

IOWA **HSEES**

Hazardous Substances Emergency Events Surveillance

**Semi-Annual Report
January 1 – June 30, 2009**

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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), 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 the Iowa Department of Public Health (IDPH) from January 1 through June 30, 2009. The cooperative agreement between IDPH and ATSDR was discontinued effective September 30, 2009 and the cutoff date for data collection was June 30, 2009. For that reason, this report contains information for the first half of 2009. 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 compiled using an ATSDR-provided Web-based data entry system. Effective January 1, 2006, a new case definition was provided by ATSDR. The new case definition reads:

A HSEES event is an uncontrolled or illegal acute release of any hazardous substance (except petroleum when petroleum is the only substance released), in any amount for substances listed on the HSEES Mandatory Chemical Reporting List, or if not on the list, in an amount greater than or equal to 10 pounds or one gallon. Threatened releases of qualifying amounts will be included if the threat led to an action, such as evacuation, to protect public health.

For the purposes of this report, IDPH will include all uncontrolled or illegal releases or threatened releases of hazardous substances (except petroleum when petroleum is the only substance released).

A total of 244 events were reported from January 1 through June 30, 2009. In 237 events (97% of all events), only one substance was released. The most commonly reported categories of substances were ammonia, agricultural chemicals and pesticides, and mixtures. During this reporting period 99 events (41% of all events) resulted in a total of 153 victims, six of whom died. The most frequently reported injuries were respiratory irritation and eye irritation. Evacuations were ordered for 14 events (6% of all events). The percentage of events with victims varies from year to year. Respiratory irritation continues to be the most common injury experienced by victims.

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 final 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 January 1 through June 30, 2009, in Iowa, 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

Through September 30, 2009, 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.

Beginning in 2002, a newly updated data-collection form, approved by the Office of Management and Budget, went into effect. Information was collected about each event, including substance(s) released, victims, injuries (adverse health effects and symptoms), and evacuations.

Various data sources were used to obtain information about these events. These sources included the Iowa Department of Natural Resources, National Response Center, Division of Narcotics Enforcement and the media. In 2006, IDPH began receiving reports from the Iowa Poison Control Center. This accounts for the large increase in reported victims. Census data were used to estimate the number of residents in the vicinity of most of the events. All data were compiled using a Web-based data entry system provided by ATSDR.

Iowa 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 for 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. The ATSDR case definition differs slightly in that the amount of the hazardous substance released must be greater than or equal to 10 pounds or one gallon. Chemicals listed on the HSEES Mandatory Chemical Reporting List (for example, mercury) are included regardless of the quantity. For the purposes of this report, all emergency chemical releases were included.

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 grouped into one of the other existing categories.

RESULTS

For the first half of 2009, Iowa HSEES captured a total of 244 acute hazardous substances events. Only one of these events involved the threatened release of a chemical. A total of 197 (81%) events occurred in fixed facilities. The counties with the most frequent number of events were Webster (13[5%]) and Woodbury (12[5%]) (Table 1).

For fixed facilities with a North American Industry Classification System (NAICS) category of 21=mining, 22=utilities, or 31, 32, 33=manufacturing, one or two types of area or equipment involved in the fixed facility where the event occurred could be selected. Of these events, 41 (100%) reported only one type of area. The main areas were classified as follows: 15 (36%) storage above ground, 11 (27%) piping, 4 (10%) ancillary process equipment, and 4 (10%) transformer. See Figure 1.

Of the 47 transportation-related events, 45 (96%) occurred during ground transport (for example, truck, van, or tractor), and two (4%) were rail related. See Figure 2. Most (79%) ground transportation events involved trucks. The largest proportions of transportation-related events occurred from a moving vehicle or vessel (45[96%]). Of the remaining transportation-related events, 1 (2%) occurred from a stationary vehicle or vessel, and 1 (2%) occurred during unloading of a stationary vehicle or vessel.

Factors contributing to the events consisted of primary and secondary entries. Primary factors were reported for 236 (97%) events (Figure 3a). Of the reported primary factors, most (47%) fixed-facility events involved human error, and most (60%) transportation-related events also

involved human error. Secondary factors were reported for 238 (98%) with 104 events having no secondary factor (Figure 3b). Of the reported secondary factors, most (23%) fixed-facility events were related to improper mixing, and most (21%) transportation-related events involved a vehicle or vessel derail/roll/capsize.

More than 95% of all events involved the release of only one substance. Two substances were released in 2% of the events and 1% involved the release of more than two substances (Table 2). Transportation events were more likely than fixed-facility events to have two or more substances released in an event (11% vs. 1%).

The number of events by month from January through June ranged from 21 (7%) in March to 72 (30%) in April, with the largest proportions occurring in April, May, and June. The proportion of events ranged from 13% to 20% during weekdays and from 6% to 11% during the weekend. Of all 236 (97%) events for which the time of day category was reported, 30% occurred from 6:00 a.m. to 11:59 a.m., 36% from noon to 5:59 p.m., 22% from 6:00 p.m. to 11:59 p.m., and the remainder during the early hours of the day.

Substances

From January 1 through June 30, 2009, a total of 253 substances were released or threatened to be released. One (0.4%) of those substances were reported as threatened to be released. The individual substances most frequently released were ammonia, nitrogen fertilizer, and antifreeze (see Appendix). Substances were grouped into 16 categories. The substance categories most commonly released in fixed-facility events were ammonia (68[34%]), mixtures (44[22%]) and agricultural chemical and pesticides (30[15%]) (Table 3). In transportation-related events, the most common substance categories released were pesticides and agricultural chemicals (24[44%]), ammonia (7[13%]), and oxy-organics (6[11.1%]).

