

# **Minnesota Department of Health**

## **Hazardous Substances Emergency Events Surveillance**

**(HSEES)**

**Report for 2004**

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Minnesota Department of Health ♦ Division of Environmental Health ♦ 625 Robert St. North, P.O. Box 64975, St. Paul, MN 55164

651/201-4899 ♦ TDD 1-800/627-3529

## *Contents*

	Page
List of Tables	3
List of Figures	4
Executive Summary	5
Introduction	6
Methods	7
Results	7
Industries	8
Substances	9
Victims	9
Nearby populations	10
Evacuations	11
Decontamination	11
Response	11
Prevention Activities in Minnesota	11
Additional Use of MN HSEES data	12
Summary of Results, 1995-2004	12
References	14
Appendix	15

### *List of Tables*

- Table 1. Number of events meeting the surveillance definition, by county and type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 2. Number of substances involved per event, by type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 3. Industries involved in hazardous substance events, by category—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 4. Number of substances involved, by substance category and type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 5. Number of victims per event, by type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 6. Frequency of substance categories in all events and events with victims—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 7. Frequencies of injuries/symptoms, by type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 8. Distribution of personnel who responded to the event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Table 9. Cumulative data by year—Minnesota Hazardous Substances Emergency Events Surveillance, 1995–2004

### *List of Figures*

- Figure 1. Areas of fixed facilities involved in events—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 2. Distribution of transportation-related events, by type of transport—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 3a. Primary factors reported as contributing to events—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 3b. Secondary factors reported as contributing to events—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 4. Number of victims, by population group and type of event—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 5. Distribution of responders injured in fixed-facility events, by type of responder—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 6. Injury disposition—Minnesota Hazardous Substances Emergency Events Surveillance, 2004
- Figure 7. Number of victims, by category and year—Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2004

## **EXECUTIVE SUMMARY**

The Hazardous Substances Emergency Events Surveillance (HSEES) system, maintained by the Agency for Toxic Substances and Disease Registry (ATSDR), actively collects information to describe the public health consequences of acute releases of hazardous substances in participating states. This report summarizes the characteristics of events reported to Minnesota in 2004. Information about acute events involving hazardous substances was collected, including the substance(s) released, number of victims, number and types of injuries, and number of evacuations. The data were computerized using an ATSDR-provided Web-based data entry system.

A total of 468 events were reported. In 425 (90.8%) events, only one substance was involved. The most commonly reported categories of substances were ammonia, sulfur dioxide, and mixtures. During this reporting period, 26 events (5.6 % of all reported events) resulted in a total of 64 victims, of whom one (1.6%) died. The most frequently reported injuries were respiratory irritation, eye irritation, and trauma. Evacuations were ordered for 40 (8.5%) events.

The findings regarding the percentage of events with victims have been fluctuating in recent years but are decreasing overall. Prevention outreach efforts for 2004 focused on completing a paper on aerial application and providing HSEES information to emergency planners and responders through conferences, presentations, and written material.

## 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 last 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 chemical releases and reduce morbidity and mortality if a release occurs.

This report provides an overview of HSEES for 2004 in Minnesota, summarizes the characteristics of acute releases of hazardous substances and their associated public health consequences, and demonstrates how data from the system are translated into prevention activities to protect public health.

## **METHODS**

In 2004, thirteen state health departments participated in HSEES: Colorado, Iowa, Louisiana, Minnesota, Missouri, New Jersey, New York, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin.

Beginning in 2002, the Office of Management and Budget approved a newly updated data-collection form. Information collected about each event included substance(s) released, 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. 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 uncontrolled or illegal releases or threatened releases of hazardous substances. Events involving releases of only petroleum are excluded. Events are included if (a) the amount of substance released (or that might have been released) needed (or would have needed) to be removed, cleaned up, or neutralized according to federal, state, or local law or (b) the release of a substance was threatened, but the threat led to an action (for example, evacuation) that could have affected the health of employees, emergency responders, or members of the general public. HSEES defines victims as people 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 defined as transportation-related if they occur (a) during surface, air, pipeline, or water transport of hazardous substances, or (b) before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

For data analyses, 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 grouped into one of the other existing categories.

## **RESULTS**

For 2004, a total of 468 acute hazardous substances events were captured by Minnesota HSEES: Three (0.6%) events were threatened releases. Two other events (0.4%) involved substances that were both threatened to be released and actually released. A total of 325 (69.4%) events occurred in fixed facilities. The counties with the most frequent number of events were Dakota (91 [19.4%]) and Hennepin (71 [15.2%]) (Table 1).

For each fixed-facility event, up to two types of area or equipment where the event occurred could be selected. Of all 325 fixed-facility events, 307 (94.5%) reported one type of area and 17 (5.2%) reported a combination of two area types. Type of area was not reported for one (0.3%) event. Among the 307 events with one type of area reported, the main areas were: 97 (31.6%) ancillary process equipment, 38 (12.4%) storage areas, and 32 (10.4%) piping (Figure 1). Of the events with two areas, eight (47.1%) involved a dump/waste area in combination with other areas.

Of the 143 transportation-related events, 121 (84.6%) occurred during ground transport (e.g., truck, van, or tractor) and 20 (14.0%) involved transport by rail (Figure 2). Fewer events involved water, air, and pipeline transport. Most (101, [83.5%]) ground transportation events involved trucks. The largest proportions of transportation-related events occurred during unloading of a stationary vehicle or vessel (64 [44.8%]) and from a moving vehicle or vessel (55 [38.5%]). Of the 143 transportation-related events, 23 (16.1%) involved a release en route that was later discovered at a fixed facility.

Factors contributing to the events were classified as primary and secondary. Primary factors were reported for 464 (99.1%) events (Figure 3a). Of the reported primary factors, most (185 [56.9%]) fixed-facility events involved equipment failure, and most (104 [72.7%]) transportation-related events involved human error. Secondary factors were reported for 332 (70.9%) events (Figure 3b). Of the reported secondary factors, a plurality (35 [17.2%]) of fixed-facility events involved improper filling, packing, or loading, and most (77 [60.2%]) transportation-related events also involved improper filling, packing or loading.

More than 90% of all events involved the release of only one substance. Two substances were released in approximately 5% of the events, and approximately 4% involved the release of more than two substances (Table 2). Fixed-facility events were more likely than transportation events to have two or more substances released in an event (11.4% vs. 4.2%).

The number of events by month ranged from 28 (6.0 %) in both January and February to 48 (10.3%) in November, with the largest proportions occurring from April through July. The proportion of events ranged from 13.2 % to 17.3% during weekdays, and was 10.5% for both weekend days. Of all 468 (100%) events for which time of day or time category was reported, 34.4% occurred from 6:00 AM to 11:59 AM, 35.9% from 12:00 PM to 5:59 PM, 17.3% from 6:00 PM to 11:59 PM, and the remainder during the early hours of the day.

### ***Industries***

The largest proportions of HSEES events were associated with manufacturing (160 [34.2%]) and transportation (108 [23.1%]) (Table 3). Within manufacturing, petroleum refining (48 [30.0%]), paper manufacturing (19 [11.9%]) and industrial chemical manufacturing (14 [8.8%]) accounted for most of the events. The largest number of events with victims occurred from the manufacturing (5 [19.2%]) and transportation industries (5 [19.2%]). The total number of victims was greatest in retail trade (21 [32.8%]) followed by the number of victims in transportation (14 [21.9%]) and professional services (7 [10.9%]). Although the manufacturing and transportation industries had a large proportion of events with victims and a large number of victims, only 3.1% and 4.6% of all 160 and 108 events, respectively, resulted in victims. In contrast, 100% of all

events in private vehicles resulted in victims, but this category represents a small proportion (3.8%) of events with victims.

