

Louisiana Hazardous Substances Emergency Events Surveillance (HSEES) System

2005: 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 2005. 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 2005, 867 events met the HSEES surveillance definition. In 622 (71.7%) 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, 48 events (5.5% of all reported events) resulted in a total of 95 victims, of whom 3 (3.2%) died. The most frequently reported injuries were respiratory irritation, gastrointestinal system problems, and chemical burns. Evacuations were ordered for 17 (2.0%) events.

The findings regarding the percentage of events with victims have been increasing in recent years partially due to expanding data sources. Prevention outreach efforts for 2005 focused on events within the Mississippi River industrial corridor and Calcasieu industrial corridor as previous data indicated a high frequency of events in these regions.

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 evacuate

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 2005, fifteen state health departments participated in HSEES: Colorado, Florida, Iowa, Louisiana, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin.

This report provides an overview of HSEES for 2005 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 have 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 2005, a total of 867 acute hazardous substances events met the HSEES surveillance definition: 5 (0.6%) of these events were threatened releases. Eight (0.9%) were events in which substances were both threatened to be released and actually released. A total of 704 (81.2%) events occurred in fixed facilities. The parishes with the most events were East Baton Rouge (126 [14.5%]) and Calcasieu (121 [14.0%]) (Table 1).

Table 1.- Number of events meeting the surveillance definition, by parish and type of event—
Louisiana Hazardous Substances Emergency Events Surveillance, 2005

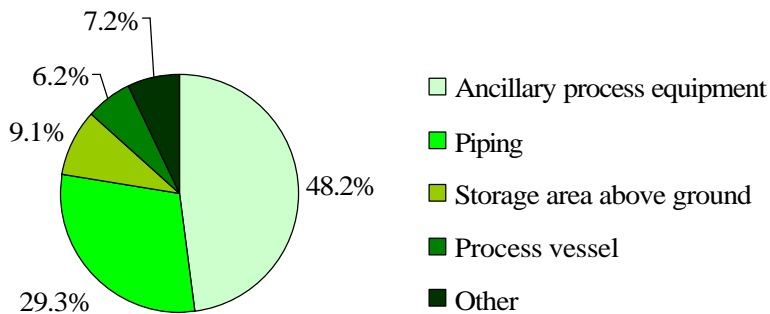
Parish	Type of event				All events	
	Fixed facility		Transportation			
	No. events	%*	No. events	%*	No. events	%
Acadia	1	100.0	0	0.0	1	0.1
Allen	1	100.0	0	0.0	1	0.1
Ascension	58	82.9	12	17.1	70	8.1
Beauregard	1	100.0	0	0.0	1	0.1
Bossier	4	57.1	3	42.9	7	0.8
Caddo	13	37.1	22	62.9	35	4.0
Calcasieu	111	91.7	10	8.3	121	14.0
Cameron	4	100.0	0	0.0	4	0.5
Claiborne	0	0.0	1	100.0	1	0.1
De Soto	2	50.0	2	50.0	4	0.5
East Baton Rouge	109	86.5	17	13.5	126	14.5
Franklin	1	100.0	0	0.0	1	0.1
Grant	1	100.0	0	0.0	1	0.1
Iberia	2	66.7	1	33.3	3	0.3
Iberville	60	93.8	4	6.3	64	7.4
Jackson	1	100.0	0	0.0	1	0.1
Jefferson	32	64.0	18	36.0	50	5.8
Jefferson Davis	0	0.0	1	100.0	1	0.1
Lafayette	4	40.0	6	60.0	10	1.2
Lafourche	1	50.0	1	50.0	2	0.2
Lincoln	2	100.0	0	0.0	2	0.2
Livingston	3	50.0	3	50.0	6	0.7
Madison	1	50.0	1	50.0	2	0.2
Morehouse	1	33.3	2	66.7	3	0.3
Natchitoches	1	100.0	0	0.0	1	0.1
Orleans	16	59.3	11	40.7	27	3.1
Ouachita	35	87.5	5	12.5	40	4.6
Plaquemines	14	82.4	3	17.6	17	2.0
Poite Coupee	0	0.0	5	100.0	5	0.6
Rapides	3	75.0	1	25.0	4	0.5
Richland	1	50.0	1	50.0	2	0.2
Sabine	2	100.0	0	0.0	2	0.2
St. Bernard	87	98.9	1	1.1	88	10.1
St. Charles	65	90.3	7	9.7	72	8.3
St. James	23	82.1	5	17.9	28	3.2
St. John the Baptist	12	92.3	1	7.7	13	1.5
St. Landry	3	75.0	1	25.0	4	0.5
St. Martin	0	0.0	2	100.0	2	0.2
St. Mary	1	100.0	0	0.0	1	0.1
St. Tammany	4	66.7	2	33.3	6	0.7
Tangipahoa	2	50.0	2	50.0	4	0.5
Terrebonne	3	37.5	5	62.5	8	0.9
Vermilion	1	100.0	0	0.0	1	0.1
W. Baton Rouge	13	65.0	7	35.0	20	2.3
W. Carroll	1	100.0	0	0.0	1	0.1
W. Feliciana	2	100.0	0	0.0	2	0.2
Washington	1	100.0	0	0.0	1	0.1
Webster	1	100.0	0	0.0	1	0.1
Total ‡	704	81.2	163	18.8	867	99.7

