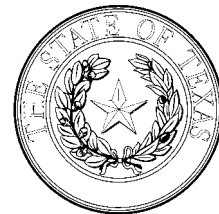


Texas Hazardous Substances Emergency Events Surveillance (HSEES) System

2004

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Contents

	Page
List of Tables	2
List of Figures	3
Executive Summary	4
Introduction	6
Methods	8
Results	9
Industries	11
Substances	12
Victims	13
Nearby populations	16
Evacuations	17
Decontamination	17
Response	18
Texas Prevention Outreach Activities	18
Summary of Results, 1993–2004	19
References	21
Appendix	22

List of Tables

	Page
Table 1. Number of events meeting the surveillance definition, by county and type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	23
Table 2. Number of substances involved per event, by type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	26
Table 3. Industries involved in hazardous substance events, by category—Texas Hazardous Substances Emergency Events Surveillance, 2004	27
Table 4. Number of substances involved, by substance category and type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	28
Table 5. Number of victims per event, by type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	29
Table 6. Frequency of substance categories in all events and events with victims—Texas Hazardous Substances Emergency Events Surveillance, 2004	30
Table 7. Frequencies of injuries/symptoms, by type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	31
Table 8. Distribution of personnel who responded to the event—Texas Hazardous Substances Emergency Events Surveillance, 2004	32
Table 9. Cumulative data by year—Texas Hazardous Substances Emergency Events Surveillance, 1993–2004	33

List of Figures

		Page
Figure 1.	Areas of fixed facilities involved in events—Texas Hazardous Substances Emergency Events Surveillance, 2004	34
Figure 2.	Distribution of transportation-related events, by type of transport—Texas Hazardous Substances Emergency Events Surveillance, 2004	35
Figure 3a.	Primary factors reported as contributing to events—Texas Hazardous Substances Emergency Events Surveillance, 2004	36
Figure 3b.	Secondary factors reported as contributing to events—Texas Hazardous Substances Emergency Events Surveillance, 2004	37
Figure 4.	Number of victims, by population group and type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004	38
Figure 5.	Injury disposition—Texas Hazardous Substances Emergency Events Surveillance, 2004	39
Figure 6.	Number of victims, by category and year—Texas Hazardous Substances Emergency Events Surveillance, 1993–2004	40

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 Texas in 2004. Information about acute events involving hazardous substances was collected, including the substance(s) released, number of victims, number and types of injuries, and number of evacuations. The data were computerized using an ATSDR-provided Web-based data entry system.

A total of 2,298 events were reported. In 2,257 (98.2%) events, only one substance was released. The most commonly reported categories of substances were mixture, other inorganic substances, and volatile organic compounds. During this reporting period, 40 events (1.7% of all reported events) resulted in a total of 210 victims, of whom 13 (6.2%) died. The most frequently reported injuries were respiratory irritation, headache, and eye irritation. Evacuations were ordered for 38 (1.7%) events.

The findings regarding the percentage of events with victims have been consistent in recent years. The distribution of the types of injuries reported has also been consistent with respiratory irritation reported the most frequently. The 2004 prevention outreach activities focused on developing employee and responder awareness of potentially hazardous chemicals and situations with a goal of reducing and preventing future releases and associated injuries. Specifically fact sheets on chlorine, hydrochloric acid, sulfuric acid, and the report on 2002 – 2003 events were distributed to industry contacts. An exhibit on hazardous substance release events involving mass casualties was displayed for responders attending the National Disaster

Medical System conference. The exhibit included situations involving fires and/or explosions which were associated with a large number of fatalities.

INTRODUCTION

The Centers for Disease Control and Prevention defines surveillance as the

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

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences of releases of hazardous substances. The decision to initiate a surveillance system of this type was based on a study published in 1989 about the reporting of hazardous substances releases to three national databases: the National Response Center Database, the Hazardous Material Information System (HMIS), and the Acute Hazardous Events Database [2].

A review of these databases indicated limitations. Many events were missed because of specific reporting requirements (for example, the HMIS did not record events involving intrastate carriers or fixed-facility events). Other important information was not recorded, such as the demographic characteristics of victims, the types of injuries sustained, and the number of persons evacuated.

As a result of this review, ATSDR implemented the HSEES system to more fully describe the public health consequences of releases of hazardous substances.

HSEES has several goals:

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

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

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

This report provides an overview of HSEES for 2004 in 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

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

Beginning in 2002, 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, but were not limited to, the National Response Center, the Texas Commission on Environmental Quality, the Department of Transportation's 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 most of the events. All data were computerized using a Web-based data entry system provided by ATSDR.

HSEES defines hazardous substances emergency events as acute uncontrolled or illegal releases or threatened releases of hazardous substances. Events involving releases of only petroleum are excluded. Events are included if (a) the amount of substance released (or that might have been released) needed (or would have needed) to be removed, cleaned up, or neutralized according to

federal, state, or local law or (b) the release of a substance was threatened, but the threat led to an action (for example, evacuation) that could have affected the health of employees, emergency responders, or members of the general public. HSEES defines victims as people who experience at least one documented adverse health effect within 24 hours after the event or who die as a consequence of the event. Victims who receive more than one type of injury or symptom are counted once in each applicable injury type or symptom. Events are defined as transportation-related if they occur (a) during surface, air, pipeline, or water transport of hazardous substances, or (b) before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

For data analyses, 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 2004, a total of 2,298 acute hazardous substances events were captured by Texas HSEES: 3 (0.1%) of these events were threatened releases. Five (0.2%) were events in which substances were both threatened to be released and actually released. A total of 1,959 (85.2%) events occurred in fixed facilities. The counties with the most frequent number of events were Harris (676 [29.4%]) and Jefferson (323 [14.1%]) (Table 1).