Two types of releases for each substance (for example, spill and air) could be reported. Only one type of release was associated with the following: spill (107[47%]), air release (118[52%]), fire (1[0.4%]) threatened release (1 [0.4%]), and explosion (1[0.4%]). Of events with two types of releases, the following combinations were reported: spill and vapor (20[90%]), spill and fire (2[5%]), and vapor and fire (2[5%]). The release type was reported for all substances.

Victims

A total of 153 victims were involved in 99 events (41% of all events) (Table 4). Of the 99 events with victims, 80 (81%) events involved only one victim, eight (8%) involved two victims and 11 (11%) involved three or more victims. Of all victims, 142 (93%) were injured in fixed-facility

events. Fixed-facility events were more likely to have multiple victims per event than were transportation-related events.

Additionally, 15 persons in two events (0.8% 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 in a specific substance category was compared with the number of events in the same category that resulted in victims. 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 5). For example, events categorized as ammonia constituted 30% of all events; however, only 28% of these events resulted in injuries. Conversely, events involving mixtures accounted for 18% of all events, but 89% of the 45 events resulted in injuries.

The general public (80[52%]) constituted the largest proportion of the population groups injured, followed employees (66[43%]) (Figure 4). Two police officers and two hospital personnel (for example, doctor, nurse) reported injuries the first half of 2009. Both police officers were injured in fixed-facility events.

Victims were reported to sustain a total of 217 injuries or symptoms (Table 6). 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 (79[33%]), eye irritation (27[13%]), and headache (25[12%]). In transportation-related events, non-chemical trauma-related injuries were reported most frequently followed by respiratory irritation. The non-chemical trauma-related injuries resulted from a chain of events, such as a motor vehicle accident leading to the release of a hazardous substance, and not from exposure to the substance itself.

For the 147 (96%) injured persons for whom an age category was reported, two (1%) were one to four, 21 (14%) were 5-14 years of age, 12 (8%) were 15-19 years of age, 72 (49%) were 20-44 years of age, 29 (20%) were 45-64 and 11 (7%) were 65 or older.

Gender was known for 148 (97%) victims; of these 64 (43%) were females and 84 (57%) were males.

Severity of injuries was known for all reported victims. Of the 153 victims, 73 (48%) were treated at the hospital but did not require admission, 47 (31%) did not seek medical treatment but had injuries reported by an official (for example, Iowa Poison Control Center) within 24 hours of the event, 11 (7%) were seen by a private physician, 14 (9%) were admitted to the hospital, one (0.6%) was observed at the hospital but did not receive treatment, one (0.6%) was treated on scene, four (3%) died on scene and two (1%) died after arrival at the hospital (Figure 5).

The status of personal protective equipment (PPE) use was reported for 66 (100%) employee victims and three (75%) responder-victims. Of all employee-victims, only four wore PPE. Two of the three responder-victims wore PPE.

The largest number of people injured in a single event was 16. An ice resurfacers at a skating rink malfunctioned causing a release of carbon monoxide. A day long hockey camp for children was being held at the time of the release. Three adults and 11 children were transported to the hospital, treated and released. Two children had minor symptoms but did not seek medical attention.

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 located within ¼ mile of 211 (86%) events, schools were to be found with ¼ mile of 17 (7%) events, hospitals were located within ¼ mile of one (0.4%) events, nursing homes were situated within ¼ of two (0.8%) events, licensed daycares were located within ¼ mile of 13 (5%) events, industries or other businesses were located within ¼ of 127 (52%) events and recreational areas were situated within ¼ mile of 19 (8%) events. Information for proximity of the event location in relation to selected populations was missing for 13 events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 134 (96%) events with persons living within ¼ mile of the event; 136 (97%)

events with persons living within ½ mile; and 136 (97%) events with persons living within one mile. Information on the number of people living within ¼, ½ and one mile of the event was missing for 104 events.

Evacuations

Evacuations were reported for 14 (6%) of 244 events. Of these evacuations, nine (64%) were of buildings or affected parts of buildings; three (21%) were downwind/downstream, one (7%) was a defined circular area surrounding the event location, and one (7%) was unknown. The number of people evacuated was known for 11 of the 14 events and ranged from one to 250 people.

Evacuation length was known for all events. The length of evacuations ranged from one hour to 96 hours. In 116 (31%) of the 244 events, access to the area where the release occurred was restricted. No events reported sheltering in place.

Decontamination

Decontamination status was known for all (153) victims. Of those, 122 (80%) were not decontaminated, 12 (8%) were decontaminated at the scene, four (3%) were decontaminated at a medical facility and 15 (10%) were decontaminated at both the scene and a medical facility.

Response

Of the 229 events with information on who (if anyone) responded to the event, 25% reported two or more categories of personnel who responded, 10% reported three or more categories, and 4% reported four or more categories. Company response team (44%) responded most frequently to events, followed by fire departments (22%), and law enforcement (15%) (Table 7).

2009 Prevention outreach activities

The Iowa Hazardous Substances Emergency Events Surveillance (HSEES) program completed three prevention outreach activities during the first half of 2009.

