

Minnesota Department of Health

Hazardous Substances Emergency Events Surveillance

(HSEES)

Report for 2005

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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 to Minnesota in 2005. Information collected includes the substance(s) released, number of victims, number and types of injuries, and number of evacuations.

A total of 407 events were reported. In 377 (92.6%) events, one substance was released. The most commonly reported categories of substances were inorganic substances, pesticides and fertilizers, ammonia, and acids. During this reporting period, 26 events (6.4 % of all reported events) resulted in a total of 52 victims, none of whom died. The most frequently reported injuries were respiratory irritation, eye irritation, and trauma. Evacuations were ordered for 25 (6.1%) events.

Prevention outreach efforts for 2005 focused on providing HSEES information to emergency planners and responders through conferences, presentations, and written materials. HSEES data were also used in creating materials for Meth Day at the Capitol, a collaborative event by several organizations to highlight meth-related issues during the legislative session. Meth-related legislation that restricted access to pseudoephedrine passed during the Legislative session and became effective July 1, 2005.

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

This report provides an overview of HSEES for 2005 in Minnesota, summarizes acute hazardous substance release events and associated public health consequences, and describes prevention activities to protect public health.

METHODS

In 2005, fifteen state health departments participated in HSEES: Colorado, Florida, Iowa, Louisiana, Michigan, Minnesota, Missouri, 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. 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 petroleum only 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) to protect public health. 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, 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.

RESULTS

For 2005, 407 events were documented by Minnesota HSEES: Two (0.5%) of these events were threatened releases and three (0.7%) were events in which substances were both threatened to be released and actually released. The counties with the most events were Dakota (69 [17.0%]) and Hennepin (63 [15.5%]) (Table 1).

A total of 271 (66.6%) events were in fixed facilities. For fixed facilities involving mining, utilities, or manufacturing, one or two types of area or equipment involved in the event could be selected. Among the 139 events with one type of area reported, the main areas were classified as follows: 45 (32.4%) ancillary process equipment, 22 (15.8%) above ground storage areas, and 20 (14.4%) piping. Eight fixed facility (3.0%) events involved two locations. Most of these events involved piping (7, 87.5%) in combination with process vessels, material handling areas, storage areas, ancillary process equipment, or heating/cooling for the building. Percentages of area type for all reported locations (155) are shown in Figure 1.

Of the 136 (33.4%) transportation-related events, 120 (88.2%) occurred during ground transport (e.g., truck, van, or tractor) and 10 (7.4%) involved transport by rail. Five events involved air transportation and one involved pipeline modes (Figure 2). Most ground transportation events involved trucks (108, [90.0%]). The largest proportions of transportation-related events occurred from a moving vehicle or vessel (51 [37.5%]), during unloading of a stationary vehicle or vessel (46 [33.8%]), or from a release en route that was later discovered at a fixed facility (28, [20.6%]).

Primary factors contributing to events were reported for 405 (99.5%) events (Figure 3a). Of the reported primary factors, equipment failure was the most frequently reported primary factor in (158 [58.3%]) fixed facility events, and human error was most frequently reported in (95 [69.9%]) transportation-related events. Secondary factors were reported for 292 (71.7%) events (Figure 3b). Of the reported secondary factors, improper filling, packing, or loading was most frequently reported for both fixed-facility events (42 [15.5%]) and transportation-related events (64 [47.1%]).

More than 92% of all events involved the release of only one substance. Two substances were released in approximately 5% of the events, and approximately 3% 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 (9.1% vs. 3.6%).

By month, number of events ranged from 19 (4.7%) in February to 52 (12.8%) in June, with about one third of all events occurring from April through June. By day of week, proportion of weekday events ranged from 13.0% (Friday) to 20.4% (Wednesday) and for weekends days, and 10.1% occurred on Saturdays and 5.9% were on Sundays. The time of day or time category of event occurrence was reported for all 407 events. A majority of events, 272 (66.8%) of the events occurred between 6:00 AM to 5:59 PM, while 73 (17.9%) occurred from 6:00 PM to 11:59 PM and 62 (15.2%) events occurred from 12:00 AM to 5:59 AM.

Industries

The largest proportions of HSEES events were associated with the manufacturing (110 [27.0%]) and transportation and warehousing (109 [26.8%]) industries (Table 3). Within manufacturing, petroleum refining (25 [22.7%]), chemical manufacturing (24 [21.8%]),

and food manufacturing (14 [12.7%]) accounted for most of the events. The largest number of events with victims occurred from the manufacturing (6 [23.1%]) and transportation industries (5 [19.2%]). The total number of victims was greatest in the manufacturing industry (18 [34.6%]) followed by the number of victims in administrative and support services (7 [13.5%]). Although the manufacturing resulted in a large proportion of events with victims and a large number of victims, only 5.5% of 110 events resulted in victims.

Substances

A total of 456 substances were involved in all events, of which 5 (1.1%) substances were threatened to be released. The individual substances most frequently released were ammonia, paint, and sulfuric acid (Table 4). Substances were grouped into 16 categories. The substance categories most commonly released in fixed-facility events were other inorganic substances (74 [23.6%]), oxy-organics (45 [14.4%]), and ammonia (40 [12.8%]). In transportation-related events, the most common substance categories released were pesticides and fertilizers (29 [20.3%]), acids (28 [19.6%]), and paints and dyes (20 [14.0%]) (Table 5).

Two types of releases for each of the 456 substances released could be reported (e.g., spill and air release). Only one type of release was associated with the following: spills (287 [62.9%]), air releases (132 [28.9%]), threatened release (5 [1.1%]), fire (2 [0.4%]) and explosion (1 [0.2%]). Of events with two types of releases, the following combinations were reported: spill and air release (19 [4.2%]), spill and fire (9 [2.0%]), air release and fire (1 [0.2%]). All substances had release types reported.

Victims

A total of 52 victims were involved in 26 events (6.4% of all events) (Table 6). Of the 26 events with victims, 14 (53.8%) events involved only one victim, and 7 (26.9%) involved two victims. Of all victims, 34 (65.4%) were injured in fixed-facility events. In events with victims, fixed-facility events were more likely to have three or more victims per event (25.0%) than were transportation-related events (10.0%). Additionally, two persons in two events (0.5% of all events) were observed at a hospital but did not have symptoms. They did not sustain injuries and were not counted as victims.

To determine if 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 substance 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 pesticides and fertilizers constituted 13.0% of all events while only accounting for 3.8% of events with victims. Conversely, events involving mixtures were 2.7% of all events, but accounted for 19.2% of the events with victims.

