

Louisiana Hazardous Substances Emergency Events Surveillance (HSEES) System

2006: A Summary Report

**Louisiana Department of Health and Hospitals
Office of Public Health
Section of Environmental Epidemiology & Toxicology**



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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. The Louisiana Department of Health and Hospitals, Office of Public Health, Center for Environmental Health Services, Section of Environmental Epidemiology and Toxicology has participated in this surveillance system since 2001. This report summarizes the characteristics of events reported to Louisiana in 2006. 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.

In 2006, 660 events met the HSEES surveillance definition. In 470 (71.2%) events, only one substance was released. The most commonly reported categories of substances were volatile organic compounds, other inorganic substances, and acids. During this reporting period, 31 events (4.7% of all reported events) resulted in a total of 63 victims, of whom 4 (6.3%) died. The most frequently reported injuries were respiratory irritation, gastrointestinal system problems, and eye irritation. Evacuations were ordered for 11 (1.7%) events.

Prevention outreach efforts for 2006 focused on lessons learned from Hurricanes Katrina and Rita related events.

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.

The Louisiana Department of Health and Hospitals, Office of Public Health, Center for Environmental Health Services, Section of Environmental Epidemiology and Toxicology has participated in this surveillance system since 2001. In 2006, 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.

This report provides an overview of HSEES for 2006 in Louisiana, 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 2005 an updated data-collection form was approved by the Office of Management and Budget. 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 Louisiana Department of Public Safety and Corrections, Office of State Police, the Louisiana Department of Environmental Quality (LDEQ), the U.S. Coast Guard National Response Center, and the U.S. Department of Transportation, Hazardous Materials Information System (HMIS). 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.

A HSEES event is defined as 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 lbs or 1 gallon. Threatened releases of qualifying amounts will be included if the threat led to an action (e.g., evacuation) to protect the public health. Petroleum-only releases are not included because of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). [Note: The Petroleum Exclusion clause of

CERCLA excludes any form of petroleum that has not been refined to the point of becoming single-chemical product]. 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 15 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

In 2006, a total of 660 acute hazardous substances events met the HSEES surveillance definition. A total of 515 (78.0%) events occurred in fixed facilities. The parishes with the most events were East Baton Rouge (115 [17.4%]) and Ascension (104 [15.8%]) (Table 1).

Table 1.- Number of events meeting the surveillance definition, by parish and type of event—
Louisiana Hazardous Substances Emergency Events Surveillance, 2006

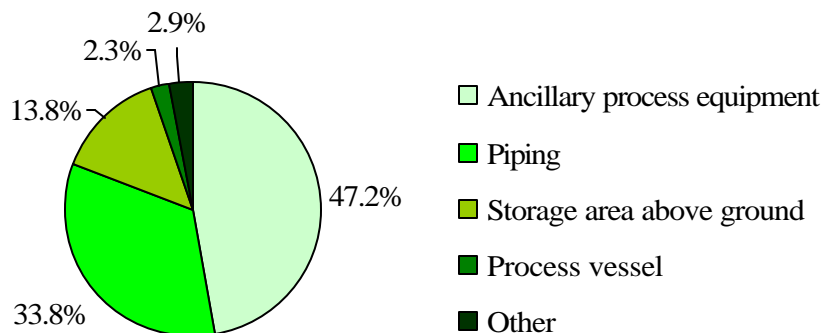
Parish	Type of event				All events	
	Fixed facility		Transportation			
	No. events	%*	No. events	%*	No. events	%
Acadia	1	50.0	1	50.0	2	0.3
Ascension	75	72.1	29	27.9	104	15.8
Bienville	1	100.0	0	0.0	1	0.2
Bossier	5	41.7	7	58.3	12	1.8
Caddo	15	65.2	8	34.8	23	3.5
Calcasieu	63	82.9	13	17.1	76	11.5
Caldwell	0	0.0	1	100.0	1	0.2
Cameron	4	100.0	0	0.0	4	0.6
De Soto	1	50.0	1	50.0	2	0.3
East Baton Rouge	108	93.9	7	6.1	115	17.4
Franklin	0	0.0	1	100.0	1	0.2
Grant	1	100.0	0	0.0	1	0.2
Iberia	0	0.0	2	100.0	2	0.3
Iberville	34	77.3	10	22.7	44	6.7
Jefferson	18	78.3	5	21.7	23	3.5
Jefferson Davis	1	50.0	1	50.0	2	0.3
Lafayette	1	14.3	6	85.7	7	1.1
Lafourche	3	50.0	3	50.0	6	0.9
Lincoln	0	0.0	1	100.0	1	0.2
Livingston	0	0.0	1	100.0	1	0.2
Madison	1	25.0	3	75.0	4	0.6
Morehouse	0	0.0	1	100.0	1	0.2
Natchitoches	2	66.7	1	33.3	3	0.5
Orleans	2	33.3	4	66.7	6	0.9
Ouachita	29	90.6	3	9.4	32	4.8
Plaquemines	19	100.0	0	0.0	19	2.9
Pointe Coupee	0	0.0	5	100.0	5	0.8
Rapides	6	85.7	1	14.3	7	1.1
Richland	1	50.0	1	50.0	2	0.3
St. Bernard	40	97.6	1	2.4	41	6.2
St. Charles	43	86.0	7	14.0	50	7.6
St. James	15	78.9	4	21.1	19	2.9
St. John the Baptist	14	100.0	0	0.0	14	2.1
St. Landry	0	0.0	1	100.0	1	0.2
St. Martin	0	0.0	1	100.0	1	0.2
St. Mary	0	0.0	2	100.0	2	0.3
St. Tammany	0	0.0	2	100.0	2	0.3
Tangipahoa	3	75.0	1	25.0	4	0.6
Tensas	0	0.0	1	100.0	1	0.2
Terrebonne	2	40.0	3	60.0	5	0.8
W. Baton Rouge	1	25.0	3	75.0	4	0.6
Washington	2	100.0	0	0.0	2	0.3
Webster	4	57.1	3	42.9	7	1.1
Total ‡	515	78.0	145	22.0	660	100.7

