

# Minnesota Hazardous Substances Emergency Events Surveillance

## Report for 2008\*

### \* Preliminary data

This report is supported by funds from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) trust fund and the Office of Terrorism Preparedness and Emergency Response of the Centers for Disease Control and Prevention (CDC), provided to Minnesota Department of Health under a cooperative agreement by the Agency For Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services. The contents of the documents are solely the responsibility of the authors and do not necessarily reflect the official views of ATSDR.



Minnesota Department of Health ♦ Division of Environmental Health ♦ Environmental Surveillance and Assessment

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## EXECUTIVE SUMMARY

The Hazardous Substances Emergency Events Surveillance (HSEES) system, maintained by the Agency for Toxic Substances and Disease Registry (ATSDR), collects information to describe the public health consequences of acute releases of hazardous substances in participating states. This report summarizes events reported in Minnesota in 2008\*. Information collected about acute events involving hazardous substances includes the substance(s) and quantity released; time, place, and cause of the event; number of victims and injuries sustained; response; and public health protective actions taken.

A total of 600 events were reported. In 581 (96.8%) events, one substance was released. The most commonly reported categories of substances were Other Inorganic Substances; Oxy-organic substances; Ammonia; Volatile Organic Compounds; and Pesticides and Fertilizers. During this reporting period, 55 events (9.2%) resulted in 187 victims (four deaths). The most frequently reported injuries were respiratory irritation, eye irritation, and dizziness/central nervous system symptoms. Evacuations were ordered for 54 (9.0%) events.

Prevention outreach efforts for 2008 involved providing HSEES information about unplanned hazardous substances releases to emergency planners and the public. Activities for 2008 are 1) a summary of mercury incidents in Minnesota schools for 1995-2007; 2) a presentation at a Minnesota hazardous materials incident responders group meeting; 3) a multi-agency article on anhydrous ammonia outreach activities, published in the March 2009 issue of *Journal of Occupational and Environmental Medicine*; 4) an article for the Minnesota Department of Health "Ready to Respond" newsletter; 5) a 1995-2006 MN HSEES summary report; 6) and a 2007 Minnesota HSEES report. Minnesota HSEES also forwarded alert information to state and local contacts to ensure information was received by local officials.

## INTRODUCTION

The Centers for Disease Control and Prevention defines surveillance as the

“ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link of the surveillance chain is the application of these data to prevention and control. A surveillance system includes a functional capacity for data collection, analysis, and dissemination linked to public health programs” [1].

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences of releases of hazardous substances. The decision to initiate a surveillance system of this type was based on a study published in 1989 about the reporting of hazardous substances releases to three national databases: the National Response Center Database, the Hazardous Material Information System (HMIS), and the Acute Hazardous Events Database [2]. A review of these databases indicated limitations. Many events were missed because of specific reporting requirements (for example, the HMIS did not record events involving intrastate carriers or fixed-facility events). Other important information was not recorded, such as the demographic characteristics of victims, the types of injuries sustained, and the number of persons evacuated. As a result of this review, ATSDR implemented the HSEES system to more fully describe the public health consequences of releases of hazardous substances.

HSEES has several goals:

- To describe the distribution and characteristics of acute hazardous substances releases;
- To describe morbidity and mortality among employees, responders, and the general public that resulted from hazardous substances releases; and
- To develop strategies that might reduce future morbidity and mortality resulting from the release of hazardous substances.

For a surveillance system to be useful, it must not only be a repository for data, but the data must also be used to protect public health.

In the past few years, the last goal of the HSEES system has been emphasized; i.e., to develop strategies to reduce subsequent morbidity and mortality by having each participating state analyze its data and develop appropriate prevention outreach activities. These activities are intended to provide industry, responders, and the general public with information that can help prevent hazardous substances releases and reduce morbidity and mortality if a release occurs.

This report summarizes acute hazardous substance release events and associated public health consequences for 2008 in Minnesota and describes prevention activities to protect public health.

## **METHODS**

In 2008, fourteen state health departments participated in HSEES: Colorado, Florida, Iowa, Louisiana, Michigan, Minnesota, New Jersey, New York, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin.

Minnesota has participated in the HSEES program since 1995. While a few data-collection questions have been adjusted by ATSDR over time, information collected has continuously included substance(s) released, number of victims, injuries (adverse health effects and symptoms), and evacuations.

Data sources used to obtain information about these events included the Minnesota Duty Officer, the National Response Center, and the U.S. Department of Transportation Hazardous Materials Incident Reporting System. U.S. census data were used to estimate the number of residents in the vicinity of most of the events. Data were stored using a Web-based data entry system provided by ATSDR.

HSEES defines hazardous substances emergency events as acute unplanned or illegal spills or air releases or potential spills or air releases of hazardous substances. Events involving releases of petroleum only are excluded. Events are included if (a) the substance released could cause adverse human health effects or (b) the release was potential, not actual, and the threat led to an action (for example, evacuation) to protect public health. All hazardous substances are included in quantities of a least one gallon or 10 pounds, unless the substance has been designated by ATSDR for inclusion at any amount. HSEES defines victims as persons who experience at least one documented adverse health effect within 24 hours after the event or who die as a consequence of the event. Victims who receive more than one type of injury or symptom are counted once in each applicable injury type or symptom. Events are categorized as transportation if they occur (a) during surface, air, pipeline, or water transport or (b) before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

For data analyses, the substances released were categorized into 16 groups. The category "Mixture" comprises substances from different categories that were mixed or formed from a reaction before the event; the category "Other inorganic substances" comprises all inorganic substances except acids, bases, ammonia, and chlorine; and the category "Other" comprises substances that could not be included in one of the other existing categories. A complete list of substance categories is available in the Appendix.

## **RESULTS**

For 2008, 600 events were documented by Minnesota HSEES (MN HSEES): Actual spills or air releases occurred in 597 events (99.5%), while substances were both threatened to be released and actually released in two events (0.3%). There was one event

(0.2%) that was only a potential, but not actual, release. The county with the most events was Hennepin (89 [14.8%]) (Table 1).

A total of 436 (72.7%) events were in fixed facilities. For fixed facilities involving mining, utilities, or manufacturing, one or two area types or equipment involved in the event could be selected. There were 237 events (54.4%) that did not meet this criterion and had no area type reported. Among the 169 (38.8%) events with one area type reported, the most frequently reported were: 56 (33.1%) ancillary process equipment, 34 (20.1%) piping, and 18 (10.7%) storage areas. Thirty fixed-facility events (6.9%) involved two locations. Many of these events involved combinations of piping and storage areas (7 events [23.3%]), piping and ancillary process equipment (6 events, [20.0%]) or other combinations involving piping, ancillary process equipment, material handling areas, process vessels, dump/waste areas, heating and cooling for buildings, or transport within a fixed facility. Percentages of area type for all reported 199 events (229 locations) are shown in Figure 1.

Of the 164 (27.3%) transportation events, 139 (84.8%) occurred during ground transport (e.g., truck, van, or tractor), 18 (11.0%) involved rail transport, and 7 events (4.3%) involved air transportation (Figure 2). Most ground transportation events involved trucks (123 [88.5%]). The largest proportion of transportation events occurred from a moving vehicle or vessel (57 [34.8%]) or the spill or air release occurred en route and was discovered later at a fixed facility (51 [31.1%]). A smaller portion of incidents occurred during unloading of a stationary vehicle or vessel (38 [23.2%]).

Primary factors contributing to events were reported for 599 (99.8%) events (Figure 3a). Of the reported primary factors, equipment failure was most frequently reported for fixed-facility events (247 [56.8%]) and human error was the most frequent for transportation events (99 [60.4%]). Secondary factors were reported for 377 (62.8%) events (excluding reports of “no secondary factor”) (Figure 3b). Of the events with secondary factors reported, equipment failure (55 [22.5%]) was the most frequently reported secondary factor for the 244 fixed-facility events, and improper filling, loading or packing (69 [51.9%]) was most frequently reported for the 133 transportation events with secondary factors.