### ***Substances***

A total of 740 substances were involved in all events, of which 9 (1.2%) substances were reported as threatened to be released. The individual substances most frequently released were ammonia, sulfur dioxide, mercury, and polychlorinated biphenyls (Appendix). Substances were grouped into 16 categories. The substance categories most commonly released in fixed-facility events were other inorganic substances (131 [22.2%]), volatile organic compounds (88 [14.9%]), and oxy-organics (83 [14.1%]) (Table 4). In transportation-related events, the most common substance categories released were agricultural chemicals and pesticides (36 [24.0%]), acids (18 [12.0%]), and volatile organic compounds (18 [12.0%]).

Two types of releases for each substance (e.g., spill and air release) could be reported. Only one type of release was associated with the following: spills (314 [42.4%]), fire (208 [28.1%]), air releases (160 [21.6%]), threatened release (9 [1.2%]), and explosion (2 [0.3%]). Of events with two types of releases, the following combinations were reported: spill and air release (27 [3.6%]), air release and fire (9 [1.2%]), spill and fire (5 [0.7%]), and the remaining 6 (0.8%) involved other combinations of release types. All substances had release types reported.

### ***Victims***

A total of 64 victims were involved in 26 events (5.6% of all events) (Table 5). Of the 26 events with victims, 15 (57.7%) events involved only one victim, and 5 (19.2%) involved two victims. Of all victims, 52 (81.3%) were injured in fixed-facility events. Fixed-facility events were more likely to have three or more victims per event (40.0%) than were transportation-related events (0.0%). Additionally, 12 persons in 3 events (0.6% of all events) were observed at a hospital or medical facility but did not have symptoms resulting from the event and therefore were not counted as victims.

To represent the magnitude of the effects of substances involved in injuries, the number of events involving a specific substance category was compared with the number of events with victims in the same category. In events that involved one or more substances from the same substance category, substances were counted once in that category. In events that involved two or more substances from different categories, substances were counted once in the multiple substance category. Substances released most often were not necessarily the most likely to result in victims (Table 6). For example, events with other inorganic substances constituted 22.5% of all events; however, none of these events resulted in injuries. Conversely, events involving acids and ammonia accounted for 8.6% and 9.0% of all events respectively, but 12.5% of the acid events and 11.9% of the ammonia events resulted in injuries.

Employees (35 [54.7%]) constituted the largest proportion of the population groups injured, followed by general public (25 [39.1%]) (Figure 4). In fixed-facility events, 3 emergency response personnel were injured. Of those, 2 (66.7%) were firefighters, 1 (33.3%) was a police officer (Figure 5). No responders were injured in transportation-related events.

Victims were reported to sustain a total of 87 injuries or symptoms (Table 7). Some victims had

more than one injury or symptom. Of all reported injuries/symptoms, the most common injuries/symptoms in fixed-facility events were respiratory irritation (38 [52.1%]), and eye irritation (13 [17.8%]). In transportation-related events, trauma (9 [64.3%]) and eye irritation (3 [21.4%]) were reported most frequently. The trauma injuries in transportation-related events were not substance-related; these injuries resulted from a motor vehicle accident which also led to the release of hazardous substance.

The median age of the 38 (59.4%) victims for whom exact age was reported was 34 years (range: 6–78 years). For the 59 (92.2%) injured persons for whom an age category was reported, 43 (72.9%) were 20–44 years of age, and 10 (16.9%) were 45–64 years of age. Of the five injured persons for whom age was not reported, one (20.0%) was presumably an adult (because the population group was reported as responder), and four (80.0%) could have been adults or children (because their population group was reported as members of the general public).

Sex was known for 60 (93.8%) of the victims; of these, 34 (56.7%) were males. Of all employees and responders for whom sex was reported, 65.8% were males.

Of the 64 victims, 29 (45.3%) experienced adverse health effects within 24 hours that were reported by an official (no treatment other than fresh air) and 19 (29.7%) were taken to a hospital but not admitted. One (1.6%) death was reported (Figure 6). Severity was known for 64 (100%) of victims.

The status of personal protective equipment (PPE) use was reported for 33 (94.3%) employee-victims and for three (100%) responder-victims. Most of the employee-victims (97.0%) and 33.3% of the responder-victims had not worn any form of PPE. The one employee-victim who wore PPE used level C protection (1 [3.0%]). Among injured emergency responders who wore PPE, two (100%) wore fire fighter turnout gear without respiratory protection.\*

One event involved more than 10 injured people. In January 2004, employees and patrons at a restaurant began experiencing eye irritation, respiratory irritation, and some gastrointestinal symptoms. Employees called the fire department. When the fire department arrived, many of the patrons had already left the area and the building air had begun to clear. An official evacuation was therefore not ordered. Through interviews, it was discovered that a patron had jarred a spray container of mace in her purse, releasing the substance into the restaurant. The ventilation system further dispersed the substance within the restaurant. Twelve people were reportedly affected by the release, receiving mostly respiratory irritation and eye irritation, but none were known to have received treatment.

### ***Nearby populations***

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS) or health department records. Residences were within ¼

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\* Firefighter turnout gear is protective clothing usually worn by firefighters during structural firefighting operations and is similar to level “D” protection. The Occupational Safety and Health Administration defines Level D protection as coveralls, boots/shoes (chemical-resistant leather, steel toe and shank), safety glasses or chemical splash goggles, and hard hats. Level “D” provides limited protection against chemical hazards.

mile of 316 (67.5%) events, schools within ¼ mile of 84 (17.9%) events, hospitals within ¼ mile of 16 (3.4%) events, nursing homes within ¼ mile of 25 (5.3%) events, licensed daycares within ¼ mile of 157 (33.5%) events, industries or other businesses within ¼ mile of 385 (82.3%) events and recreational areas within ¼ mile of 157 (33.5%) events. Information for proximity of the event location in relation to selected populations was missing for one event.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 323 (69.0%) events with persons living within ¼ mile of the event; 449 (95.9%) events with persons living within ½ mile; and 462 (98.7%) events with persons living within 1 mile. Information on the number of people living within ¼, ½, and 1 mile of the event was missing for one event.

### ***Evacuations***

Evacuations were ordered in 40 (8.6%) of 464 events where evacuation status was reported. Of these evacuations, 72.5% were of buildings or affected parts of buildings; 17.5% were of defined circular areas surrounding the event locations; 5.0% were of circular and downwind or downstream areas, and the remainder were of areas downwind or downstream of the event, of no criteria, or not known. The number of people evacuated was known for 38 (95.0%) events and ranged from one to 100 people, with a median of 20 people. The median length of evacuation was 2.0 hours (range: 0.2 to 520 hours). Evacuation length was available for all events. Of all 468 events, 86 (18.4%) resulted in restricted access to the area. Five events resulted in in-place sheltering ordered by an official.

### ***Decontamination***

Of the 55 (85.9%) victims for whom decontamination status was known, 49 (89.1%) were not decontaminated, five (9.1%) were decontaminated at the scene, 0 (0.0%) were decontaminated at a medical facility, and one (1.8%) was decontaminated at both the scene and a medical facility.

