessels in navigable waters which do not cross the international border. The Canadian Coast Guard is in charge under this plan. Under this plan, MOEE again provides a support and advisory role similar to that outlined under the Joint Plan.

The Province of Ontario Contingency Plan for Spills of Oil and other Hazardous Materials

The *Province of Ontario Contingency Plan for Spills of Oil and Hazardous Materials* establishes a reporting and notification protocol for all spills and to provide a mechanism to deal with major spills under provincial jurisdiction which threaten the environment. It also provides the mechanism through which provincial efforts are coordinated under the contingency plans discussed above. The Plan deals with the containment, clean-up, and disposal phases of spills and is subordinate to plans which deal with contingencies where the threat to life and property is of primary concern. For major spills within MOEE's mandate, the Plan places MOEE in charge and works with the Ministries of Natural Resources, Northern Development and Mines, Health, Labour, Solicitor General and Correctional Services, Consumer and Commercial Relations, and Transportation. Two

federal agencies, Environment Canada and the Canadian Coast Guard, are also signatories. The Plan relies on a response team concept, consisting of representatives of the participating agencies.

The Provincial Emergency Plan

The *Provincial Emergency Plan* provides guidance and a management framework for the overall coordination of emergency preparedness and response to major emergencies employing the resources of provincial ministries.

Each provincial ministry with special emergency responsibilities is developing a plan outlining their ministry's role and resources available in the event of a significant emergency.

The Province of Ontario Nuclear Plan

The *Province of Ontario Nuclear Plan* is designed to coordinate the response to major events involving nuclear generating facilities. The Plan establishes several groups and organizations in which MOEE participates. MOEE's role includes sampling under the direction of the Ministry of Labour, participation on the Provincial Ingestion Monitoring Control Group, and the Provincial Restoration Committee established under the Plan.

The Canada-Ontario Agreement (COA) Spill Reduction Commitment

Under the *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (1994)*, federal and provincial governments jointly initiated a spill reduction commitment. This commitment focuses on the prevention and control of spills by improving federal and provincial spill prevention, preparedness, and response programs in priority areas (such as the St. Clair River) in order to reduce pollutant loadings. Five educational workshops are planned for industrial and municipal groups in

the priority areas to promote awareness of the environmental consequences of spills.

The feasibility of a one-window approach to federal and provincial spill reporting is also being investigated, as well as a framework for ensuring coordinated and cooperative spill preparedness and response throughout Ontario. This would include Regional Environmental Emergency Teams comprised of federal, provincial, industrial representatives, and other local experts as required.

MOEE's Contingency Planning Office

The Ministry encourages those companies and individuals to assess their operations and minimize the potential for spills. Assistance in this regard is available through the Ministry's Contingency Planning Office at (416) 325-3000.

APPENDIX I

SAMPLE OCCURRENCE REPORT

Ministry of
Environment
and Energy

OCCURRENCE REPORT
=====

Entered:
Batch :
Abstracts[00] Diaries[00]

=====

Received By	ORIS No.	I.E.B. No.
Occurrence Type:	Work Plan	Date
Subtype:	[]	Occurrence:
Reported by (Name/Organization)	Report to MOE:	
MOE at Scene:		
Telephone No.	Alternate No.	Assigned To:
X	X	
Address:	ERP Contacted:	NSP: []
Postal Code:	Callout: []	ERP Name:
Location of Occurrence:	Source:	
Sector: []	Source: []	SIC: []
UTM:		
Reg. []	Dist. []	Municipality []
N: []	E: []	Zone: []
Syn:		
Brief Summary:		

=====

If there are related reports, record initial/master ORIS No. here>>

Follow-up Action: [] Abatement [] IEB [] Other _____ | BF Date:

=====

File Closed:	Complainant Contact	Date	Suspected
[] Abatement [] IEB [] OTHER	Code [] [] []		[] Violation
Report Prepared by:	Date	IEB Investigator	IEB BF Date
Approving Officer	Date	Reviewing Officer	Date
Specify number(s) for routing original [] [] [] []	Continued []	Yes	
Specify number(s) for copy distribution [] [] [] [] []			
1. Investigator/E.O.	2. D.O./File	3. SAC (all spills)	
4. Reg.Dir./_____Mgr.	5. IEB Reg.Spvr	6. IEB H.O./file	7. Other _____

SAC Action Class: 1:[53] 2:[]

ORIS

No.:

IEB No.:

Material 1: Code...:
Amount: UN No.:
Material 2: Code...:
Amount: UN No.:

Cause.....: Code...:
Reason.....: Code...:

Person in Control: Waste GenNum:
Owner: Waste GenNum:
Agencies Involved.....:

Clean up and Restoration Carried out by:
[] Controller [] Owner [] Other

% Cleaned up: Estimated Cost: \$
Were Directions or Approval Given Under
EPA Part X [] Regulation 362 [] | Manifest No.