About 96% of all events involved release of only one substance. Two substances were released in 2.3% of the events, and 0.8% involved the release of more than two substances (Table 2).

By month, number of events ranged from 34 (5.7%) in September to 75 (12.5%) in July. Percentage of events on weekdays ranged from 14.7% on Fridays (88 events) to 18.8% on Tuesdays (113 events). For weekend days, 6.3% (38 events) event occurred on Saturdays and 7.8% (47 events) occurred on Sundays. The time of day or time category of event occurrence was reported for 599 events (99.8%). A majority of events, 429 (71.6%), occurred between 6:00 a.m. and 5:59 p.m., while 97 (16.2%) occurred from 6:00 p.m. to 11:59 p.m. and 73 (12.2%) events occurred from 12:00 a.m. to 5:59 a.m.

### ***Industries***

The largest proportions of HSEES events were associated with Manufacturing (149 [24.8%]) and Transportation and Warehousing (135 [22.5%]) (Table 3). The largest number of victim events occurred in the Manufacturing industry (13 [23.6%]). Although Manufacturing had a larger number of events with victims, only 8.7% of 149 events resulted in victims. Some industries had a high percentage of events with victims, such as Real Estate (100.0%) and Accommodation and Food Services (60.0%), but overall the number of events in these categories was small (one and three, respectively).

Five events resulted in the majority of victims for three industry categories. The category with the most victims was Manufacturing (81 [43.3%]), where 55 of the victims resulted from two refrigeration system-related anhydrous ammonia incidents. In the category of Education, 25 (96.2%) of the 26 victims resulted from two incidents: one involved a release of ammonia and potassium hydroxide at a veterinary facility (14 victims) and a release of carbon monoxide from a boiler system at a high school (11 victims). In Agriculture, Forestry, Fishing, and Hunting, 13 of the 17 victims resulted from one incident that involved release of anhydrous ammonia from a nurse tank in a field. More information about these incidents is provided in the “Victims” section that follows.

### ***Substances***

A total of 630 substances were involved in all events, of which three (0.5%) substances were threatened to be released. The substances most frequently released were anhydrous ammonia, antifreeze, and mercury (Table 4).

Substances were grouped into 16 categories. The substance categories most commonly released in fixed-facility events were Other inorganic substances (96 [21.1%]), Ammonia (71 [15.6%]) and Oxy-organics (70 [15.4%]). In transportation events, the most common substance categories released was Pesticides and Fertilizers (36 [20.9%]), Acids (25 [14.5%]), and Paint, Coatings, Inks, and Dyes (24 [14.0%]) (Table 5).

Two types of releases for each of the 630 substances released could be reported (e.g., spill and air release). Only one type of release was reported for 590 (93.7%) substances, which were as follows: spills (468 [79.3%]), air releases (110 [18.6%]), fire (8 [1.4%]), threatened release (3 [0.5 %]), and explosion (1 [0.2%]). Of the 40 (6.3%) events with two types of releases, the following combinations were reported: spill and air release (24 events), spill and fire (10 events), air release and fire (four events), spill and explosion (one event), and air release followed by secondary air release (one event). All substances had release types reported.

### ***Victims***

A total of 187 victims were involved in 55 (9.2%) events (Table 6). Of the events with victims, 32 (58.2%) events involved one victim, and 9 (16.4%) involved two victims, while 14 (25.5%) events involved three or more victims. By event type, 13 (31.7%) of the 41 fixed-facility events with victims had three or more victims, and one (7.1%) of the 14 transportation events with victims involved three or more victims. There were 168

(89.8%) persons injured in fixed-facility events and 19 (10.2%) victims injured in transportation events. Additionally, five persons in four events (0.8%) were observed at a hospital but did not have symptoms. They did not sustain injuries and were not counted as victims.

To determine if the type of substance(s) released in an event was related to number of victims in the event, substances released and victim totals were compared. In events that involved substances from the same substance category, substances were counted once in that category. In events that involved substances from different categories, substances were counted once in the Multiple Substances category.

The comparison showed that substances released most often were not necessarily the most likely to result in victims (Table 7). For example, events categorized as Other Inorganic Substances constituted 16.2% of all events, but only 9.1% of the victim events. Conversely, events in the Ammonia category were 12.7% of all events, but accounted for 23.6% of the victim events.

Employees constituted the largest proportion of the population groups injured (112 [59.9%]), followed by general public (48 [25.7%]), responders (12 [6.4%]), students (11 [5.9%]) and unclassified (4, [2.1]) (Figure 4). All victims except 14 employees, three general public victims, and two responders were injured in fixed facilities. The 12 responder victims were five police officers, three volunteer firefighters, two career firefighters, and two emergency medical services personnel. (A company employee responder was included in the employee category.)

Victims sustained a total of 282 injuries or symptoms (Table 8). Some victims had more than one injury or symptom. The most common injuries/symptoms in fixed-facility events were respiratory irritation (111 [42.5%]) and eye irritation (69 [26.4%]). In transportation events, trauma (9 [42.9%]) and respiratory irritation (8 [38.1%]) were the most commonly reported symptoms. Except for one event where a victim affected by carbon monoxide fell and received a cut, none of the trauma injuries were substance-related. The trauma injuries resulted from a chain of events, such as a motor vehicle accident that involved release of a hazardous substance, and not from exposure to the substance itself.

The median age of the 131 victims for whom exact age was reported was 35.0 years (range: 1-76 years). For the 43 injured persons for whom only an age category was reported, 27 (62.8%) were 20-44 years of age, 11 (25.6%) were 44-64 years of age, two (4.7%) were 15-19 years of age, two (4.7%) were under 12 months, and one (2.3%) was 65 years of age or older. For the 13 injured persons for whom age was not reported, six were from general public, two were police officers, one was an employee and four had no demographic category reported, though they were likely in the general public category.

Sex was known for 180 victims: 121 (67.2%) were males. Of the 124 employees and responders, 86 (69.4%) were male. Sex was known for all responders and employees.

Severity was known for 181 victims (96.8%). The severity ranged from minor injury to death (Figure 5). Of those with information on severity, 18 (9.9%) experienced adverse health effects that were reported by an official but no other treatment was verified. Three victims (1.7%) were seen by a private physician, 13 victims (7.2%) required only on scene first aid, 16 victims (8.8%) were observed at a hospital but did not require treatment, and 109 (60.2%) victims were treated at a hospital but not admitted. Eighteen victims (9.9%) required admission to hospital. Four deaths (2.2%) were reported: three were related to carbon monoxide poisoning and one was related to trauma in a vehicle crash. Severity was unknown for six victims.

The status of personal protective equipment (PPE) use was reported for 110 employee-victims (98.2%) and for 12 responder-victims (100.0%). Of these, most of the employee-victims (68 [61.8%]) did not report wearing PPE. Among the 43 employee-victims who wore PPE, two wore “level C” protection, four wore “level D” protection, 33 wore gloves, two wore eye protection, and one wore steel-toe shoes. Of the 12 injured responders, five police officers were not wearing PPE, three firefighters were wearing firefighter turn-out gear with respiratory protection, two firefighters were wearing firefighter turn-out gear without respiratory protection, and two emergency medical personnel were wearing gloves.

There were five events that involved more than ten victims. The events involved two anhydrous ammonia releases from refrigeration systems, an anhydrous ammonia release from a nurse tank, a release of potassium hydroxide and ammonia from a veterinary lab, and a release of carbon monoxide at a school.

The first event involved a cooler that leaked anhydrous ammonia at a food processing facility. Thirty victims, all employees, were exposed to the ammonia. Symptoms reported included respiratory irritation and eye irritation. All employees were treated at a hospital and released. Part of the building was evacuated for about three hours. Responders included trained company employees and ambulances.