In events where uninjured persons were decontaminated, the median number of uninjured decontaminated individuals was one person per event (range: 1 – 49 persons). Decontamination at a medical facility was done for no uninjured employees, no uninjured responders, 10 uninjured members of the general public, and no uninjured students. Decontamination at the scene was done for four uninjured employees, 10 uninjured responders, 50 uninjured members of the general public, and no uninjured students.

### ***Response***

There were 467 (99.8%) events with information on who responded to the event. The category No Response was reported in 52 (11.1%) events. Two or more responder categories were reported for 105 (22.5%) events, 50 (10.7%) reported 3 or more categories, and 27 (5.8%) reported four or more categories. Company response teams responded most frequently to events (73.7%), followed by fire departments (17.1%), law enforcement (16.5%), and certified hazardous materials teams (10.7%) (Table 8).

### ***Prevention Activities in Minnesota***

During 2004, the Minnesota HSEES program performed several prevention activities. These activities included:

- Presenting HSEES information at a booth at the Minnesota Governor's Emergency Management Conference in St Paul, MN.
- Presenting a poster on unplanned releases of chemicals and acute public health consequences associated with aerial application at the International Society of Environmental Epidemiologists in New York, NY.
- Presenting a HSEES program overview and general trends in hazardous substances releases during a refresher class at the Minnesota Safety Council in St. Paul, MN.
- Discussing response to illegal methamphetamine labs in urban areas at a Metro Community Awareness and Emergency Response (MetroCAER) group in Minneapolis, MN.
- Adding information, including reports, articles published by the MN HSEES program, and spill reporting information, to the Minnesota HSEES program website. The Minnesota HSEES Internet website page is available at <http://www.health.state.mn.us/divs/eh/hazardous/surv/index.html>.

The Minnesota Governor's Emergency Management Conference, which is held annually in the Minneapolis/St. Paul area, is attended by many professionals that could use HSEES data for planning and training. In 2004, the Minnesota HSEES program staffed a booth representing emergency response-related programs at the Minnesota Department of Health, particularly the Office of Emergency Preparedness. A map of Minnesota HSEES events was displayed, along with HSEES reports and brochures. Prior to the conference, county emergency managers were sent an email inviting them to visit the booth to get a prepared information sheet about previous HSEES events in their county. The HSEES program also had a representative available throughout the conference to answer questions about the program.

The conference offers a good networking opportunity for the HSEES program. The visibility of the HSEES program at the conference appears to have assisted in getting better response when collecting data concerning hazardous substances releases. This visibility also has encouraged use of HSEES data for emergency planning, which will help to reduce release-related morbidity and mortality in the long term.

### ***Additional Use of MN HSEES Data***

Minnesota HSEES program data continues to be utilized by public and private emergency planners and safety personnel on a state and local level. Many find it useful to review data about hazardous substances releases that have occurred within their jurisdiction or in nearby areas. Because the HSEES system has a comprehensive collection of unplanned hazardous substance events and their immediate impact on public health, emergency response trainers have used the database as a resource for examples of actual events for use in training. Data continue to be available upon request by contacting the program.

### **SUMMARY OF RESULTS, 1995-2004**

During 1995-2004, the largest proportion of events occurred in fixed facilities (Table 9). However, the number of reported transportation-related events has increased in recent years. The increase is partially due to the 2002 addition of the U.S. Department of Transportation's Hazardous Materials Information System as a primary notification source for transportation

events. Over time, the total of number of HSEES events has increased. The increase in the number of events may have been due, at least in part, to the expansion of reporting sources.

The number of substances released has also increased, particularly in 2004. The 2004 increase can be partially attributed to four events that involved 222 substances collectively.

The percentage of events with victims was highest in 1995 (10.0%) and lowest in 2002 (4.5%). The average percentage of events with victims during 1995–2004 was 6.4%. There have been more deaths associated with chemical releases in the Minnesota HSEES system in recent years. A few of these of these deaths were related to circumstances surrounding the release events (e.g., a vehicle crash) and some were related to chemical explosions caused by human error or illegal methamphetamine production. Overall, respiratory irritation has consistently been the most frequently reported injury.

Employees continue to be the most commonly reported victims of acute chemical releases. However, members of the general public constitute a large proportion of the victims as well (Figure 7). The number of emergency responders victims has decreased from a high of 22 victims in 1999. Nine of the responder victims in 1999 and four victims in 2000 occurred as a result of illegal methamphetamine production. There were no emergency responder injuries related to meth labs reported to MN HSEES in 2003 or 2004. The decline may be related to efforts by the Meth Lab program at the Minnesota Department of Health to increase awareness of meth lab hazards and promote use of precautionary measures when a lab is encountered. With recent legislation passed in Minnesota to deter illegal methamphetamine production, the occurrence of illegal methamphetamine labs is expected to decrease in future years.

## REFERENCES

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## Appendix

The 11 substances most frequently involved in events—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004

1	Ammonia	43
2	Sulfur Dioxide	39
3	Mercury	29
4	Polychlorinated Biphenyls	15
5	Nitrogen Oxide	12
6	Volatile Organic Compounds	11
7	Resin NOS	10
8	Hydrogen Sulfide	10
9	Chlorine	9
10	Ethylene Glycol	8
11	Nitrogen Dioxide	8

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

County	Type of event				
	Fixed facility		Transportation		All events Total no. events (%)
	No. events	%*	No. events	%*	
Aitkin	1	100.0	0	0	1 (0.2)
Anoka	13	56.5	10	43.5	23 (4.9)
Becker	1	50.0	1	50.0	2 (0.4)
Beltrami	0	0.0	0	0.0	0 (0.0)
Benton	1	50.0	1	50.0	2 (0.4)
Big Stone	0	0.0	0	0.0	0 (0.0)
Blue Earth	5	83.3	1	16.7	6 (1.3)
Brown	4	100.0	0	0.0	4 (0.9)
Carlton	5	83.3	1	16.7	6 (1.3)
Carver	3	100.0	0	0.0	3 (0.6)
Cass	1	100.0	0	0.0	1 (0.2)
Chippewa	1	100.0	0	0.0	1 (0.2)
Chisago	0	0.0	0	0.0	0 (0.0)
Clay	7	87.5	1	12.5	8 (1.7)
Clearwater	0	0.0	0	0.0	0 (0.0)
Cook	1	100.0	0	0.0	1 (0.2)
Cottonwood	1	100.0	0	0.0	1 (0.2)
Crow Wing	2	100.0	0	0.0	2 (0.4)
Dakota	65	71.4	26	28.6	91 (19.4)
Dodge	1	50.0	1	50.0	2 (0.4)
Douglas	0	0.0	2	100.0	2 (0.4)
Faribault	1	50.0	1	50.0	2 (0.4)
Fillmore	0	0.0	2	100.0	2 (0.4)
Freeborn	1	33.3	2	66.7	3 (0.6)
Goodhue	2	40.0	3	60.0	5 (1.1)
Grant	1	100.0	0	0.0	1 (0.2)
Hennepin	53	74.6	18	25.4	71 (15.2)
Houston	2	100.0	0	0.0	2 (0.4)
Hubbard	1	33.3	2	66.7	3 (0.6)
Isanti	0	0.0	0	0.0	0 (0.0)
Itasca	11	84.6	2	15.4	13 (2.8)
Jackson	1	100.0	0	0.0	1 (0.2)
Kanabec	0	0.0	0	0.0	0 (0.0)
Kandiyohi	0	0.0	3	100.0	3 (0.6)
Kittson	1	100.0	0	0.0	1 (0.2)

