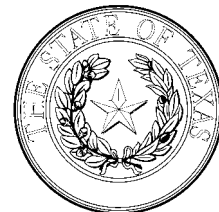


**Texas Hazardous Substances Emergency  
Events Surveillance (HSEES) System  
Executive Summary for 2002 - 2003**

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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 releases of hazardous substances in 15 states. This report summarizes the characteristics of events reported to the Texas Department of State Health Services in 2002 and 2003. 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 5,525 events were reported. In 5,453 (98.7%) events, only one substance was released. The most commonly reported categories of substances were mixtures, other inorganic substances, volatile organic compounds, and acids. During this reporting period, 76 events (1.4% of all reported events) resulted in a total of 181 victims, of whom 16 (8.8%) died. The most frequently reported injuries were respiratory irritation, trauma, chemical burns, and eye irritation. Evacuation reportedly was ordered for 79 (1.4%) events.

The percentage of events with evacuations has decreased over the years since Texas started collecting HSEES data, with the percentage of evacuations being the lowest for the 2002-2003 reporting period. The percentage of events with victims reported during this time period has been the lowest since Texas joined the HSEES system in 1993. Approximately 1.4% of these events involved injured persons. Respiratory irritation has been the most frequently reported injury in every year, except year 2000 when trauma was the most frequently reported injury. In 2002 - 2003, trauma was the second most frequently reported injury. There are no

clear patterns to the number of victims and number of reported injuries. They have fluctuated from year to year since 1993 when TxHSEES began collecting data.

# **HAZARDOUS SUBSTANCES EMERGENCY EVENTS SURVEILLANCE SYSTEM — 2002-2003 SUMMARY**

## **INTRODUCTION**

The Centers for Disease Control and Prevention defines surveillance as

“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 four 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;
- To identify risk factors associated with the morbidity and mortality; and
- To identify 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 also useful to protect public health.

In the last few years, the fourth 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 2002-2003 in Texas, 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**

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

Various data sources were used to obtain information about these events. These sources included, but were not limited to, the National Response Center, the Texas Commission on Environmental Quality, the Department of Transportations' Hazardous Materials Incident System (HMIS), local fire department and hazardous materials response team reports, and medical records. Census data were used to estimate the number of residents in the vicinity of the events. All data were computerized using Web-based data entry system provided by ATSDR.

HSEES defines hazardous substances emergency events as uncontrolled or illegal releases or threatened releases of hazardous substances. Events involving releases of only petroleum are not included. Events are included if (1) 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 (2) 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 suffer at least one adverse health effect within 24 hours of the event or who die as a consequence of the

event. Victims who receive more than one type of injury are counted once in each applicable injury type. Events are defined as transportation-related if they occur during surface, air, pipeline, or water transport of hazardous substances, or before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

For the data analyses in this report, the substances released were categorized into 16 groups. The category “mixture” comprises substances from different categories that were mixed before the event, and the category “other inorganic substances” comprises all inorganic substances, except acids, bases, ammonia, and chlorine.

## **RESULTS**

For 2002-2003, 5,525 hazardous substances emergency events were reported to HSEES: 11 of these events were threatened releases only. A total of 4,964 (89.8%) occurred in fixed facilities.

For each fixed-facility event, one or two types of area involved in the release can be selected. Of all 4,964 fixed-facility events, 3,895 (78.5%) had one type of area; 1,067 (21.5%), a combination of two area types; and 2 (<1%), no type of area reported. Among events with one type of area reported, the main area was classified as follows: 2,422 (62.2%) ancillary processing equipment, 449 (11.5%) process vessel (a reaction chamber in which chemicals are processed), 407 (10.4%) piping, and 257 (6.6%) storage areas above ground (i.e., tank, storage shed, and warehouse). Of the 1,067 events with two areas, 805 (75.4%) involved ancillary processing equipment in combination with other types of area (Figure 1). There were 561 transportation-related events. Two events involved two types of transportation. Of the 563 transportation types, 412 (73.2%)

occurred during ground transport (e.g., truck, van, or tractor), and 73 (13.0%) involved transport by rail (Figure 2). Fewer events involved water, air, and pipeline transportation modes. The largest proportion of transportation-related events occurred from a moving vehicle or vessel 229 (40.7%) and releases that occurred enroute that were later discovered at a fixed facility 185 (32.9%).

Factors contributing to the events consisted of primary and secondary entries and were reported for 5,517 (99.9%) events. Of reported factors, 3,118 (69.0%) fixed-facility events (Figure 3a) and 164 (29.8%) transportation-related events (Figure 3b) involved equipment failure as the primary factor; 450 (10.0%) fixed-facility and 373 (67.7%) transportation-related events involved human error as the primary factor. The most frequently reported secondary factor for fixed-facility events was process upset 1,407 (28.4%) (Figure 3c). There was no secondary factor reported in 40.2% of the transportation events. Improper filling, loading, packing, and mixing accounted for 37.3% of the secondary factors in transportation events (Figure 3d).

More than 98% of all events involved the release of only one substance. Two substances were released in 50 (0.9%), and 0.4% involved the release of more than two substances (Table 1).

Transportation events were more likely than fixed-facility events to have two or more substances involved in an event (5.5% vs. 0.8%).

A total of 5,773 substances were either released or threatened to be released during the events.

Two types of releases for each chemical (e.g., spill and air) could be reported. Only one type of release was reported in 5,644 events; the single-release types were associated with the following:



air releases (4,361, 77.3%), spills (1045, 18.5%), fires (208, 3.7%), and explosions (3, 0.1%); 27 (0.5%) were threatened releases. Two types of releases occurred in 129 events. The following combinations were reported: spill and air releases (94, 72.9%), spill and fire (18, 14.0%), and fires and explosions (8, 0.6%); the remainder involved other combinations of release types, or unknown release types.

The number of events by month ranged from 393 (7.1%) in February to 546 (9.9%) in October. The proportion of events ranged from 14.8% to 16.2% during week days, and from 10.5% to 11.7% during weekend days. Of all 5,524 (99.9%) events for which time of day or time category was reported, 32.8% occurred from 6:00 a.m. to 11:59 a.m., 28.0% from 12:00 p.m. to 5:59 p.m., 21.1% from 6:00 p.m. to 11:59 p.m., and the remainder during the early hours of the day.

### ***Industries***

The industries with the largest proportions of HSEES events were associated with manufacturing 4,351 (78.8%) and transportation 653 (11.8%) (Table 2). The largest proportion of events with injuries occurred in the transportation industry (40.8%). The largest number of victims was in the manufacturing industry (98, 54.1%), followed by the number of victims in the transportation industry (50, 27.6%) (Table 2). For specific industry codes, the largest proportions of HSEES events were associated with the industrial and miscellaneous chemicals manufacturing 1,850 (33.5%) and petroleum refining 1,390 (25.2%) industries. However, the largest proportion of events with injuries occurred in the trucking industry (35.1%). The largest number of victims

occurred in the trucking industry and the industrial and miscellaneous chemicals manufacturing; each had 38 victims (21.6%), followed by the petroleum refining industry (18, 10.2%).

