

# **Louisiana Hazardous Substances Emergency Events Surveillance (HSEES) System**

## **2001: A Summary Report**

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



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## EXECUTIVE SUMMARY

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Department of Health and Human Services has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences associated with the release of hazardous substances. Since 2001, the Louisiana Department of Health and Hospitals (LDHH) has participated in this surveillance system. This report summarizes the characteristics of events reported to the surveillance system by the LDHH during January 1<sup>st</sup> through December 31<sup>st</sup>, 2001.

Information on acute hazardous substances emergency events was collected. The types of data collected included general information on the event, substance(s) released, number of victims, number and types of adverse health effects experienced by the victims, and number of evacuations.

Several data sources were used to obtain the maximum amount of information about each event. These sources included, but were not limited to, the Louisiana State Police, the National Response Center, and the Louisiana Department of Environmental Quality (LDEQ). Data were entered into a web-based data entry system that allows for real-time entry.

The LDHH screened over 8,000 events and of those events, a total of 1,884 events were entered initially to the HSEES database system. Out of 1,884 events, 815 of them met the criteria for the Louisiana HSEES database for 2001. Among the 815 events, 684 (83.9%) of the events occurred at fixed facilities and 131 (16.1%) were transportation related. "Equipment failure" was reported as a primary factor in 357 events, and it was also reported as a secondary factor in 40 events. In 605 (74.2%) of the events, only a single substance was released. The most commonly reported categories of substances were "Other inorganic substances", "Volatile organic compounds", and "Other". During this reporting period, 20 events resulted in a total of 63 victims (2.5% of all events). The adverse health effects most frequently experienced by victims were "Respiratory system problems" and "Burns". A total of 2 (2.7%) people died as a result of work-related events and 22 events required evacuations.

# **HAZARDOUS SUBSTANCES EMERGENCY EVENTS SURVEILLANCE (HSEES)**

## **INTRODUCTION**

The HSEES system has four goals:

- To describe the distribution and characteristics of hazardous substances emergencies.
- To describe the morbidity and mortality experienced by employees, responders, and the general public as a result of hazardous substances releases.
- To identify risk factors associated with morbidity and mortality.
- To identify strategies that may reduce future morbidity and mortality resulting from the release of hazardous substances.

This report summarizes the characteristics of hazardous substances releases and the associated public health consequences of events reported in Louisiana to the surveillance system during 2001.

## **METHODS**

Hazardous substances releases are eligible for inclusion in the surveillance system if they are uncontrolled or illegal and require removal, cleanup, or neutralization according to federal, state, or local law. Threatened releases are also included in the system if 1) they involve actions such as evacuations, which are taken to protect the public health, and 2) they would have required removal, cleanup, or neutralization according to federal, state, or local law. A substance is considered hazardous if it can be reasonably expected to cause injury or death to an exposed person. Releases to air and water that could not be cleaned up are also included in the system if the amount released would have needed to be cleaned up if the spill had occurred on land. Events involving only petroleum products are excluded.

Various data sources were used to obtain information about these events. These sources included, but were not limited to, the Louisiana State Police, the National Response Center, and the Louisiana Department of Environmental Quality. Census data were used to estimate the number of residents living in the vicinity of the events. For each event, information was collected about the type of event (fixed-facility or transportation-related event); substance(s) released (identity, chemical form, type of release, and quantity released); victim(s) (population group, type of injury sustained, medical outcome, demographics, personnel protective equipment (PPE) worn, and distance from the event); the type of area in which the event occurred; date and time of occurrence; numbers of persons potentially affected; use of environmental sampling; evacuations; response plans; and causal factors.

Emergency events captured by HSEES are classified according to whether they occur at fixed facilities or during transportation. Fixed-facility events involve hazardous substances released at industrial sites, schools, farms, or other permanent facilities; transportation-related events involve hazardous materials released during transport by surface, air, or water. Victims are defined as individuals with symptoms (including psychological stress) or injuries (including death) that result from the event. Victims who receive more than one type of injury are counted once in each applicable type of injury.