Employees constituted the largest proportion of the population groups injured (31 [59.6%]), followed by responders (11 [21.2%]) (Figure 4). In fixed-facility events, 4 emergency response personnel were injured. Of those, 3 (75.0%) were firefighters, 1 (25.0%) was a police officer. In transportation events, 7 emergency response personnel were injured, including 6 (85.7%) unspecified responders and 1 (14.3%) police officer. Figure 5 shows the distribution of responder victims for all events.

Victims sustained a total of 77 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 (10 [20.8%]) and shortness of breath (8 [16.7%]). In transportation-related events, respiratory irritation (10 [34.5%]) and eye irritation (7 [24.1%]) were reported most frequently. The trauma injuries in transportation-related events were not substance-related; these 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 30 (57.7%) victims for whom exact age was reported was 32.5 years (range: 20–65 years). For the 43 (82.7%) injured persons for whom an age category was reported, 28 (65.1%) were 20–44 years of age, and 13 (30.2%) were 45–64 years of age and 2 (4.7%) were 65 years or older. Of the nine injured persons for whom age was not reported, all were presumably adults because the population group was reported as responder or employee.

Sex was known for all victims: 44 (84.6%) were males. Of all employees and responders, 83.3% were males.

The severity of injuries to the 52 victims ranged from minor to requiring hospitalization (Figure 6). One (1.9%) was observed at a hospital but did not require treatment. Seven (13.5%) of the victims required only on scene first aid. Nine (17.3%) of victims experienced adverse health effects within 24 hours that were reported by an official and 24 (46.2%) were taken to a hospital but not admitted. Ten (19.2%) victims required admission into a hospital, but no deaths within twenty-four hours of the event were reported. Severity was known for 51 (98.1%) of victims.

The status of personal protective equipment (PPE) use was reported for 27 (87.1%) employee-victims and for 9 (81.8%) responder-victims. Most of the employee-victims (74.2%) and 72.7% of the responder-victims had not worn any form of PPE. Among the four employee-victims who wore PPE, three used gloves and two used eye protection. The one injured emergency responder who wore PPE wore fire fighter turnout gear with respiratory protection.

There were two events that involved more than five people: one in response to a vehicle accident and one involving a refrigerant release.

The first event involved a vehicle rollover that resulted in release and reaction of several cleaning chemicals. While the driver of the vehicle sustained only trauma injuries, six

responders, primarily police and EMS personnel, were affected by chemical vapors. None of the victims required admission to the hospital.

The second event involved a release of a Freon-like refrigerant in a building when a pipe failed. Seven employees complained of chest tightness and headaches after the event. All symptoms were resolved after exposure to fresh air. The company ventilated the area after the release and a refrigeration contractor was called to make repairs.

Nearby populations

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS) or health department records. There were 315 (77.4%) events with persons living within ¼ mile of the event; 385 (94.6%) events with persons living within ½ mile; and 402 (98.8%) events with persons living within 1 mile. Additionally, there were schools within ¼ mile of 71 (17.4%) events; hospitals within ¼ mile of 5 (1.2%) events; nursing homes within ¼ mile of 8 (2.0%) events; licensed daycares within ¼ mile of 111 (27.3%) events; industries or other businesses within ¼ mile of 338 (83.0%) events; and recreational areas within ¼ mile of 91 (22.4%) events.

Evacuations

Evacuations were ordered in 25 (6.1%) events. Of these evacuations, 72.0% occurred in buildings or affected parts of buildings; 20% were downwind or downstream of the event, and 8.0% were of defined circular areas surrounding the event locations. The number of people evacuated was known for 20 (80.0%) events and ranged from one to 375 people, with a median of 9 people. (One event evacuated zero people: the evacuation was ordered after no one was in the building). The median length of evacuation was 2.0 hours (range: 0.1 to 30 hours). Evacuation length was available for 24 (96.0%) events. Of all 407 events, 74 (18.2%) had restricted access to the area. In place sheltering ordered by an official was reported for one event.

Decontamination

Of the 51 (98.1%) victims for whom decontamination status was known, 36 (70.6%) were not decontaminated, one (2.0%) was decontaminated at the scene, 11 (21.6%) were decontaminated at a medical facility, and three (5.9%) were 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 – 8 persons).

Decontamination at a medical facility was done for one uninjured employee and two uninjured responders. Decontamination at the scene was done for eight uninjured employees and 12 uninjured responders. No members of the general public or students were decontaminated at a medical facility or on scene.

Response

Of the 406 (99.8%) events with information on who responded to the event, the category of No Response was reported in 37 (9.1%) of the events. Two or more of responder

categories were reported for 102 (25.1%) events, 51 (12.6%) reported 3 or more categories, and 28 (6.9%) reported four or more categories. Company response team (79.3%) responded most frequently to events, followed by fire department (19.7%), law enforcement (17.2%), and certified hazardous materials team (3.0%) (Table 9).

Prevention Activities in Minnesota

During 2005, the Minnesota HSEES program performed several prevention activities. These activities included:

- Participating in Meth Day at the Capitol, an event developed by several state agencies and organizations to present information about the meth lab issues in the state.
- 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.
- Staffing a booth at the Minnesota Governor's Emergency Management Conference, where overview information was distributed to fire fighters. Two requests for HSEES data were also received and processed.
- Updating an information sheet on chlorine releases in Minnesota and posting it on the MN HSEES web pages. The chlorine information sheet continues to receive the largest number of downloads of the HSEES material.
- Distributing the latest HSEES reports from ATSDR to county emergency managers. This report generated a few additional inquires about the HSEES program.
- Adding information, including reports, past 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>.

Of the above activities, one that seemed to have a notable impact was the Meth Day at the Capitol. This activity involved a collaboration of several state agencies and other organizations. HSEES data were used in part to create maps that illustrated the rapid rise in the number of the state's meth labs, presented on posters and in two 20-minute presentations. Information sheets and visual aids, such as chemicals used in meth labs, depicted how limiting access to precursors could reduce the meth lab problem. Hazards and injuries associated with meth labs were also described. This activity drew about 300 people, including state legislators and legislative aids. The event also involved media coverage, including footage on four local TV stations.

Later, in May 2005, legislation concerning meth passed, limiting access to meth precursors and increasing penalties for meth use. A follow up HSEES survey of counties indicated that the number of meth labs were decreasing in the state, though usage was continuing and possibly increasing. A second survey of meth lab discoveries began in July 2006. See <http://www.health.state.mn.us/divs/eh/meth/ordinance/mnmethlabs2005.pdf> for results of the first survey.

ADDITIONAL USE OF MN HSEES DATA

The Minnesota HSEES program continues to receive requests for data from emergency planners and responders. The data are often reviewed to determine patterns of hazardous substances releases within certain areas. Because the HSEES system has a comprehensive collection of unplanned hazardous substance events and impact on public health, emergency response trainers have used the database for examples of actual events for training. Data continue to be available upon request by contacting the program.