### ***Substances***

A total of 5,773 substances were involved in all events, of which 27 (< 1%) were reported as threatened releases. The substances most frequently released were NO<sub>x</sub> (n=554) (includes nitric oxide, nitrogen oxide (NO<sub>x</sub>), and oxides of nitrogen NOS); the substance composed of the mixture of carbon monoxide, hydrogen sulfide, NO<sub>x</sub>, and sulfur dioxide (n=212); and the substance composed of the mixture of carbon monoxide, NO<sub>x</sub>, sulfur dioxide, and volatile organic compounds (n=153) (Appendix A). Excluding mixtures, the most frequent single substances were NO<sub>x</sub> (n=554), ammonia (n=120), and sulfur dioxide (n=93). These substances were grouped into 16 categories (Table 3).

### ***Victims***

A total of 181 victims were involved in 76 events (1.4% of all events) (Table 4). Of the 76 events with victims, 42 (55.3%) events involved only one victim, and 19 (25.0%) involved two victims. Of all victims, 121 (66.9%) were injured in fixed-facility events. Fixed-facility events were more likely to have more than one victim per event (51.3%) than were transportation events (38.5%).

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 had victims. Substances in events that involved one or more substances from the same substance category were counted once in that category. Substances in events that involved two or more substances from different categories 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 involving the substance category “mixtures” constituted 47.8% of all events. However, only 0.4% of these events resulted in injuries. Conversely, events involving “other” and chlorine exclusively comprised 1.2% and 0.7% of all events respectively, but 7.2% of these “other” events and 7.9% of chlorine events resulted in injuries.

Employees, including one employee-responder, (103, 56.9%) constituted the largest proportion of the population groups injured, followed by members of the general public (56, 30.9%) (Figure 4). Eighteen emergency response personnel were injured in fixed-facility events (Figure 5). Four emergency-responder victims were injured in transportation-related events. All of these victims were police officers. Police officers were more frequently victims in transportation-related events (6.7%) than in fixed-facility events (2.5%).

Victims were reported to sustain a total of 225 injuries (Table 6). Some victims had more than one injury. Of all reported injuries, the most common injuries in fixed-facility events were respiratory irritation (73, 49.3%), eye irritation (22, 14.9%), and chemical burns (15, 10.1%). In transportation-related events, trauma (39, 50.6%), chemical burns (15, 19.5%), and headache and gastrointestinal system problems (7 each, 9.1%) were reported most frequently. In a large proportion of the instances, trauma might have resulted from a chain of events, such as a motor

vehicle accident, leading to the release of a hazardous substance, and not necessarily by the exposure to the substance itself.

Of the 181 victims, 153 (84.5%) were males. Males constituted 96.0% of all employees and responders. The median age of the 136 (75.1%) victims for whom age was reported was 40 years (range: 1–87). Of these victims, one was a child age 1 year, and one was a child age 11 years. For the 45 (24.9%) injured persons for whom the age was not reported, all were adults (employees and members of the general public) age 20 or greater. The largest proportion of victims (83, 45.9%) were treated at the hospital and released; 30 (16.6%) were given first aid at the scene, 19 (10.5%) were admitted to the hospital, and 16 (8.8%) died (Figure 6).

Most of these employees (47, 45.6%) and 9 (40.9%) of first responders (7 police officers and 2 volunteer firefighters) had not worn any form of PPE. Employees most often used gloves and eye protection (28, 27.2%), followed by a Level “D” uniform (25, 24.3%). Two (1.9%) employees also wore Level C protection and one (1%) employee wore Level B protection. Among first responders, the majority, 11 (50.0%) wore fire fighter turn-out gear without respiratory protection and 2 (9.1%) wore fire fighter turn-out gear with respiratory protection.<sup>a</sup>

There were two events each involving a large number of injured people. The first event occurred in an industrial/residential area of a city and involved an oven coated with Teflon

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<sup>a</sup> Note: Firefighter turn-out gear is protective clothing normally worn by firefighters during structural fire-fighting operations and is similar to level “D” protection. Level “D” as defined by the Occupational Safety and Health Administration is coveralls, boots/shoes (leather or chemical resistant, steel toe and shank), safety glasses or chemical splash goggles, and hard hat. Level “D” provides limited protection against chemical hazards.

(polytetrafluoroethylene). Fourteen people were injured: 2 employees, 3 police officers, and 9 firefighters. The oven malfunctioned and overheated the coating, causing it to decompose into 200 pounds of hydrogen fluoride and carbonyl fluoride gas. The facility's power was secured and the oven was turned off; the building was ventilated. After entering the emergency department, one of the employees refused treatment. The remaining victims were observed and treated for symptoms of respiratory irritation, decontaminated by emergency showers, and then released. Personal protective equipment (PPE) only was worn by the fire fighters. They were wearing fire fighter turn-out gear, but it was unknown if they also were wearing respiratory protection at the time of their exposure.

The second event occurred on the evening shift at a petroleum refining plant; 17 people were injured. A corrosion failure of a phenol column line released 15,000 pounds of phenol; 12,000 pounds spilled on the ground, of which 3,000 pounds volatilized to the atmosphere. The spill impacted local roads inside the plant. Access to the facility was restricted. Seventeen people were evacuated from the affected building for one hour. Twenty-six employees received emergency decontamination; nine of these employees were uninjured and nine employees received first-aid at the scene for symptoms of respiratory irritation. The remaining eight employees were transported to the hospital: 6 were observed for symptoms of respiratory irritation, but received no treatment, and 2 employees were treated for eye irritation. All 17 injured employees were wearing Level "D" PPE. The company responded to the spill with its own company certified hazmat response team and company fire department.

## **EVACUATIONS**

Evacuations were ordered in 79 (1.4%) events where evacuation status was reported. Of these evacuations, 55.7% were of a building or the affected part of a building; 17.7% were of a defined circular area surrounding the event locations; and the remainder were evacuated downwind or downstream of the area, a circular and downwind or downstream area, or had no criteria for the evacuation. The number of people evacuated ranged from 1 to 1,000 people, with a median of 20. The median length of evacuation was 2 hours, with a range of 1 hour to 4 days. In 86.1% of events for which evacuation was ordered, access to the area was restricted. Forty-two events had in-place sheltering ordered by an official.

## **RESPONSE**

States could report up to 10 categories of “who responded” to the event. At least one response category was reported for 4662 (84.4%) of events. Of these events, 6.7% had 2 or more categories reported, 1.9% had 3 or more categories reported, and approximately 1% had more 4 or more categories reported.

The distribution of the 10 response categories are as follows:

Company’s response team	92.51%
Certified HazMat team	8.02%
Fire Department	5.56%
Law enforcement agency	1.89%
Environmental agency	0.54%
EMT	0.49%

‘Other’	0.34%
Health Department	0.09%
Hospital personnel	0.02%
EPA response team	0.02%

\* Percentages sum to greater than 100% because an event can report multiple categories.

## **PREVENTION ACTIVITIES**

During 2002-2003 the Texas HSEES program performed various prevention activities. These activities included:

- A power point presentation to the National Fire Protection Association conference on Texas data and case studies regarding injured firefighters;
- Improved Texas HSEES web site which now contains links for all the reports, fact sheets, and presentations produced by Texas HSEES;
- Developed and distributed a report on the trucking services industry using Texas HSEES data from 1993 – 2000;
- Developed and distributed a cumulative report on Texas HSEES data from 1998 – 2001;
- Delivered a power point presentation at the Mary Kay O’Connor Process Safety Symposium describing the impact of adverse weather on fixed-facility hazardous substances emergency events; and
- Increased awareness of the morbidity and mortality associated with ammonia releases in Texas by distributing ammonia fact sheets to a targeted group (i.e., ammonia users).