Activity #1

IDPH co-authored a paper entitled State Programs to Reduce Uncontrolled Ammonia Releases and Associated Injury Using the Hazardous Substances Emergency Events Surveillance System. The paper was published in the March 2009 issue of Journal of Occupational and Environmental Medicine. The paper described how the HSEES program identifies leading causes of uncontrolled ammonia released and targets activities aimed at reducing the frequency of these incidents.

Activity #2

Public awareness and education activities are the keys to reducing the number of emergency chemical releases and associated injuries. For the past several years, this type of activity has

been the most successful activity for raising awareness performed by the HSEES program in Iowa. IDPH conducted presentations on HSEES data and the *HazMat Quarterly* newsletter was sent out quarterly to approximately 350 subscribers. All reports and the newsletter were posted on the HSEES Website.

Activity #3

Annual reports containing a variety of data were prepared for calendar years 2006, 2007, 2008 and the first half of 2009. All reports are posted on the HSEES Website.

SUMMARY OF RESULTS, 1993-2008 (2009 data is not included because it contains only six months of data)

Iowa began participation in HSEES in 1990. From 1990 through 1992 the program was considered to be in a pilot phase, therefore, data collected during that time period are not included.

During 1993-2008, the largest proportion of events occurred in fixed facilities (Table 8). From 1993 through 1999, fixed facility releases seemed to decline slightly and averaged 200 releases per year. In 2000, fixed facility releases began to rise and now average 281 per year. This increase in the number of events may have been due, at least in part, to the methamphetamine epidemic. The Iowa Poison Control Center began reporting to HSEES in 2006 and the number of fixed facility events continues to increase. An all time high of 440 fixed facility events was reported in 2008. Transportation related events have fluctuated from year to year with a high of 128 in 1995 to a low of 71 in 2006.

The number of substances released also continues to fluctuate from year to year. The lowest number reported was 311 in 1994, and 2008 reported the most substances released at 601. The percentage of events with victims was highest in 2008 (40%) and lowest in 1997 (4%).

Respiratory irritation has consistently been the most frequently reported injury. Employees were the most commonly reported victims for the years 1993, 1994, 1997, 1998, 1999, 2003, 2006, and 2007. Members of the public were the most commonly reported victims during 1995, 1996,

2000, 2001, 2002, 2004, 2005, and 2008. With the exception of 1996 and 1998, first responders consistently reported the lowest number of injuries (Figure 6).

The number of deaths associated with acute hazardous substances events fluctuates from year to year. Some of these deaths were attributed to non-chemical circumstances surrounding the events (for example, a crash involving a vehicle transporting a chemical or thermal burns resulting from a fire where chemicals were involved).

REFERENCES

1. Centers for Disease Control and Prevention. Comprehensive plan for epidemiologic surveillance. Atlanta: US Department of Health and Human Services; 1986.
2. Binder S. Death, injuries, and evacuations from acute hazardous material releases. *Am J Public Health* 1989; 70:1042-4.

Appendix

The most frequently released substances involved in events – Iowa Hazardous Substances
Emergency Events Surveillance, January-June, 2009

<u>Chemical</u>	<u>Number of Events</u>
Ammonia	75
Nitrogen Fertilizer	10
Antifreeze	7
Freon	6
Hydrochloric Acid	4

Table 1. - Number of events meeting the surveillance definition, by county and type of event - Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

County	Type of event				All events Total no. events (%)
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	
Adair	0	0	0	0	0
Adams	0	0	1	2.1	1 (0.4%)
Allamakee	1	0.5	1	2.1	2 (0.8%)
Appanoose	1	0.5	1	2.1	2 (0.8%)
Audubon	0	0	0	0	0
Benton	1	0.5	3	6.4	4 (1.6%)
Black Hawk	4	2.0	0	0	4 (1.6%)
Boone	3	1.5	1	2.1	4 (1.6%)
Bremer	2	1.0	0	0	2 (0.8%)
Buchanan	3	1.5	1	2.1	4 (1.6%)
Buena Vista	2	1.0	1	2.1	3 (1.2%)
Butler	1	0.5	0	0	1 (0.4%)
Calhoun	0	0	0	0	0
Carroll	2	1.0	0	0	2 (0.8%)
Cass	3	1.5	0	0	3 (1.2%)
Cedar	0	0	2	4.3	2 (0.8%)
Cerro Gordo	5	2.5	0	0	5 (2.0%)
Cherokee	4	2.0	1	2.1	5 (2.0%)
Chickasaw	2	1.0	1	2.1	3 (1.2%)
Clarke	0	0	0	0	0
Clay	1	0.5	1	2.1	2 (0.8%)
Clayton	2	1.0	0	0	2 (0.8%)
Clinton	7	3.6	0	0	7 (2.9%)
Crawford	0	0	1	2.1	1 (0.4%)
Dallas	2	1.0	1	2.1	3 (1.2%)
Davis	1	0.5	0	0	1 (0.4%)
Decatur	0	0	0	0	0
Delaware	3	1.5	0	0	3 (1.2%)
Des Moines	0	0	2	4.3	2 (0.8%)
Dickinson	3	1.5	0	0	3 (1.2%)
Dubuque	10	5.0	0	0	10 (4.1%)
Emmet	0	0	0	0	0
Fayette	4	2.0	0	0	4 (1.6%)