In the second event, a problem with a seal on a tissue digester at a veterinary school lab resulted in a release of potassium hydroxide and ammonia. The area was evacuated for about 7 to 8 hours. Fourteen employees and one student reported symptoms of respiratory irritation and eye irritation.

The third event involved a release of anhydrous ammonia from a pressure relief valve on a refrigeration system at food processing facility. When the ammonia blew back into and around the facility, 22 employees and three members of the general public experienced respiratory irritation. All of the victims were treated at a hospital and released. Area around the plant was evacuated for a short time. The company responders, fire department, law enforcement, and ambulance responded.

Another event with several victims occurred in a school when a boiler malfunctioned, releasing carbon monoxide into the building. Ten students and one employee reported symptoms of headache, dizziness and nausea. The area was evacuated for about 20

minutes. The problem with the boiler was corrected. Two victims were transported and treated at a hospital, while all others were treated on scene.

The fifth event involved a release of anhydrous ammonia from a nurse tank in an agriculture field when a hitch broke and a hose tore apart. The release was near a busy roadway, and 13 people who drove through a vapor cloud or near the area experienced respiratory and eye irritation. Twelve victims were treated and released from the hospital. The treatment status of one victim was not available.

### ***Nearby populations***

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS). There were 507 events with persons living within ¼ mile of the event (84.5%); 565 events with persons living within ½ mile (94.2%); and 589 events with persons living within one mile (98.2%). Additionally, there were industries or other businesses within ¼ mile of 473 events (78.8%); recreational areas within ¼ mile of 117 events (19.5%); schools within ¼ mile of 101 events (16.8%); licensed daycares within ¼ mile of 69 events (11.5%); nursing homes within ¼ mile of 17 events (2.8%) and hospitals within ¼ mile of 10 events (1.7%).

### ***Evacuations***

Evacuations were ordered in 54 events (9.0%). Of these evacuations, 47 occurred in buildings or affected parts of buildings (87.0%); four were in a circle or radius from the event (7.4%); two were downwind or downstream of the event (3.7%), and one had no defined criteria (1.9%). The number of persons evacuated was known for 40 events (74.1%) and an estimate range was known 11 events (20.4%). For three events, the number of persons evacuated was not known (5.6%). The number evacuated ranged from zero to 2,800 persons, with a median of 17. (In the evacuation with zero persons, individuals had already self-evacuated or vacated the area before the official evacuation was ordered.) Evacuation length was available for 51 events (94.4%). The median length of evacuation was 4.0 hours (range: 20 minutes to 252 hours). Of all 600 events, 298 (49.7%) had restricted access to the area. In-place sheltering ordered by an official was reported for two events.

### ***Decontamination***

Of the 180 victims (96.3%) for whom decontamination status was known, 144 (80.0%) were not decontaminated, 18 (10.0%) were decontaminated at a medical facility, 12 (6.7%) were decontaminated at the scene, and six (3.3%) were decontaminated at both the scene and a medical facility.

In the 15 events (2.5%) where uninjured persons were decontaminated, the median number of uninjured decontaminated individuals was two persons per event (range: 1 – 6 persons). Decontamination at the scene was done for 17 uninjured employees, 16 uninjured responders, and one uninjured member of the general public.

### ***Response***

Information on who responded to the event was available for all events. The category of No Response was reported in 9 events (1.5%). Two or more responder categories were reported for 197 events (32.8%), 103 reported three or more categories (17.2%), and 55 reported four or more categories (9.2%). Company response teams responded most frequently to events (513 events [85.5%]), followed by law enforcement (116 events [19.3%]), fire department (115 events [19.2%]), and third party clean up contractors (96 events [16.0%]) (Table 9).

### **PREVENTION ACTIVITIES IN MINNESOTA**

During 2008, the MN HSEES program performed prevention activities. These activities included:

- Compiling a summary of mercury spills in Minnesota schools from 1995-2007 and posting the summary on the Minnesota Department of Health (MDH) HSEES Web page.
- Presenting information about the HSEES program to the State's hazardous materials incidents responders group.
- Assisting in writing an article done jointly by three HSEES states and ATSDR on anhydrous ammonia outreach activities. The article was published in the March 2009 issue of *Journal of Environmental and Occupational Health*.
- Writing an overview article about HSEES for the October issue of an MDH newsletter about emergency preparedness called "Ready to Respond."
- Completing a 1995-2006 HSEES report and posting it on the MDH HSEES Web page.
- Writing a 2007 HSEES annual report and making it available on the MDH HSEES Web page.
- Alerting appropriate state and local health authorities about incidents related to their areas of expertise.

The HSEES program also uses the data collected to analyze trends in chemical incidents and promotes ways to reduce acute hazardous substance releases and health impacts related to those releases. MN HSEES continues to seek opportunities to inform industry health and safety representatives, emergency responders, emergency planners, and others of the trends in unplanned or illegal acute hazardous substance releases.

### **ADDITIONAL USE OF MN HSEES DATA**

The MN HSEES program continues to receive requests for data for a variety of uses. Because the HSEES system has a large collection of unplanned hazardous substance release events and the associated impact on public health, emergency planners, response trainers, and health care facilities have requested data for planning and training exercises. The data are requested to determine patterns of hazardous substances releases within certain areas or to review trends in certain types of releases. Data continue to be available by contacting the program.

## **LIMITATIONS**

Data included in the HSEES system are based upon incidents reported to sources accessible to HSEES, such as the Minnesota Duty Officer, the National Response Center, the U.S. Department of Transportation, the Federal Railroad Administration, the media or by direct contact. Hazardous substances releases that are not reported via one of these channels are not likely to appear in the HSEES system. It is unknown how many spills occur that are not reported. Therefore, HSEES is a representation of reported spills and does not necessarily reflect all of the releases that occur in the state.

## **SUMMARY OF RESULTS: 1995–2008**

From 1995-2008, the largest proportion of events occurred in fixed facilities (Table 10). In recent years, however, transportation events have represented an increasing proportion of the total events. During 1995-2001 and 2003, transportation events were about one fourth or less of the total events. In 2002, and 2004-2007, transportation events were about one third or more of the total events. In 2008, the transportation events fell back to a little more than a fourth of the events (27.3%). The cause for the fluctuation is unknown, but could reflect changes in economic conditions or reporting practices.

The number of substances released per event has remained fairly constant, with an average of about one substance released per event for all years except 1995 and 2004. In 1995 and 2004, there were fires at a chemical manufacturer and a laboratory, respectively, which released many chemicals. Overall, most events (94.3%) involved only one substance.

The percentage of events with victims from 1995-2008 is about 6.4%. The year with the highest percentage of events with victims (10%) was 1995, when 23 events resulted in 172 victims. The lowest percentage of events with victims (4.5%) occurred in 2002 when 16 events led to 85 victims. Because some commonly released substances, such as ammonia and chlorine, often affect many individuals, the yearly percentage of events with victims does not always correlate with the number of victims. The highest number of victims (187) occurred in 2008, when 55 events (9.2%) resulted in injuries. The lowest number of victims occurred in 1997, when 19 victims resulted from 16 events (6.0%).

The most frequently reported category of victims continues to be employees. However, members of the general public constitute a large proportion of the victims as well (Figure 6). The number of injured responders has generally remained low, though in certain instances unexpected chemical reactions, fires, or releases at crash scenes have resulted in respiratory irritation and eye irritation for responders.

The number of deaths per year associated with acute hazardous substances events varied between zero and four from 1995-2008. Most of these deaths were attributed to circumstances surrounding the events that lead to chemical release (e.g., vehicle crash), and were not directly related to the chemical release, though carbon monoxide caused four of the recently reported deaths.