The Texas HSEES Internet website page is available at <http://www.tdh.state.tx.us/epitox/hsees/default.htm>. At this site, annual reports and other information can be downloaded.



### **Characteristics of Events Involving Fatalities in 2002 – 2003**

During 2002 through 2003 there were ten events where 16 victims died; 2 other victims were also injured in these events. Most events with fatalities were transportation events (8, 80%) involving the deaths of 5 employees and 8 members of the general public. The type of injuries sustained in transportation events were 12 reports of trauma injuries and 7 reports of chemical burns. All of the transportation events involved the primary factor of human error and a secondary factor either of vehicular collisions, derailments, or rollovers. These transportation events involved the release of a variety of chemicals including acetone, amines, furniture cleaner, glyphosate isopropylammonium salt, paint, propylene glycol, and sodium hydrosulfide. Some of the victims died from trauma injuries; their deaths most likely were not related to chemical exposure. There were two fixed-facility events involving the deaths of 1 employee and 2 members of the general public. The injuries reported in the fixed-facility events were dizziness/central nervous system symptoms (2, 40%), and gastrointestinal symptoms, chemical burns, and pneumonia (1 each, 20%). One fixed-facility event involved the misapplication of the pesticide methyl bromide within a private residence which resulted in the death of two men. The other fixed-facility event involved an employee connecting a hose to a waste incinerator. The hose ruptured releasing a mixture of triethylaluminum and mineral oil which caused a flash fire, fatally injuring the employee.

### **SUMMARY OF RESULTS, 1993-2003**

During 1993–2003, the largest proportion of events occurred in fixed facilities (Table 7). Since Texas began HSEES surveillance in 1993, the proportion of fixed-facility events has averaged about 90% each year. Texas HSEES utilizes the U.S. Department of Transportation’s Hazardous

Materials Information System as a primary notification source for transportation events. More than 2,000 events have been investigated each year since 1995 (Figure 7). Fluctuations in the number of events may have been due, in part, to the expansion of reporting sources and changes in state and federal reportable quantities.

In events involving victims, respiratory symptoms have been the most common injury reported. Although the number of victims has decreased since 2001, injuries and deaths continue to occur. The number of deaths associated with events continues to suggest the need not only to evaluate the danger posed by exposure to hazardous substances, but also to describe the circumstances surrounding the events (e.g., fires, explosions, motor vehicle accidents). From 1993 through 1995, members of the general public were the most frequently reported victims. In 1993 there were three events involving large numbers of victims, the majority being members of the general public. One event involved 251 members of the public, a second event involved 128 members of the public, and a third event involved 73 members of the public, 3 employees, and 8 responders. In 1994, there were 2 events involving large numbers of victims. One event involved 111 members of the general public and 25 responders. The second event involved 580 members of the general public and 2 employees. In 1995 one event injured 90 members of the general public and 2 responders. Since 1996, employees have been the most commonly reported victims of emergency events. However, members of the general public and responders continue to be victims (Figure 8).

HSEES data analyses show that from 1993 through 2003, the proportions of the number of events with victims have fluctuated from year to year, but overall 2.4% of the events involve

victims. The proportion of the number of events with evacuations also has fluctuated from year to year, with an average of 3% of the events involving evacuations.

## 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 materials releases. Am J Public Health 1989; 70:1042-4.

Appendix A. — The 10 most frequent substances involved in events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003

Number	Standardize Substance Name	Frequency
1.	NO <sub>x</sub> *	554
2.	MIX: CO <sup>†</sup> /H <sub>2</sub> S <sup>‡</sup> /NO <sub>x</sub> /SO <sub>2</sub> <sup>¶</sup>	212
3.	MIX: CO/NO <sub>x</sub> /SO <sub>2</sub> /VOC <sup>€</sup>	153
4.	MIX: CO/NO <sub>x</sub> /VOC	126
5.	Ammonia	120
6.	MIX: CO/Ethylene/NO <sub>x</sub> /VOC	116
7.	MIX: CO/NO <sub>x</sub>	115
8.	Sulfur dioxide	93
9.	MIX: CO/NO <sub>x</sub> /Propylene	89
10.	MIX: CO/Ethylene/NO <sub>x</sub>	85

\*Hawley's Condensed Chemical Dictionary, 12<sup>th</sup> edition, 1993, defines NO<sub>x</sub> as including Nitric Oxide, Nitrous Oxide, Nitrogen Oxide (NO<sub>x</sub>), Oxides of Nitrogen NOS, and Nitrogen Dioxide.