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

‡ Percentages do not total 100% because of rounding.

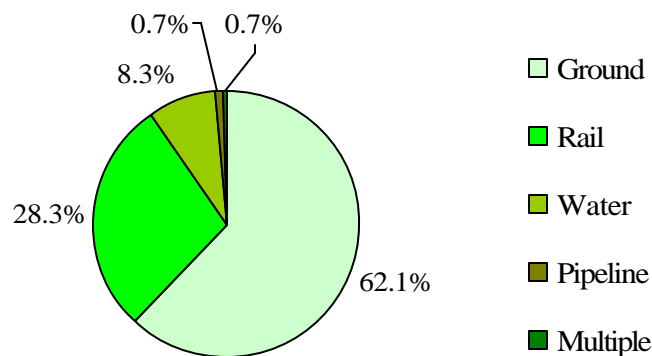
For each fixed-facility event, one or two choices can be selected to describe the type of area where the event occurred or the equipment involved with the event. Type of area was not reported for 54 (8.2%) events. Of all 461 fixed-facility events where type of area was reported, 441 (95.7%) reported one type of area and 20 (4.3%) reported a combination of two area types. Among events with one type of area reported, the main areas were classified as follows: 280 (47.2%) ancillary process equipment, 149 (33.8%) piping, and 61 (13.8%) storage area above ground (Figure 1). Of the events with two areas, 15 (75.0%) involved ancillary processing equipment in combination with other types of areas.

Figure 1.- Areas of fixed facilities involved in events—Louisiana Hazardous Substances Emergency Events Surveillance, 2006



Of the 145 transportation-related events, 90 (62.1%) occurred during ground transport (e.g., truck, van, or tractor) and 41 (28.3%) involved transport by rail (Figure 2). Fewer events involved water, air, and pipeline transportation modes. The largest proportions of transportation-related events occurred en route but were not discovered until the vehicle reached a fixed facility destination (42[29.0%]) or from a stationary vehicle or vessel (40 [27.6%]). Of the 145 transportation-related events, 37 (25.05) involved a release from a moving vehicle or vessel.

Figure 2.- Distribution of transportation-related events, by type of transport—Louisiana Hazardous Substances Emergency Events Surveillance, 2006



Primary and secondary factors contributing to the events were reported. Primary factors were reported for 655 (99.2%) events (Figure 3a). Most (77.7%) fixed-facility events reported equipment failure as the primary factor, and most (49.7%) transportation-related events also reported equipment failure as the primary factor. Secondary factors were reported for 229 (34.7%) events (Figure 3b). Of the reported secondary factors, most (22.2%) fixed-facility events involved system start up and shutdown and most (50.7%) transportation-related events involved improper filling, loading, or packing.