For each fixed-facility event, one or two types of area or equipment involved in the fixed facility where the event occurred could be selected. Of all 1,959 fixed-facility events, 1,519 (66.1%) reported one type of area and 440 (22.5%) reported a combination of two area types. Among the 1,519 events with one type of area reported, the main areas were classified as follows: 986 (64.9%) ancillary process equipment, 171 (11.3%) piping, and 109 (7.2%) piping (Figure 1). Of the events with two areas, 347 (78.9%) involved ancillary processing equipment in combination with other types of areas.

Of the 339 transportation-related events, 260 (76.7%) occurred during ground transport (e.g., truck, van, or tractor) and 35 (10.3%) involved transport by rail (Figure 2). Fewer events involved water and pipeline transportation modes. Most (76.2%) ground transportation events involved trucks. Transportation-related chemical releases occurred in one of four phases. The largest proportions occurred from a moving vehicle or vessel (120 [35.4%]), followed by a release en route that was later discovered at a fixed facility (114 [33.6%]), releases occurring during unloading of a stationary vehicle or vessel (103 [30.4%]), and other (2 [0.6%]).

Factors contributing to the events consisted of primary and secondary entries. Primary factors were reported for 2,292 (99.7%) events (Figure 3a). Of the reported primary factors, most (67.5%) fixed-facility events involved equipment failure, and most (70.4%) transportation-related events involved human error. Secondary factors were reported for 1801 (78.4%) events (Figure 3b). Of the reported secondary factors, most (37.6%) fixed-facility events involved process upset, and most (60.7%) transportation-related events involved improper filling, loading, or packing.

More than 98% of all events involved the release of only one substance. Two substances were released in approximately 1.3% of the events, and approximately 0.5% 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 (6.8% vs.1.0%).

The number of events by month ranged from 162 (7.0%) in February to 241 (10.5%) in December, with the peaks from May through July and October through December. The proportion of events ranged from 14.3% to 16.9% during weekdays, and from 10.6% to 11.9% during weekend days. For time of occurrence of events, 31.0% occurred from 6:00 AM to 11:59 AM, 29.4% from 12:00 PM to 5:59 PM, 20.4% from 6:00 PM to 11:59 PM, and the remainder during the early hours of the day.

Industries

The largest proportions of HSEES events were associated with the manufacturing (1,669 [72.6%]) and transportation (391 [17.0%]) industries (Table 3). Within manufacturing, industrial and miscellaneous chemical manufacturing (661 [39.6%]) and petroleum refining (597 [35.8%]) accounted for most of the events. The largest number of events with victims occurred from the transportation industry (18 [45.0%]). The total number of victims was greatest in the transportation industry (78 [37.1%]) followed by the number of victims in manufacturing (44 [21.0%]) and wholesale trade (42 [20.0%]). Although the manufacturing industry resulted in a large proportion of events with victims and a large number of victims, only 0.5% of all

manufacturing events resulted in victims. Conversely, all events in the professional services industry resulted in victims, but this industry represented a small proportion (5.0%) of events with victims.

Substances

A total of 2,399 substances were released in all events, of which 4 (0.2%) substances were reported as threatened to be released. The individual substances most frequently released were NO_x [3], a mixture of carbon monoxide, hydrogen sulfide, NO_x, and sulfur dioxide, sulfur dioxide, and ammonia (Appendix). Substances were grouped into 16 categories. The substance categories most commonly released in fixed-facility events were mixtures (1,009 [50.1%]), other inorganic substances (411 [20.4%]), and volatile organic compounds (294 [14.6%]) (Table 4). In transportation-related events, the most common substance categories released were volatile organic compounds (92 [24.0%]), acids (50 [13.0%]), and bases (36 [9.4%]).

Two types of releases for each substance (e.g., spill and air) could be reported. Only one type of release was associated with the following: air releases (1,735 [73.4%]), spills (549 [23.2%]), fire (69 [2.9%]), threatened release (9 [0.4%]), and explosion (2 [0.1%]). Of events with two types of releases, the following combinations were reported: spill and air (21 [60.0%]), air and fire (9 [25.7%]), fire and explosion (4 [11.4%]), and the remaining 1 (2.9%) involved other combinations of release types.

Victims

A total of 210 victims were involved in 40 events (1.7% of all events) (Table 5). Of the 40 events with victims, 21 (52.5%) events involved only one victim, and 7 (17.5%) involved two victims. Of all victims, 130 (61.9%) were injured in fixed-facility events. Fixed-facility events were more likely to have three or more victims per event (47.4%) than were transportation-related events (14.3%). Additionally, 35 persons in 9 events (0.4% 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 6). For example, events categorized as mixtures constituted 44.3% of all events; however, only 0.4% of these events resulted in injuries. Conversely, events involving multiple substances and chlorine accounted for 31.4% and 9.5% of all events respectively, but 31.4% and 9.5% these events, respectively, resulted in injuries.

Members of the general public (101 [48.1%]) constituted the largest proportion of the population groups injured, followed by employees (90 [42.9%]) (Figure 4). In fixed-facility events, 10

emergency response personnel were injured. Of those, 5 (50.0%) were responders of unknown type, 4 (40%) were career firefighters, and 1 (10.0%) police officer. Nine responders were injured in transportation-related events. Of these, most (4 [44.4%]) were unknown responder type.