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

County	Type of event				
	Fixed facility		Transportation		All events
	No. events	%*	No. events	%*	Total no. events (%)
Koochiching	1	50.0	1	50.0	2 (0.4)
Lac Qui Parle	1	100.0	0	0.0	1 (0.2)
Lake	0	0	0	0.0	0 (0.0)
Lake of the Woods	0	0	0	0.0	0 (0.0)
Le Sueur	1	33.3	2	66.7	3 (0.6)
Lincoln	1	100.0	0	0	1 (0.2)
Lyon	1	50.0	1	50.0	2 (0.4)
Mahnomen	0	0.0	0	0.0	0 (0.0)
Marshall	1	100.0	0	0.0	1 (0.2)
Martin	1	100.0	0	0.0	1 (0.2)
McLeod	5	71.4	2	28.6	7 (1.5)
Meeker	0	0.0	1	100.0	1 (0.2)
Mille Lacs	1	100.0	0	0.0	1 (0.2)
Morrison	1	100.0	0	0.0	1 (0.2)
Mower	1	100.0	0	0.0	1 (0.2)
Murray	2	66.7	1	33.3	3 (0.6)
Nicollet	1	100.0	0	0.0	1 (0.2)
Nobles	0	0.0	1	100.0	1 (0.2)
Norman	0	0.0	0	0.0	0 (0.0)
Olmsted	4	50.0	4	50.0	8 (1.7)
Otter Tail	2	50.0	2	50.0	4 (0.9)
Pennington	1	100.0	0	0.0	1 (0.2)
Pine	0	0.0	0	0.0	0 (0.0)
Pipestone	0	0.0	0	0.0	0 (0.0)
Polk	2	100.0	0	0.0	2 (0.4)
Pope	1	50.0	1	50.0	2 (0.4)
Ramsey	33	57.9	24	42.1	57 (12.2)
Red Lake	0	0.0	0	0.0	0 (0.0)
Redwood	3	100.0	0	0.0	3 (0.6)
Renville	5	71.4	2	28.6	7 (1.5)
Rice	4	100.0	0	0.0	4 (0.9)
Rock	0	0.0	0	0.0	0 (0.0)
Roseau	2	66.7	1	33.3	3 (0.6)
St. Louis	9	69.2	4	30.8	13 (2.8)

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

County	Type of event				Total no. events (%)
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	
Scott	0	0.0	2	100.0	2 (0.4)
Sherburne	7	77.8	2	22.2	9 (1.9)
Sibley	1	100.0	0	0.0	1 (0.2)
Stearns	5	71.4	2	28.6	7 (1.5)
Steele	2	50.0	2	50.0	4 (0.9)
Stevens	0	0.0	2	100.0	2 (0.4)
Swift	2	66.7	1	33.3	3 (0.6)
Todd	2	100.0	0	0.0	2 (0.4)
Traverse	0	0.0	0	0.0	0 (0.0)
Wabasha	0	0.0	0	0.0	0 (0.0)
Wadena	0	0.0	0	0.0	0 (0.0)
Waseca	1	100.0	0	0.0	1 (0.2)
Washington	24	82.8	5	17.2	29 (6.2)
Watonwan	0	0.0	0	0.0	0 (0.0)
Wilkin	0	0.0	0	0.0	0 (0.0)
Winona	2	100.0	0	0.0	2 (0.4)
Wright	7	70.0	3	30.0	10 (2.1)
Yellow Medicine	2	100.0	0	0.0	2 (0.4)
<b>Total<sup>†</sup></b>	<b>325</b>	<b>69.4</b>	<b>143</b>	<b>30.6</b>	<b>468</b>

\* Percentage = (number of events by type of event per county ÷ total number of events in that county) x 100

† Total may not equal 100% due to rounding.

**Table 2.—Number of substances involved per event, by type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	288	88.6	288	137	95.8	137	425	90.8	425
2	19	5.8	38	5	3.5	10	24	5.1	48
3	14	4.3	42	1	0.7	3	15	3.2	45
4	1	0.3	4	0	0.0	0	1	0.2	4
≥ 5	3	0.9	218	0	0.0	0	3	0.6	218
<b>Total*</b>	<b>325</b>	<b>99.9</b>	<b>590</b>	<b>143</b>	<b>100.0</b>	<b>150</b>	<b>468</b>	<b>99.9</b>	<b>740</b>

\*Percentages may not total 100% due to rounding.

**Table 3.—Industries involved in hazardous substance events, by category—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims Number (maximum)*
	No.	%	No.	%		
Abandoned†	8	1.7	1	3.8	12.5	2 (2)
Agriculture	47	10.0	3	11.5	6.4	3 (1)
Business and repair services	6	1.3	1	3.8	16.7	1 (1)
Communication	1	0.2	0	0	0.0	0 (0)
Construction	3	0.6	0	0	0.0	0 (0)
Entertainment	7	1.5	1	3.8	14.3	4 (4)
Finance and Real estate	1	0.2	0	0	0.0	0 (0)
Illegal activity (illicit drug related)	2	0.4	1	3.8	50.0	2 (2)
Illegal activity (non-illicit drug related)	6	1.3	1	3.8	16.7	1 (1)
Manufacturing	160	34.2	5	19.2	3.1	5 (1)
Mining	4	0.9	0	0	0.0	0 (0)
Personal services	13	2.8	0	0	0.0	0 (0)
Private vehicle or property	1	0.2	1	3.8	100	2 (2)
Professional services	21	4.5	2	7.7	9.5	7 (4)
Public administration	7	1.5	1	3.8	14.3	1 (1)
Retail trade	9	1.9	3	11.5	33.3	21 (12)
Transportation	108	23.1	5	19.2	4.6	14 (9)
Utilities	44	9.4	0	0	0.0	0 (0)
Wholesale trade	20	4.3	1	3.8	5.0	1 (1)
Unspecified and unknown	0	0.0	0	0	0	0
<b>Total†‡</b>	<b>468</b>	<b>100.0</b>	<b>26</b>	<b>99.5</b>	<b>5.6</b>	<b>64 (12)</b>

\*Minimum number of victims per event = 1.

†Includes chemical dumped on highway or other property and currently non-operating former businesses.

‡Percentages may not total 100% due to rounding..

**Table 4.—Number of substances involved, by substance category and type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	46	7.8	18	12.0	64	8.7
Ammonia	34	5.8	10	6.7	44	6.0
Bases	12	2.0	9	6.0	21	2.8
Chlorine	12	2.0	3	2.0	15	2.0
Formulations	3	0.5	1	0.7	4	0.5
Hetero-organics	66	11.2	1	0.7	67	9.1
Hydrocarbons	9	1.5	3	2.0	12	1.6
Mixture*	20	3.4	8	5.3	28	3.8
Other <sup>†</sup>	25	4.2	2	1.3	27	3.7
Other inorganic substances <sup>‡</sup>	131	22.2	10	6.7	141	19.1
Oxy-organics	83	14.1	9	6.0	92	12.4
Paints and dyes	6	1.0	8	5.3	14	1.9
Pesticides	37	6.3	36	24.0	73	9.9
Polychlorinated biphenyls	14	2.4	1	0.7	15	2.0
Polymers	3	0.5	13	8.7	16	2.2
Volatile organic compounds	88	14.9	18	12.0	106	14.3
<b>Total<sup>¶</sup></b>	<b>589</b>	<b>99.8</b>	<b>150</b>	<b>100.1</b>	<b>739</b>	<b>100.0</b>

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

<sup>†</sup> Not belonging to one of the existing categories.