* 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 83 (11.8%) events. Of all 621 fixed-facility events where type of area was reported, 581 (93.6%) reported one type of area and 40 (6.4%) reported a combination of two area types. Among events with one type of area reported, the main areas were classified as follows: 280 (48.2%) ancillary process equipment, 170 (29.3%) piping, and 53 (9.1%) storage area above ground (Figure 1). Of the events with two areas, 26 (65.0%) involved ancillary processing equipment in combination with other types of areas.

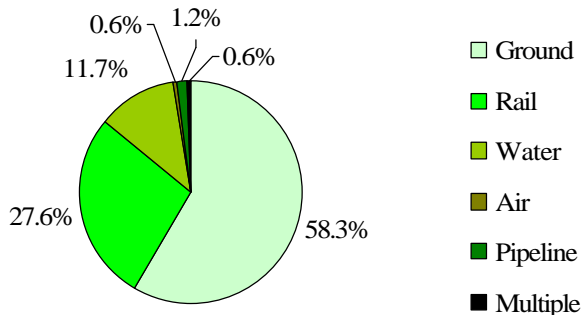
Figure 1.- Areas of fixed facilities involved in events—Louisiana Hazardous Substances Emergency Events Surveillance, 2005



Of the 163 transportation-related events, 95 (58.3%) occurred during ground transport (e.g., truck, van, or tractor) and 45 (27.6%) involved transport by rail (Figure 2). Fewer events involved water, air, and pipeline transportation modes. Most (96.8%) ground transportation events involved trucks. The largest proportions of transportation-related events occurred en route but were not discovered until the vehicle reached a fixed facility destination (48 [29.4%]) or

from a stationary vehicle or vessel (47 [28.8%]). Of the 163 transportation-related events, 44 (27.0%) 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, 2005



Primary and secondary factors contributing to the events were reported. Primary factors were reported for 843 (97.2%) events (Figure 3a). Most (70.9%) fixed-facility events reported equipment failure as the primary factor, and most (50.3%) transportation-related events also reported equipment failure as the primary factor. Secondary factors were reported for 448 (51.7%) events (Figure 3b). Of the reported secondary factors, most (29.1%) fixed-facility events involved system start up and shutdown and most (39.2%) transportation-related events involved improper filling, loading, or packing.

Figure 3a.- Primary factors reported as contributing to events—Louisiana Hazardous Substances Emergency Events Surveillance, 2005