Victims were reported to sustain a total of 337 injuries or symptoms (Table 7). Some victims had more than one injury or symptom. Of all reported injuries/symptoms, the most common injuries/symptoms in fixed-facility events were respiratory irritation (79 [40.9%]), headaches (27 [14.0%]), and gastrointestinal system problems (20 [10.4%]). In transportation-related events, eye irritation (33 [22.9%]), respiratory irritation (31 [21.5%]), and trauma (25 [17.4%]) were reported most frequently. None of the trauma injuries in transportation-related events were substance-related; these 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.

The median age of the 158 (75.2%) victims for whom exact age was reported was 39 years (range: 2–85 years). For the 202 (96.0%) injured persons for whom an age category was reported, 5 (2.5%) were < 5 years of age, 15 (7.4%) were 5–14 years of age, 13 (6.4%) were 15–19 years of age, 110 (54.5%) were 20–44 years of age, 48 (23.8%) were 45–64 years of age, and 11 (5.5%) were ≥65 years of age. Of the 8 injured persons for whom age was not reported, 5 (62.5%) were presumably adults (because their population group was reported as responders or employees), and 3 (37.5%) could have been adults or children (because their population group was reported as members of the general public).

Of the 210 victims, 119 (56.7%) were males. Of all employees and responders for whom sex was reported, 56.9% were males.

Of the 210 victims, 120 (57.1%) were treated at the hospital and not admitted and 33 (15.7%) victims reported symptoms and were taken to the hospital for observation, however they did not require treatment. Thirteen (6.2%) deaths were reported (Figure 5).

Most of the employee-victims (86.7%) and 47.4% of the responder-victims had not worn any form of PPE. Employee-victims who wore PPE most often used other types of protection such as gloves, eye protection, hard hat, or steel-toed shoes (7 [58.3%]) or Level A (4 [33.3%]).

Among injured emergency responders who wore PPE, 6 (60.0%) wore firefighter turnout gear with respiratory protection and 4 (40.0%) wore firefighter turnout gear without respiratory protection.*

One event involved 44 injured people. This event occurred because of human error. At 5:15 am, a moving train hit a stationary train causing a puncture in the chlorine tank car. Multiple cars derailed and the trains caught on fire. The damaged chlorine tank car released 90,000 pounds of chlorine gas. Thirty tons of chlorine reacted with sodium hydroxide forming sodium hypochlorite. Also released were 78,000 gallons of urea fertilizer and 7,000 gallons of diesel. The train conductor was killed in the crash and two older women in a nearby residential area died from the exposure to chlorine gas.

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

A shelter-in-place was ordered. Evacuation, at first, was not feasible because of bridge damage and flooding in the immediate area. Some people self-evacuated. The official evacuation occurred when the company prepared to unload the chlorine car.

A city/county meeting was held to evaluate lessons learned from this event. Flooding in the area made it difficult for people to evacuate. Responders faced several issues: 1) there was only one bridge into this rural neighborhood, 2) confusing rural roads that changed names, and 3) language barriers. Spanish was the dominant language for many of the people impacted by the event. Communication in both Spanish and English would have made directions regarding shelter-in-place, evacuation, and medical care more clear. Some emergency response plan resources such as radio and television announcements were not used to communicate shelter-in-place directions or to direct people to specific locations for medical treatment. Patients and potentially exposed persons went in search of treatment in the nearby city and local towns instead of going to places predetermined by the general emergency response plan. For this reason, it was difficult for the investigator to obtain confirmed medical information and numbers of victims for this event.

Nearby populations

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS) or health department records. Residences were within ¼ mile of 571 (24.9%) events, schools within ¼ mile of 103 (4.5%) events, hospitals within ¼ mile

of 3 (0.1%) events, nursing homes within ¼ mile of 27 (1.2%) events, licensed daycares within ¼ mile of 110 (4.8%) events, industries or other businesses within ¼ mile of 1,978 (86.1%) events and recreational areas within ¼ mile of 161 (7.0%) events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 835 (36.3%) events with persons living within ¼ mile of the event; 1,354 (58.9%) events with persons living within ½ mile; and 1,638 (71.3%) events with persons living within 1 mile.

Evacuations

Evacuations were ordered in 38 (1.7%) of all 2,298 events. Of these evacuations, 39.5% were of buildings or affected parts of buildings; 23.7% were of defined circular areas surrounding the event locations; 18.4% were of areas downwind or downstream of the event; and the remainder were of circular and downwind or downstream areas or of no criteria. The number of people evacuated ranged from 1 to 900 people, with a median of 20 people. However, one ordered evacuation was reported as having no evacuees. The median length of evacuation was three hours (range: 1 hour to 13 days). Of all 2,298 events, 151 (6.6%) had access to the area restricted. Thirteen events had in-place sheltering ordered by an official.

Decontamination

Of the 210 (100%) victims for whom decontamination status was known, 163 (77.6%) were not decontaminated, 17 (8.1%) were decontaminated at the scene, 24 (11.4%) were decontaminated at a medical facility, and 6 (2.9%) 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 2 persons per event (range: 1–100 persons). No decontamination was done at a medical facility. Decontamination at the scene was done for 42 uninjured employees, 115 uninjured responders, and 4 uninjured members of the general public.

Response

Of all 2,298 events, 8.1% reported 2 or more categories of personnel who responded, 2.7% reported 3 or more categories, and 0.9% reported 4 or more categories. No one responded in 290 (12.6%) events. Company response teams (80.5%) responded most frequently to events, followed by certified HazMat teams (7.4%), fire departments (5.3%), and law enforcement (2.9%) (Table 8).