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

<sup>¶</sup> Of a total of 740 substances, one was excluded because it was not assigned a substance category: it occurred in a fixed facility. Percentages do not total 100% because of rounding.

**Table 5.—Number of victims per event, by type of event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	5	33.3	5	10	90.9	10	15	57.7	15
2	4	26.7	8	1	9.1	2	5	19.2	10
3	1	6.7	3	0	0.0	0	1	3.8	3
4	2	13.3	8	0	0.0	0	2	7.7	8
5	0	0.0	0	0	0.0	0	0	0.0	0
≥6	3	20.0	28	0	0.0	0	3	11.5	28
<b>Total*</b>	<b>15</b>	<b>100.0</b>	<b>52</b>	<b>11</b>	<b>100.0</b>	<b>12</b>	<b>26</b>	<b>99.9</b>	<b>64</b>

\* Percentages do not total 100% because of rounding.

**Table 6.—Frequency of substance categories in all events and events with victims—  
Minnesota Hazardous Substances Emergency Events Surveillance System, 2004\***

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	40	8.6	5	19.2	12.5
Ammonia	42	9.0	5	19.2	11.9
Bases	18	3.9	1	3.8	5.6
Chlorine	13	2.8	1	3.8	7.7
Formulations	4	0.9	0	0.0	0.0
Hetero-organics	4	0.9	0	0.0	0.0
Hydrocarbons	3	0.6	0	0.0	0.0
Mixture <sup>†</sup>	26	5.6	2	7.7	7.7
Multiple substance category	15	3.2	3	11.5	20.0
Other <sup>‡</sup>	6	1.3	1	3.8	16.7
Other inorganic substances <sup>§</sup>	105	22.5	0	0.0	0.0
Oxy-organics	38	8.1	3	11.5	7.9
Paints and dyes	11	2.4	0	0.0	0.0
Pesticides	49	10.5	3	11.5	6.1
Polychlorinated biphenyls	14	3.0	0	0.0	0.0
Polymers	13	2.8	0	0.0	0.0
Volatile organic compounds	66	14.1	2	7.7	3.0
<b>Total<sup>¶</sup></b>	<b>467</b>	<b>100.0</b>	<b>26</b>	<b>99.7</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 substance 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. Of a total of 468 events, one was excluded because it was not assigned a substance category. It involved two substances, one of which could not be categorized. The event had no victims.

**Table 7.—Frequencies of injuries/symptoms, by type of event\*—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Chemical burns	3	4.1	0	0.0	3	3.4
Dizziness/central nervous system symptoms	4	5.5	0	0.0	4	4.6
Eye irritation	13	17.8	3	21.4	16	18.4
Gastrointestinal system problems	4	5.5	0	0.0	4	4.6
Headache	2	2.7	0	0.0	2	2.3
Heart problems	0	0.0	0	0.0	0	0.0
Heat stress	0	0.0	0	0.0	0	0.0
Other	0	0.0	0	0.0	0	0.0
Respiratory irritation	38	52.1	2	14.3	40	46.0
Shortness of breath	2	2.7	0	0.0	2	2.3
Skin irritation	4	5.5	0	0.0	4	4.6
Thermal burns	3	4.1	0	0.0	3	3.4
Trauma <sup>†</sup>	0	0.0	9	64.3	9	10.3
<b>Total<sup>‡</sup></b>	<b>73</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>	<b>87</b>	<b>99.9</b>

\* The number of injuries is greater than the number of victims (26) because a victim could have had more than one injury.

<sup>†</sup> Of the 9 trauma injuries, none were chemical-related, nine were not chemical-related.

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

**Table 8.—Distribution of personnel who responded to the event—  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**

<b>Responder category</b>	<b>No.</b>	<b>%*</b>
Certified HazMat team	50	10.7
Department of works/ utilities/ transportation	8	1.7
Emergency medical technicians	30	6.4
Environmental agency	22	4.7
EPA <sup>†</sup> response team	1	0.2
Fire department	80	17.1
Health department/health agency	3	0.6
Hospital personnel	1	0.2
Law enforcement agency	77	16.5
Other	4	0.9
Response team of company where release occurred	344	73.7
Specialized multi-agency team	1	0.2
State, county, or local emergency managers/coordinators/planning Committees	2	0.4

\*Percentages total greater than 100% because multiple responder categories could be reported per event.

<sup>†</sup>Environmental Protection Agency.

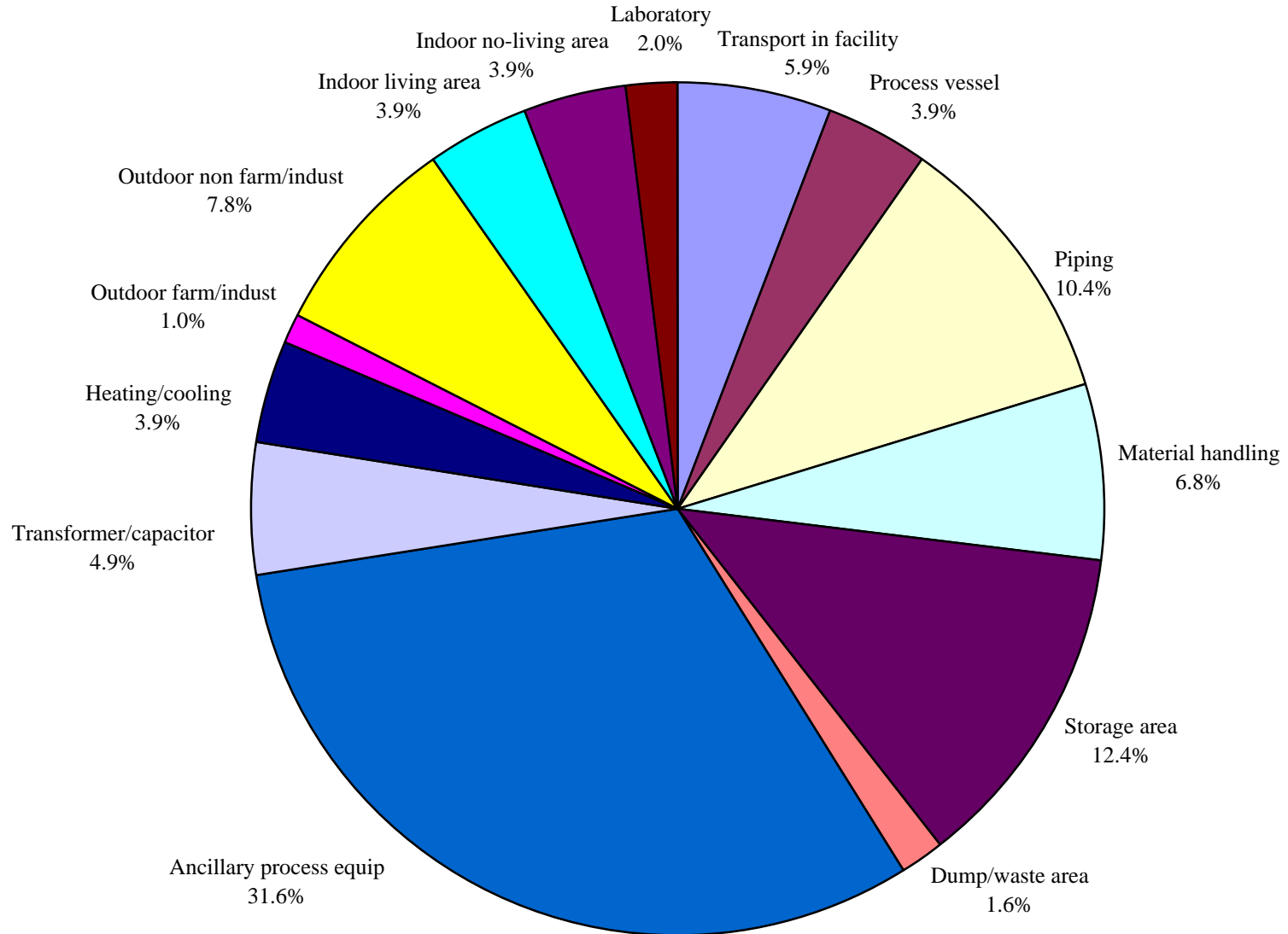
**Table 9.— Cumulative data by year—  
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2004\***