The MN HSEES program continues to strive toward conducting activities that will help reduce hazardous substance releases and associated public health effects. The HSEES program also works to provide quality data to agencies engaged in emergency planning and training, and continues to seek new opportunities for outreach.

### **REFERENCES**

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**Table 1.—Number of events meeting the surveillance definition, by county and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

County	Fixed facility No. events	Transportation No. events	All events	
			Total no.	(%)
Aitkin	0	0	0	0
Anoka	23	14	37	6.2
Becker	1	1	2	0.3
Beltrami	1	0	1	0.2
Benton	2	0	2	0.3
Big Stone	1	0	1	0.2
Blue Earth	12	3	15	2.5
Brown	6	1	7	1.2
Carlton	3	2	5	0.8
Carver	5	1	6	1.0
Cass	1	0	1	0.2
Chippewa	2	0	2	0.3
Chisago	5	0	5	0.8
Clay	8	1	9	1.5
Clearwater	0	0	0	0
Cook	0	0	0	0
Cottonwood	3	0	3	0.5
Crow Wing	3	0	3	0.5
Dakota	38	23	61	10.2
Dodge	8	2	10	1.7
Douglas	8	1	9	1.5
Faribault	3	1	4	0.7
Fillmore	2	1	3	0.5
Freeborn	2	1	3	0.5
Goodhue	2	0	2	0.3
Grant	0	0	0	0
Hennepin	73	16	89	14.8
Houston	1	2	3	0.5
Hubbard	2	0	2	0.3
Isanti	1	0	1	0.2
Itasca	10	2	12	2.0
Jackson	1	3	4	0.7
Kanabec	0	0	0	0
Kandiyohi	1	2	3	0.5
Kittson	0	1	1	0.2
Koochiching	1	1	2	0.3
Lac Qui Parle	0	2	2	0.3
Lake	1	0	1	0.2
Lake of the Woods	0	0	0	0
Le Sueur	3	0	3	0.5
Lincoln	0	0	0	0
Lyon	5	0	5	0.8
Mahnomen	0	0	0	0
Marshall	0	0	0	0
Martin	9	1	10	1.7

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

County	Fixed facility No. events	Transportation No. events	All events	
			Total no.	(%)
McLeod	10	1	11	1.8
Meeker	0	2	2	0.3
Mille Lacs	3	0	3	0.5
Morrison	1	0	1	0.2
Mower	3	0	3	0.5
Murray	0	3	3	0.5
Nicollet	0	1	1	0.2
Nobles	3	0	3	0.5
Norman	0	0	0	0
Olmsted	11	3	14	2.3
Otter Tail	2	2	4	0.7
Pennington	0	0	0	0
Pine	0	0	0	0
Pipestone	2	0	2	0.3
Polk	1	0	1	0.2
Pope	1	0	1	0.2
Ramsey	30	24	54	9.0
Red Lake	0	0	0	0
Redwood	3	1	4	0.7
Renville	5	2	7	1.2
Rice	8	1	9	1.5
Rock	2	1	3	0.5
Roseau	0	0	0	0
St. Louis	21	0	21	3.5
Scott	4	5	9	1.5
Sherburne	9	5	14	2.3
Sibley	2	0	2	0.3
Stearns	10	2	12	2.0
Steele	5	4	9	1.5
Stevens	1	0	1	0.2
Swift	5	1	6	1.0
Todd	2	0	2	0.3
Traverse	0	0	0	0
Wabasha	1	0	1	0.2
Wadena	0	1	1	0.2
Waseca	1	0	1	0.2
Washington	31	17	48	8.0
Watonwan	3	0	3	0.5
Wilkin	0	0	0	0
Winona	3	4	7	1.2
Wright	4	1	5	0.8
Yellow Medicine	2	1	3	0.5
<b>Total*</b>	<b>436</b>	<b>164</b>	<b>600</b>	<b>100.0</b>

\* Percentage might not sum to 100.0% because of rounding.

**Table 2.—Number of substances involved per event, by type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	424	97.2	424	157	95.7	157	581	96.8	581
2	8	1.8	16	6	3.7	12	14	2.3	28
3	1	0.2	3	1	0.6	3	2	0.3	6
4	2	0.5	8	0	0.0	0	2	0.3	8
≥ 5	1	0.2	7	0	0.0	0	1	0.2	7
<b>Total*</b>	<b>436</b>	<b>100.0</b>	<b>458</b>	<b>164</b>	<b>100.0</b>	<b>172</b>	<b>600</b>	<b>100.0</b>	<b>630</b>

\*Percentages may not total 100% as a result of rounding.

**Table 3.—Industries\* involved in hazardous substance events, by category—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims	Maximum number of victims in a single event
	No.	%	No.	%			
Accommodation and Food Services	5	0.8	3	5.5	60.0	6	3
Administration and Support and Waste Management and Remediation Services	20	3.3	2	3.6	10.0	2	1
Agriculture, Forestry, Fishing and Hunting	27	4.5	4	7.3	14.8	17	13
Arts, Entertainment, and Recreation	5	0.8	1	1.8	20.0	2	2
Construction	19	3.2	0	0.0	0.0	0	N/A
Education Services	23	3.8	3	5.5	13.0	26	14
Finance and Insurance	0	0.0	0	0.0	N/A	0	N/A
Health Care and Social Assistance	11	1.8	1	1.8	9.1	1	1
Information	0	0.0	0	0.0	N/A	0	N/A
Management of Companies and Enterprises	0	0.0	0	0.0	N/A	0	N/A
Manufacturing	149	24.8	13	23.6	8.7	81	30
Mining	17	2.8	0	0.0	0.0	0	N/A
Other (includes residences)	30	5.0	9	16.4	30.0	29	9
Professional services, Scientific and Technical Services	7	1.2	0	0.0	0.0	0	N/A
Public Administration	4	0.7	0	0.0	0.0	0	N/A
Real Estate, Rental and Leasing	1	0.2	1	1.8	100.0	1	1
Retail Trade	4	0.7	2	3.6	50.0	2	1
Transportation and Warehousing	135	22.5	6	10.9	4.4	6	1
Utilities	44	7.3	0	0.0	0.0	0	N/A
Wholesale Trade	71	11.8	7	12.7	9.9	9	2
Not an industry	17	2.8	3	5.5	17.6	5	3
Not identified	11	1.8	0	0.0	0.0	0	N/A
<b>Total<sup>†</sup></b>	<b>600</b>	<b>100.0</b>	<b>55</b>	<b>100.0</b>	<b>9.2</b>	<b>187</b>	<b>30</b>

\*Based on responsible party.

<sup>†</sup>Percentages might not total 100% because of rounding.

**Table 4.—Substances most frequently involved in events—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

Rank	Substance	Number of releases and release threats
1	Anhydrous ammonia	74
2	Antifreeze (Includes Antifreeze (10), Antifreeze NOS (9), Ethylene glycol (27), Ethylene glycol NOS (1), Glycol NOS (3), Polypropylene glycol (2), Propylene glycol (15))	67
3	Mercury (66), Mercury NOS (1)	67
4	Fertilizers (Includes: Ammonium thiosulfate (1), Fertilizer 10-34-0 (4); Fertilizer - Nitrogen-Phosphorus-Potassium (4), Fertilizer NOS (3), Nitrogen fertilizer (3), Nitrogen fertilizer, dry (2), Potash (3), Urea (2), Urea Ammonium Nitrate (8))	30
5	Paints, Coatings, Inks and Dyes (Includes: Latex Paint (1), Paint NOS (25), Paint or Coating NOS (2), Water Based Paint (1))	29
6	Sulfuric Acid (Includes: Battery Acid (1), Battery Acid NOS (1), Sulfuric Acid (26))	28
7	Volatile organic compounds	22
8	Ethyl alcohol (Ethanol)	16
9	Hydrochloric acid	14
10	Sodium hydroxide	14