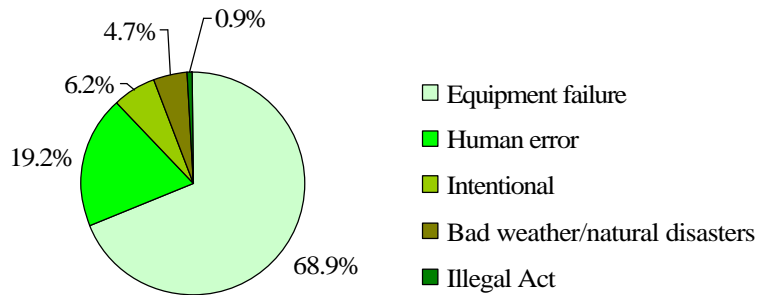
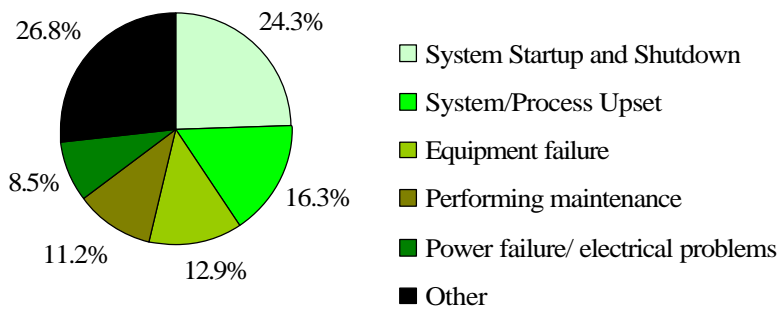


Figure 3b.- Secondary factors reported as contributing to events—Louisiana Hazardous Substances Emergency Events Surveillance, 2005



More than 71% of all events involved the release of only one substance. Two substances were released in approximately 13% 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 (33.9% vs. 3.6%).

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

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	465	66.1	465	157	96.3	157	622	71.7	622
2	113	16.1	226	2	1.2	4	115	13.3	230
3	46	6.5	138	1	0.6	3	47	5.4	141
4	22	3.1	88	2	1.2	8	24	2.8	96
≥ 5	58	8.2	418	1	0.6	7	59	6.8	425
Total*	704	100.0	1335	163	99.9	179	867	100.0	1514

* 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 (35.7%) and the 6 hours after and including noon (30.4%), compared with the 6 hours before midnight (17.2%) and the 6 hours after and including midnight (16.7%) (12 events did not have a time specified). Additionally, 12%-16% of events occurred on each weekday as compared with 10%-12% on a weekend day. March through August had 57% of the events, and the other 6 months of the year had 43%.

Industries

The largest proportions of HSEES events were associated with the manufacturing (622 [71.7%]) and transportation (152 [17.5%]) industries (Table 3). Within manufacturing, chemical manufacturing 376 [60.5%]) and petroleum manufacturing 229 [36.8%]) accounted for most of the events. The largest number of events with victims occurred in the manufacturing industry (16 [33.3%]). The total number of victims was greatest in the manufacturing industry (29 [30.5%]) followed by the number of victims in transportation (11 [11.6%]) and health care (9 [9.5%]). The

subcategory chemical manufacturing accounted for 55.2% 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 2.6% of all 622 events resulted in victims.

Conversely, 23.1% of all events in the utilities industry resulted in victims, but this industry represents a small proportion (6.3%) of events with victims.

Table 3.- Industries involved in hazardous substance events and events with victims, by category— Louisiana Hazardous Substances Emergency Events Surveillance, 2005

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims # (maximum)*
	No.	%	No.	%		
Accommodation and Food Services	0	0.0	0	0.0	0.0	0
Administrative and Support Services	3	0.3	1	2.1	33.3	2 (2)
Agriculture	7	0.8	4	8.3	57.1	8 (5)
Communication	0	0.0	0	0.0	0.0	0
Construction	5	0.6	1	2.1	20.0	3 (3)
Educational Services	3	0.3	2	4.2	66.7	5 (4)
Entertainment	1	0.1	1	2.1	100.0	1 (1)
Finance and Insurance	0	0.0	0	0.0	0.0	0
Health Care	2	0.2	1	2.1	50.0	9 (9)
Management	0	0.0	0	0.0	0.0	0
Manufacturing	622	71.7	16	33.3	2.6	29 (7)
Mining	14	1.6	1	2.1	7.1	2 (2)
Not an Industry	7	0.8	2	4.2	28.6	7 (6)
Not Identified	7	0.8	1	2.1	14.3	1 (1)
Other Services	4	0.5	3	6.3	75.0	3 (1)
Professional services	0	0.0	0	0.0	0.0	0
Public Administration	3	0.3	0	0.0	0.0	0
Real Estate	0	0.0	0	0.0	0.0	0
Retail trade	6	0.7	2	4.2	33.3	2 (1)
Transportation	152	17.5	7	14.6	4.6	11 (4)
Utilities	13	1.5	3	6.3	23.1	8 (6)
Wholesale trade	18	2.1	3	6.3	16.7	4 (2)
Total ‡	867	99.8	48	100.3	-	95 (9)

*Minimum number of victims per event = 1.