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	641	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	230	126	356	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
<b>Total</b>	<b>2801</b>	<b>814</b>	<b>3615</b>	<b>4365</b>	<b>757</b>	<b>7</b>	<b>226</b>	<b>6.3</b>

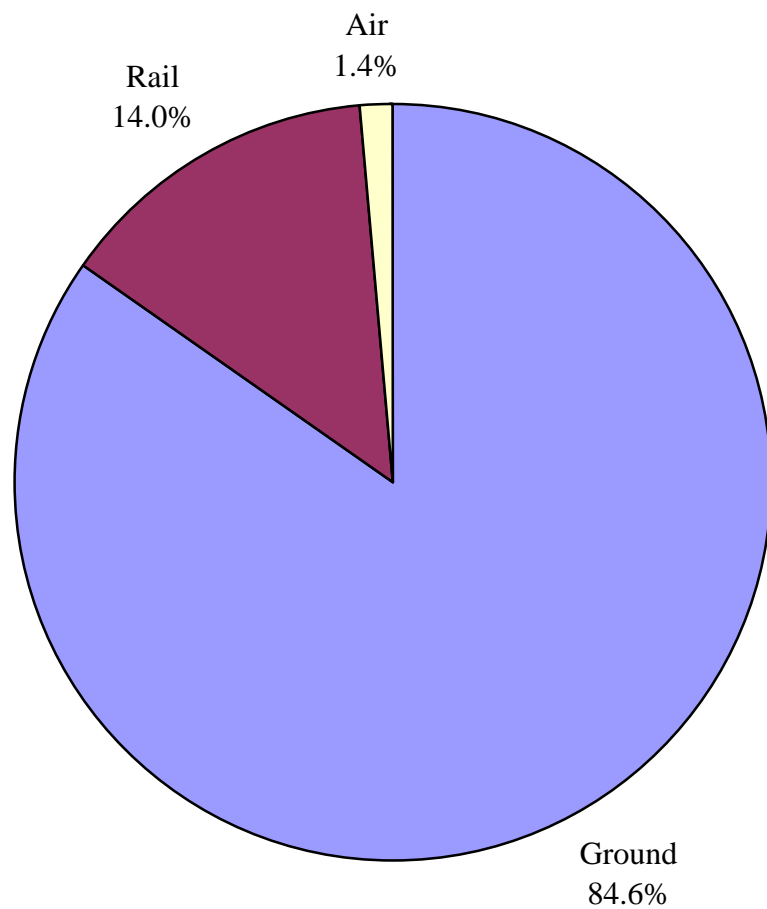
\* Numbers in the table may differ from those reported in previous years because of adjustments in HSEES qualification requirements for events.

† Percentage of events with victims.

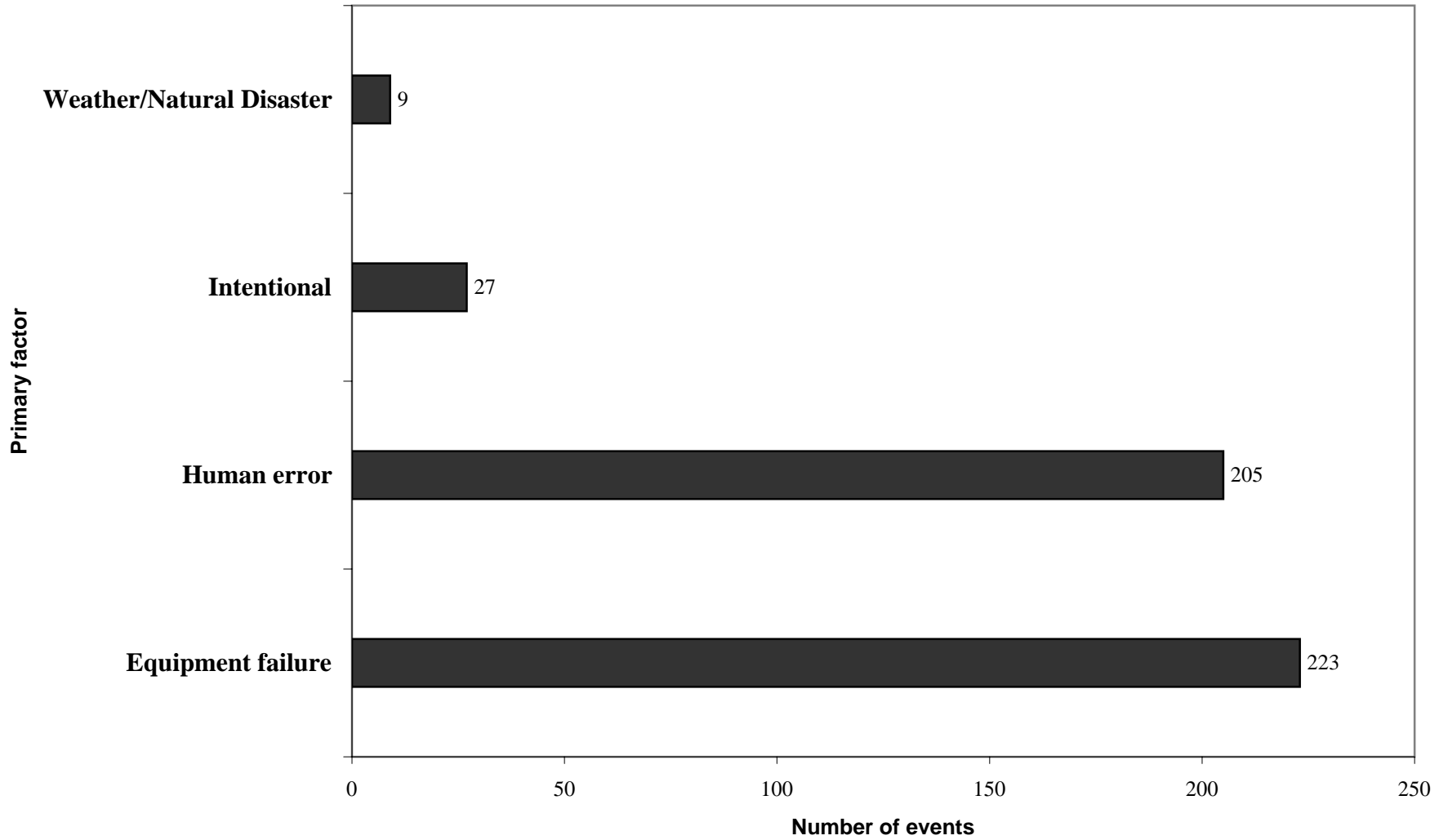
**Figure 1. Areas of fixed facilities involved in events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