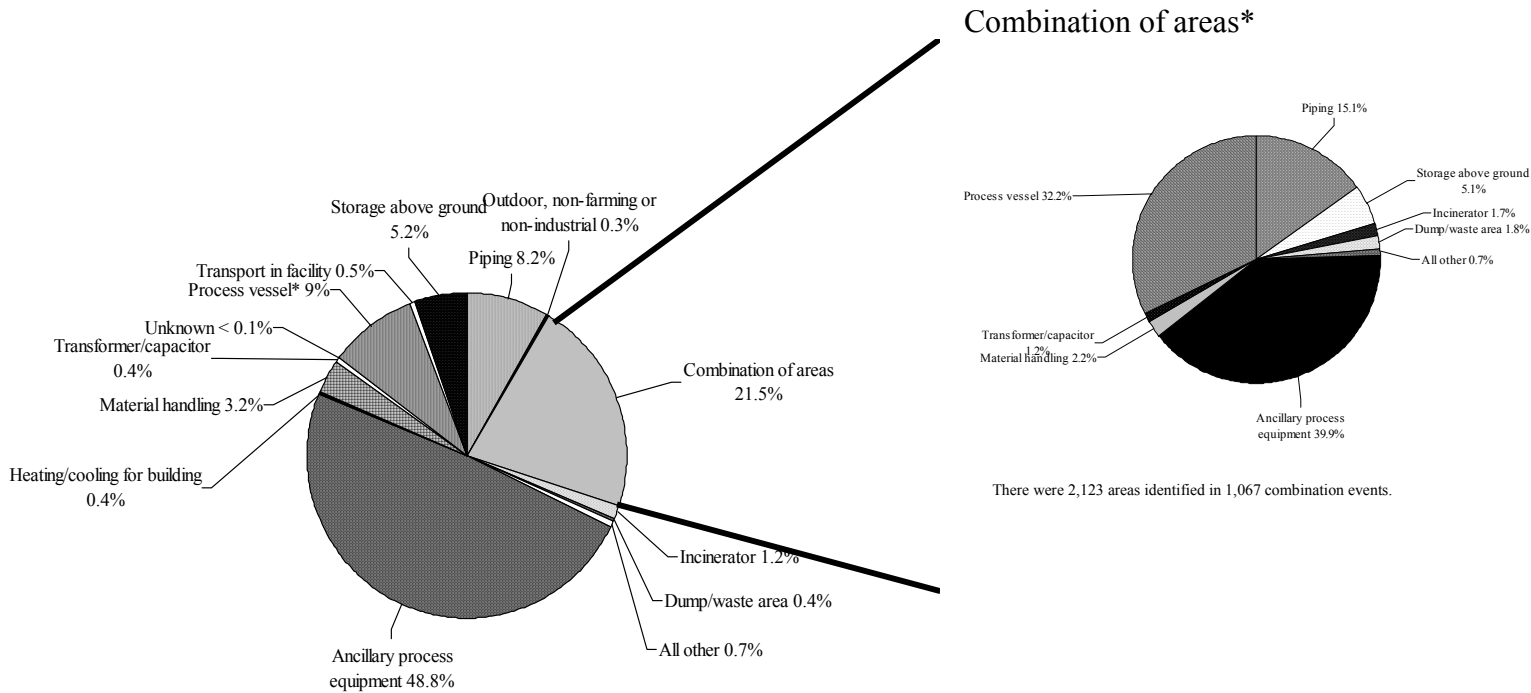
<sup>†</sup>CO=Carbon Monoxide

<sup>‡</sup>H<sub>2</sub>S =Hydrogen Sulfide

<sup>¶</sup>SO<sub>2</sub>=Sulfur Dioxide

<sup>€</sup>VOC=Volatile Organic Compounds

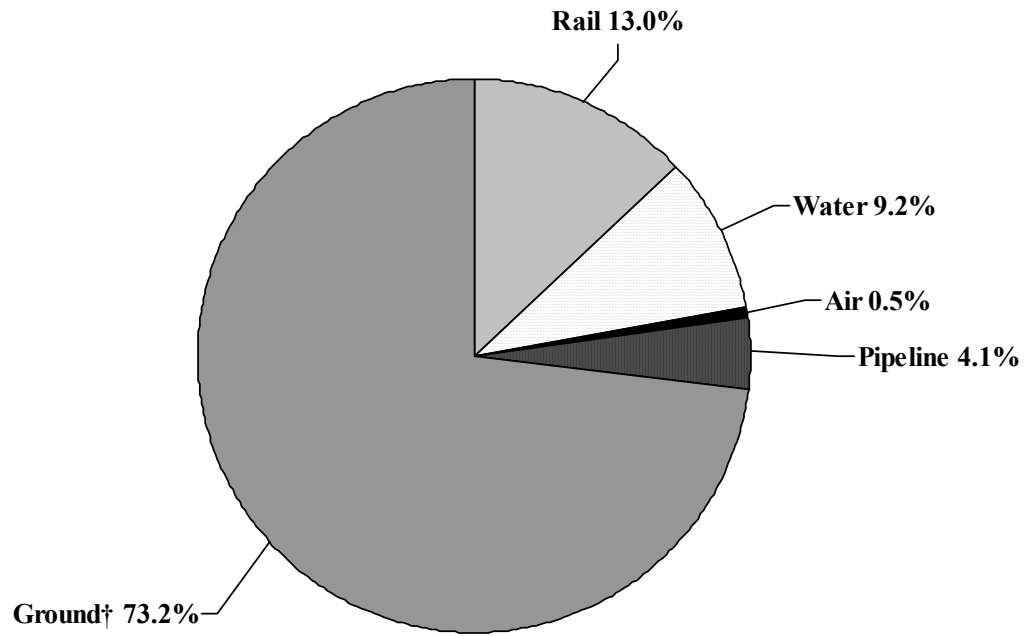
Figure 1.--Areas of fixed facilities involved in events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*Reaction chamber where substances are processed.

There were 2,123 areas identified in 1,067 combination events.

Figure 2.—Distribution of transportation-related events\*, by type of transport, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\* Two events involved a combination of two types of transport.

† Transport in a truck, van, or trailer.

Figure 3a.—Primary factors reported as contributing to the occurrence of fixed-facility events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

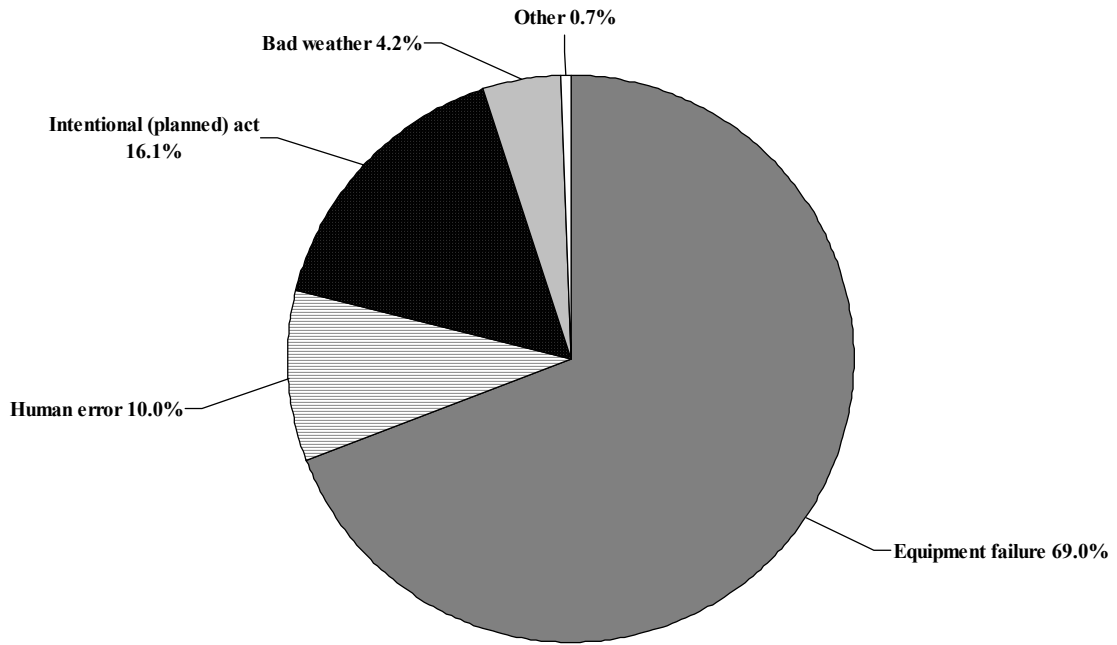




Figure 3b.—Primary factors reported as contributing to the occurrence of transportation events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