County	Type of event				All events
	Fixed facility		Transportation		Total no. events (%)
	No. events	%	No. events	%	
Floyd	0	0	2	4.3	2 (0.8%)
Franklin	1	0.5	0	0	1 (0.4%)
Fremont	1	0.5	0	0	1 (0.4%)
Greene	2	1.0	1	2.1	3 (1.2%)
Grundy	1	0.5	0	0	1 (0.4%)
Guthrie	1	0.5	1	2.1	2 (0.8%)
Hamilton	3	1.5	0	0	3 (1.2%)
Hancock	1	0.5	0	0	1 (0.4%)
Hardin	2	1.0	0	0	2 (0.8%)
Harrison	1	0.5	1	2.1	2 (0.8%)
Henry	0	0	0	0	0
Howard	4	2.0	0	0	4 (1.6%)
Humboldt	1	0.5	0	0	1 (0.4%)
Ida	3	1.5	0	0	3 (1.2%)
Iowa	0	0	0	0	0
Jackson	2	1.0	1	2.1	3 (1.2%)
Jasper	2	1.0	0	0	2 (0.8%)
Jefferson	0	0	0	0	0
Johnson	6	3.0	0	0	6 (2.5%)
Jones	1	0.5	0	0	1 (0.4%)
Keokuk	0	0	0	0	0
Kossuth	1	0.5	0	0	1 (0.4%)
Lee	2	1.0	0	0	2 (0.8%)
Linn	6	3.0	0	0	6 (2.5%)
Louisa	0	0	0	0	0
Lucas	2	1.0	0	0	2 (0.8%)
Lyon	1	0.5	2	4.3	3 (1.2%)
Madison	0	0	0	0	0
Mahaska	1	0.5	1	2.1	2 (0.8%)
Marion	3	1.5	0	0	3 (1.2%)
Marshall	4	2.0	1	2.1	5 (2.0%)
Mills	0	0	0	0	0
Mitchell	1	0.5	0	0	1 (0.4%)
Monona	2	1.00	0	0	2 (0.8%)
Monroe	0	0	0	0	0

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%	No. events	%	Total no. events (%)
Montgomery	0	0	0	0	0
Muscatine	4	2.0	1	2.1	5 (2.0%)
O'Brien	2	1.0	0	0	2 (0.8%)
Osceola	0	0	0	0	0
Page	2	1.0	0	0	2 (0.8%)
Palo Alto	1	0.5	0	0	1 (0.4%)
Plymouth	2	1.0	0	0	2 (0.8%)
Pocahontas	6	3.0	0	0	6 (2.5%)
Polk	7	3.6	3	6.4	10 (4.1%)
Pottawattamie	2	1.0	0	0	2 (0.8%)
Poweshiek	3	1.5	1	2.1	4 (1.6%)
Ringgold	0	0	0	0	0
Sac	0	0	0	0	0
Scott	4	2.0	1	2.1	5 (2.0%)
Shelby	2	1.0	0	0	2 (0.8%)
Sioux	1	0.5	3	6.4	4 (1.6%)
Story	2	1.0	1	2.1	3 (1.2%)
Tama	1	0.5	0	0	1 (0.4%)
Taylor	0	0	0	0	0
Union	3	1.5	2	4.3	5 (2.0%)
Van Buren	0	0	0	0	0
Wapello	2	1.0	0	0	2 (0.8%)
Warren	0	0	0	0	0
Washington	1	0.5	1	2.1	2 (0.8%)
Wayne	2	1.0	0	0	2 (0.8%)
Webster	13	6.6	0	0	13 (5.3%)
Winnebago	0	0	1	2.1	1 (0.4%)
Winneshiek	1	0.5	2	4.3	3 (1.2%)
Woodbury	11	5.6	1	2.1	12 (4.9%)
Worth	1	0.5	1	2.1	2 (0.8%)
Wright	2	1.0	1	2.1	3 (1.2%)
Total	197	80.7	47	19.2	244 (100%)

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

Table 2. – Number of substances involved per event, by type of event – Iowa Hazardous Substances Emergency Events Surveillance, January-June 2009

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	195	99%	195	42	89%	42	237	97%	237
2	2	1%	4	3	6%	6	5	2%	10
3				2	5%	6	2	1%	6
Total	197	100%	199	47	100%	54	244	100%	253

Table 3. – Number of substances involved, by substance category and type of event - Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	11	5.5	0	0	11	4.3
Ammonia	68	34.2	7	13.0	75	29.6
Bases	4	2.0	0	0	4	1.6
Chlorine	4	2.0	1	1.0	5	2.0
Formulations	0	0	0	0	0	0
Hetero-organics	0	0	1	1.9	1	0.4
Hydrocarbons	1	0.5	2	3.7	3	1.2
Mixture*	44	22.1	3	5.5	47	18.6
Other†	13	6.5	5	9.2	18	7.1
Other inorganic substances‡	9	4.5	1	1.9	10	4.0
Oxy-organics	8	4.0	6	11.1	14	5.5
Paints and dyes	0	0	0	0	0	0
Agricultural chemicals & pesticides	30	15.1	24	44.4	54	21.3
Polychlorinated biphenyls	4	2.0	0	0	4	1.6
Polymers	0	0	1	1.9	1	0.4
Volatile organic compounds	3	1.5	3	5.5	6	2.4
Total§	199	100.0	54	100.0	253	100.0

*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 may not total 100% because of rounding

Table 4. – Number of victims per event, by type of event – Iowa 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	79	84.0	79	1	20.0	1	80	81.0	8.0
2	6	6.4	12	2	40.0	4	8	8.0	16
3	4	4.3	12	2	40.0	6	6	6.0	18
4	1	1.0	4	0	0	0	1	1.0	4
>4	4	4.3	35	0	0	0	4	4.0	35
Total	94	100	142	5	100	11	99	100	153