NOS = Not Otherwise Specified

**Table 5.—Number of substances involved, by substance category and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	23	5.0	25	14.5	48	7.6
Ammonia*	71	15.5	7	4.1	78	12.4
Bases	22	4.8	16	9.3	38	6.0
Chlorine	19	4.1	2	1.2	21	3.3
Formulations	4	0.9	1	0.6	5	0.8
Hetero-organics	3	0.7	0	0.0	3	0.5
Hydrocarbons	5	1.1	1	0.6	6	1.0
Mixture <sup>†</sup>	16	3.5	3	1.7	19	3.0
Other <sup>‡</sup>	34	7.4	15	8.7	49	7.8
Other Inorganic Substances <sup>§</sup>	96	21.0	8	4.7	104	16.5
Oxy-organics	70	15.3	12	7.0	82	13.0
Paints, Coatings, Inks, and Dyes	7	1.5	24	14.0	31	4.9
Pesticides and Fertilizers	24	5.2	36	20.9	60	9.5
Polychlorinated biphenyls	6	1.3	1	0.6	7	1.1
Polymers	10	2.2	5	2.9	15	2.4
Volatile organic compounds	48	10.5	16	9.3	64	10.2
<b>Total</b>	<b>458</b>	<b>100.0</b>	<b>172</b>	<b>100.0</b>	<b>630</b>	<b>100.0</b>

\* Includes 74 anhydrous ammonia incidents and 4 ammonium hydroxide incidents.

† Substances from different categories that were mixed or formed from a reaction before the event.

‡ Not belonging to one of the existing categories.

§ All inorganic substances except for acids, bases, ammonia, and chlorine

¶ Percentages might not sum to 100.0 because of rounding.

**Table 6.—Number of victims per event, by type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

No. victims	Type of event				All events		
	Fixed facility		Transportation		No. events	%	Total victims
	No. events	Total victims	No. events	Total victims			
1	21	21	11	11	32	58.2	32
2	7	14	2	4	9	16.4	18
3	2	6	0	0	2	3.6	6
4	3	12	1	4	4	7.3	16
5	1	5	0	0	1	1.8	5
≥6	7	110	0	0	7	12.7	110
<b>Total*</b>	<b>41</b>	<b>168</b>	<b>14</b>	<b>19</b>	<b>55</b>	<b>100.0</b>	<b>187</b>

**Table 7.—Frequency of substance categories in all events and events with victims—  
Minnesota Hazardous Substances Emergency Events Surveillance System, 2008\***

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	47	7.8	4	7.3	8.5
Ammonia	76	12.7	13	23.6	17.1
Bases	37	6.2	2	3.6	5.4
Chlorine	20	3.3	2	3.6	10.0
Formulations	5	0.8	0	0.0	0.0
Hetero-organics	2	0.3	0	0.0	0.0
Hydrocarbons	0	0.0	0	0.0	Na
Mixture <sup>†</sup>	19	3.2	4	7.3	21.1
Multiple Substances category	14	2.3	4	7.3	28.6
Other <sup>‡</sup>	38	6.3	4	7.3	10.5
Other Inorganic Substances <sup>§</sup>	97	16.2	5	9.1	5.2
Oxy-organics	80	13.3	11	20.0	13.8
Paints, Coatings, Inks, and Dyes	30	5.0	1	1.8	3.3
Pesticides and Fertilizers	54	9.0	3	5.5	5.6
Polychlorinated biphenyls	6	1.0	0	0.0	0.0
Polymers	15	2.5	0	0.0	0.0
Volatile organic compounds	60	10.0	2	3.6	3.3
<b>Total<sup>¶</sup></b>	<b>600</b>	<b>100.0</b>	<b>55</b>	<b>100.0</b>	<b>N/A</b>

\* Substances in events that involved multiple substances were counted only once in a substance category when all the substances were associated with the same category. If events involved multiple substances from different substance categories, they were counted only once in the multiple substances category.

<sup>†</sup> Substances from different categories that were mixed or formed from a reaction before the event.

<sup>‡</sup> Not classified.

<sup>§</sup> All inorganic substances except for acids, bases, ammonia, and chlorine.

<sup>¶</sup> Percentages do not total 100% because of rounding.

**Table 8.—Frequencies of injuries/symptoms, by type of event\*—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Burns <sup>†</sup>	6	2.3	0	0.0	6	2.1
Dizziness/central nervous system symptoms	23	8.8	1	4.8	24	8.5
Eye irritation	69	26.4	2	9.5	71	25.2
Gastrointestinal system problems	7	2.7	0	0.0	7	2.5
Headache	22	8.4	0	0.0	22	7.8
Heart problems	0	0.0	0	0.0	0	0.0
Heat stress	1	0.4	0	0.0	1	0.4
Other	1	0.4	0	0.0	1	0.4
Respiratory irritation	111	42.5	8	38.1	119	42.2
Shortness of breath	0	0.0	0	0.0	0	0.0
Skin irritation	16	6.1	1	4.8	17	6.0
Trauma <sup>‡</sup>	5	1.9	9	42.9	14	5.0
<b>Total<sup>‡</sup></b>	<b>261</b>	<b>100.0</b>	<b>21</b>	<b>100.0</b>	<b>282</b>	<b>100.0</b>

\* The number of injuries is greater than the number of victims (187) because a victim could have had more than one injury.

† Of the six victims with burns in fixed facilities, three victims had chemical burns, one victim had thermal burns, one victim had both chemical and thermal burns and one victim had unspecified burns,

‡ Of the 14 trauma none of them were related to chemical exposure, one was related to chemical exposure. The other victims' injuries were not directly caused by the chemical released and were caused by other factors, such as impact in a crash or fall.

‡ Percentages might not total 100% as a result of rounding.

**Table 9.—Responders to events—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

<b>Responder Category</b>	<b>No. of responses</b>	<b>% of events within category</b>	<b>No. of events (% of total events)</b>
<b>No response</b>	9	100.0	9 (1.5%)
<b>Single responder</b>			
(Events with one on-scene responder)			
Certified HazMat team	1	0.3	
Company's Response Team	360	91.4	
Dept. of Works/Utilities/Transportation (includes Coast Guard)	2	0.5	
Environmental Agency/EPA Response Team	2	0.5	
Fire Department	7	1.8	
Law Enforcement Agency	3	0.8	
Third party clean up contractor	19	4.8	
Subtotals	394	100.0*	394 (65.7%)
<b>Multiple responders</b>			
(Events with two or more on-scene responders)			
Certified HazMat Team	18	3.0	
Company's Response Team	153	25.3	
Dept. of Works/Utilities/Transportation (includes Coast Guard)	20	3.3	
Emergency Medical Services	55	9.1	
Environmental Agency/EPA Response Team	43	7.1	
Fire Department	108	17.9	
Health Department/Health Agency	1	0.2	
Law Enforcement Agency	113	18.7	
Other	4	0.7	
Specialized Multiagency Teams	2	0.3	
State, County Or Local Emergency Managers/Coordinators/Planning Committees	11	1.8	
Third party clean up contractor	77	12.7	
Subtotals	605 <sup>†</sup>	100.0*	197 (32.8%)
<b>Totals</b>	<b>1008<sup>†</sup></b>	<b>N/A</b>	<b>600 (100.0%*)</b>

\* Percentages might not total 100.0% because of rounding.

<sup>†</sup> There could be more than one responder per event.