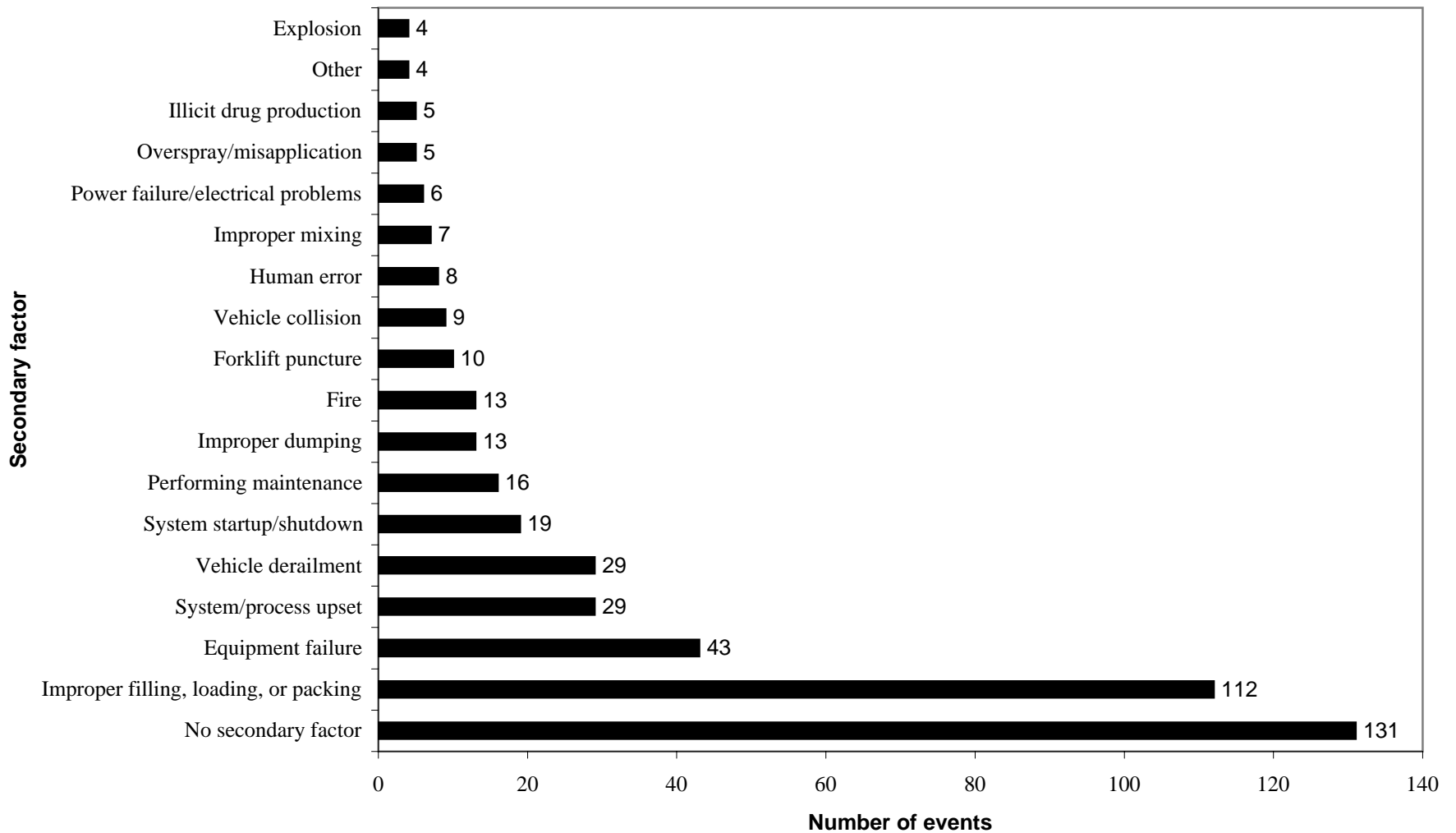
**Figure 2. Distribution of transportation-related events, by type of transport, Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



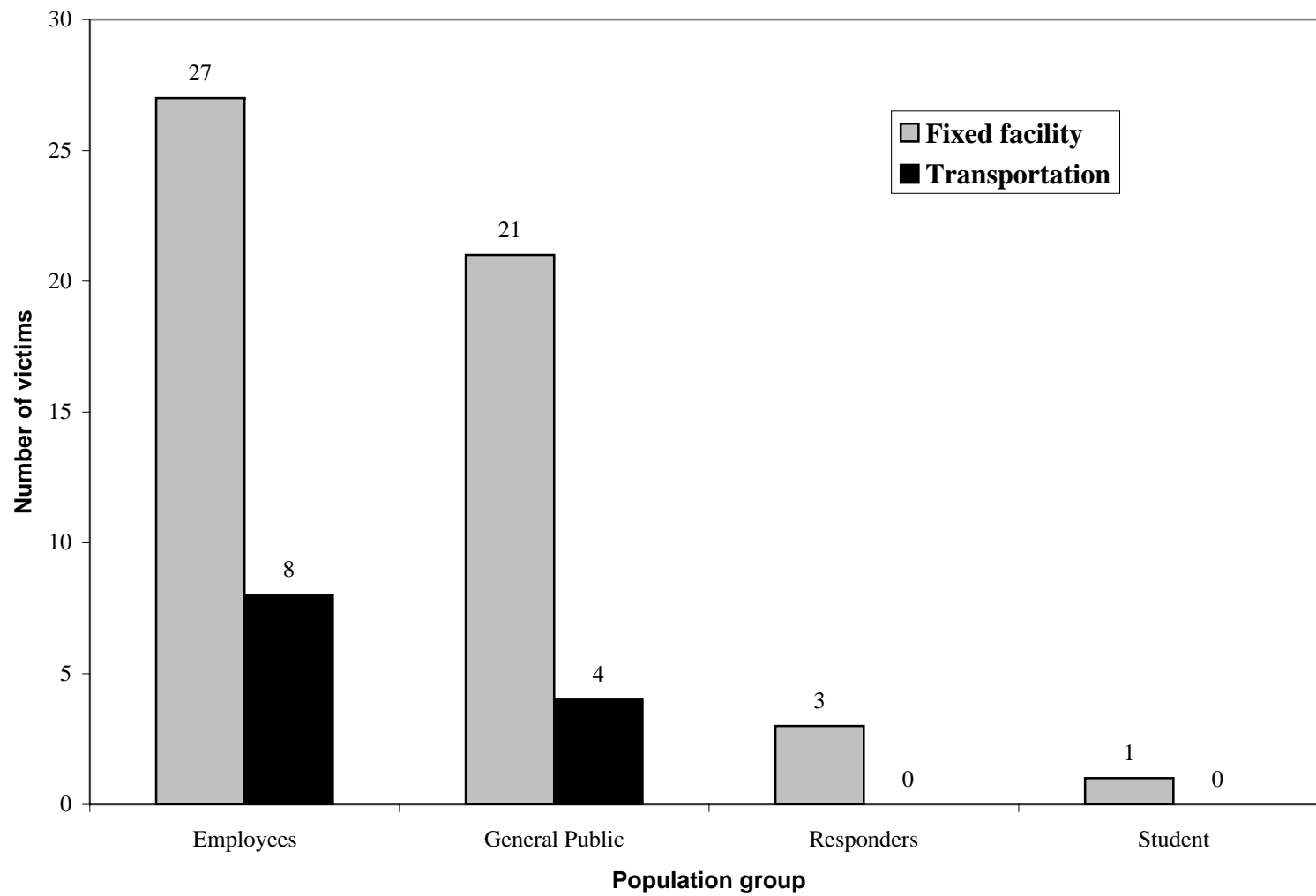
**Figure 3a. Primary factors reported as contributing to events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