Table 5. – Frequency of substance categories in all events and events with victims – Iowa Hazardous Substances Emergency Events Surveillance System, January-June, 2009*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	10	4.1	4	4.0	40.0
Ammonia	75	30.7	21	21.2	28.0
Bases	4	1.6	3	3.0	75.0
Chlorine	5	2.0	2	2.0	40.0
Formulations	0	0	0	0	0
Hetero-organics	1	0.4	0	0	0
Hydrocarbons	0	0	00	0	0
Mixture†	45	18.4	40	40.4	88.9
Multiple substance category	7	2.9	2	2.0	28.6
Other‡	13	5.3	7	7.0	53.8
Other inorganic substances§	9	3.7	2	2.0	22.2
Oxy-organics	11	4.5	6	6.1	54.5
Paints and dyes	0	0	0	0	0
Pesticides and agricultural chemicals	54	22.1	11	11.1	20.4
Polychlorinated biphenyls	4	1.6	0	0	0
Polymers	0	0	0	0	0
Volatile organic compounds	6	2.5	1	1.0	16.7
Total**	244	100	99	100	

*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 may not total 100% because of rounding.

Table 6. – Frequencies of injuries/symptoms, by type of event* - Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. Injuries	%	Total no.	%
Chemical burns	12	5.7	0	0	12	5.5
Dizziness/central nervous system symptoms	21	10.4	0	0	21	9.7
Eye irritation	27	13.4	2	12.5	29	13.4
Gastrointestinal system problems	21	10.4	2	12.5	23	10.6
Headache	25	12.4	0	0	25	11.5
Heart problems	0	0	0	0	0	0
Heat stress	0	0	0	0	0	0
Other	0	0	0	0	0	0
Respiratory irritation	79	39.3	3	18.7	82	37.8
Shortness of breath	4	2.0	0	0	4	1.8
Skin irritation	10	5.0	0	0	10	4.6
Thermal burns	1	0.5	0	0	1	0.5
Trauma†	1	0.5	9	56.3	10	4.6
Total	201	100	16	100	217	100

*The number of injuries is greater than the number of victims (217) because a victim could have had more than one injury.

†Of the 9 trauma injuries, none was chemical-related.

Table 7. – Distribution of personnel who responded to the event - Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

Responder Category	No.	%*
Certified HazMat team	12	4.9
Emergency medical technicians	19	7.8
Environmental agency/EPA† response team	0	0
Fire department	54	22.1
Health department/health agency	0	0
Hospital personnel/Poison control	0	0
Law Enforcement	37	15.2
Other	1	0.4
Response team of company where release occurred	107	43.8
3 rd Party clean up contractor	2	0.8
Specialized multiagency teams	0	0
Department of works/utilities/transportation	6	2.5
State, county, or local emergency planning committee	5	2.0

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

†Environmental Protection Agency

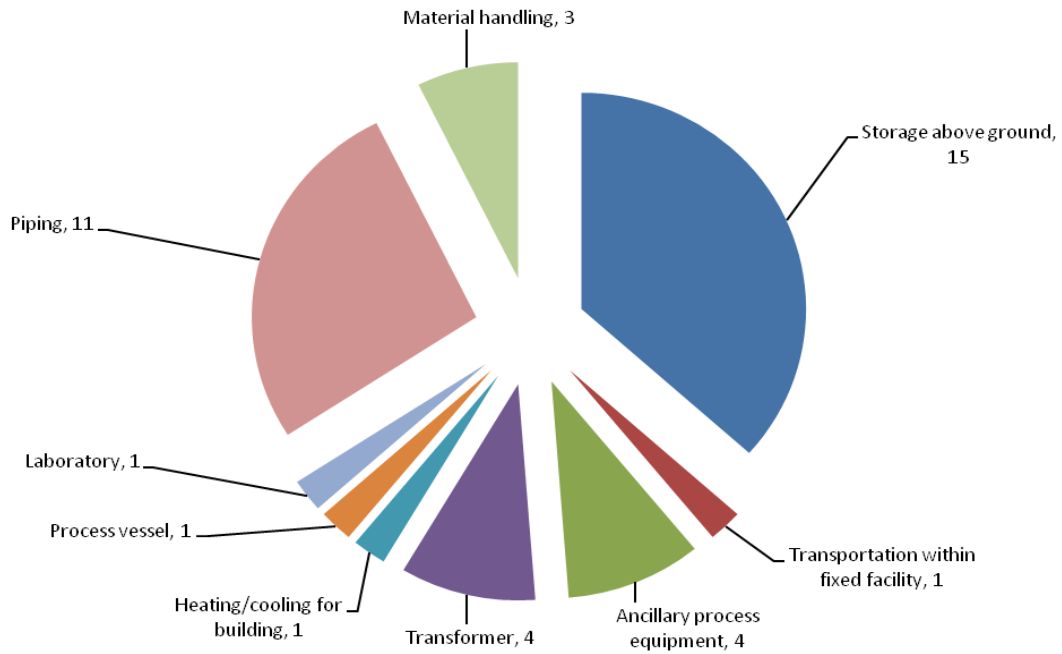
Table 8. – Cumulative data by year - Iowa Hazardous Substances Emergency Events Surveillance, 1993-June, 2009