Texas Prevention Outreach Activities

Prevention outreach efforts for 2004 focused on preventing chlorine, sulfuric acid, and hydrochloric acid releases through the development of fact sheets for each of these substances and distribution of those fact sheets to the responsible parties who contributed data to the TxHSEES surveillance system. In an effort to decrease the overall number of chemical releases, the 2002-2003 report was distributed to the responsible parties who contributed data to TxHSEES. The fourth prevention outreach activity for 2004 was presenting an exhibit on TxHSEES events involving mass casualties to the National Disaster Medical Systems

conference. The purpose of the exhibit was to educate medical responders on the types of situations and injuries involving mass casualties that have been captured by the TxHSEES surveillance system.

SUMMARY OF RESULTS, 1993–2004

During 1993–2004, the largest proportion of events occurred in fixed facilities (Table 9). However, the number of reported transportation-related events has increased since data collection began. The increase is partially due to the 1999 addition of the U.S. Department of Transportation’s Hazardous Materials Information System as a primary notification source for transportation events. Although, the total number of events has decreased since 2002, more than 2,000 events have been investigated each year since 1995. Fluctuation 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. Other uncontrollable factors such as weather and business economic cycles impact industrial production, which then impacts the number of chemical release events. The number of substances released has also fluctuated.

The percentage of events with victims was highest in 1994 (6.4%) and lowest in 2003 (1.3%) (Figure 6). The average percentage of events with victims during 1993–2004 was 2.4%.

Although the number of victims decreased in 2002 and 2003, in 2004 the number of victims was the highest it has been since 1999. The proportion of the number of events with evacuations also has fluctuated from year to year, with an average of 2.9% of the events involving evacuations. The number of deaths was the highest it has been since 1996. Because there

continues to be injuries and deaths associated with releases of hazardous substances, evaluation of the danger posed by exposure to hazardous substances and descriptions of the circumstances surrounding the events (e.g., fires, explosions, motor vehicle accidents) are needed.

Respiratory irritation has consistently been the most frequently reported injury. From 1993 through 1995, and again in 2004, members of the general public were the most frequently reported victims. From 1996 through 2003, employees were the most commonly reported victims of emergency events. Responders also continue to be victims.

The number of deaths associated with acute hazardous substances events has increased since 2001. Many of these deaths were attributed to non-chemical circumstances surrounding the event (e.g., motor vehicle crashes).

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2. Binder S. Death, injuries, and evacuations from acute hazardous materials releases. *Am J Public Health* 1989;70:1042-4.
3. Hawley's Condensed Chemical Dictionary, 12th edition, 1993, defines NO_x as including Nitric Oxide, Nitrous Oxide, Nitrogen Oxide (NO_x), Oxides of Nitrogen NOS, and Nitrogen Dioxide.

Appendix

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

Number	Standardized Substance Name	Frequency
1.	NO _x *	175
2.	MIX: CO [†] /H ₂ S [‡] /NO _x /SO ₂ [¶]	86
3.	Sulfur dioxide	69
4.	Ammonia	55
5.	Ethylene	41
6.	MIX: CO/NO _x /VOC	37
7.	Benzene	36
8.	MIX: CO/Ethylene/NO _x	33
9.	MIX: H ₂ S/ SO ₂	33
10.	Butadiene	28
11.	Resin NOS	28

*Hawley's Condensed Chemical Dictionary, 12th edition, 1993, defines NO_x as including Nitric Oxide, Nitrous Oxide, Nitrogen Oxide (NO_x), Oxides of Nitrogen NOS, and Nitrogen Dioxide.

[†]CO=Carbon Monoxide

[‡]H₂S =Hydrogen Sulfide

[¶]SO₂=Sulfur Dioxide

[€]VOC=Volatile Organic Compounds

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

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
ANDREWS	1	100.0	0	0.0	1 (0.0)
ANGELINA	1	25.0	3	75.0	4 (0.2)
ARANSAS	0	0.0	1	100.0	1 (0.0)
AUSTIN	1	100.0	0	0.0	1 (0.0)
BEXAR	9	45.0	11	55.0	20 (0.9)
BOWIE	2	100.0	0	0.0	2 (0.1)
BRAZORIA	184	95.8	8	4.2	192 (8.4)
BRAZOS	1	100.0	0	0.0	1 (0.0)
BURLESON	1	50.0	1	50.0	2 (0.1)
CALHOUN	71	100.0	0	0.0	71 (3.1)
CAMERON	6	75.0	2	25.0	8 (0.3)
CHAMBERS	40	81.6	9	18.4	49 (2.1)
COLLIN	2	100.0	0	0.0	2 (0.1)
COLLINGSWORTH	1	100.0	0	0.0	1 (0.0)
COMAL	1	100.0	0	0.0	1 (0.0)
CRANE	31	100.0	0	0.0	31 (1.3)
CULBERSON	0	0.0	2	100.0	2 (0.1)
DALLAM	2	100.0	0	0.0	2 (0.1)
DALLAS	42	37.2	71	62.8	113 (4.9)
DAWSON	1	50.0	1	50.0	2 (0.1)
DEAF SMITH	1	100.0	0	0.0	1 (0.0)
DENTON	0	0.0	2	100.0	2 (0.1)
ECTOR	31	88.6	4	11.4	35 (1.5)
EL PASO	22	62.9	13	37.1	35 (1.5)
ELLIS	6	60.0	4	40.0	10 (0.4)
FAYETTE	2	100.0	0	0.0	2 (0.1)
FORT BEND	1	50.0	1	50.0	2 (0.1)
FREESTONE	0	0.0	1	100.0	1 (0.0)
GAINES	0	0.0	1	100.0	1 (0.0)
GALVESTON	158	96.9	5	3.1	163 (7.1)
GLASSCOCK	0	0.0	1	100.0	1 (0.0)
GRAY	1	100.0	0	0.0	1 (0.0)
GRAYSON	1	100.0	0	0.0	1 (0.0)
GREGG	32	88.9	4	11.1	36 (1.6)
GRIMES	1	100.0	0	0.0	1 (0.0)
HALE	1	100.0	0	0.0	1 (0.0)
HARDIN	2	66.7	1	33.3	3 (0.1)
HARRIS	576	85.2	100	14.8	676 (29.4)
HARRISON	3	100.0	0	0.0	3 (0.1)
HENDERSON	1	100.0	0	0.0	1 (0.0)
HIDALGO	1	50.0	1	50.0	2 (0.1)
HILL	1	100.0	0	0.0	1 (0.0)
HOOD	5	100.0	0	0.0	5 (0.2)
HOPKINS	0	0.0	1	100.0	1 (0.0)
HOUSTON	1	100.0	0	0.0	1 (0.0)
HOWARD	22	100.0	0	0.0	22 (1.0)