SUMMARY OF RESULTS: 1995–2005

From 1995-2005, 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 ¼ or less of the total events. In 2002, 2004, and 2005, transportation events were about 1/3 of the total events. This increase is possibly related to more complete reporting from transportation companies to the U.S. Department of Transportation, but could also be related to an increase in shipping events.

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, the majority of events (93.5%) involve only one substance.

The percentage of events with victims from 1995-2004 is about 6.4%. The highest number of victims (172), as well as the highest percentage of events with victims (10%), occurred in 1995. The lowest percentage of events resulting in victims occurred in 2002 (4.5%) with a total of 16 victims.

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 injured responders has generally remained low, though in 2005 an unexpected chemical reaction at a crash scene resulted in respiratory irritation and eye irritation for several responders.

The number of deaths associated with acute hazardous substances events varied between 0 and 3 from 1995-2005. Many 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.

The Minnesota HSEES program continues to conduct activities aimed at reducing hazardous substance releases and public health affects associated with those releases. The HSEES program also provides data to agencies engaged in emergency planning and training and continues to seek new opportunities for outreach.

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Acknowledgements

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1. Centers for Disease Control and Prevention. Comprehensive plan for epidemiologic surveillance. Atlanta: US Department of Health and Human Services; 1986.
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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, 2005**

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
Aitkin	0	0.0	0	0.0	0 (0.0)
Anoka	13	65.0	7	35.0	20 (4.9)
Becker	0	0.0	0	0.0	0 (0.0)
Beltrami	0	0.0	0	0.0	0 (0.0)
Benton	0	0	1	100	1 (0.2)
Big Stone	0	0.0	0	0.0	0 (0.0)
Blue Earth	3	60.0	2	40.0	5 (1.2)
Brown	1	100.0	0	0.0	1 (0.2)
Carlton	3	75.0	1	25.0	4 (1.0)
Carver	0	0.0	0	0.0	0 (0.0)
Cass	0	0.0	0	0.0	0 (0.0)
Chippewa	1	50.0	1	50.0	2 (0.5)
Chisago	0	0.0	1	100.0	1 (0.2)
Clay	3	60.0	2	40.0	5 (1.2)
Clearwater	1	100.0	0	0.0	1 (0.2)
Cook	0	0.0	0	0.0	0 (0.0)
Cottonwood	0	0.0	0	0.0	0 (0.0)
Crow Wing	0	0.0	1	100.0	1 (0.2)
Dakota	44	63.8	25	36.2	69 (17.0)
Dodge	6	100.0	0	0.0	6 (1.5)
Douglas	3	100.0	0	0.0	3 (0.7)
Faribault	3	75.0	1	25.0	4 (1.0)
Fillmore	1	100.0	0	0.0	1 (0.2)
Freeborn	3	60.0	2	40.0	5 (1.2)
Goodhue	5	100.0	0	0.0	5 (1.2)
Grant	1	50.0	1	50.0	2 (0.5)
Hennepin	53	84.1	10	15.9	63 (15.5)
Houston	1	33.3	2	66.7	3 (0.7)
Hubbard	1	100.0	0	0.0	1 (0.2)
Isanti	0	0.0	0	0.0	0 (0.0)
Itasca	2	40.0	3	60.0	5 (1.2)
Jackson	0	0.0	1	100.0	1 (0.2)
Kanabec	0	0.0	0	0.0	0 (0.0)

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
Kandiyohi	1	33.3	2	66.6	3 (0.7)
Kittson	0	0.0	0	0.0	0 (0.0)
Koochiching	2	100.0	0	0.0	2 (0.5)
Lac qui Parle	0	0.0	0	0.0	0 (0.0)
Lake	1	100.0	0	0.0	1 (0.2)
Lake of the Woods	0	0.0	0	0.0	0 (0.0)
Le Sueur	2	100.0	0	0.0	2 (0.5)
Lincoln	0	0.0	0	0.0	0 (0.0)
Lyon	0	0.0	1	100.0	1 (0.2)
Mahnomen	0	0.0	0	0.0	0 (0.0)
Marshall	0	0.0	2	100.0	2 (0.5)
Martin	0	0.0	0	0.0	0 (0.0)
McLeod	12	92.3	1	7.7	13 (3.2)
Meeker	1	100.0	0	0.0	1 (0.2)
Mille Lacs	0	0.0	0	0.0	0 (0.0)
Morrison	1	50.0	1	50.0	2 (0.5)
Mower	0	0.0	0	0.0	0 (0.0)
Murray	0	0.0	0	0.0	0 (0.0)
Nicollet	0	0.0	1	100.0	1 (0.2)
Nobles	1	50.0	1	50.0	2 (0.5)
Norman	0	0.0	0	0.0	0 (0.0)
Olmsted	8	72.7	3	27.3	11 (2.7)
Otter Tail	7	87.5	1	12.5	8 (2.0)
Pennington	0	0.0	1	100.0	1 (0.2)
Pine	1	100.0	0	0.0	1 (0.2)
Pipestone	0	0.0	3	100.0	3 (0.7)
Polk	5	55.6	4	44.4	9 (2.2)
Pope	0	0.0	1	100.0	1 (0.2)
Ramsey	13	39.4	20	60.6	33 (8.1)
Red Lake	0	0.0	0	0.0	0 (0.0)
Redwood	2	100.0	0	0.0	2 (0.5)
Renville	0	0.0	0	0.0	0 (0.0)
Rice	2	50.0	2	50.0	4 (1.0)

**Table 1.—Number of events meeting the surveillance definition, by county and type of event—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
Rock	0	0.0	0	0.0	0 (0.0)
Roseau	3	100.0	0	0.0	3 (0.7)
St. Louis	10	100.0	0	0.0	10 (2.5)
Scott	7	87.5	1	12.5	8 (2.0)
Sherburne	5	100.0	0	0.0	5 (1.2)
Sibley	2	100.0	0	0.0	2 (0.5)
Stearns	3	60.0	2	40.0	5 (1.2)
Steele	3	60.0	2	40.0	5 (1.2)
Stevens	2	100.0	0	0.0	2 (0.5)
Swift	2	66.7	1	33.3	3 (0.7)
Todd	1	100.0	0	0.0	1 (0.2)
Traverse	1	100.0	0	0.0	1 (0.2)
Wabasha	0	0.0	0	0.0	0 (0.0)
Wadena	0	0.0	1	100.0	1 (0.2)
Waseca	0	0.0	1	100.0	1 (0.2)
Washington	20	47.6	22	52.4	42 (10.3)
Watonwan	1	100.0	0	0.0	1 (0.2)
Wilkin	0	0.0	0	0.0	0 (0.0)
Winona	1	50.0	1	50.0	2 (0.5)
Wright	2	100.0	0	0.0	2 (0.5)
Yellow Medicine	1	100.0	0	0.0	1 (0.2)
Total	271	67%	136	33%	407

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

Table 2.—Number of substances involved per event, by type of event, Minnesota Hazardous Substances Emergency Events Surveillance, 2005

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	246	90.8	246	131	96.3	131	377	92.6	377
2	15	5.5	30	4	2.9	8	19	4.7	38
3	5	1.8	15	0	0.0	0	5	1.2	15
4	3	1.1	12	1	0.7	4	4	1.0	16
≥ 5	2	0.7	10	0	0.0	0	2	0.5	10
Total*	271	99.9	313	136	99.9	143	407	100.0	456

*Percentages may not total 100% due to rounding.