Substances are grouped into 11 categories: acids, ammonia, bases, chlorine, mixtures, paints and dyes, pesticides, polychlorinated biphenyls, volatile organic compounds (VOCs), other inorganic substances, and other substances. The “Mixtures” category consists of chemicals from different categories that are mixed before release, and the “Other” category consists of chemicals that cannot be classified into any one of the other 10 chemical categories. The category “Other inorganic substances” comprises all inorganic substances except acids, bases, ammonia, and chlorine.

Beginning in January 2001, data were entered into the Agency for Toxic Substances and Disease Registry’s (ATSDR) web-based data entry system. ATSDR and the Louisiana Department of Health and Hospitals (LDHH) perform data management, data analysis, and reporting of the entered data. Louisiana HSEES data will be used for prevention activities by both ATSDR and by LDHH.

**RESULTS**

A total of 815 hazardous substances emergency events were qualified in 2001 to the HSEES system by LDHH. Of those 815 events, 807 (99.0%) were in the category “Substances all actually released into environment”, 6 (0.7%) were in the category “Substances all threatened to be released into environment”, and 2 (0.3%) were in the category “Substances some actually and some threatened to be released”. Out of 815 events, 684 (83.9%) events occurred at fixed facilities, and 131 (16.1%) events were transportation-related events (Table 1). Table 2 shows the number of events by parish and type of event.

**Table 1 — Number of events meeting the surveillance definition, by year and type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

Year	Type of event				Total no. of events
	Fixed facility		Transportation		
	No. of events	%	No. of events	%	
2001	684	83.9	131	16.1	815
<b>Total</b>	<b>684</b>	<b>100.0</b>	<b>131</b>	<b>100.0</b>	<b>815</b>



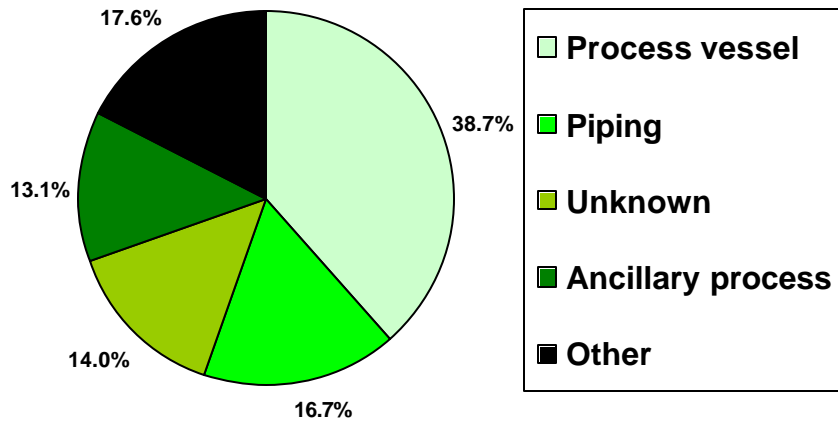
**Table 2 — Number of events meeting the surveillance definition, by parish and type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

Parish	Type of event				Total no. of events*
	Fixed facility		Transportation		
	No. of events	%	No. of events	%	
Acadia	1	20.0	4	80.0	5
Allen	2	100.0	0	0.0	2
Ascension	128	93.4	9	6.5	137
Beauregard	1	50.0	1	50.0	2
Caddo	13	72.2	5	27.7	18
Calcasieu	86	92.4	7	7.53	93
Cameron	3	75.0	1	25.0	4
Catahoula	0	0.0	1	100.0	1
East Baton Rouge	77	89.5	9	10.4	86
East Feliciana	0	0.0	2	2.0	2
Grant	4	80.0	1	20.0	5
Iberia	4	100.0	0	0.0	4
Iberville	62	89.8	7	10.1	69
Jefferson	22	64.7	12	35.2	34
Jefferson Davis	1	25.0	3	75.0	4
La Salle	1	100.0	0	0.0	1
Lafayette	1	20.0	4	80.0	5
Lafourche	4	80.0	1	20.0	5
Lincoln	3	75.0	1	25.0	4
Livingston	1	50.0	1	50.0	2
Madison	1	100.0	0	0.0	1
Natchitoches	0	0.0	1	100.0	1
Orleans	13	38.2	21	61.7	34
Ouachita	43	91.4	4	8.5	47
Plaquemines	14	82.3	3	17.6	17
Pointe Coupee	2	33.3	4	66.6	6
Rapides	3	50.0	3	50.0	6
St. Bernard	30	100.0	0	0.0	30
St. Charles	93	94.9	5	5.1	98
St. James	38	92.6	3	7.3	41
St. John the Baptist	7	77.7	2	22.2	9
St. Landry	5	83.3	1	16.6	6
St. Martin	0	0.0	1	100.0	1
St. Mary	0	0.0	1	100.0	1
St. Tammany	1	33.3	2	66.6	3
Tangipahoa	0	0.0	6	100.0	6
Terrebonne	0	0.0	1	100.0	1
Union	3	100.0	0	0.0	3
Vermillion	1	100.0	0	0.0	3
Vernon	1	33.3	2	66.6	3
West Baton Rouge	11	91.6	1	8.3	12
Washington	3	100.0	0	0.0	3
Webster	1	100.0	0	0.0	1
<b>Total</b>	<b>684</b>	<b>84.0</b>	<b>130</b>	<b>15.9</b>	<b>814</b>