Figure 3a.- Primary factors reported as contributing to events—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

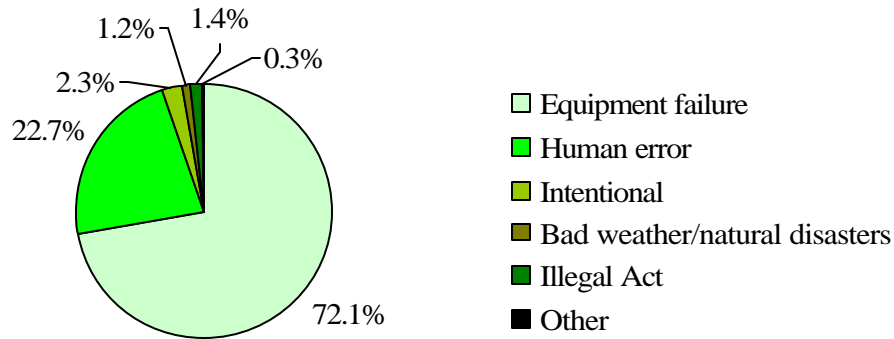
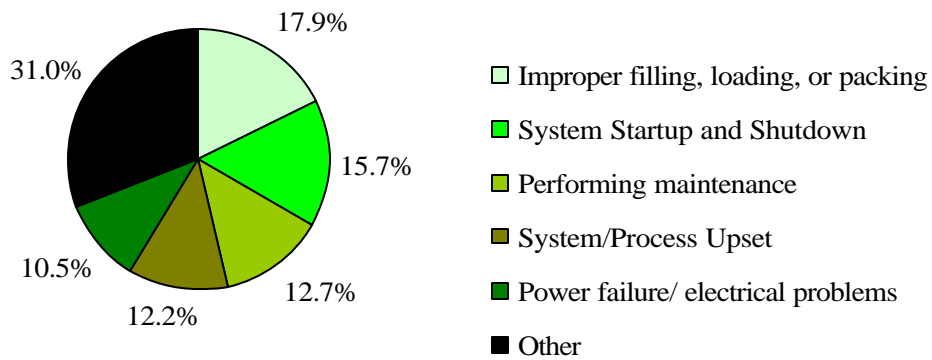


Figure 3b.- Secondary factors reported as contributing to events—Louisiana Hazardous Substances Emergency Events Surveillance, 2006



More than 71% of all events involved the release of only one substance. Two substances were released in approximately 14% of the events, and approximately 15% involved the release of more than two substances (Table 2). Fixed-facility events were more likely than transportation events to have two or more substances released in an event (36.0% vs. 3.5%).

Table 2.- Number of substances involved per event, by type of event—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	330	64.1	330	140	96.6	140	470	71.2	470
2	90	17.5	180	4	2.8	8	94	14.2	188
3	40	7.8	120	0	0.0	0	40	6.1	120
4	19	3.7	76	1	0.7	4	20	3.0	80
= 5	36	7.0	228	0	0.0	0	36	5.5	228
Total ‡	515	100.1	934	145	100.1	152	660	100.0	1086

‡ Percentages do not total 100% because of rounding.

HSEES events were more likely to occur when there was more industrial, commercial, or agricultural activity, e.g., in the 6 hours before noon (33.2%) and the 6 hours after and including noon (28.2%), compared with the 6 hours before midnight (20.6%) and the 6 hours after and including midnight (17.3%) (5 events did not have a time specified). Additionally, 15%-16% of events occurred on each weekday as compared with 9%-12% on a weekend day. May through October had 56% of the events, and the other 6 months of the year had 44%.

Industries

The largest proportions of HSEES events were associated with the manufacturing (470 [71.2%]) and transportation (130 [19.7%]) industries (Table 3). Within manufacturing, chemical manufacturing (324 [68.9%]) and petroleum manufacturing (136 [28.9%]) accounted for most of the events. The largest number of events with victims occurred in the manufacturing industry (14 [45.2%]). The total number of victims was greatest in the manufacturing industry (19 [30.2%]) followed by the number of victims in other services (18 [28.6%]) and transportation (13

[20.6%]). The subcategory chemical manufacturing accounted for 73.7% of all victims in the manufacturing industry. Although the manufacturing industry resulted in a large proportion of events with victims and a large number of victims, only 3.0% of all 470 events resulted in victims. Conversely, 25.0% of all events in the other services industry resulted in victims, but this industry represents a small proportion (6.5%) of events with victims.