Year	Type of event			No. substances released	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	%†
1993	218	88	306	344	57	1	36	11.8
1994	208	79	287	311	103	6	25	8.7
1995	194	128	322	363	62	0	27	8.4
1996	202	95	297	322	74	1	18	6.1
1997	194	121	315	323	106	1	13	4.3
1998	190	94	284	320	41	0	25	8.8
1999	196	92	288	318	93	5	47	16.3
2000	205	86	291	376	44	4	22	7.6
2001	265	75	340	389	58	1	34	10.0
2002	231	84	315	353	67	1	27	8.6
2003	240	87	327	364	52	2	31	9.5
2004	244	105	349	396	47	6	25	7.2
2005	216	86	302	327	43	0	28	8.6
2006	266	71	337	358	132	4	108	32.0
2007	428	106	534	586	271	4	188	35.0
2008	440	113	553	601	304	3	220	39.8
2009*	197	47	244	253	153	6	99	40.6
Total	4134	1557	5691	6304	1707	42	973	17.1

†Percentage of events with victims.

*Includes data from January 1 through June 30, 2009.

Figure 1. Areas of fixed facilities involved in events – Iowa Hazardous Emergency Events Surveillance, January-June, 2009*



*Only includes area types for fixed facilities with North American Industry Classification System (NAICS) categories of 21= mining, 22=utilities or, 31,32,33=manufacturing.

Figure 2. Distribution of transportation-related events, by type of transport – Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

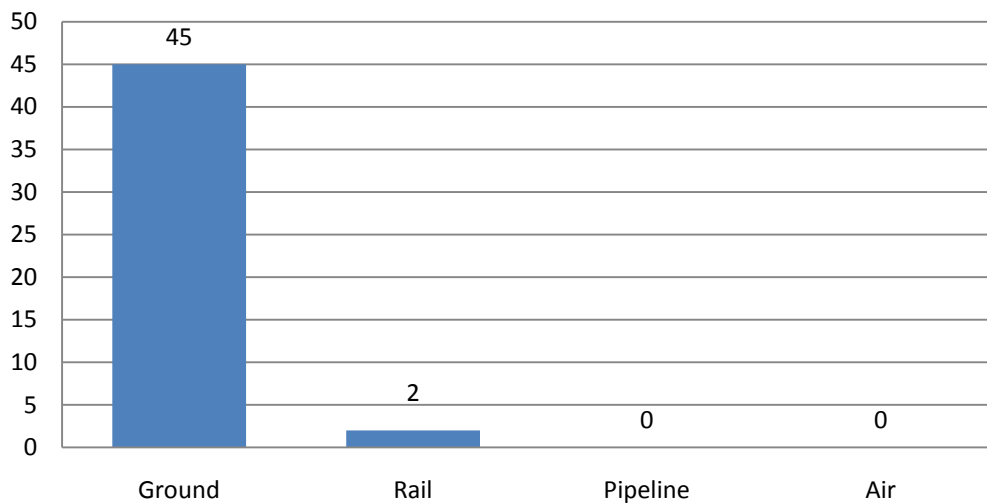


Figure 3a. Primary factors reported as contributing to events – Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

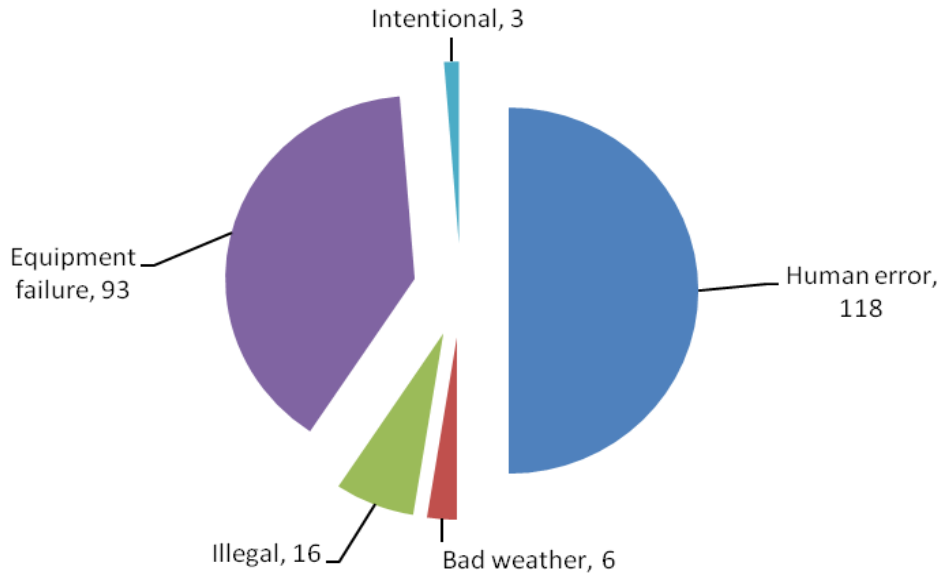


Figure 3b. Secondary factors reported as contributing to events – Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