‡ Percentages do not total 100% because of rounding.

Substances

A total of 1514 substances were released in all events, of which 15 (1.0%) substances were reported as threatened to be released. The individual substances most frequently released were sulfur dioxide, nitrogen oxides (NO_x), benzene, and hydrogen sulfide (Appendix). Substances were grouped into 15 categories. The substance categories most commonly released in fixed-facility events were other inorganic substances (480 [36.0%]), volatile organic compounds (458 [34.3%]), and acids (88 [6.6%]) (Table 4). In transportation-related events, the most common substance categories released were acids (42 [23.5%]), volatile organic compounds (37 [20.7%]), and paints and dyes (24 [13.4%]).

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 (1181 [79.6%]), spills (249 [16.8%]), threatened release (45 [3.0%]), fire (5 [0.3%]), and explosion (3 [0.2%]). Of events with two types of releases, the following combinations were reported: spills and air releases (24 [77.4%]), spills and fire (3 [9.7%]), air releases and fire (3 [9.7%]), and the remaining 1 (3.2%) involved a spill and explosion.

Table 4.- Number of substances involved, by substance category and type of event—Louisiana Hazardous Substances Emergency Events Surveillance, 2005

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	88	6.6	42	23.5	130	8.6
Ammonia	33	2.5	6	3.4	39	2.6
Bases	19	1.4	21	11.7	40	2.6
Chlorine	43	3.2	9	5.0	52	3.4
Formulations	1	0.1	0	0.0	1	0.1
Hetero-organics	7	0.5	4	2.2	11	0.7
Hydrocarbons	23	1.7	3	1.7	26	1.7
Mixture*	13	1.0	1	0.6	14	0.9
Other †	27	2.0	6	3.4	33	2.2
Other inorganic substances ‡	480	36.0	8	4.5	488	32.2
Oxy-organics	49	3.7	5	2.8	54	3.6
Paints and dyes	9	0.7	24	13.4	33	2.2
Pesticides	33	2.5	9	5.0	42	2.8
Polymers	52	3.9	4	2.2	56	3.7
Volatile organic compounds	458	34.3	37	20.7	495	32.7
Total	1335	100.1	179	100.1	1514	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.

Victims

A total of 95 victims were involved in 48 events (5.5% of all events) (Table 5). Of the 48 events with victims, 33 (68.8%) events involved only one victim, and 5 (10.4%) involved two victims.

Of all victims, 65 (68.4%) were injured in fixed-facility events. Additionally, 17 persons in 8 events (0.9% 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, 2005

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	28	77.8	28	5	41.7	5	33	68.8	33
2	2	5.6	4	3	25.0	6	5	10.4	10
3	1	2.8	3	1	8.3	3	2	4.2	6
4	1	2.8	4	1	8.3	4	2	4.2	8
5	1	2.8	5	1	8.3	5	2	4.2	10
≥ 6	3	8.3	21	1	8.3	7	4	8.3	28
Total	36	100.1	65	12	99.9	30	48	100.1	95

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 24.0% of all events; however, only 1.9% of these events resulted in injuries. Conversely, events involving acids and chlorine accounted for 10.8% and 5% of all events respectively, but 11.7% of the 94 events and 11.6% of 43 events resulted in injuries.

Table 6.- Frequency of substance categories in all events and events with victims—Louisiana Hazardous Substances Emergency Events Surveillance System, 2005*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	94	10.8	11	22.9	11.7
Ammonia	30	3.5	3	6.3	10.0
Bases	30	3.5	3	6.3	10.0
Chlorine	43	5.0	5	10.4	11.6
Formulations	1	0.1	0	0.0	0.0
Hetero-organics	10	1.2	2	4.2	20.0
Hydrocarbons	3	0.3	0	0.0	0.0
Mixture [†]	12	1.4	3	6.3	25.0
Multiple substance category	165	19.0	5	10.4	3.0
Other [‡]	15	1.7	2	4.2	13.3
Other inorganic substances [§]	208	24.0	4	8.3	1.9
Oxy-organics	24	2.8	2	4.2	8.3
Paints and dyes	32	3.7	1	2.1	3.1
Pesticides	21	2.4	2	4.2	9.5
Polymers	42	4.8	1	2.1	2.4
Volatile organic compounds	137	15.8	4	8.3	2.9
Total[¶]	867	100.0	48	100.2	5.5

*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.