Waste Class: Code...:
Hauler: Code...:
Disposal Site: Code...:

Environmental Impact: | Nature of Impact: Code...:
|

People/Business Damaged
(Other than to Owner/Controller)

Nature of Damage: Code...:

APPENDIX II

SECTOR AND SOURCE MATRIX

Spills By Sector and Source

SECTOR	SOURCE															TOTAL
	Aircraft	Marine Tanker/Carrier	Other Watercraft	Train	Motor Vehicle	Pipeline	Service Station	Storage Facility	Heat/Power Plant	Manufacturing Facility	Sewage Treatment	Water Supply	Transformer	Other	Unknown	
Agriculture	0	0	0	0	15	0	0	3	0	2	0	0	0	25	0	45
Chemical	0	0	0	0	11	0	0	8	0	208	1	0	0	7	0	235
Construction	0	0	1	0	27	0	0	4	0	1	1	0	0	64	0	98
Electric Utilities	0	0	0	0	79	0	0	23	74	1	0	0	535	31	0	743
Food	0	0	0	0	14	0	0	2	0	62	0	0	0	11	0	89
General Mfg.	0	0	0	0	6	0	0	14	0	228	1	0	1	16	0	266
Government	4	0	0	0	49	3	3	23	0	3	5	1	2	78	1	172
Metallurgical	0	0	0	0	3	0	0	2	0	189	13	0	1	7	0	215
Mining	0	0	0	0	5	1	0	10	0	33	1	2	0	35	0	87
Petroleum	0	3	2	0	108	49	260	114	0	31	0	0	0	37	0	604
Pulp and Paper	0	0	0	1	8	0	0	0	0	155	0	0	0	0	0	164
Residential	4	0	12	0	227	0	0	266	0	0	19	3	9	38	0	578
Retail	0	0	0	0	18	0	35	48	0	2	0	0	0	21	0	124
Sewage Utilities	0	0	0	0	2	0	0	0	0	2	248	18	0	0	0	270
Services	1	1	0	0	50	0	5	32	1	5	2	0	0	67	0	164
Transportation	8	9	16	56	626	1	0	32	0	0	0	0	0	32	1	781
Other	0	0	11	0	2	1	0	3	0	6	2	0	0	11	0	36
Unknown	0	0	0	0	21	0	0	2	0	3	0	0	0	11	292	329
TOTAL	17	13	42	57	1271	55	303	586	75	931	293	24	548	491	294	5000

APPENDIX III

CAUSE AND REASON MATRIX

Spills By Cause and Reason

CAUSE	REASON														Grand Total
	ERROR	INTENTIONAL/PLANNED	NEGLIGENCE (APPARENT)	VANDALISM	EQUIPMENT FAILURE	CONTAINER FAILURE	DAMAGE BY MOVING EQUIPMENT	COMBUSTION PROBLEMS	POWER INTERRUPTION	FIRE/EXPLOSION	WEATHER CONDITIONS	ADVERSE ROAD CONDITIONS	UNKNOWN	OTHER	
AIRCRAFT CRASH	1	0	0	0	0	0	0	0	0	0	0	0	1	1	3
WATERCRAFT ACCIDENT	2	1	0	0	0	0	0	0	0	1	1	0	9	4	18
DERAILMENT	5	0	0	0	1	0	0	0	0	0	0	0	9	1	16
MOTOR VEHICLE ACCIDENT	163	0	0	2	8	0	29	0	0	2	4	37	90	11	346
CONTAINER OVERFLOW	276	2	19	2	96	15	0	0	13	3	13	0	45	39	523
STORAGE TANK LEAK	16	0	2	4	24	96	8	0	1	3	2	0	63	3	222
DYKE FAILURE	0	1	0	0	0	5	0	0	0	0	3	0	2	1	12
COOLING SYSTEM LEAK	47	1	0	8	144	51	32	1	0	14	101	0	52	8	459
OTHER CONTAINER LEAK	213	33	18	36	135	109	46	1	4	23	49	23	254	34	978
PIPE/HOSE LEAK	169	1	3	10	373	169	26	0	0	2	14	7	141	20	935
VALVE/FITTING LEAK	57	1	2	4	223	83	12	2	0	1	10	1	58	12	466
PROCESS UPSET	2	1	0	0	25	3	0	4	5	3	1	0	7	7	58
PROCESS START/STOP	4	14	0	0	15	2	0	2	2	1	0	0	2	0	42
WASTEWATER DISCHARGE	35	14	11	4	57	4	0	0	46	5	35	0	30	10	251
UNKNOWN	11	4	1	1	7	0	0	0	0	6	1	0	404	2	437
OTHER CAUSE	52	46	8	9	19	6	6	0	2	29	9	1	13	34	234
Grand Total	1053	119	64	80	1127	543	159	10	73	93	243	69	1180	187	5000

APPENDIX IV

REPORTING EXEMPTIONS

EPA Spill Definition

The following sections are taken from the Ontario Environmental Protection Act (RSO 1990). They are included in order to help the reader understand the legal definition of a spill under Part X of the Act.