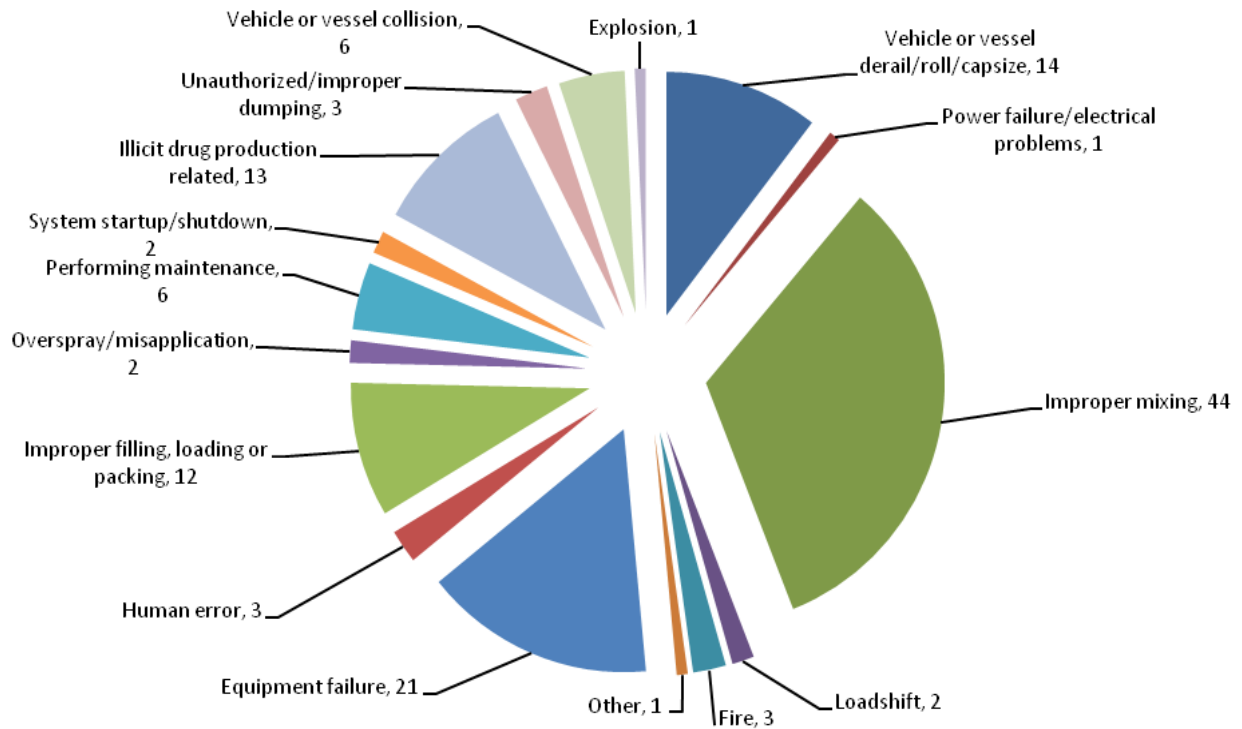


Figure 4. Number of victims by population group – Iowa Hazardous Substances Emergency Events Surveillance, January-June 2009

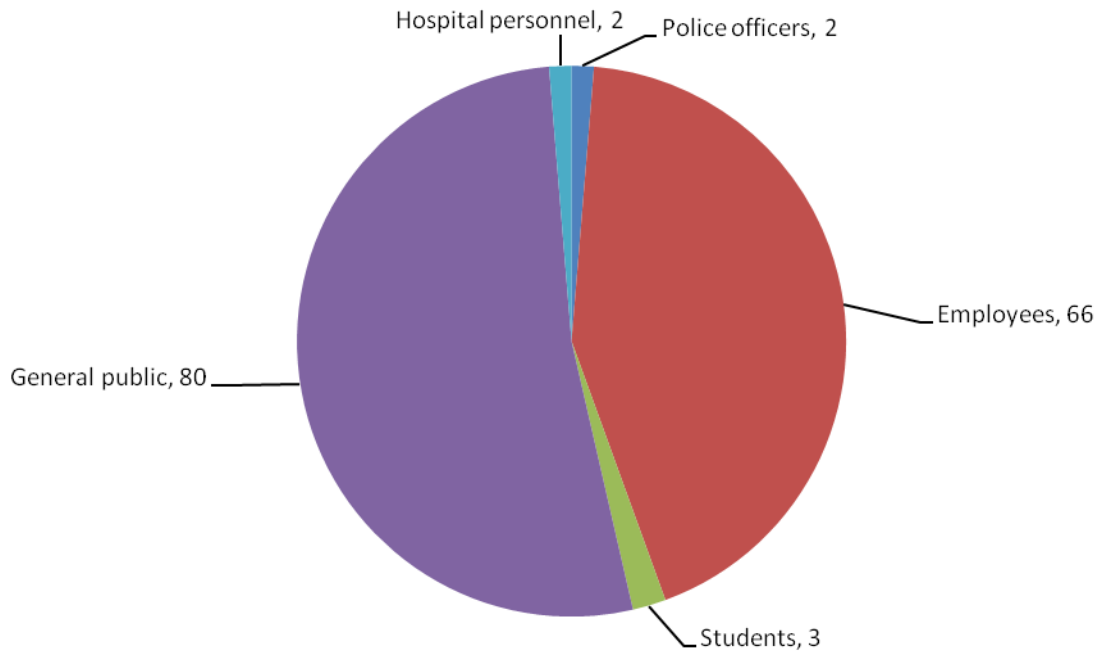


Figure 5. Injury disposition – Iowa Hazardous Substances Emergency Events Surveillance, January-June, 2009