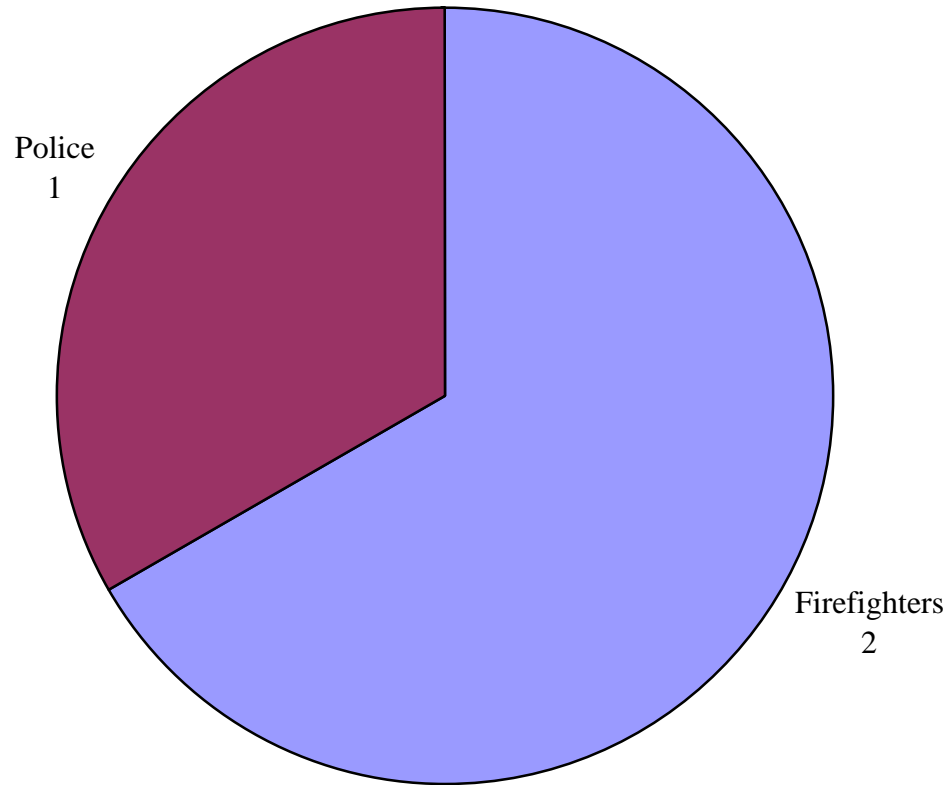
**Figure 3b. Secondary factor reported as contributing to events,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



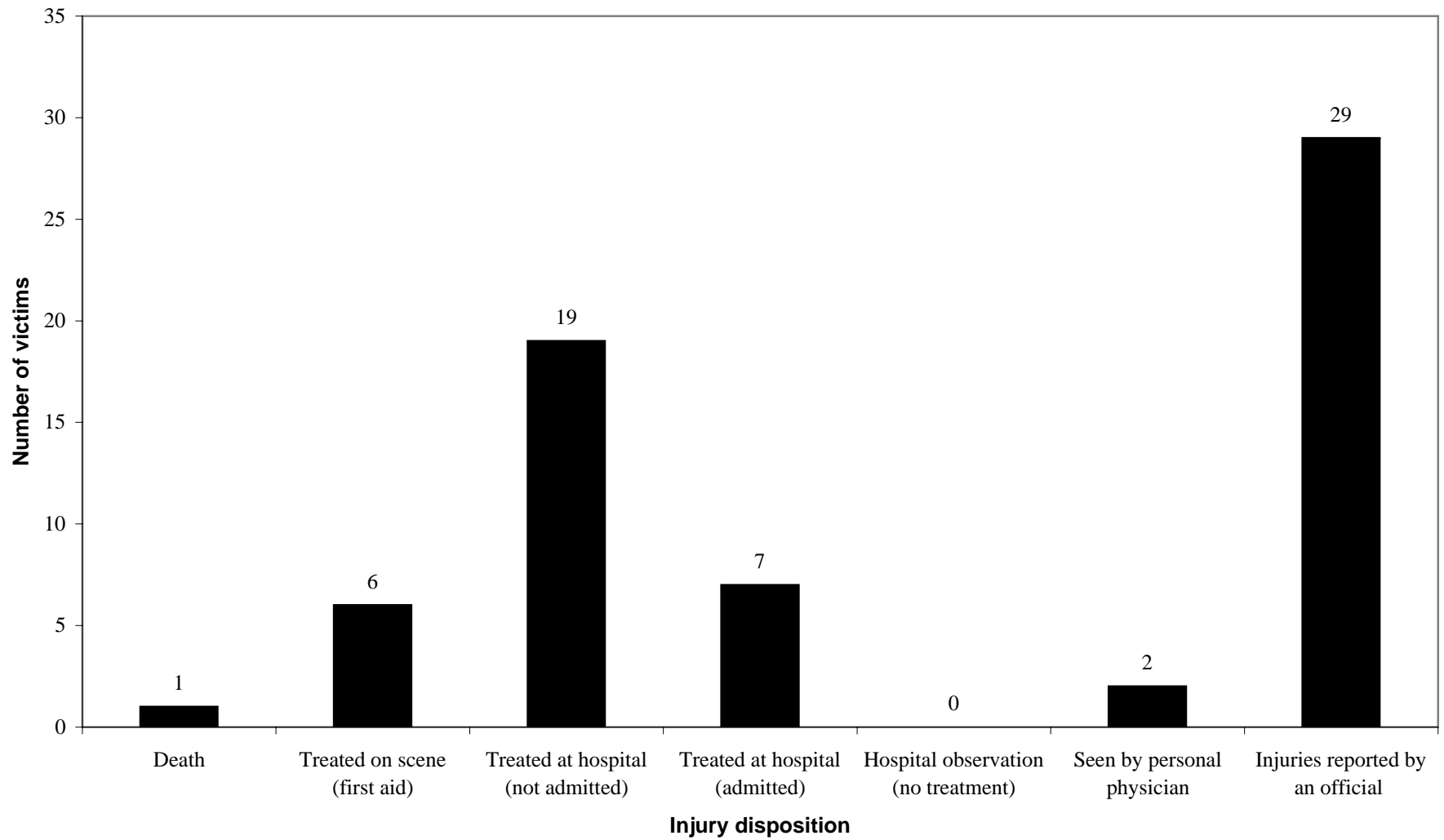
**Figure 4. Number of victims, by population group and type of event, Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



**Figure 5. Distribution of responder injuries in fixed-facility events, by type of responder, Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



**Figure 6. Injury disposition,  
Minnesota Hazardous Substances Emergency Events Surveillance, 2004**



**Figure 7. Number of victims, by category and year,  
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2004**