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

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
HUNT	1	100.0	0	0.0	1 (0.0)
HUTCHINSON	45	100.0	0	0.0	45 (2.0)
JACKSON	0	0.0	1	100.0	1 (0.0)
JEFFERSON	309	95.7	14	4.3	323 (14.1)
JONES	0	0.0	1	100.0	1 (0.0)
KAUFMAN	4	80.0	1	20.0	5 (0.2)
KENT	2	100.0	0	0.0	2 (0.1)
KERR	1	100.0	0	0.0	1 (0.0)
LAMAR	2	100.0	0	0.0	2 (0.1)
LAVACA	1	100.0	0	0.0	1 (0.0)
LEON	0	0.0	1	100.0	1 (0.0)
LIBERTY	0	0.0	1	100.0	1 (0.0)
LIVE OAK	48	98.0	1	2.0	49 (2.1)
LUBBOCK	2	25.0	6	75.0	8 (0.3)
MADISON	0	0.0	1	100.0	1 (0.0)
MARTIN	0	0.0	2	100.0	2 (0.1)
MATAGORDA	2	100.0	0	0.0	2 (0.1)
MCLENNAN	3	30.0	7	70.0	10 (0.4)
MILAM	3	75.0	1	25.0	4 (0.2)
MONTGOMERY	4	57.1	3	42.9	7 (0.3)
MOORE	24	92.3	2	7.7	26 (1.1)
NOLAN	1	100.0	0	0.0	1 (0.0)
NUECES	116	98.3	2	1.7	118 (5.1)
OCHILTREE	0	0.0	5	100.0	5 (0.2)
ORANGE	35	100.0	0	0.0	35 (1.5)
PANOLA	1	50.0	1	50.0	2 (0.1)
PARKER	1	100.0	0	0.0	1 (0.0)
POLK	0	0.0	1	100.0	1 (0.0)
POTTER	3	75.0	1	25.0	4 (0.2)
RED RIVER	1	100.0	0	0.0	1 (0.0)
REEVES	0	0.0	1	100.0	1 (0.0)
REFUGIO	0	0.0	1	100.0	1 (0.0)
ROBERTSON	0	0.0	1	100.0	1 (0.0)
SAN JACINTO	0	0.0	1	100.0	1 (0.0)
SAN PATRICIO	2	66.7	1	33.3	3 (0.1)
SCURRY	0	0.0	1	100.0	1 (0.0)
SHERMAN	0	0.0	2	100.0	2 (0.1)
SOMERVELL	1	100.0	0	0.0	1 (0.0)
SUTTON	0	0.0	1	100.0	1 (0.0)
TARRANT	29	70.7	12	29.3	41 (1.8)
TAYLOR	0	0.0	3	100.0	3 (0.1)
TERRELL	0	0.0	1	100.0	1 (0.0)
TITUS	1	100.0	0	0.0	1 (0.0)
TRAVIS	5	83.3	1	16.7	6 (0.3)
VICTORIA	36	97.3	1	2.7	37 (1.6)
WALLER	0	0.0	2	100.0	2 (0.1)

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

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
WASHINGTON	0	0.0	1	100.0	1 (0.0)
WEBB	1	14.3	6	85.7	7 (0.3)
WHARTON	0	0.0	2	100.0	2 (0.1)
WICHITA	6	85.7	1	14.3	7 (0.3)
WILBARGER	1	100.0	0	0.0	1 (0.0)
WILLIAMSON	1	100.0	0	0.0	1 (0.0)
WISE	1	100.0	0	0.0	1 (0.0)
TOTAL	1959	85.2	339	14.8	2298 (100.0)

* 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—Texas Hazardous Substances Emergency Events Surveillance, 2004

	Type of event						All events		
	Fixed facility			Transportation					
No. substances	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	1941	99.1	1941	316	93.2	316	2257	98.2	2257
2	13	0.7	26	16	4.7	32	29	1.3	58
3	1	0.1	3	2	0.6	6	3	0.1	9
4	0	0.0	0	2	0.6	8	2	0.1	8
≥ 5	4	0.2	45	3	0.9	22	7	0.3	67
Total	1959	100.1	2015	339	100.0	384	2298	100.0	2399