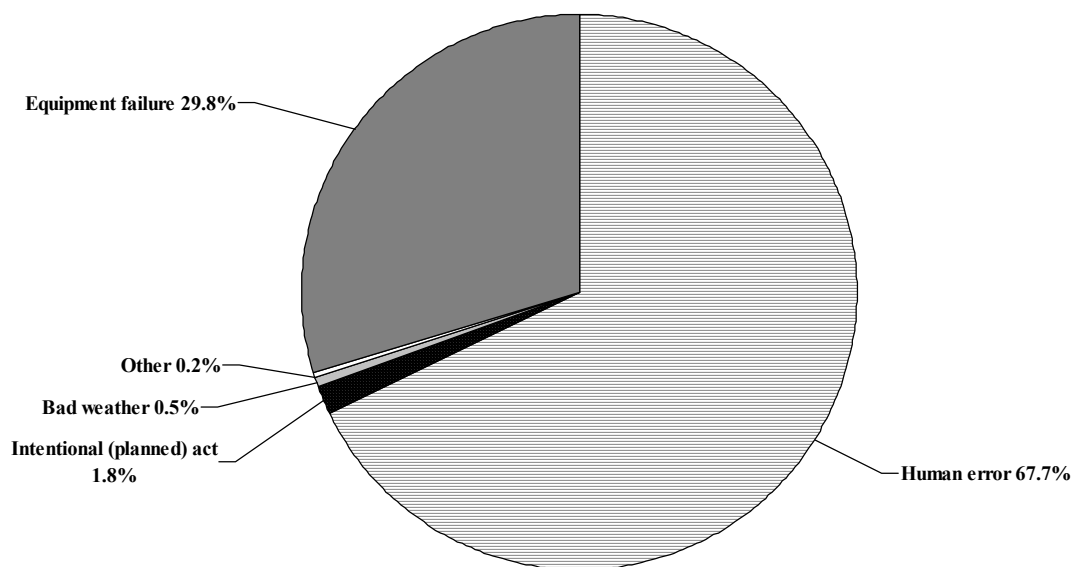
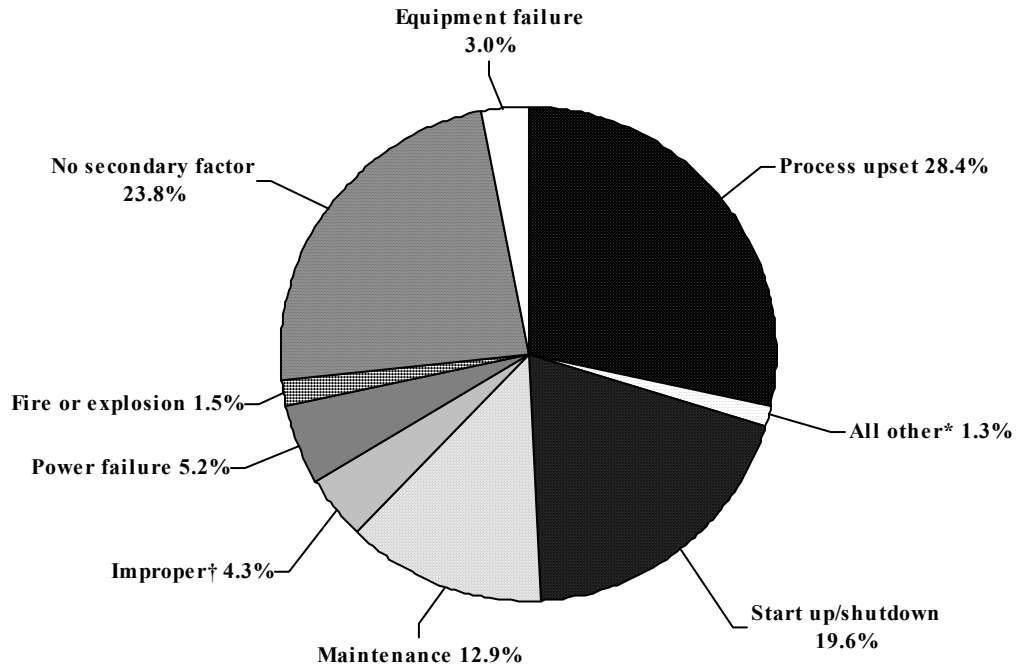


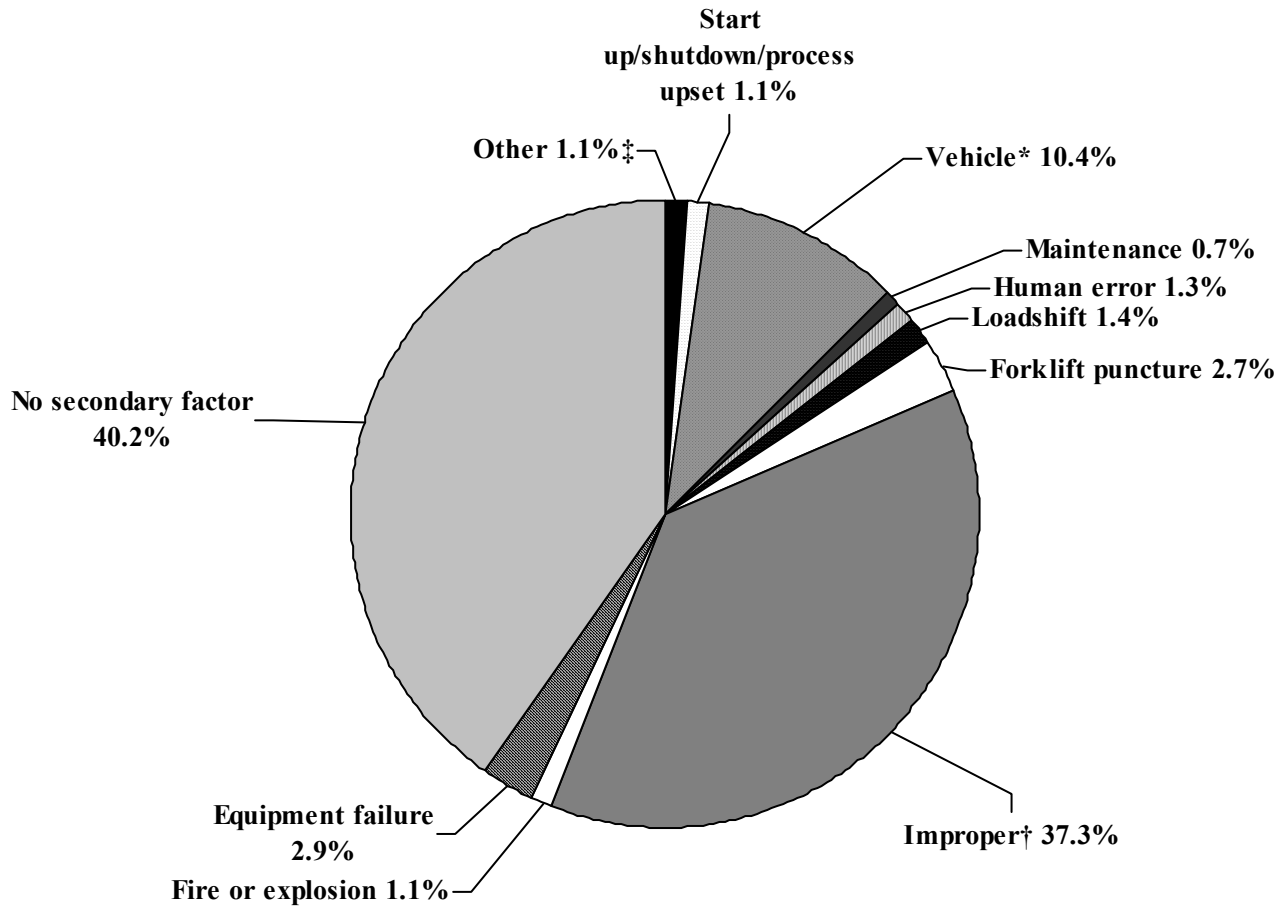
Figure 3c.—Secondary factors reported as contributing to the occurrence of fixed-facility events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*All other includes dumping, forklift puncture, human error, illicit drug production, loadshift, overspray, vehicle or vessel derailment/rollover/capsize.

†Improper includes improper filling, loading, packing, and mixing.

Figure 3d.—Secondary factors reported as contributing to the occurrence of transportation events, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*Vehicle includes vehicle collision, derailment, rollover, or capsize of vehicle.