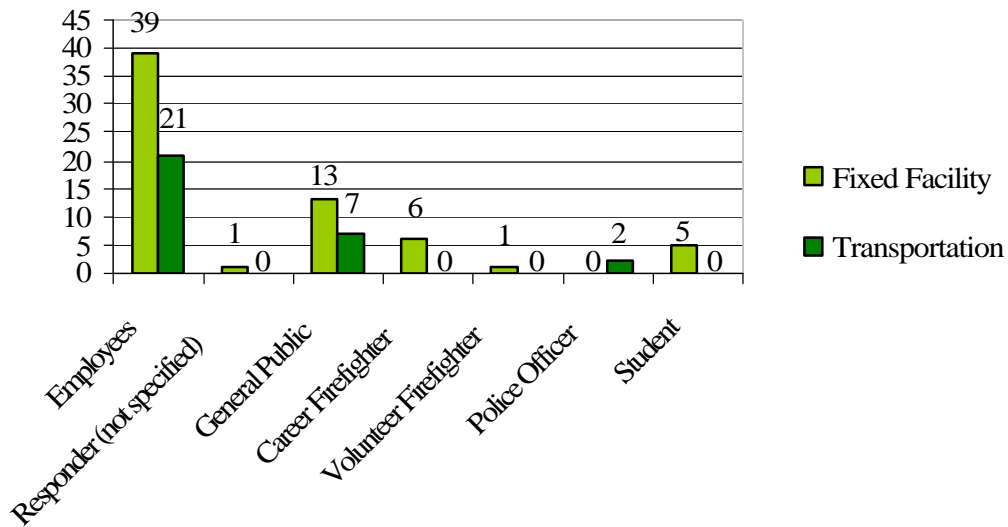
[‡]Not classified

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

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

Employees (60 [63.2%]) constituted the largest proportion of the population groups injured, followed by general public (20 [21.1%]) (Figure 4). In fixed-facility events, 8 emergency response personnel were injured. Six (75.0%) of those were career firefighters, 1 (12.5%) was a volunteer firefighter, and 1 (12.5%) was a non specified responder. 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, 2005



Victims were reported to sustain a total of 148 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 (27 [24.5%]) and chemical burns (17[15.5%]). In transportation-related events, respiratory irritation (11 [28.9%]), and trauma (10 [26.3%]) 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, 2005

Injury/symptom	Fixed facility		Transportation		All events	
	No. injuries	%	No. injuries	%	Total no.	%
Chemical Burns	17	15.5	0	0.0	17	11.5
Dizziness/central nervous system symptoms	13	11.8	0	0.0	13	8.8
Eye irritation	9	8.2	1	2.6	10	6.8
Gastrointestinal system problems	13	11.8	6	15.8	19	12.8
Headache	8	7.3	2	5.3	10	6.8
Heart problems	1	0.9	0	0.0	1	0.7
Respiratory irritation	27	24.5	11	28.9	38	25.7
Shortness of breath	12	10.9	2	5.3	14	9.5
Skin irritation	3	2.7	4	10.5	7	4.7
Trauma [†]	5	4.5	10	26.3	15	10.1
Thermal Burns	2	1.8	2	5.3	4	2.7
Total[‡]	110	99.9	38	100.0	148	100.1

*The number of injuries is greater than the number of victims (95) because a victim could have had more than one injury.