**Table 3.—Industries involved in hazardous substance events, by category—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims Number (maximum)*
	No.	%	No.	%		
Agriculture	44	10.8	2	7.7	4.5	2 (1)
Construction	6	1.5	1	3.8	16.7	2 (2)
Illegal activity†	15	3.7	2	7.7	13.3	3 (2)
Manufacturing	102	25.1	6	23.1	5.9	18 (7)
Mining	7	1.7	0	0	0	0 (0)
Private vehicle or property	1	0.2	0	0	0	0 (0)
Services‡	25	6.1	3	11.5	12.0	10 (7)
Transportation and Warehousing	109	26.8	5	19.2	4.6	6 (2)
Utilities	41	10.1	1	3.8	2.4	1 (1)
Wholesale and Retail	39	9.6	4	15.4	10.3	6 (1)
Wood Products and Production	11	2.7	0	0	0	0 (0)
Unspecified and unknown	7	1.7	2	7.7	28.6	4 (2)
Total§	407	100.0	26	99.9	6.3	52

*Minimum number of victims per event = 1.

† Includes primarily illegal methamphetamine related activities and illegal dumping.

‡ Includes Administration and Support Services; Educational Services; Health Care and Social Assistance; Public Administration; Professional, Scientific and Technical Services; Arts, Entertainment and Recreation; and Accommodation and Food Services.

§Percentages may not total 100% due to rounding.

**Table 4.—The 10 substances most frequently involved in events—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

Rank	Substance	Number of releases and release threats
1	Ammonia	54
2	Antifreeze (Includes Ethylene Glycol and Propylene Glycol)	38
3	Nitrogen Oxides	20
4	Paint NOS	20
5	Sulfuric Acid	19
6	Sulfur Dioxide	18
7	Polychlorinated Biphenyls	10
8	Sodium Hydroxide	9
9	Hydrogen Sulfide	9
10	Chlorine	8

**Table 5.—Number of substances involved, by substance category and type of event—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	26	8.3	28	19.6	54	11.8
Ammonia	40	12.8	14	9.8	54	11.8
Bases	12	3.8	7	4.9	19	4.2
Chlorine	11	3.5	0	0	11	2.4
Formulations	2	0.6	1	0.7	3	0.7
Hetero-organics	2	0.6	1	0.7	3	0.7
Hydrocarbons	5	1.6	0	0	5	1.1
Mixture*	10	3.2	4	2.8	14	3.1
Other [†]	12	3.8	6	4.2	18	3.9
Other inorganic substances [‡]	74	23.6	10	7.0	84	18.4
Oxy-organics	45	14.4	6	4.2	51	11.2
Paints and dyes	8	2.6	20	14.0	28	6.1
Pesticides and fertilizers	25	8.0	29	20.3	54	11.8
Polychlorinated biphenyls	10	3.2	0	0	10	2.2
Polymers	1	0.3	4	2.8	5	1.1
Volatile organic compounds	30	9.6	13	9.1	43	9.4
Total[¶]	313	99.9	143	100.1	456	99.9

* 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 do not total 100% because of rounding.

**Table 6.—Number of victims per event, by type of event—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	7	43.8	7	7	70.0	7	14	53.8	14
2	5	31.3	10	2	20.0	4	7	26.9	14
3	2	12.5	6	0	0	0	2	7.7	6
4	1	6.3	4	0	0	0	1	3.8	4
5	0	0	0	0	0	0	0	0	0
≥6	1	6.3	7	1	10.0	7	2	7.7	14
Total*	16	100.2	34	10	100.0	18	26	99.9	52

* Percentages do not total 100% because of rounding.

**Table 7.—Frequency of substance categories in all events and events with victims—
Minnesota Hazardous Substances Emergency Events Surveillance System, 2005***

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	50	12.3	3	11.5	6.0
Ammonia	49	12.0	4	15.4	8.2
Bases	18	4.4	0	0	0
Chlorine	10	2.5	0	0	0
Formulations	3	0.7	1	3.8	33.3
Hetero-organics	2	0.5	0	0	0
Hydrocarbons	2	0.5	1	3.8	50.0
Mixture [†]	11	2.7	5	19.2	45.5
Multiple substance category	20	4.9	4	15.4	20.0
Other [‡]	11	2.7	0	0	0
Other inorganic substances [§]	53	13.0	4	15.4	7.5
Oxy-organics	48	11.8	1	3.8	2.1
Paints and dyes	23	5.7	0	0	0
Pesticides and fertilizers	53	13.0	1	3.8	1.9
Polychlorinated biphenyls	10	2.5	0	0	0
Polymers	5	1.2	1	3.8	20.0
Volatile organic compounds	39	9.6	1	3.8	2.6
Total[¶]	407	100.0	26	99.7	N/A

* 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.

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

[‡] Not classified.

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

[¶] Percentages do not total 100% because of rounding.

**Table 8.—Frequencies of injuries/symptoms, by type of event*—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Chemical burns	4	8.3	0	0	4	5.2
Dizziness/central nervous system symptoms	4	8.3	2	6.9	6	7.8
Eye irritation	4	8.3	7	24.1	11	14.3
Gastrointestinal system problems	1	2.1	2	6.9	3	3.9
Headache	6	12.5	0	0	6	7.8
Heart problems	0	0	0	0	0	0
Heat stress	0	0	0	0	0	0
Other	1	2.1	0	0	1	1.3
Respiratory irritation	10	20.8	10	34.5	20	26.0
Shortness of breath	8	16.7	1	3.4	9	11.7
Skin irritation	1	2.1	0	0	1	1.3
Thermal burns	4	8.3	1	3.4	5	6.5
Trauma [†]	5	10.4	6	20.7	11	14.3
Total[‡]	48	99.9	29	99.9	77	100.1

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

[†] Of the 11 trauma injuries, one was chemical-related, ten were not chemical-related.