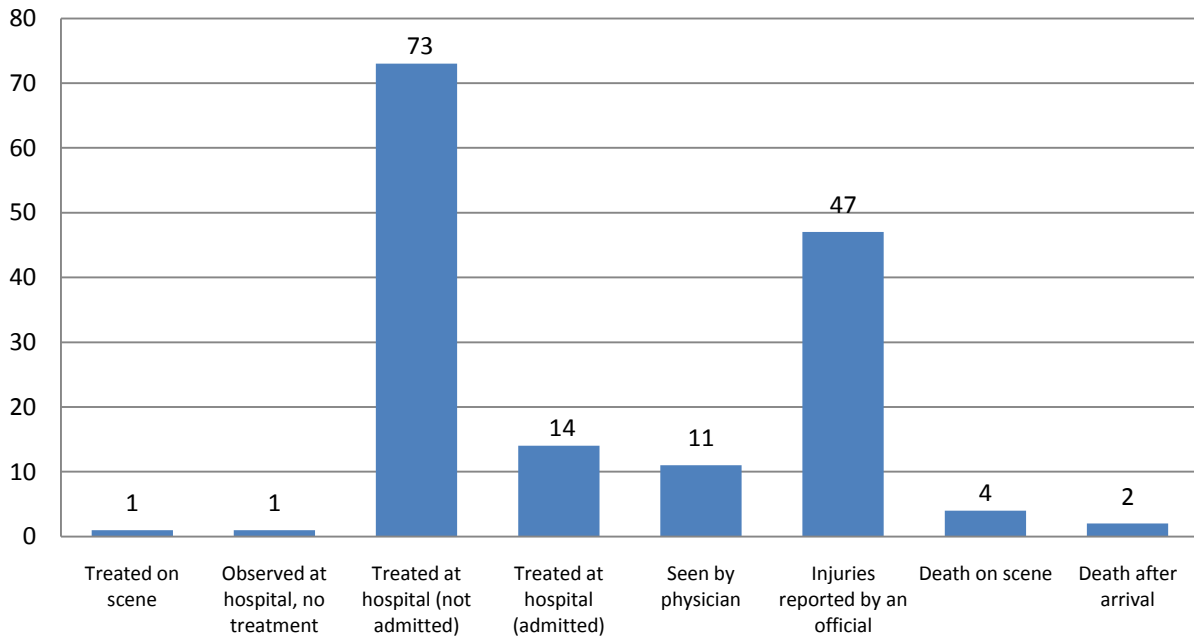
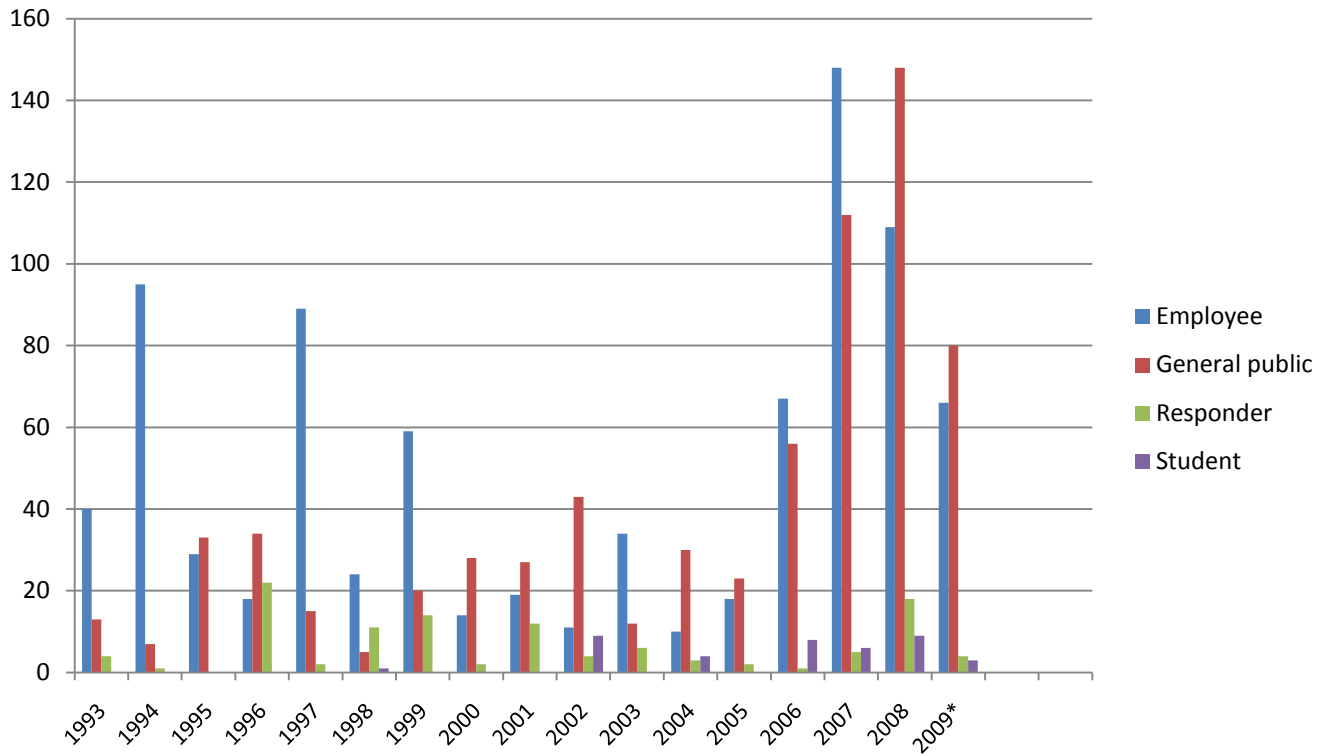


Figure 6. Number of victims, by category and year – Iowa Hazardous Substances Emergency Events Surveillance, 1993-June, 2009



*Contains data for January – January 1 through June 30, 2009.