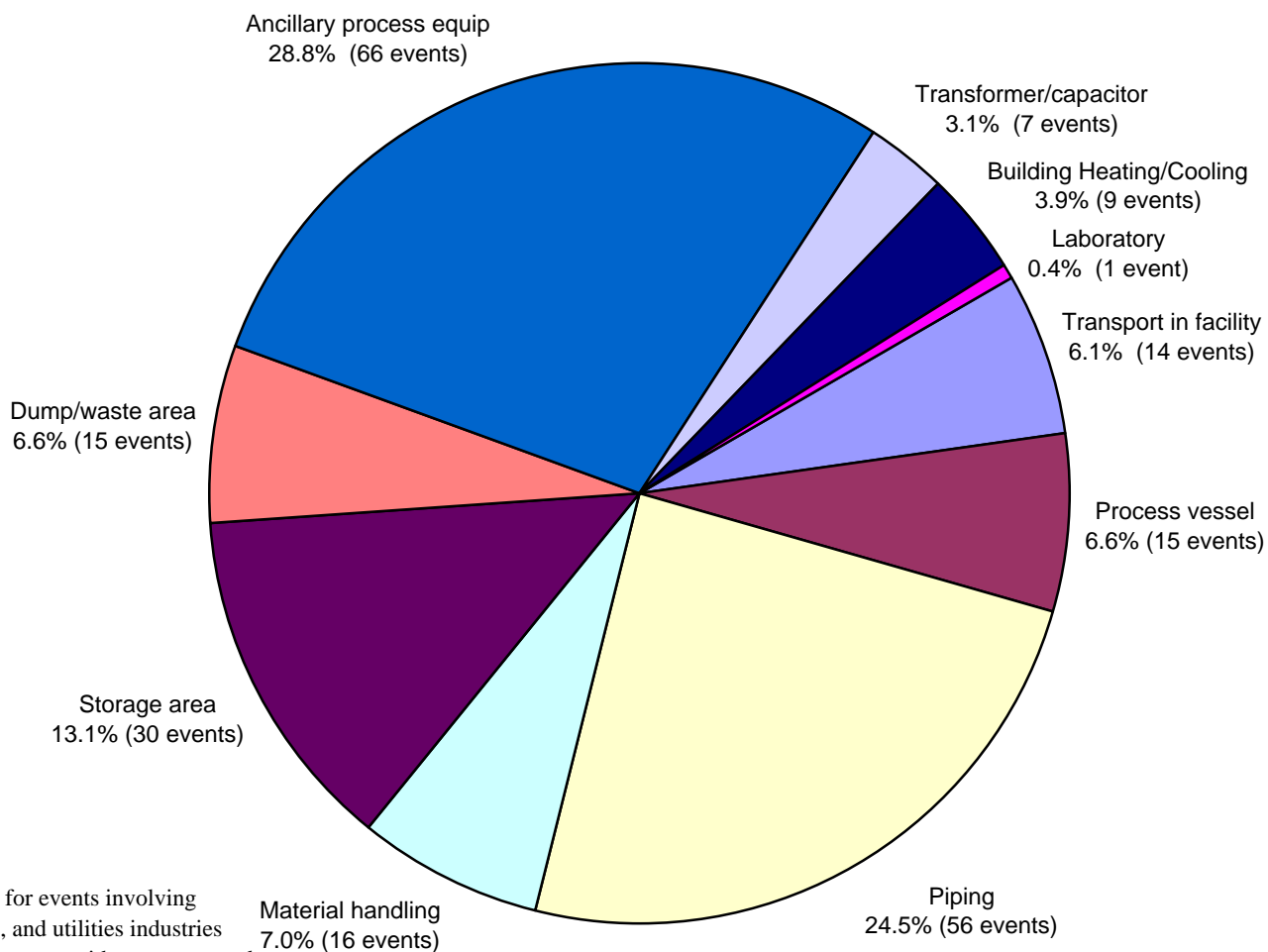
**Table 10.— Data by year—  
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2008\***

Year	Type of event			No. substances released	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	% <sup>†</sup>
1995	193	36	229	386	172	0	23	10.0
1996	224	77	301	340	73	0	21	7.0
1997	194	71	265	283	19	1	16	6.0
1998	341	36	377	440	66	0	22	5.8
1999	287	61	348	370	62	0	24	6.9
2000	346	73	419	459	83	1	29	6.9
2001	338	76	414	472	50	0	19	4.6
2002	228	126	354	376	85	1	16	4.5
2003	323	115	438	499	83	3	30	6.8
2004	325	143	468	740	64	1	26	5.6
2005	271	136	407	456	52	0	26	6.4
2006	342	204	546	584	68	1	31	5.7
2007	371	224	595	636	150	2	32	5.4
2008	436	164	600	630	187	4	55	9.2
<b>Total</b>	<b>4219</b>	<b>1542</b>	<b>5761</b>	<b>6671</b>	<b>1214</b>	<b>14</b>	<b>370</b>	<b>6.4</b>

\* Numbers in the table might differ from those reported in previous years because of adjustments in HSEES qualification requirements for events.

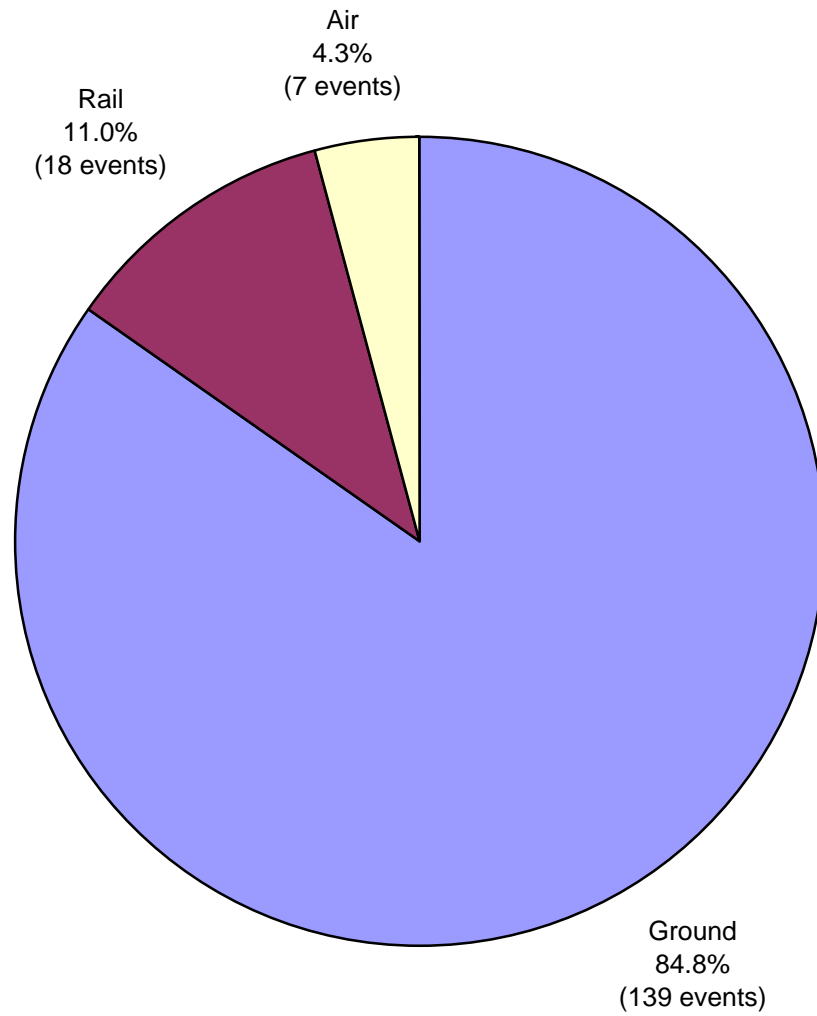
† Percentage of events with victims.