[‡] Percentages do not total 100% because of rounding.

**Table 9.—Distribution of personnel who responded to the event—
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**

Responder category	No.	%*
Certified HazMat team	12	2.9
Department of works/ utilities/ transportation	16	3.9
Emergency medical services	27	6.6
Environmental agency/ EPA [†] response team	12	2.9
Fire department	80	19.7
Health department/health agency	3	0.7
Hospital personnel	0	0
Law enforcement agency	70	17.2
Other	1	0.2
Response team of company where release occurred	322	79.1
Specialized multi-agency team	4	1.0
State, county, or local emergency managers/coordinators/planning Committees	8	2.0
Third party clean up contractors	28	6.9

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

[†]Environmental Protection Agency.

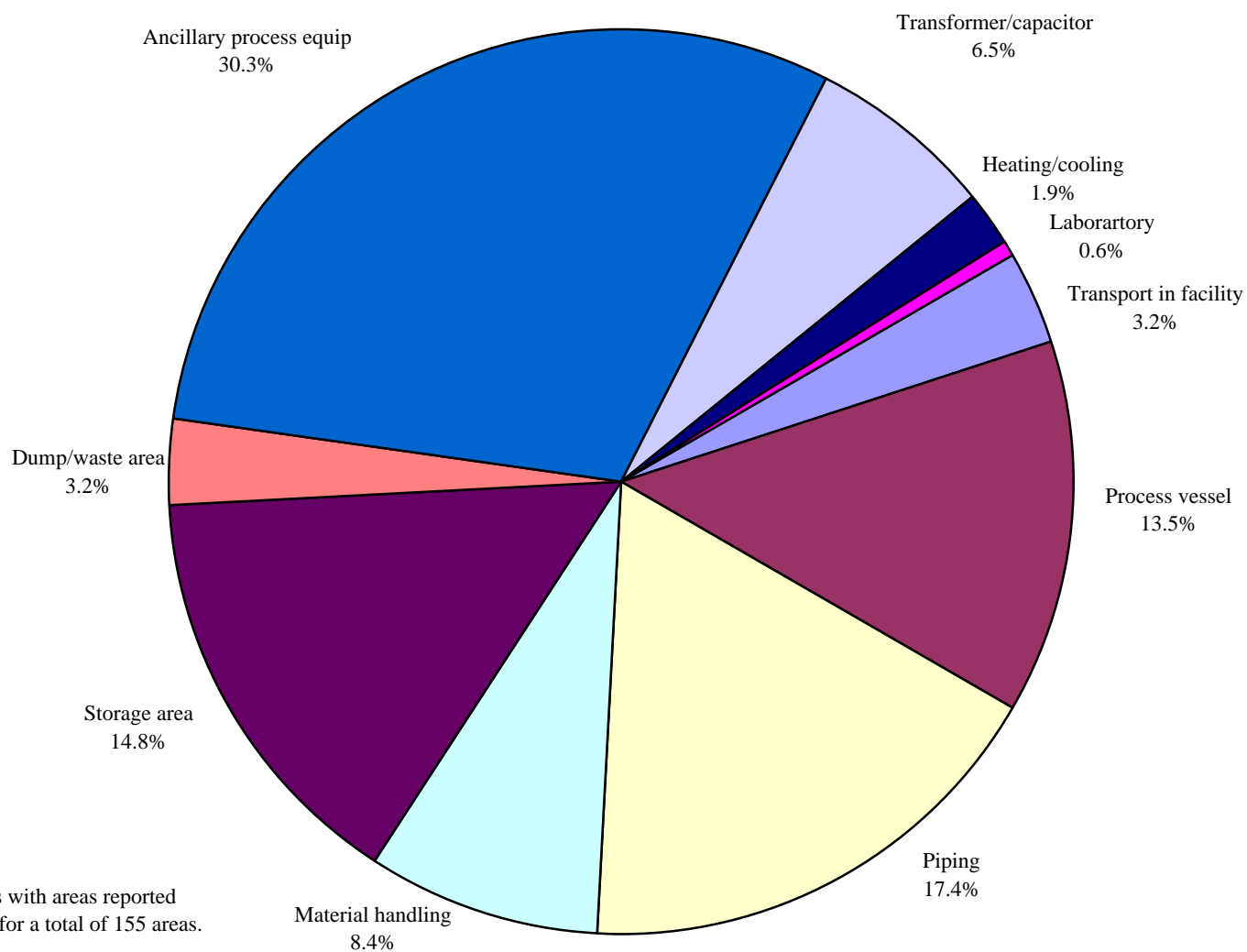
**Table 10.— Cumulative data by year—
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2005***

Year	Type of event			No. substances released	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	% [†]
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	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
2005	271	136	407	456	52	0	26	6.4
Total	3072	950	4022	4821	809	7	252	6.3

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

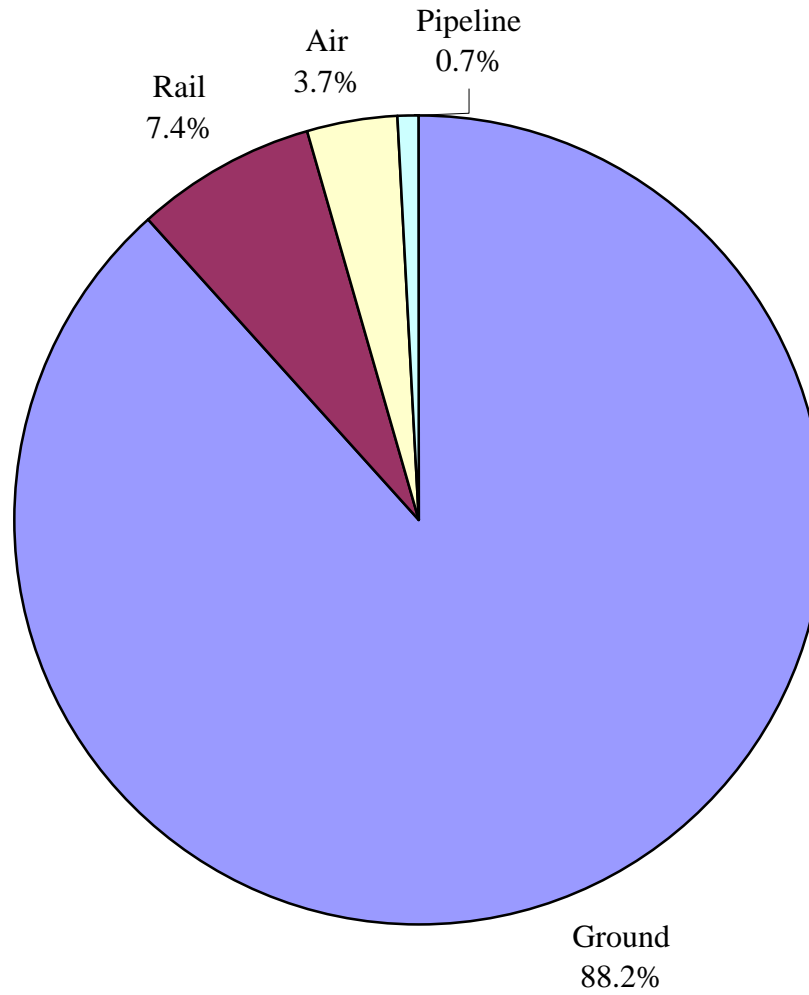
† Percentage of events with victims.