†Improper includes improper filling, loading, packing, and mixing.

‡ Other includes improper dumping.

Figure 4.—Distribution of victims, by population group and type of event, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

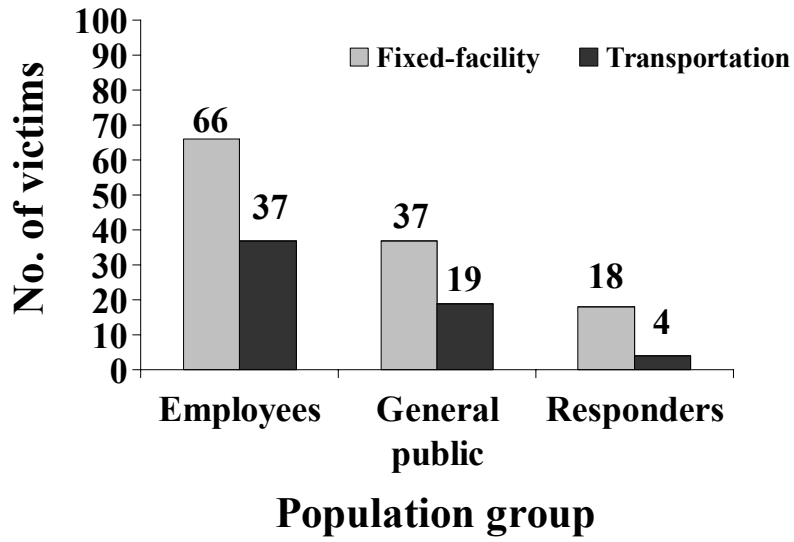
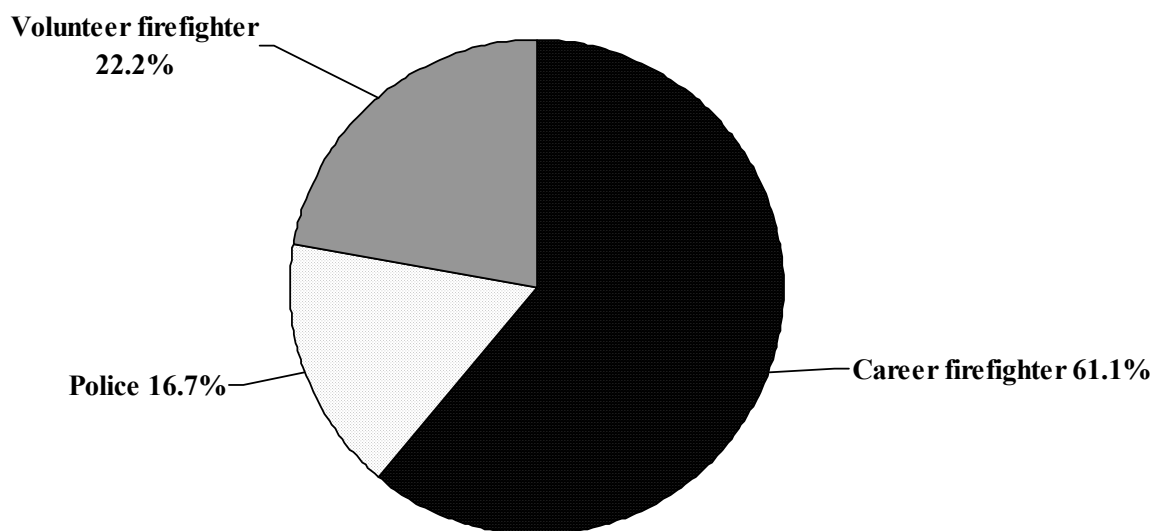
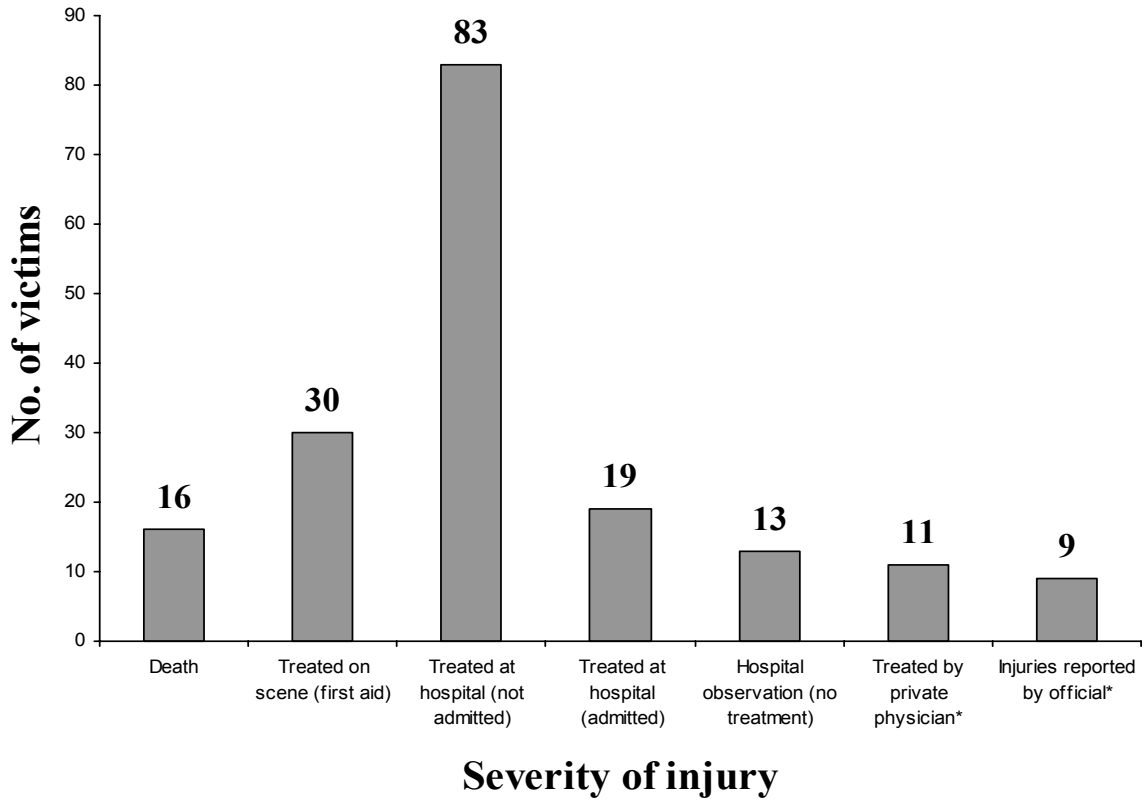


Figure 5.—Distribution of responders injured in fixed-facility events, by population group\*  
Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*A total of 18 responders were injured during fixed-facility events.

Figure 6.—Distribution of victim severity/disposition, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.



\*Within 24 hours.

Figure 7.—Cumulative data, Texas Hazardous Substances Emergency Events Surveillance, 1993-2003.