**Figure 1. Areas of fixed facilities involved in events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008\***

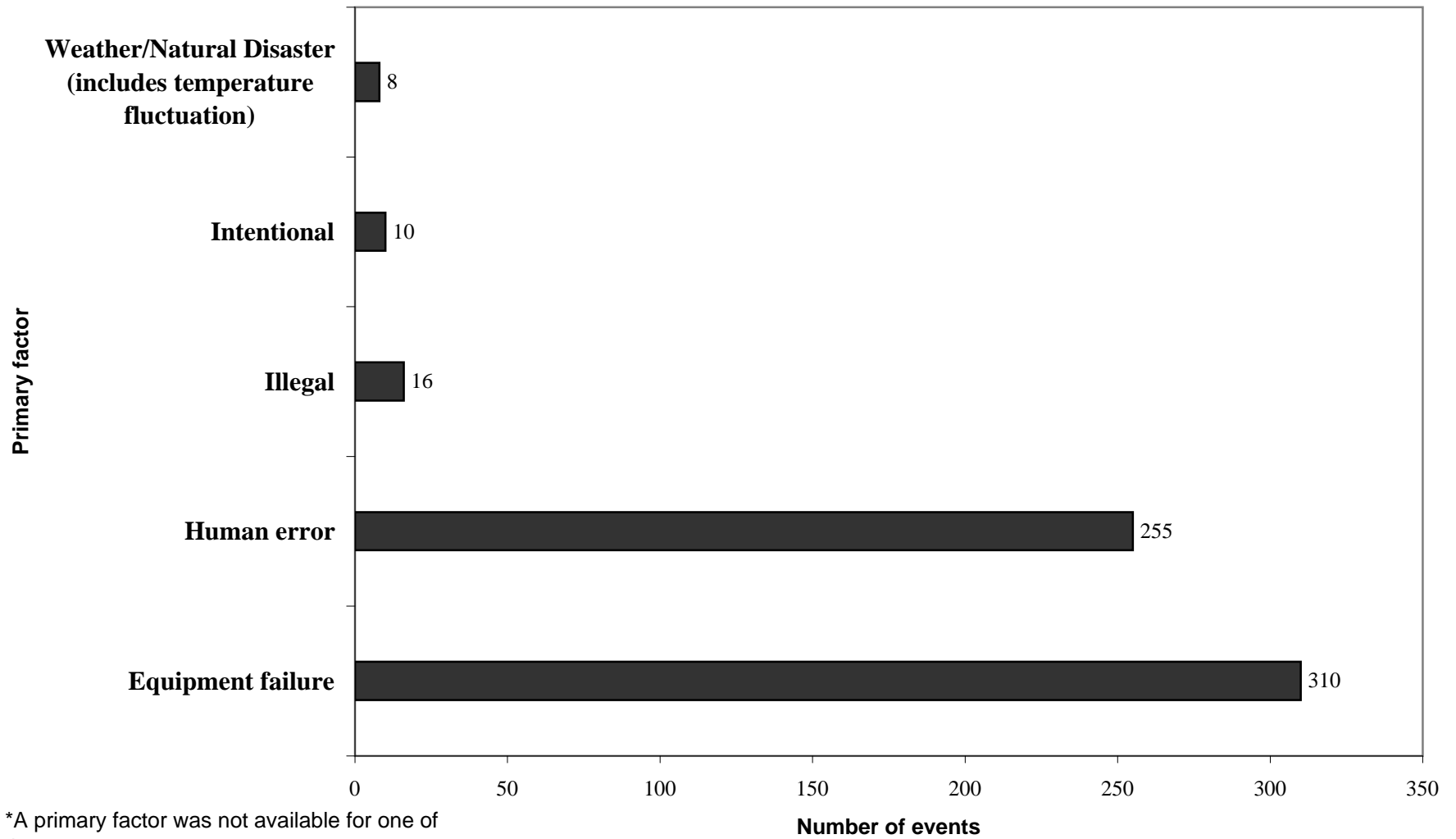


\* Areas were reported for events involving manufacturing, mining, and utilities industries only. Thirty of the 199 events with areas reported involved two areas, for a total of 229 areas. Percentages do not total 100.0% as a result of rounding

**Figure 2. Distribution of transportation events, by type of transport, Minnesota Hazardous Substances Emergency Events Surveillance, 2008**

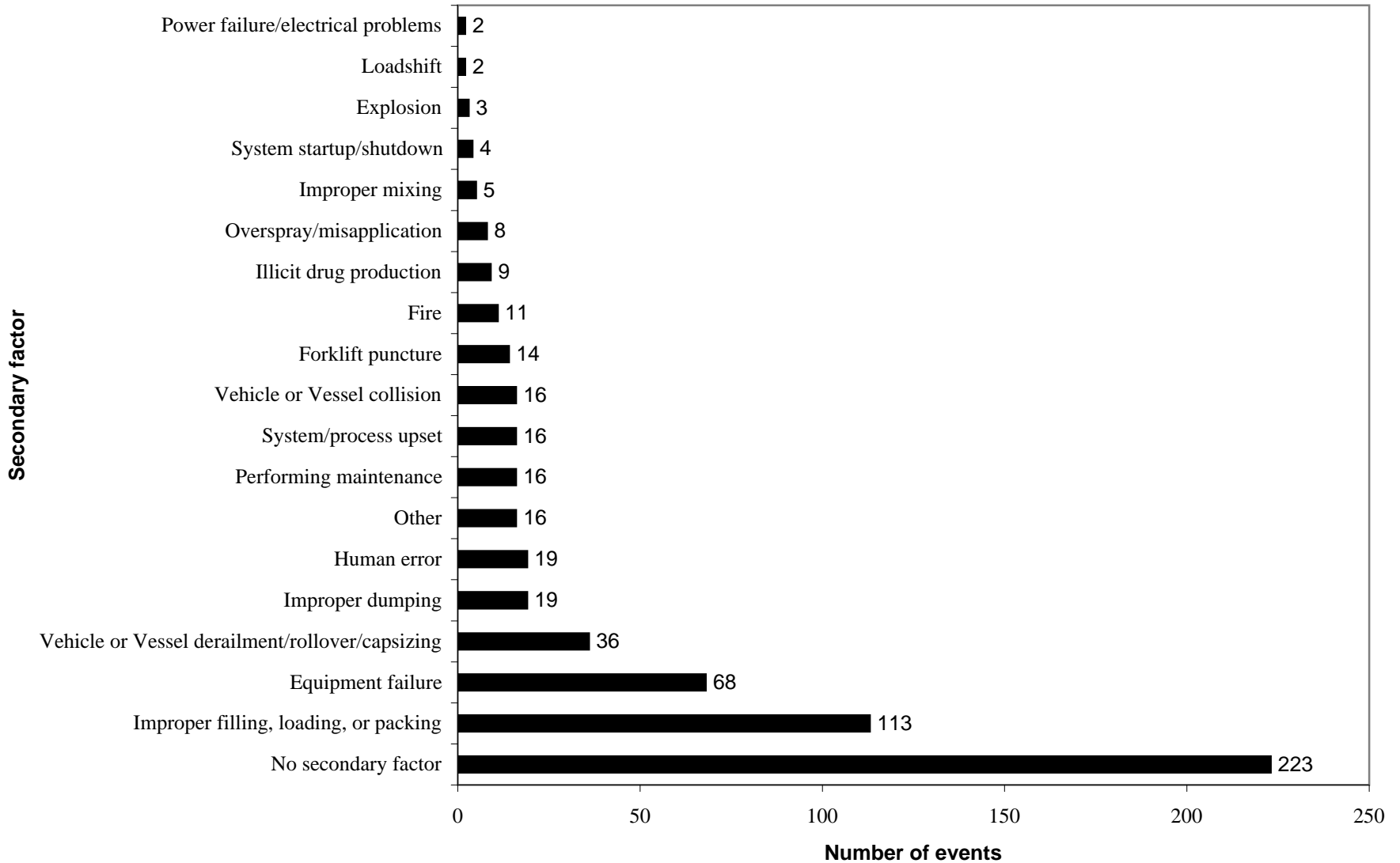


**Figure 3a. Primary factors reported as contributing to events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008\***