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

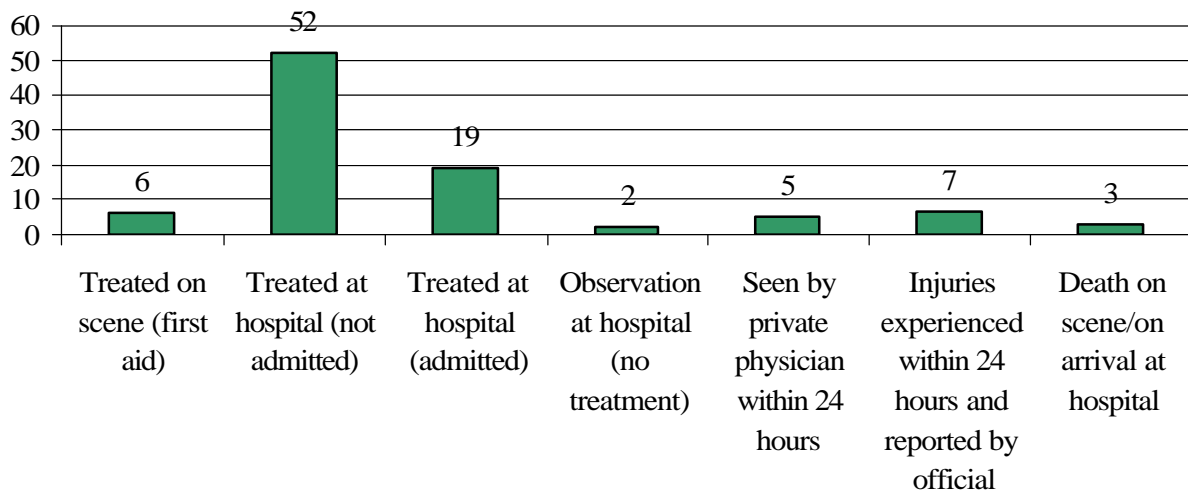
[‡] Percentages do not total 100% because of rounding.

The median age of the 67 (70.5%) victims for whom exact age was reported was 38 years (range: 4- 68 years). For the 73 (76.8%) injured persons for whom an age category was reported, 1 (1.4%) was < 5 years of age, 2 (2.7%) were 15–19 years of age, 44 (60.3%) were 20–44 years of age, 24 (32.9%) were 45–64 years of age, and 2 (2.7%) were =65 years of age. Of the 22 injured persons for whom age was not reported, 14 (63.6%) were presumably adults (because their population group was reported as responders or employees), and 8 (33.4%) could have been adults or children (because their population group was reported as members of the general public or student).

Sex was known for 90 (94.7%) of the victims; of these, 74 (82.2%) were males. Of all employees and responders for whom sex was reported, 97.0% were males.

Of the 95 victims, 52 (54.7%) were treated at hospital and not admitted and 19 (20.0%) were treated at hospital and admitted. Severity was unknown for 1 (1.1%) victim. Three (3.2%) deaths were reported (Figure 5). All three deaths resulted from physical trauma received during trucking accidents and not from exposure to the released substance(s).

Figure 5.- Injury disposition—Louisiana Hazardous Substances Emergency Events Surveillance, 2005



The status of personal protective equipment (PPE) use was reported for 32 (53.3%) employee-victims and for 8 (80.0%) responder-victims. Most of the employee-victims (78.1%) and 80.0% of the responder-victims had not worn any form of PPE. Employee-victims who wore PPE most often used Level D (2 [6.3%]) and other types of protection (5 [15.6%]) such as gloves, mask and/or boots.

Two events involved more than 6 injured people. These events resulted in 7 victims and 9 victims respectively. In the event involving 7 victims, chlorine was released at approximately 11:00 am on a Thursday in an industrial area, and an order to shelter-in-place was given followed by an evacuation of the building. The primary factor in this event was an equipment failure. A hose ruptured during the unloading of a railcar. All 7 victims were male employees between the ages of 22 and 51. All victims experienced respiratory irritation and one victim also experienced gastrointestinal problems. This event led to a road closure. In the event resulting in nine victims, chlorine was released by contractors working at hospital on a Friday morning at approximately 12:00. All nine victims were male employees that experienced respiratory symptoms. Eight of the victims also reported symptoms such as eye irritation, dizziness, gastrointestinal problems and shortness of breath. The primary contributing factor in this event was human error. The employees were mixing palletized chlorine with water. They did not properly dilute the chlorine with water causing the chlorine to be released as gas and an order to evacuate issued.