Table 3.- Industries involved in hazardous substance events and events with victims, by category— Louisiana Hazardous Substances Emergency Events Surveillance, 2006

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims # (maximum)*
	No.	%	No.	%		
Accommodation and Food Services	1	0.2	0	0.0	0.0	0
Administrative and Support Services	2	0.3	0	0.0	0.0	0
Agriculture	1	0.2	0	0.0	0.0	0
Communication	0	0.0	0	0.0	0.0	0
Construction	1	0.2	0	0.0	0.0	0
Educational Services	1	0.2	0	0.0	0.0	0
Entertainment	2	0.3	1	3.2	50.0	5 (5)
Finance and Insurance	0	0.0	0	0.0	0.0	0
Health Care	2	0.3	1	3.2	50.0	1 (1)
Management	0	0.0	0	0.0	0.0	0
Manufacturing	470	71.2	14	45.2	3.0	19 (4)
Mining	6	0.9	0	0.0	0.0	0
Not an Industry	6	0.9	2	6.5	33.3	6 (4)
Not Identified	4	0.6	0	0.0	0.0	0
Other Services	8	1.2	2	6.5	25.0	18 (17)
Professional services	0	0.0	0	0.0	0.0	0
Public Administration	1	0.2	0	0.0	0.0	0
Real Estate	0	0.0	0	0.0	0.0	0
Retail trade	8	1.2	0	0.0	0.0	0
Transportation	130	19.7	10	32.3	7.7	13 (3)
Utilities	12	1.8	1	3.2	8.3	1 (1)
Wholesale trade	5	0.8	0	0.0	0.0	0
Total ‡	660	100.2	31	100.1	-	63 (17)

*Minimum number of victims per event = 1.

‡ Percentages do not total 100% because of rounding.

Substances

A total of 1086 substances were released in all events, of which 3 (0.3%) substances were reported as threatened to be released. The individual substances most frequently released were benzene, sulfur dioxide, and hydrogen sulfide (Appendix). Substances were grouped into 15 categories. The substance categories most commonly released in fixed-facility events were volatile organic compounds (425 [45.5%]), other inorganic substances (229 [24.5%]), and acids (57[6.1%]) (Table 4). In transportation-related events, the most common substance categories released were acids (44 [28.9%]), volatile organic compounds (26 [17.1%]), bases (13 [8.6]), and pesticides (13 [8.6%]).

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 (814 [78.1%]), spills (221 [21.2%]), fire (4 [0.4%]), and threatened release (3 [0.3%]). Of events with two types of releases, the following combinations were reported: spills and air releases (31 [70.5%]), air and fire (8 [18.2%]), and the remaining 5 (11.4%) involved a fire and explosion.

Table 4.- Number of substances involved, by substance category and type of event—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	57	6.1	44	28.9	101	9.3
Ammonia	33	3.5	9	5.9	42	3.9
Bases	11	1.2	13	8.6	24	2.2
Chlorine	29	3.1	3	2.0	32	2.9
Formulations	1	0.1	0	0.0	1	0.1
Hetero-organics	11	1.2	4	2.6	15	1.4
Hydrocarbons	27	2.9	1	0.7	28	2.6
Mixture*	10	1.1	1	0.7	11	1.0
Other †	19	2.0	8	5.3	27	2.5
Other inorganic substances ‡	229	24.5	5	3.3	234	21.5
Oxy-organics	28	3.0	7	4.6	35	3.2
Paints and dyes	3	0.3	11	7.2	14	1.3
Pesticides	26	2.8	13	8.6	39	3.6
Polymers	25	2.7	7	4.6	32	2.9
Volatile organic compounds	425	45.5	26	17.1	451	41.5
Total	934	100.0	152	100.1	1086	99.9

*Minimum number of victims per event = 1.

†Includes chemical dumped on highway or other property.

‡ Percentages do not total 100% because of rounding.

Victims

A total of 63 victims were involved in 31 events (4.7% of all events) (Table 5). Of the 31 events with victims, 22 (71.0%) events involved only one victim, and 4 (12.9%) involved two victims.