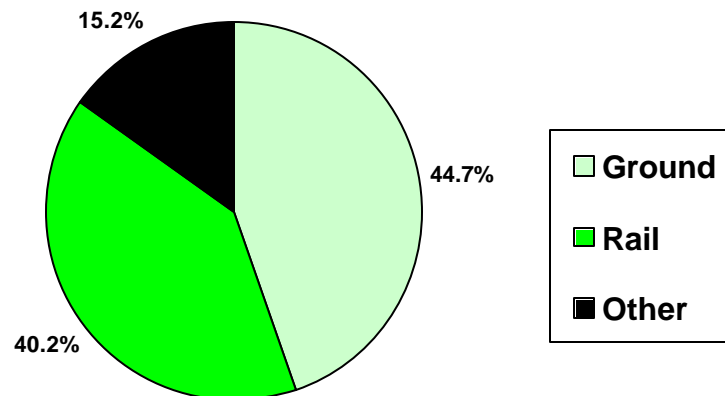
\* Location data of one event is missing.

In 2001, “Process vessel” was an area/location involving 266 (38.7%) fixed-facility events. One hundred and fifteen (16.7%) events were reported as involving “Piping”, 96 (14.0%) involving “Unknown”, 90 (13.1%) involving “Ancillary process”, and the remainder was attributable to other areas/locations (Figure 1). In transportation-related events, 44.7% occurred during ground transport (for example, truck, van, or tractor), and 40.2% involved transport by rail (Figure 2). The remaining transportation-related events involved “Water”, “Air”, or “Pipeline” transport.

**Figure 1 — Areas of fixed facilities involved in events, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**



**Figure 2 — Distribution of transportation-related events, by type of transport, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**



Primary factors contributing to fixed-facility events were also reported (Figure 3). “Equipment failure” was a contributing factor in 321 (46.9%) events. Ninety (13.2%) events were reported as involving “System/process upset”, 79 (11.5%) involving “System start up and shutdown”, and the remainder was attributable to other factors.

Secondary factors contributing to fixed-facility events were also reported (Figure 3). “No secondary factor” was reported in 535 (78.2%) events. “Equipment failure” was a contributing factor in 33 (4.8%) events. Forty-seven (6.9%) events were reported as involving “System/process upset”, and the remainder was attributable to other factors.

Primary factors contributing to transportation events were also reported (Figure 4). “Equipment failure” was a contributing factor in 36 (27.5%) events. Thirty-three (25.2%) were reported as involving “Motor vehicle rollover/derailment”, 21 (16.0%) involving “Human error”, and the remainder was attributable to other factors.

Secondary factors contributing to transportation events were also reported (Figure 4). “No secondary factor” was reported in 110 (84.0%) events. Eight (6.1%) events were reported as involving “Improper loading”, 7 (5.3%) involving “Equipment failure”, and the remainder was attributable to other factors.

Of all events, 74.2% involved the release of only one substance. Two substances were released in approximately 15.7% of the events, and the remainder involved the release of more than two substances (Table 3).