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

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims Number (maximum)*
	No.	%	No.	%		
Agriculture	6	0.3	1	2.5	16.6	1 (1)
Business and repair services	7	0.3	2	5.0	28.6	2 (1)
Construction	4	0.2	0	0.0	0.0	0
Entertainment	2	0.1	0	0.0	0.0	0
Finance and Real estate	2	0.1	1	2.5	50.0	4 (4)
Manufacturing	1669	72.6	8	20.0	0.5	44 (12)
Mining	120	5.2	1	2.5	0.8	2 (2)
Personal services	5	0.2	2	5.0	40.0	30 (28)
Professional services	2	0.1	2	5.0	100.0	5 (4)
Public administration	7	0.3	0	0.0	0.0	0
Retail trade	2	0.1	0	0.0	0.0	0
Transportation	391	17.0	18	45.0	4.6	78 (44)
Utilities	32	1.4	1	2.5	3.1	1 (1)
Wholesale trade	35	1.5	3	7.5	8.6	42 (40)
Other†	14	0.6	1	2.5	7.1	1 (1)
Total	2298	100.0	40	100.0	1.7	210

*Minimum number of victims per event = 1

†Includes abandoned (n=9), private vehicle (n=1), private property (n=1), illegal activity (n=3)

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

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	52	2.6	50	13.0	102	4.3
Ammonia	46	2.3	10	2.6	56	2.3
Bases	33	1.6	36	9.4	69	2.9
Chlorine	16	0.8	8	2.1	24	1.0
Formulations	0	0.0	0	0.0	0	0.0
Hetero-organics	8	0.4	4	1.0	12	0.5
Hydrocarbons	17	0.8	5	1.3	22	0.9
Mixture*	1009	50.1	20	5.2	1029	42.9
Other†	27	1.3	18	4.7	45	1.9
Other inorganic substances‡	411	20.4	33	8.6	444	18.5
Oxy-organics	25	1.2	29	7.6	54	2.3
Paints and dyes	14	0.7	27	7.0	41	1.7
Pesticides	40	2.0	25	6.5	65	2.7
Polychlorinated biphenyls	5	0.3	0	0.0	5	0.2
Polymers	16	0.8	27	7.0	43	1.8
Volatile organic compounds	294	14.6	92	24.0	386	16.1
Total¶	2013	99.9	384	100.0	2397	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.

¶ Of a total of 2,399 substances, 2 were excluded because they were not assigned a substance category. These 2 substances were released in fixed facilities. Percentages do not total 100% because of rounding.

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

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	7	36.8	7	14	66.7	14	21	52.5	21
2	3	15.8	6	4	19.0	8	7	17.5	14
3	1	5.3	3	0	0.0	0	1	2.5	3
4	2	10.5	8	0	0.0	0	2	5.0	8
5	1	5.3	5	0	0.0	0	1	2.5	5
≥6	5	26.3	101	3	14.3	58	8	20.0	159
Total	19	100.0	130	21	100.0	80	40	100.0	210

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

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	92	4.0	8	20.0	8.7
Ammonia	54	2.4	1	2.5	1.9
Bases	63	2.7	2	5.0	3.2
Chlorine	21	0.9	2	5.0	9.5
Formulations	0	0.0	0	0	0.0
Hetero-organics	12	0.5	1	2.5	8.3
Hydrocarbons	13	0.6	0	0	0.0
Mixture [†]	1019	44.3	4	10.0	0.4
Multiple substance category	35	1.5	11	27.5	31.4
Other [‡]	30	1.3	0	0	0.0
Other inorganic substances [§]	431	18.8	2	5.0	0.5
Oxy-organics	45	2.0	2	5.0	4.4
Paints and dyes	38	1.7	0	0	0.0
Pesticides	46	2.0	2	5.0	4.3
Polychlorinated biphenyls	5	0.2	0	0	0.0
Polymers	39	1.7	1	2.5	2.6
Volatile organic compounds	355	15.5	4	10.0	1.1
Total[¶]	2298	100.1	40	100.0	1.7

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

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Burns [†]	12	6.2	4	2.8	16	4.8
Dizziness/central nervous system symptoms	18	9.3	16	11.1	34	10.1
Eye irritation	10	5.2	33	22.9	43	12.8
Gastrointestinal system problems	20	10.4	6	4.2	26	7.7
Headache	27	14.0	19	13.2	46	13.7
Heat stress	0	0.0	1	0.7	1	0.3
Respiratory irritation	79	40.9	31	21.5	110	32.6
Shortness of breath	3	1.6	3	2.1	6	1.8
Skin irritation	8	4.2	6	4.2	14	4.2
Trauma [‡]	16	8.3	25	17.4	41	12.2
Total**	193	57.3	144	42.7	337	100.2

*The number of injuries is greater than the number of victims (210) because a victim could have had more than one injury.

[†]Of the 12 burns, 10 were chemical, 4 were thermal, and 2 were both.

[‡]Of the 41 trauma injuries, 5 were chemical-related and 36 were not chemical-related.

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

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

Responder category	No.	%*
Certified HazMat team	169	7.4
Emergency medical technicians	26	1.1
Environmental agency	24	1.1
EPA* response team	4	0.2
Fire department	121	5.3
Health department/health agency	4	0.2
Law enforcement agency	67	2.9
Other	32	1.4
Response team of company where release occurred	1849	80.5
Total†	2296	100.1

* Environmental Protection Agency.