Of all victims, 44 (69.8%) were injured in fixed-facility events. Additionally, 41 persons in 11 events (1.7% 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.

Table 5.- Number of victims per event, by type of event—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	10	58.8	10	12	85.7	12	22	71.0	22
2	4	23.5	8	0	0.0	0	4	12.9	8
3	0	0.0	0	1	7.1	3	1	3.2	3
4	1	5.9	4	1	7.1	4	2	6.5	8
5	1	5.9	5	0	0.0	0	1	3.2	5
= 6	1	5.9	17	0	0.0	0	1	3.2	17
Total	17	100.0	44	14	99.9	19	31	100.0	63

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 other inorganic substances constituted 21.5% of all events; however, only 6.3% of these events resulted in injuries. Conversely, events involving chlorine accounted for 2.9% of all events respectively, but 12.9% of the 32 events resulted in injuries.

Table 6.- Frequency of substance categories in all events and events with victims—Louisiana Hazardous Substances Emergency Events Surveillance System, 2006*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	81	12.3	6	19.4	7.4
Ammonia	37	5.6	3	9.7	8.1
Bases	24	3.6	1	3.2	4.2
Chlorine	31	4.7	4	12.9	12.9
Formulations	1	0.2	0	0.0	0.0
Hetero-organics	10	1.5	2	6.5	20.0
Hydrocarbons	8	1.2	0	0.0	0.0
Mixture†	10	1.5	2	6.5	20.0
Multiple substance category	117	17.7	3	9.7	2.6
Other‡	21	3.2	3	9.7	14.3
Other inorganic substances§	64	9.7	4	12.9	6.3
Oxy-organics	14	2.1	1	3.2	7.1
Paints and dyes	14	2.1	0	0.0	0.0
Pesticides	34	5.2	1	3.2	2.9
Polymers	20	3.0	1	3.2	5.0
Volatile organic compounds	174	26.4	0	0.0	0.0
Total¶	660	100.0	31	100.1	4.7

*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.

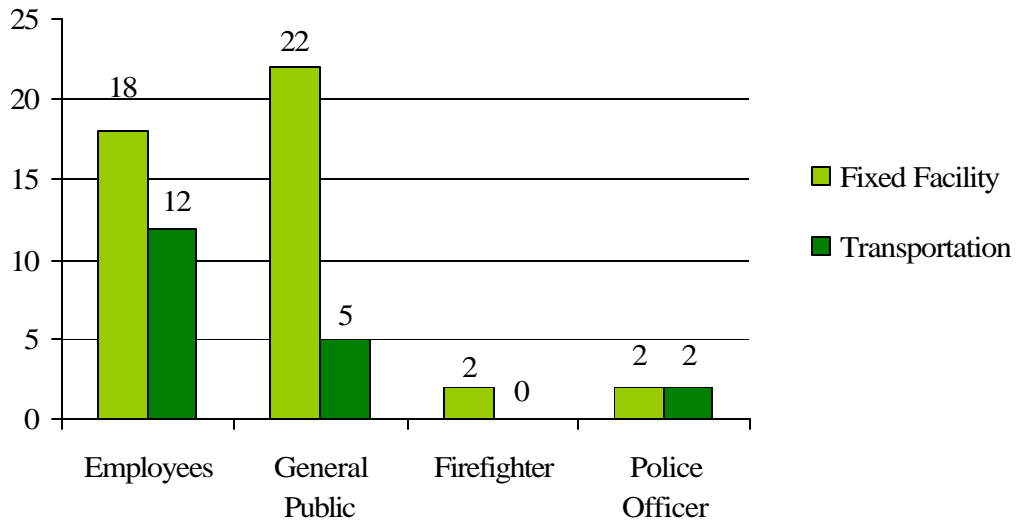
‡Not classified.

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

¶Percentages do not total 100% because of rounding.

Employees (30 [47.6%]) constituted the largest proportion of the population groups injured, followed by general public (27 [42.9%]) (Figure 4). In fixed-facility events, 4 emergency response personnel were injured. Two (50.0%) of those were firefighters and 2 (50.0%) were police officers. Two responders were injured in transportation-related events. Both were police officers.