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 680 (78.4%) events, schools were within ¼ mile of 108 (12.5%) events, hospitals were within ¼ mile of 2 (0.2%) events, nursing homes were within ¼ mile of 29 (3.3%) events, licensed daycares were within ¼ mile of 88 (10.1%) events, industries or other businesses were within ¼ mile of 837 (96.5%) events and recreational areas were within ¼ mile of 71 (8.2%) events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 701 (81.7%) events with persons living within ¼ mile of the event; 774 (90.2%) events with persons living within ½ mile; and 830 (96.7%) events with persons living within 1 mile. Information on the number of people living within ¼, ½, and 1 mile of the event was missing for 9 events.

Evacuations

Evacuations were ordered in 17 (2.0%) events. Of these evacuations, 58.8% were of buildings or affected parts of buildings; 17.6% were of defined circular areas surrounding the event locations; 11.8% were of no criteria; 5.9% were of areas downwind or downstream of the event; and 5.9% were of circular and downwind or downstream areas. The number of people evacuated was known for 11 (64.7%) events and ranged from 6000 to 3 people, with a median of 45 people. The median length of evacuation was 45 minutes (range: 6 minutes to 4 hours). Evacuation length was missing for 3 (17.6%) events. Of all 17 events, 3 (17.6%) had access to the area restricted. Eighteen (2.1%) events had in-place sheltering ordered by an official.

Decontamination

Of the 82 (86.3%) victims for whom decontamination status was known, 65 (79.3%) were not decontaminated, 14 (17.1%) were decontaminated at the scene, 2 (2.4%) were decontaminated at a medical facility, and 1 (1.2%) was 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: 1–4 persons). Decontamination at the scene was done for 9 uninjured employees and 7 uninjured responders.

Response

Eight hundred sixty-three (99.5%) events had information on who responded to the event; 15.5% reported 2 or more categories of personnel who responded, 10.1% reported 3 or more categories, and 5.7% reported 4 or more categories. Company response teams (88.3%) responded most frequently to events, followed by law enforcement agencies (11.1%), fire departments (8.0%), and third party clean-up contractors (7.6%) (Table 8). No one responded in 142 (16.5%) events.

Table 8.- Distribution of personnel who responded to the event—Louisiana Hazardous Substances Emergency Events Surveillance, 2005

Responder category	No.	%*
Certified HazMat team	53	7.4
Emergency medical technicians	14	1.9
Environmental agency	52	7.2
Fire department	58	8.0
Health department/ health agency	8	1.1
Hospital personnel	9	1.2
Law enforcement agency	80	11.1
Other	1	0.1
Response team of company where release occurred	637	88.3
Department of works/utilities/transportation	5	0.7
State, parish, or local emergency managers/coordinators/planning committees	6	0.8
Third party clean-up contractor	55	7.6

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

Hurricanes Katrina and Rita

Hurricanes Katrina and Rita both made landfall in southern Louisiana causing catastrophic damage along the coastline. Hurricane Katrina came ashore in southeastern Louisiana on August 29, 2005 as a Category 3 hurricane causing extensive property damage, flooding from breached levees, and loss of life. Hurricane Katrina was one of the most devastating and costliest natural disasters to strike the United States. Hurricane Rita made landfall in southwestern Louisiana as a Category 3 hurricane on September 24, 2005. Before making landfall, Hurricane Rita skirted the Louisiana coastline causing additional flooding to the southeastern coastal communities already impacted by the surge from Hurricane Katrina. After making landfall, the storm surge of Hurricane Rita devastated entire communities in coastal areas of southwestern Louisiana.

Thousands of homes and businesses throughout southern Louisiana were damaged or destroyed by these hurricanes. One of Louisiana's top industries, oil and gas, was greatly affected by both hurricanes due to evacuations, flooded refineries, damaged platforms and crippled pipelines.

Thousands of orphan drums of unknown origin and content were found scattered throughout Louisiana's coastal communities. These unprecedented hurricanes resulted in many unintended chemical releases. However, due to the severity of these storms and their impact on the infrastructure of the affected communities, many releases went unreported.

A total of 44 hurricane-related events were captured by Louisiana HSEES in 2005. Thirty (68.2%) events were related to Hurricane Katrina, 13 (29.6%) were related to Hurricane Rita, and one (2.3%) event was related to both hurricanes. Fifty percent of the events occurred in August; 38.6% were in September; 9.1% were in October; and 2.3% were in November. Most events occurred in the manufacturing industry (29 [65.9%]). The most common primary contributing factor was bad weather (29 [65.9%]), and the most common secondary contributing factor was system start up or shutdown (9 [20.5%]). Most releases were air releases (70.9%), and VOCs was the category of chemicals (40.5%) most frequently released. Seven injuries were associated with two hurricane-related events.