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

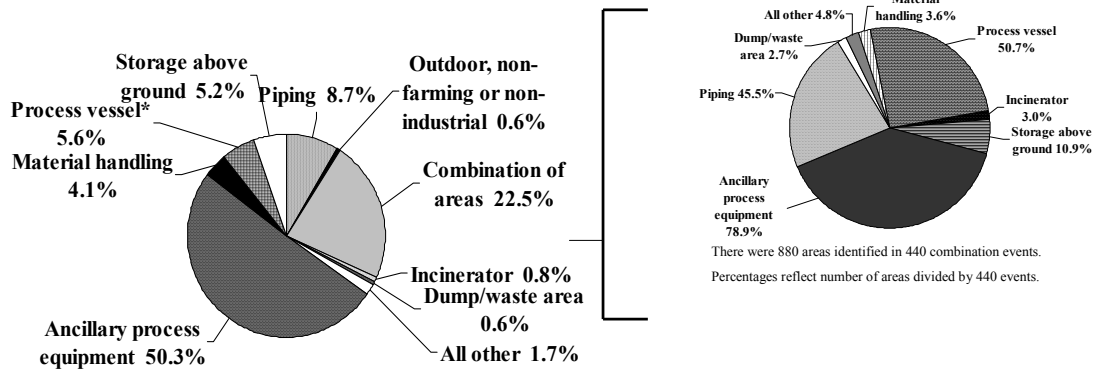
Table 9.— Cumulative data by year—Texas Hazardous Substances Emergency Events Surveillance, 1993-2004*

Year	Type of event			No. substances released	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
2004	1,959	339	2,298	2,399	210	13	40	1.7
Total	25,139	3,052	28,191	30,035	4,029	89	667	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.

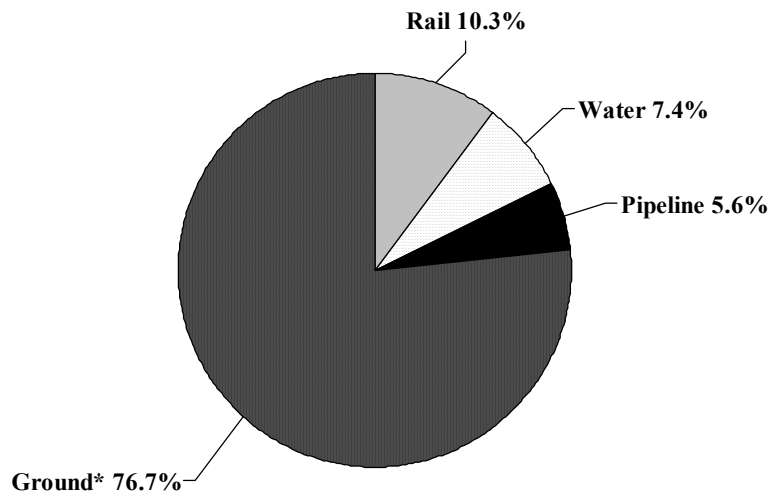
Figure 1.--Areas of fixed facilities involved in events—Texas Hazardous Substances Emergency Events Surveillance, 2004



*Reaction chamber where substances are processed.

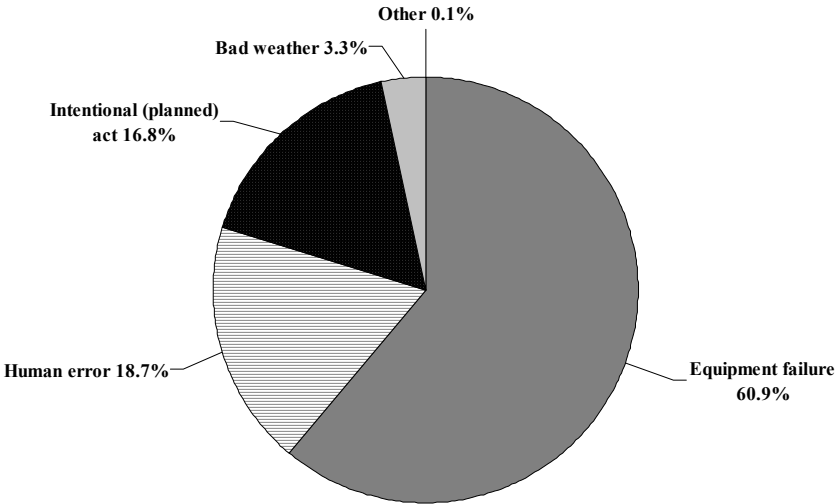
There were 880 areas identified in 440 combination events.
 Percentages reflect number of areas divided by 440 events.

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



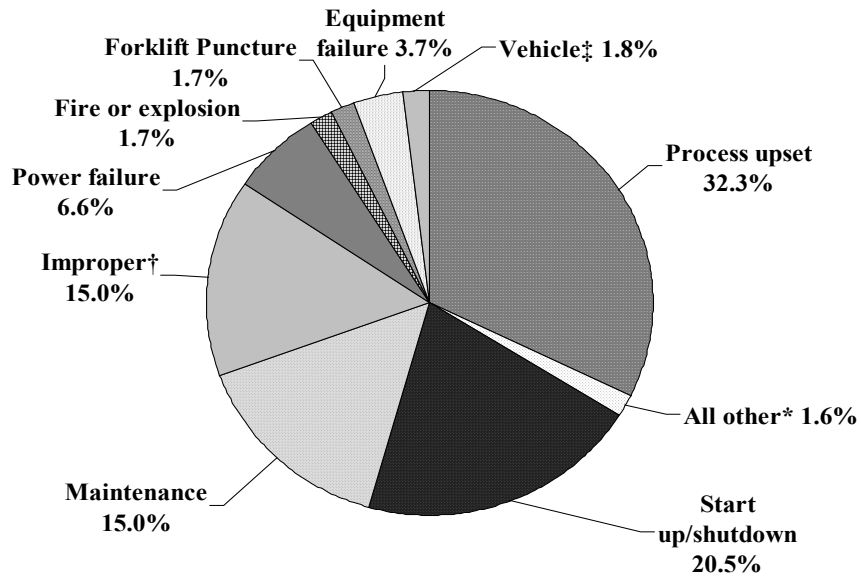
* Transport in a truck, van, or trailer.