Figure 4.- Number of victims, by population group and type of event—Louisiana Hazardous Substances Emergency Events Surveillance, 2006



Victims were reported to sustain a total of 101 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 (22 [28.9%]) and gastrointestinal system problems (18 [23.7%]). In transportation-related events, respiratory trauma (8 [32.0%]), and respiratory irritation (7 [28.0%]) were reported most frequently. All of the trauma injuries in transportation-related events were not substance-related; these injuries resulted from a chain of events, such as a motor vehicle accident leading to the release of a hazardous substance, and not from exposure to the substance itself.

Table 7.- Frequencies of injuries/symptoms, by type of event*—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Chemical Burns	4	5.3	1	4.0	5	5.0
Dizziness/central nervous system symptoms	3	3.9	2	8.0	5	5.0
Eye irritation	12	15.8	4	16.0	16	15.8
Gastrointestinal system problems	18	23.7	0	0.0	18	17.8
Headache	7	9.2	1	4.0	8	7.9
Heart problems	1	1.3	0	0.0	1	1.0
Heat Stress	2	2.6	0	0.0	2	2.0
Respiratory irritation	22	28.9	7	28.0	29	28.7
Shortness of breath	2	2.6	0	0.0	2	2.0
Skin irritation	3	3.9	1	4.0	4	4.0
Trauma [†]	0	0.0	8	32.0	8	7.9
Thermal Burns	2	2.6	1	4.0	3	3.0
Total[‡]	76	99.8	25	100.0	101	100.1

*The number of injuries is greater than the number of victims (63) because a victim could have had more than one injury.

[†] All trauma injuries were not chemical-related.

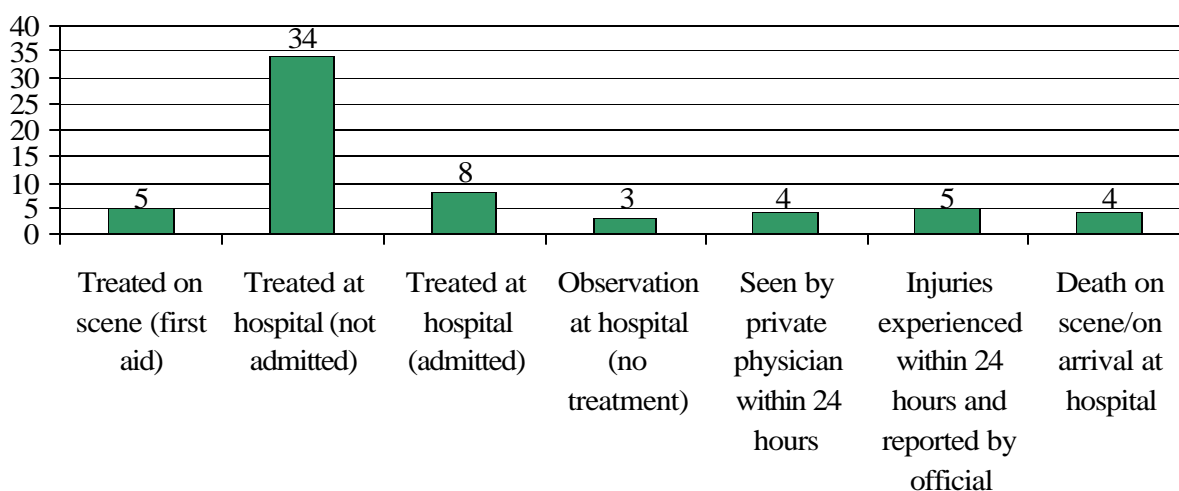
[‡] Percentages do not total 100% because of rounding.

The median age of the 40 (63.5%) victims for whom exact age was reported was 42 years (range: 6- 62 years). For the 41 (65.1%) injured persons for whom an age category was reported, 3 (4.8%) were 5-14 years of age, 1 (1.6%) was 15–19 years of age, 20 (31.7%) were 20–44 years of age, and 17 (27.0%) were 45–64 years of age. Of the 22 injured persons for whom age was not reported, 19 (86.4%) were presumably adults (because their population group was reported as responders or employees), and 3 (13.6%) could have been adults or children (because their population group was reported as members of the general public or student).

Sex was known for 57 (90.5%) of the victims; of these, 41 (71.9%) were males. Of all employees and responders for whom sex was reported, 90.60% were males.

Of the 63 victims, 34 (54.0%) were treated at hospital and not admitted and 8 (12.7%) were treated at hospital and admitted. Four (6.3%) deaths were reported (Figure 5). All four deaths resulted from physical trauma received during a motor vehicle accident and not from exposure to the released substance(s).