PREVENTION ACTIVITIES

During 2005, the Louisiana HSEES Program performed various prevention activities. These activities included:

- Louisiana Parish Health Profiles
- Presentations of HSEES data
- Mississippi River Industrial Corridor Fact Sheet
- Calcasieu Industrial Corridor Fact Sheet

Previous data indicated a large number of events among parishes bordering the Mississippi River and also in Calcasieu Parish. The Louisiana HSEES staff developed two fact sheets focused on these two regions. The Mississippi River Industrial Corridor includes the parishes: Ascension, East Baton Rouge, Jefferson, Iberville, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, and West Baton Rouge. The Calcasieu Industrial Corridor includes all of Calcasieu Parish. The fact sheets included summary data from the specified regions as well as precautions for residents and industries to prepare for and to prevent chemical releases.

SUMMARY OF RESULTS, 2001–2005

During 2001–2005, the largest proportion of events occurred in fixed facilities (Table 9). The number of reported transportation-related events has increased in the last year. The increase is partially due to expansion of transportation-related reporting sources. In addition, the total number of events increased. The increase in the number of events from 2004 to 2005 may have been due, at least in part, to the expansion of the list of extremely hazardous substances. In 2005 all events involving the release of an extremely hazardous substance were included regardless of the quantity released.

Table 9.- Cumulative data by year—Louisiana Hazardous Substances Emergency Events Surveillance, 2001-2005*

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
Total	3079	593	3672	6048	406	7	121	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.

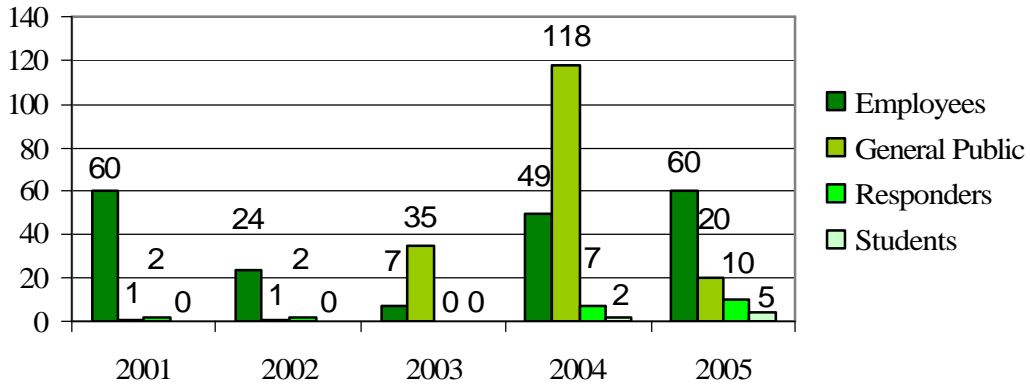
The number of substances released increased from 2003-2005. The percentage of events with victims was highest in 2005 (5.5%) and lowest in 2003 (1.2%). The average percentage of events with victims during 2001–2005 was 3.3%.

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

In 2005 employees were the most commonly reported victim type, however, members of the general public constituted a large proportion of the victims in previous years (Figure 6). As with previous years, most employee-victims and responder-victims had not worn any form of PPE.

The number of injured responders increased in 2005, and this increase likely resulted from hazards responders faced in the aftermath of Hurricanes Katrina and Rita.

Figure 6.- Number of victims, by category and year—Louisiana Hazardous Substances Emergency Events Surveillance, 2001–2005



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, 2005

	Chemical Substance	Number of Releases
1	Sulfur Dioxide	165
2	NOx	97
3	Benzene	70
4	Hydrogen Sulfide	63
5	Nitric Oxide	58
6	Hydrochloric Acid	53
7	Vinyl Chloride	50
8	Chlorine	50
9	Volatile Organic Compounds	46
10	Nitrogen Dioxide	44

Note: chemical substance may include related chemical substances such as substances not otherwise specified (NOS).