- Sec. 91(1) **"spill"**, when used with reference to a pollutant, means a discharge,
 (a) into the natural environment,
 (b) from or out of a structure, vehicle, or other container, and,
 (c) is abnormal in quantity or quality in light of all the circumstances of the discharge;
- Sec. 1(1) **"natural environment"** means the air, land and water, or any combination or part thereof, of the province of Ontario;
- Sec. 1(1) **"air"** means open air not enclosed in a building, chimney or flue;
- "land"** means surface land not enclosed in a building, land covered by water and all subsoil, or any combination or part thereof;
- "water"** means surface water or ground water, or either of them;
- Sec. 1(1) **"contaminant"** means any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of them resulting directly or indirectly from human activities that may cause an adverse effect;
- Sec. 91(1) **"pollutant"** means a contaminant other than heat, sound, vibration, or radiation, and includes any substance from which a pollutant is derived;
- Sec. 1(1) **"adverse effect"** means one or more of,
 (a) impairment of the natural environment for any use that can be made of it,
 (b) injury or damage to property or to plant or animal life,
 (c) harm or material discomfort to any person,
 (d) an adverse effect on the health of any person,
 (e) impairment of the safety of any person,
 (f) rendering any property or plant or animal life unfit for use by humans,
 (g) loss of enjoyment of normal use of property,
 (h) interference with the normal conduct of business;
- Sec. 2 A contaminant that is discharged into the air within a building or structure as a result of the discharge of the same or another contaminant in another building or structure shall be deemed to be discharged into the natural environment by the owner or the person who has the charge, management or control of the contaminant discharged in another building or structure;

Every person having control of a pollutant that is spilled and every person who spills or causes or permits a spill of a pollutant that causes or is likely to cause an adverse effect must notify forthwith,

- (1) the Ministry,
- (2) the municipality within other boundaries of which the spill occurred,
- (3) the owner of the pollutant and,
- (4) the controller of the pollutant.

The owner and the person having control of the pollutant must do everything practicable to clean up the spill and restore the natural environment. If they fail to do so, the municipality may perform the clean up. Failing that, the Minister of Environment and Energy may issue a Minister's direction to employees of the ministry or their agents under section 94 of the Act, or order nearly anybody (including the discharger) to take immediate action to stop, contain, and cleanup the spill.

Incidents exempt from Part X of the Environmental Protection Act (the “Spills Bill”)

Several categories of discharges are exempted by Ontario Regulation 360 (RSO 1990) from some or all portions of Part X of the Environmental Protection Act. Other Parts of the Act still apply.

The following incidents are exempt from all requirements of Part X of the Environmental Protection Act:

- Animal wastes disposed of in accordance with normal farming practices;
- Ministry approved air emissions which do not contravene any of the conditions of approval;
- Discharges to water or land, which the ministry has approved, such as from sewage works, waste disposal sites, or the application of pesticides, provided such discharges do not contravene any of the conditions of approvals, licenses, or permits;
- Spills of water from reservoirs formed by dams;
- Spills of pollutants from fires equivalent to those from fires of ten or fewer households. This means that many fires are not considered spills, but fires at large commercial or industrial facilities are not exempt from Part X.

Reporting Exemptions

The following discharges are exempt from the reporting requirements only; cleanup and other provisions of the legislation still apply:

- Planned spills such as would be generated by some industry startup or shutdown procedures and for spill training exercises. This exemption is on condition that a ministry director is notified in advance and consents, and that the release is monitored.
- Spills of less than 100 litres of vehicular operating fuels, lubricants, and coolants from a motor vehicle if the liquids have not entered, and are not likely to enter, any surface water or well (any notification required under the Highway Traffic Act must still be made).
- Water discharges from broken municipal water mains where there is no personal injury and no damage to buildings. These incidents are also exempt from the reporting requirements of Section 14 of the Environmental Protection Act.
- Sewer bypass overflows through approved bypass systems if the bypass was caused by precipitation or runoff.