Figure 5.- Injury disposition—Louisiana Hazardous Substances Emergency Events Surveillance, 2006



The status of personal protective equipment (PPE) use was reported for 11 (36.7%) employee-victims. Most of the employee-victims (90.0%) had not worn any form of PPE. One employee-victim reported wearing Level D personal protective equipment.

Two events involved more than 4 injured people. These events resulted in 5 victims and 17 victims respectively. In the event involving 5 victims, chlorine was released at approximately 3:30 pm on a Tuesday in a commercial area, and an order to evacuate the affected part of the facility was given. The primary factor in this event was an equipment failure. The pumps on a

wave pool malfunctioned causing a backup of concentrated chlorine. When the pumps were brought back online a cloud of chlorine rose from the pool. Three of the victims were female members of the general public between the ages of 6 and 35 and two of the victims were male members of the general public ages 6 and 15. All victims experienced respiratory irritation and eye irritation, four victims also experienced gastrointestinal system problems, and two victims also experienced skin irritation. In the event resulting in seventeen victims, dichlorobutene was released at approximately 8:20 pm on a Tuesday in an industrial area, and an order to shelter in place was given. The primary contributing factor in this event was human error. Residue leaked out of a hose after a cleaning operation causing a noxious odor. Two of the seventeen victims were employees that experienced respiratory symptoms. The remaining fifteen victims were members of the general public that reported symptoms such as respiratory irritation, gastrointestinal problems, headache, dizziness, eye irritation, and shortness of breath.

Nearby populations

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS), a computer mapping program, or state health department records. Residences were within ¼ mile of 521 (78.9%) events, schools were within ¼ mile of 61 (9.2%) events, hospitals were within ¼ mile of 2 (0.3%) events, nursing homes were within ¼ mile of 5 (0.8%) events, licensed daycares were within ¼ mile of 65 (9.8%) events, industries or other businesses were within ¼ mile of 647 (98.0%) events and recreational areas were within ¼ mile of 19 (2.9%) events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 521 (78.9%) events with persons living within ¼ mile of the event; 607 (92.0%) events with persons living within ½ mile; and 649 (98.3%) events with persons living within 1 mile.

Evacuations

Evacuations were ordered in 11 (1.7%) events. Of these evacuations, 63.6% were of buildings or affected parts of buildings; 9.1% were of defined circular areas surrounding the event locations; and 27.3% were of no criteria. The number of people evacuated was known for 3 (27.3%) events and ranged from 1000 to 5 people. The median length of evacuation was 45 minutes (range: less than one hour to 22 hours). Of all 11 events, 3 (27.3%) had access to the area restricted. Sixteen (2.4%) events had in-place sheltering ordered by an official.

Decontamination

Of the 60 (95.2%) victims for whom decontamination status was known, 57 (95.0%) were not decontaminated and 2 (5.0%) were decontaminated at the scene.

In two events uninjured persons were decontaminated. In one event four uninjured members of the public were decontaminated on the scene and in a second event six uninjured members of the public were decontaminated at the scene.

Response

Six hundred fifty-nine (99.8%) events had information on who responded to the event; 20.3% reported 2 or more categories of personnel who responded, 11.6% reported 3 or more categories, and 5.4% reported 4 or more categories. Company response teams (78.4%) responded most frequently to events, followed by third party clean-up contractors (19.1%), law enforcement agencies (16.2%), and fire departments (10.4%) (Table 8). No one responded in 177 (26.8%) events.

Table 8.- Distribution of personnel who responded to the event—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

Responder category	No.	%*
Certified HazMat team	16	3.3
Emergency medical technicians	11	2.3
Environmental agency	39	8.1
Fire department	50	10.4
Health department/ health agency	3	0.6
Hospital personnel	2	0.4
Law enforcement agency	78	16.2
Response team of company where release occurred	378	78.4
Department of works/utilities/transportation	7	1.5
State, county, or local emergency managers/coordinators/planning committees	5	1.0
Third party clean-up contractor	92	19.1

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

PREVENTION ACTIVITIES

During 2006, the Louisiana HSEES Program performed various prevention activities. These activities included:

- Louisiana Parish Health Profiles
- Louisiana HSEES Report Card and Legislative Fact Sheet/Issue Brief
- Presentation of 2005 Hurricane Events

- Summary Report and Lessons Learned from Hurricanes Katrina and Rita Related Events

There are a large number of industrial facilities concentrated in southern Louisiana. Hurricanes Katrina and Rita made landfall in southern Louisiana causing damage to several manufacturing facilities as well as other industries along the Louisiana coastline. The Louisiana HSEES staff developed a summary report and lesson learned from Hurricanes Katrina and Rita related events. The report included summary data from hurricane related events as well as suggestions to prepare for and to prevent chemical releases before and during hurricanes.