**Figure 1. Areas of fixed facilities involved in events,
Minnesota Hazardous Substances Emergency Events Surveillance, 2005***

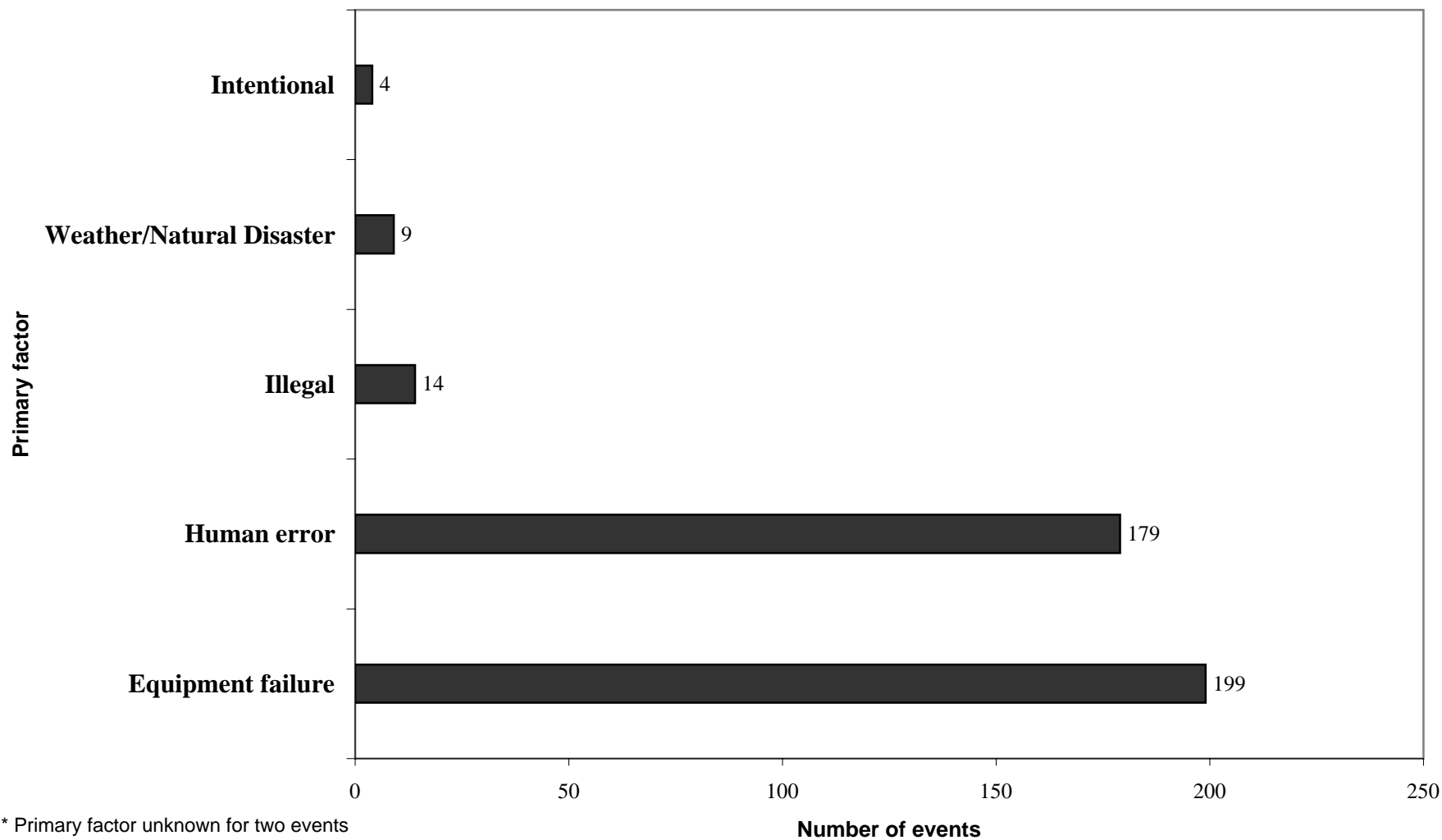


*Eight of the 147 events with areas reported involved two locations, for a total of 155 areas.

Figure 2. Distribution of transportation-related events, by type of transport, Minnesota Hazardous Substances Emergency Events Surveillance, 2005



**Figure 3a. Primary factors reported as contributing to events,
Minnesota Hazardous Substances Emergency Events Surveillance, 2005***



**Figure 3b. Secondary factor reported as contributing to events,
Minnesota Hazardous Substances Emergency Events Surveillance, 2005***