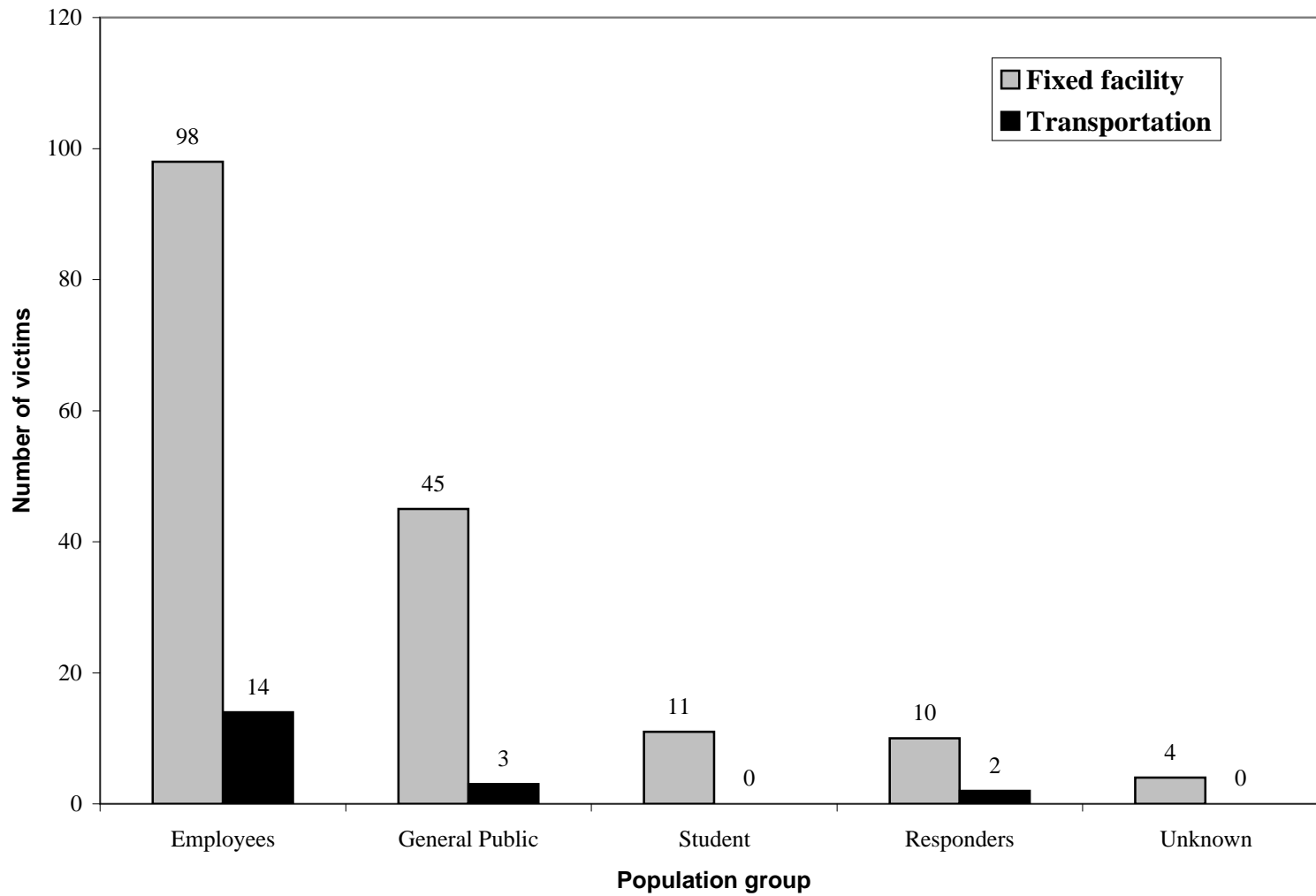


\*A primary factor was not available for one of the 600 events.

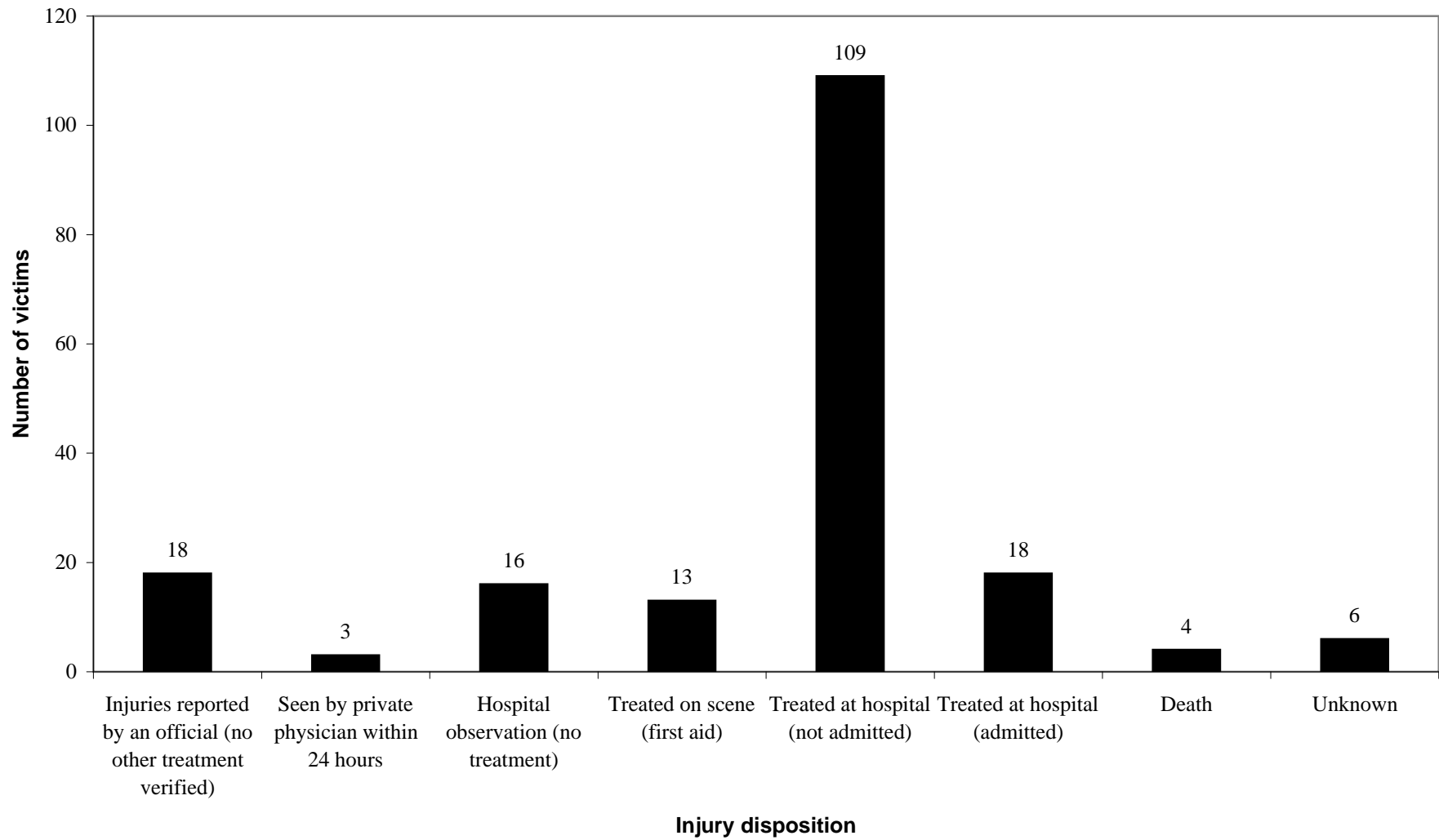
**Figure 3b. Secondary factors reported as contributing to events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008\***



**Figure 4. Number of victims, by population group and type of event, Minnesota Hazardous Substances Emergency Events Surveillance, 2008**



**Figure 5. Injury disposition,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2008**



**Figure 6. Number of victims, by category and year,  
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2008**