Figure 3a.--Primary factors reported as contributing to events—Texas Hazardous Substances Emergency Events Surveillance, 2004



Primary factor is missing for six events.

Figure 3b.--Secondary factors reported as contributing to events—Texas Hazardous Substances Emergency Events Surveillance, 2004



*All other includes improper dumping, human error, load shift, and other.
†Improper includes improper filling, loading, packing, and mixing.
‡Vehicle includes vehicle collision, derailment, rollover, or capsizing.

Figure 4.--Number of victims, by population group and type of event—Texas Hazardous Substances Emergency Events Surveillance, 2004

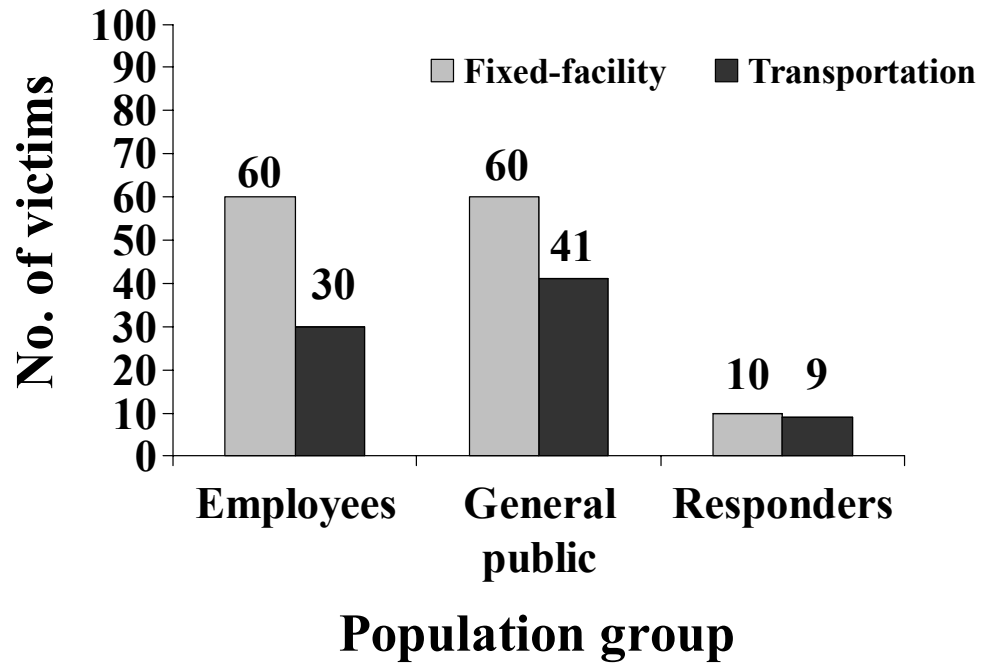
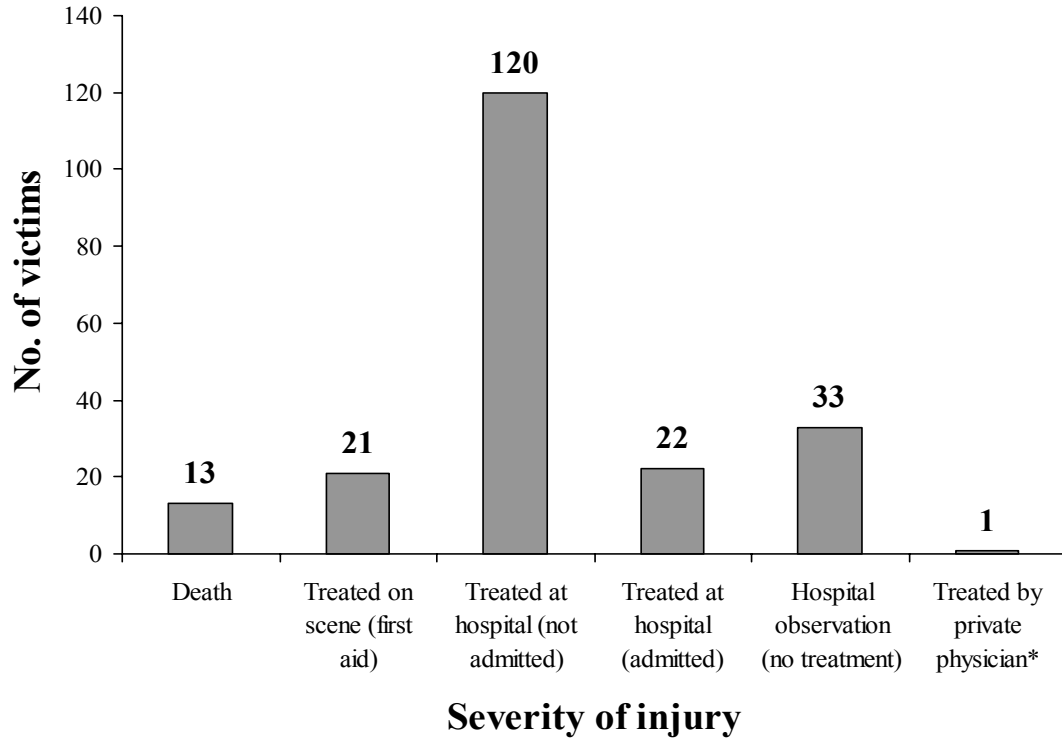


Figure 5.--Injury disposition—Texas Hazardous Substances Emergency Events Surveillance, 2004



*Within 24 hours.

Figure 6.--Number of victims, by category and year—Texas Hazardous Substances Emergency Events Surveillance, 1993–2004