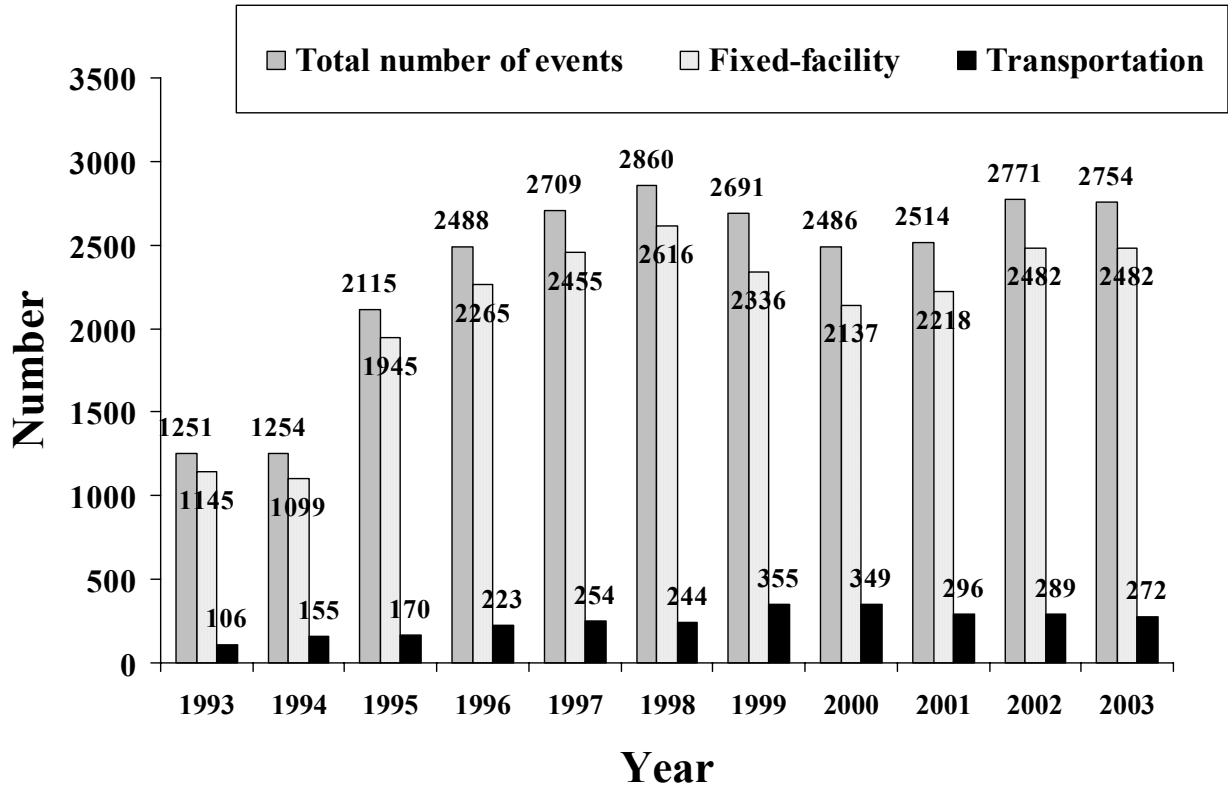
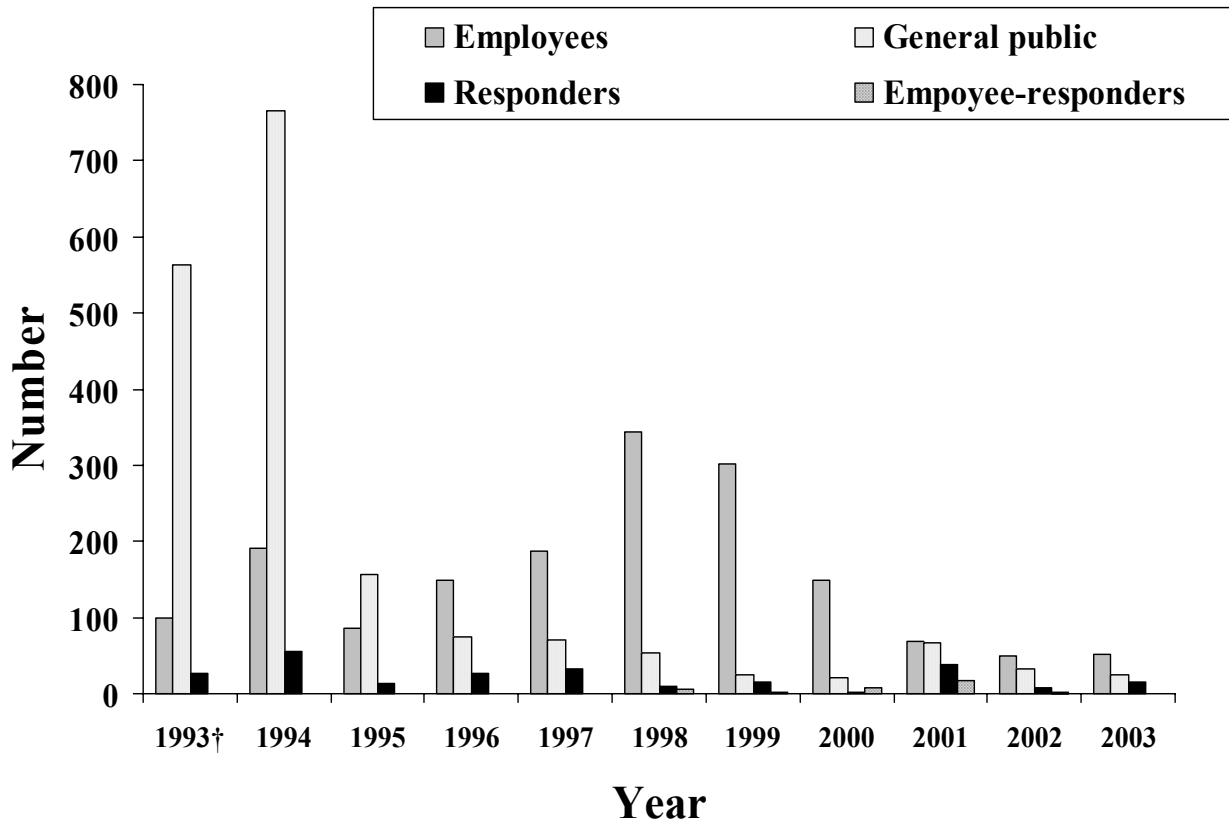


Figure 8.—Distribution of victims, by year, Texas Hazardous Substances Emergency Events Surveillance, 1993-2003\*.



\* The victim category was missing or unknown for 21 victims.

†In 1993, members of the general public included two students. The category of “student” did not become available until 1996.