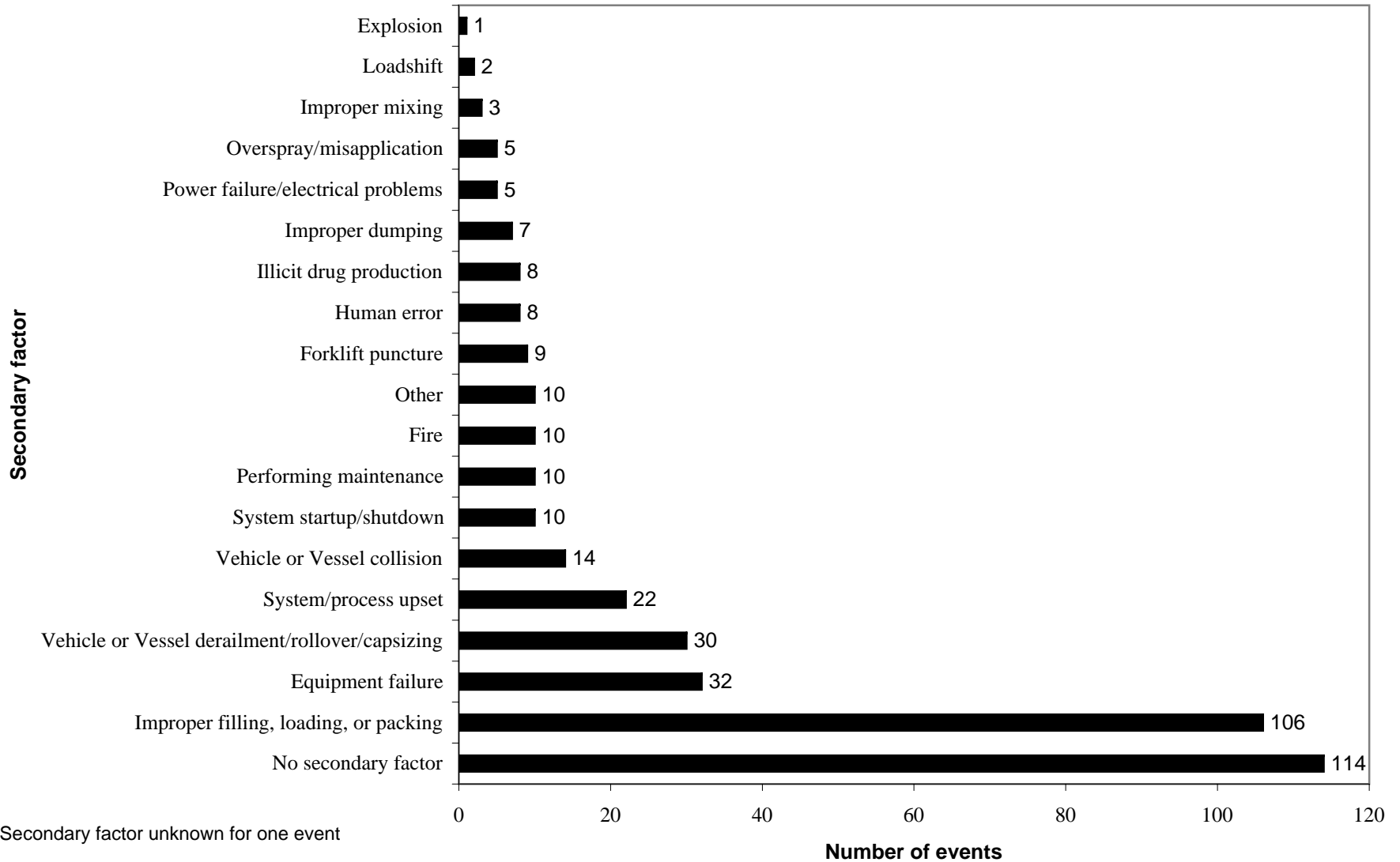
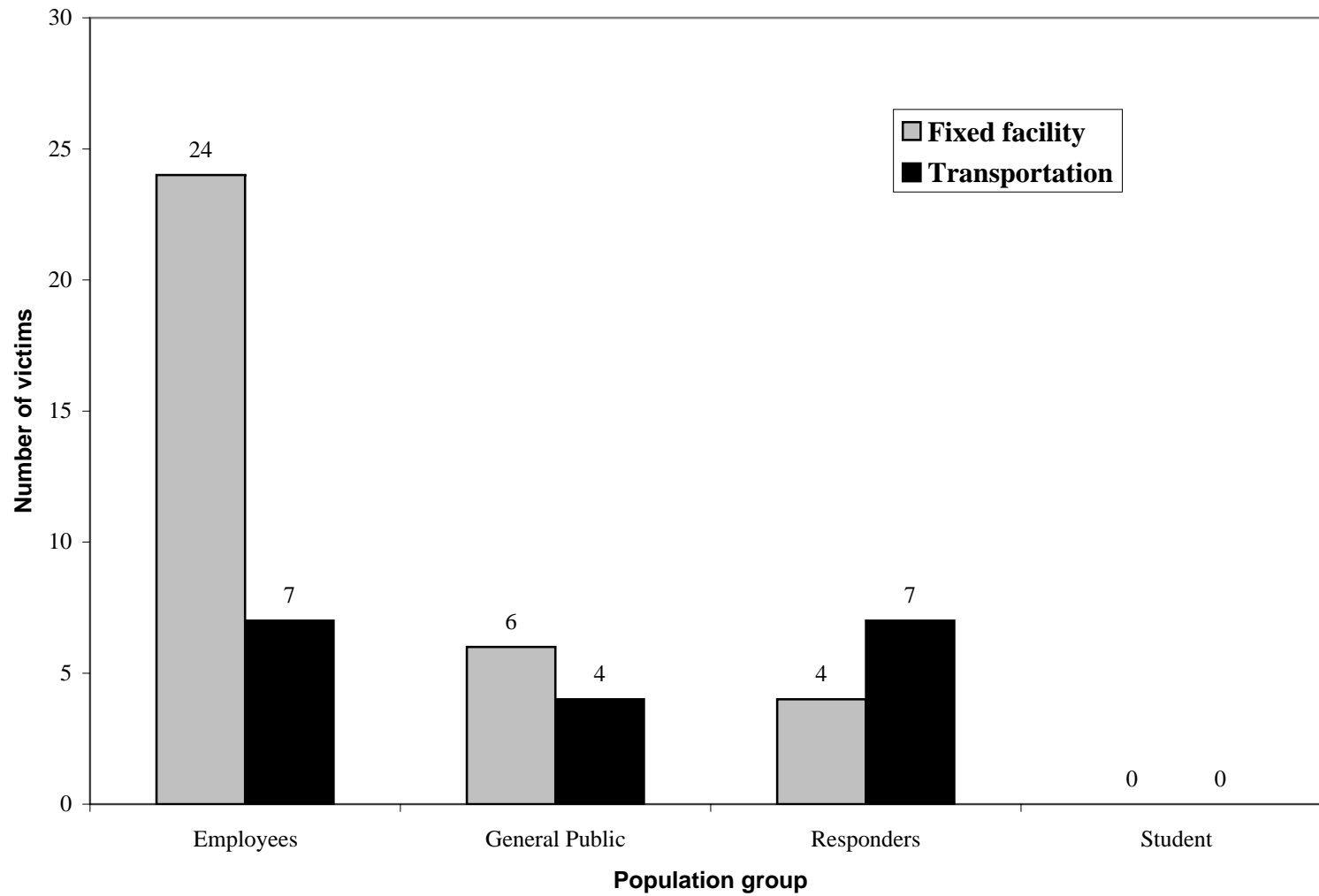
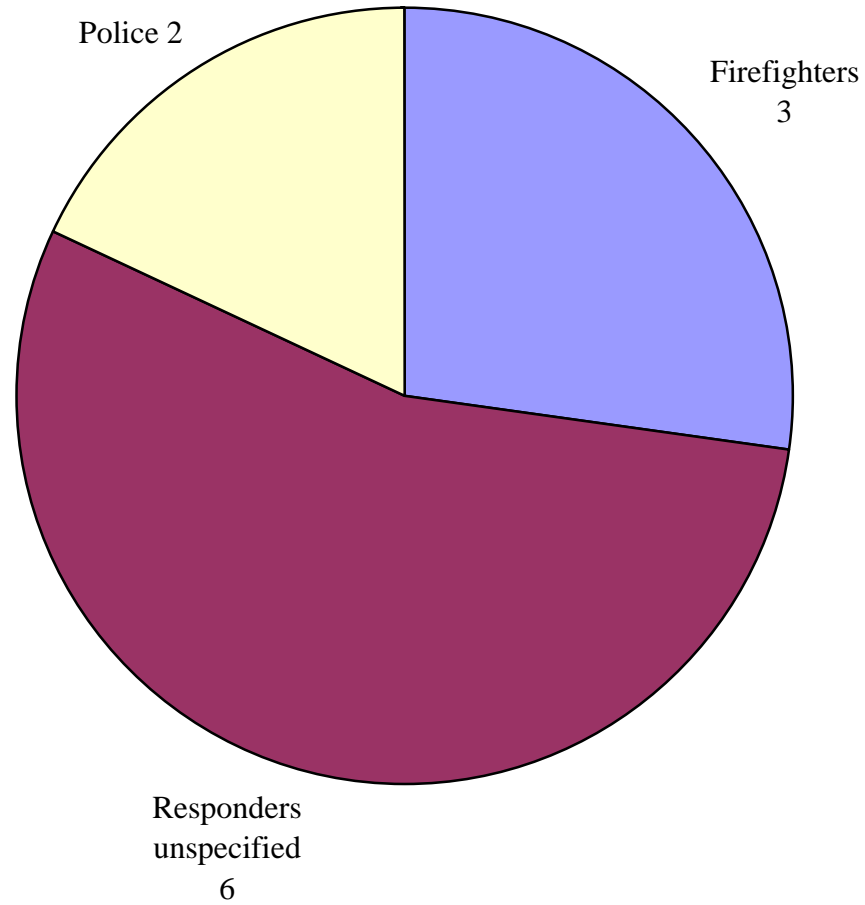