SUMMARY OF RESULTS, 2001–2005

During 2001–2006, the largest proportion of events occurred in fixed facilities (Table 9). The percentage of transportation-related events has increased in the last year. The increase is partially due to expansion of transportation-related reporting sources. The total number of events decreased from 2005 to 2006. This decrease was also observed in the number of events reported to the state point of contact for hazardous materials releases (Louisiana Office of State Police, Transportation and Environmental Safety Section).

Table 9.- Cumulative data by year—Louisiana Hazardous Substances Emergency Events Surveillance, 2001-2006*

Year	Type of event			No. substances released	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	% †
2001	684	131	815	1163	63	2	20	2.5
2002	630	122	752	1205	30	1	20	2.7
2003	587	87	674	1113	42	1	8	1.2
2004	474	90	564	1053	176	0	25	4.4
2005	704	163	867	1514	95	3	48	5.5
2006	515	145	660	1086	63	4	31	4.7
Total	3594	738	4332	7134	469	11	152	3.3

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

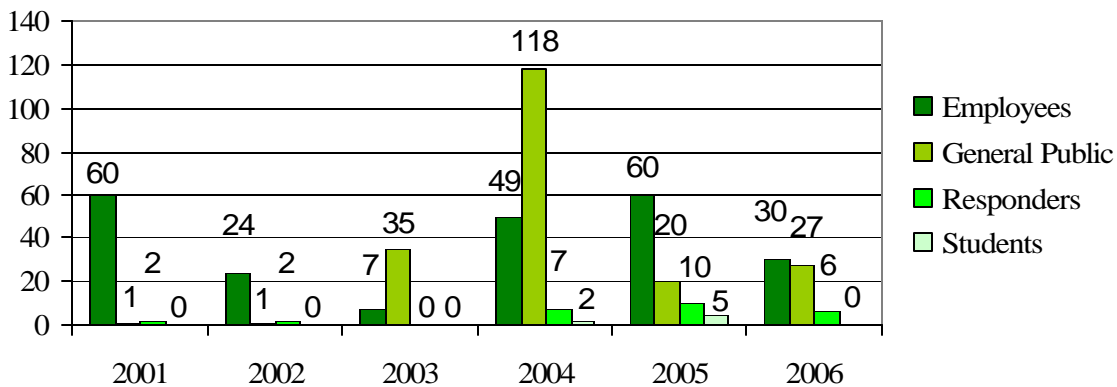
† Percentage of events with victims.

The percentage of victims decreased from 2005 to 2006. The percentage of events with victims was highest in 2005 (5.5%) and lowest in 2003 (1.2%). The average percentage of events with victims during 2001–2006 was 3.3%.

Respiratory irritation has consistently been one of the most frequently reported injuries.

In 2006 employees were the most commonly reported victim type, however, members of the general public also constituted a large proportion of the victims in 2006 as well as in previous years (Figure 6). As with previous years, most employee-victims and responder-victims had not worn any form of PPE.

Figure 6.- Number of victims, by category and year—Louisiana Hazardous Substances Emergency Events Surveillance, 2001–2006



The number of deaths associated with acute hazardous substances events has increased. Many of these deaths were attributed to non-chemical circumstances surrounding the events (e.g., a crash resulting from high-speed travel of a truck).

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

The 10 substances most frequently involved in events—Louisiana Hazardous Substances Emergency Events Surveillance, 2006

	Chemical Substance	Number of Releases
1	Benzene	80
2	Sulfur Dioxide	59
3	Hydrogen Sulfide	52
4	NOx	46
5	Volatile Organic Compounds	45
6	Hydrochloric Acid	43
7	Nitric Oxide	43
8	Ammonia	42
9	1,3-Butadiene	35
10	Chlorine	27

Note: NOx includes Nitrogen Oxide, Nitrogen Oxides, Nitrogen Oxide NOx, and Nitrogen Oxides NOx