Table 1.—Number of substances involved per event, by type of event, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	4923	99.2	4923	530	94.5	530	5453	98.7	5453
2	31	0.6	62	19	3.4	38	50	0.9	100
3	4	< 0.1	12	8	1.4	24	12	0.2	36
4	2	< 0.1	8	3	0.5	12	5	< 0.1	20
≥ 5	4	< 0.1	159	1	0.2	5	5	< 0.1	164
<b>Total</b>	<b>4964</b>	<b>100.0</b>	<b>5164</b>	<b>561</b>	<b>100.0</b>	<b>609</b>	<b>5525</b>	<b>100.0</b>	<b>5773</b>

Table 2.—Industries involved in hazardous substances events, by category, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

Industry category	Total events		Events with victims		Percentage all events with victims	Total no. victims # (range)*
	No.	%	No.	%		
Agriculture	10	0.2	2	2.6	20.0	2 (1)
Business and repair services	15	0.3	2	2.6	13.3	2 (1)
Communications	3	< 0.1	0	0.0	0	0 (0)
Construction	17	0.3	0	0.0	0.0	0 (0)
Entertainment and recreation	4	< 0.1	0	0.0	0	0 (0)
Finance and real estate	1	< 0.1	0	0.0	0	0 (0)
Manufacturing	4351	78.8	21	27.6	0.5	98 (1-17)
Mining	272	4.9	4	5.3	1.5	4 (1)
Personal services	3	< 0.1	1	1.3	33.3	2 (2)
Professional services	15	0.3	3	4.0	20.0	6 (2)
Public administration	12	0.2	2	2.6	16.7	2 (1)
Retail trade	8	0.1	1	1.3	12.5	1 (1)
Transportation	653	11.8	31	40.8	4.7	50 (1-4)
Utilities and sanitary services	68	1.2	1	1.3	1.5	1 (1)
Wholesale trade	58	1.0	3	4.0	5.2	3 (1)
Unspecified and unknown	35	0.6	5	6.6	14.3	10 (1-3)
Total	5525	100.0	76	100.0	1.4	181 (1-17)

\*Range of number of victims per event with victims.

Table 3.—Number of substances\* involved, by substance category and type of event, Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

Substance category	Type of event				All events	
	Fixed facility		Transportation		No. substances	%
	No. substances	%	No. substances	%		
Acids	141	2.7	81	13.4	222	3.8
Ammonia	117	2.3	6	1.0	123	2.1
Bases	75	1.5	61	10.1	136	2.4
Chlorine	38	0.7	3	0.5	41	0.7
Hetero-Organics	43	0.8	19	3.1	62	1.1
Hydrocarbons	39	0.8	8	1.3	47	0.7
Mixture‡	2659	51.5	34	5.6	2693	46.7
Other†	55	1.1	39	6.5	94	1.6
Other inorganic substances¶	976	18.9	56	9.3	1032	17.9
Oxy-Organics	96	1.9	48	7.9	144	2.5
Paints & dyes	24	0.5	47	7.8	71	1.2
Pesticides	105	2.0	48	7.9	153	2.7
Polychlorinated biphenyls	3	0.1	0	0.0	3	0.1
Polymers	63	1.2	25	4.1	88	1.5
Volatile organic compounds	724	14.0	129	21.4	853	14.8
Indeterminate	6	0.1	5	0.8	11	0.2
<b>Total€</b>	<b>5164</b>	<b>100.1</b>	<b>604</b>	<b>100.7</b>	<b>5768</b>	<b>100.0</b>

\*The number of substances (5,773) was greater than the number of events (5,525) because some events had more than one substance.

†Not classified.

‡Substances from different categories that were mixed prior to the event.

¶All inorganic substances except for acids, bases, ammonia and chlorine.

€Percentages may not add to 100% due to rounding.

Table 4.—Frequency of the number of victims by type of event, Texas Hazardous Substances Emergency events Surveillance, 2002-2003.

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. of events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	18	48.6	18	24	61.5	24	42	55.3	42
2	8	21.6	16	11	28.2	22	19	25.0	38
3	4	10.8	12	2	5.1	6	6	7.9	18
4	0	0.0	0	2	5.1	8	2	2.6	8
5	0	0.0	0	0	0.0	0	0	0.0	0
≥6	7	18.9	75	0	0.0	0	7	9.2	75
<b>Total*</b>	<b>37</b>	<b>99.9</b>	<b>121</b>	<b>39</b>	<b>99.9</b>	<b>60</b>	<b>76</b>	<b>100.0</b>	<b>181</b>

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

Table 5.—Frequency of substance categories in all events and events with victims, Texas Hazardous Substances Emergency Events Surveillance System, 2002-2003.\*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	203	3.7	9	11.8	4.4
Ammonia	119	2.2	2	2.6	1.7
Bases	129	2.3	4	5.3	3.1
Chlorine	38	0.7	3	3.9	7.9
Hetero organics	44	0.8	4	5.3	9.1
Hydrocarbons	39	0.7	1	1.3	2.6
Mixture†	2639	47.8	10	13.2	0.4
Multiple substance category	59	1.1	11	14.5	18.6
Other‡	69	1.2	5	6.6	7.2
Other inorganic substances¶	991	17.9	6	7.9	0.6
Oxy-organics	106	1.9	2	2.6	1.9
Paints & dyes	63	1.1	2	2.6	3.2
Pesticides	135	2.4	4	5.3	3.0
Polychlorinated biphenyls	3	0.1	0	0.0	0.0
Polymers	76	1.4	4	5.3	5.3
Volatile organic compounds	806	14.6	8	10.5	1.0
Indeterminate	6	0.1	1	1.3	16.7
<b>Total</b>	<b>5525</b>	<b>100.0</b>	<b>76</b>	<b>100.0</b>	<b>1.4</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. Events that involved multiple substances from different substance categories were counted only once in the multiple substance category.

†Substances from different categories that were mixed prior to the event.

‡Not classified.

¶All inorganic substances except for acids, bases, ammonia, and chlorine.

Table 6.—Frequencies of injuries/symptoms, by type of event,\* Texas Hazardous Substances Emergency Events Surveillance, 2002-2003.

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Chemical burns	15	10.1	15	19.5	30	13.3
Dizziness or other central nervous system	3	2.0	2	2.6	5	2.2
Eye	22	14.9	2	2.6	24	10.7
Gastrointestinal system	2	1.4	7	9.1	9	4.0
Headache	5	3.4	7	9.1	12	5.3
Heart problems	2	1.4	0	0.0	2	0.9
Other	2	1.4	0	0.0	2	0.9
Respiratory	73	49.3	5	6.5	78	34.7
Shortness of breath	2	1.4	0	0.0	2	0.9
Skin	13	8.8	0	0.0	13	5.8
Trauma	9	6.1	39	50.6	48	21.3
<b>Total†</b>	<b>148</b>	<b>100.2</b>	<b>77</b>	<b>100.0</b>	<b>225</b>	<b>100.0</b>

\*The number of injuries is greater than the number of victims (181) because a victim could have had more than one injury.

† Percentages may not add to 100% due to rounding.

Table 7.— Cumulative data by year, Texas Hazardous Substances Emergency Events Surveillance, 1993-2003.\*

Year	Type of event			No. substances Involved	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	%†
1993	1,145	106	1,251	1,543	702	6	60	4.8
1994	1,099	155	1,254	1,668	1,012	7	80	6.4
1995	1,945	170	2,115	2,289	254	0	52	2.5
1996	2,265	223	2,488	2,543	249	19	65	2.6
1997	2,455	254	2,709	2,833	290	11	55	2.0
1998	2,616	244	2,860	2,925	418	6	72	2.5
1999	2,336	355	2,691	2,791	344	2	49	1.8
2000	2,137	349	2,486	2,583	178	8	53	2.1
2001	2,218	296	2,514	2,688	191	1	65	2.6
2002	2,482	289	2,771	2,812	90	6	39	1.4
2003	2,482	272	2,754	2,961	91	10	37	1.3
Total‡	23,180	2,713	25,893	27,636	3,819	76	627	2.4

\* 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.

‡ The total number of substances does not include 43 because the type of substance was not known.