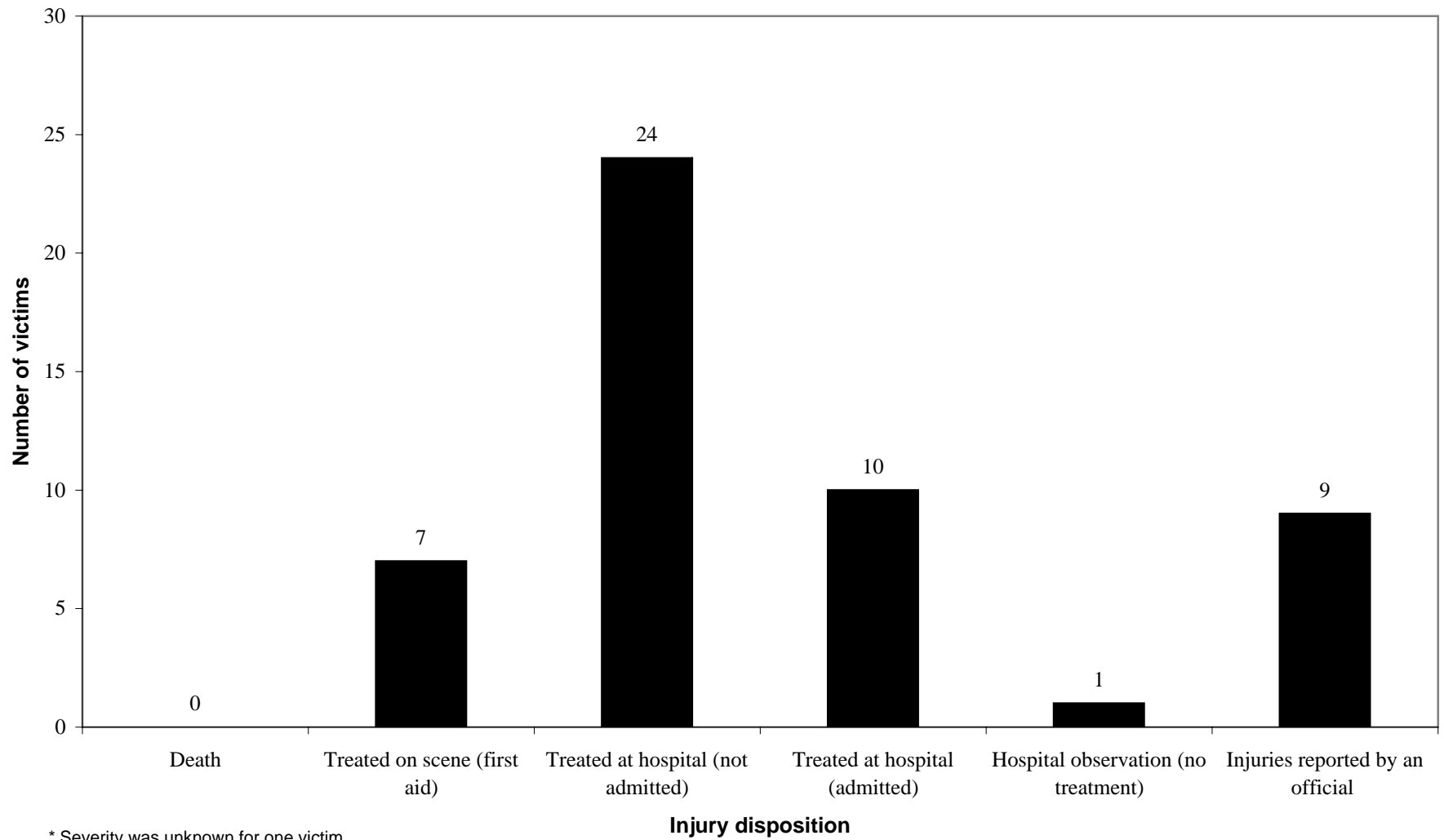
Figure 4. Number of victims, by population group and type of event, Minnesota Hazardous Substances Emergency Events Surveillance, 2005



**Figure 5. Distribution of responder injuries, by type of responder,
Minnesota Hazardous Substances Emergency Events Surveillance, 2005**



**Figure 6. Injury disposition,
Minnesota Hazardous Substances Emergency Events Surveillance, 2005***



* Severity was unknown for one victim

**Figure 7. Number of victims, by category and year,
Minnesota Hazardous Substances Emergency Events Surveillance, 1995-2005**