**Table 3 — Distribution of the number of substances released, by type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

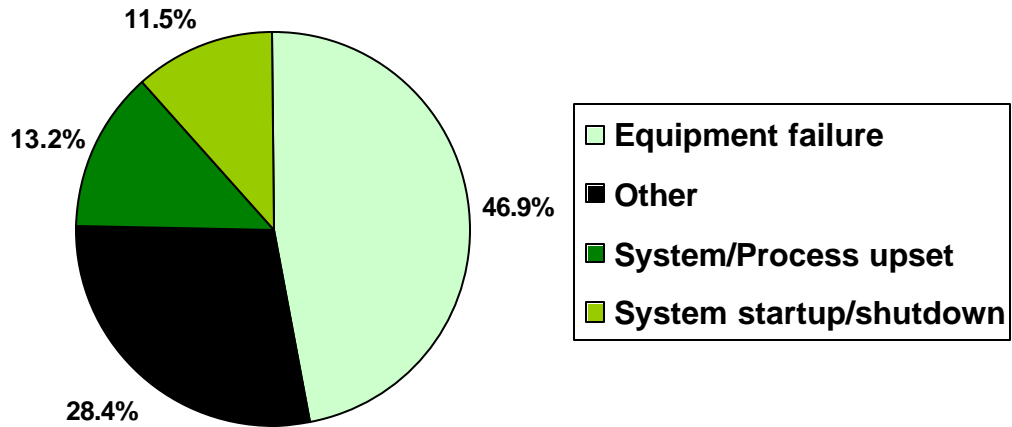
No. of substances released	Type of event						All events		
	Fixed facility			Transportation			No. of events	%	No. of substances
	No. of events	%	No. of substances	No. of events	%	No. of substances			
1	482	70.5	482	123	93.9	123	605	74.2	605
2	122	17.8	244	6	4.6	12	128	15.7	256
3	49	7.2	147	2	1.5	6	51	6.3	153
4	18	2.6	72	0	0.0	0	18	2.2	72
≥ 5	13	1.9	78	0	0.0	0	13	1.6	78
<b>Total</b>	<b>684</b>	<b>100.0</b>	<b>1023</b>	<b>131</b>	<b>100.0</b>	<b>141</b>	<b>815</b>	<b>100.0</b>	<b>1164</b>

In the 815 events, there were 1,164 chemicals released. Out of 1,164 chemicals released, 1,150 (98.8%) were actually released and 14 (1.2%) were threatened to be released. The number of substances released was higher than the number of events, because some of the events involved more than one substance. Most substances released were spills (20.7%), air emissions (71.9%), or fires (1.0%). Of the spills, 60.7 % were fixed-facility events. Of the air emissions, 96.2% were from fixed-facility events. Of the fire, 70.0% were from the fixed-facility events.

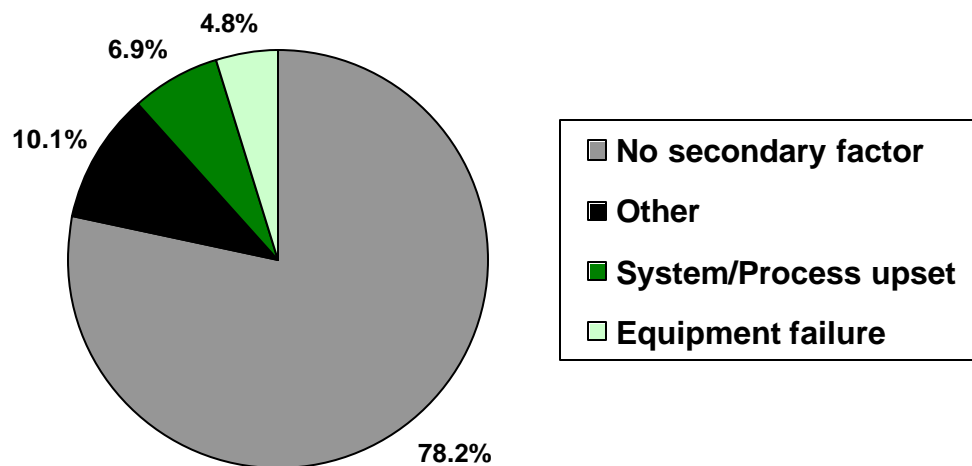
Of the events with known time of occurrence, 30.8% occurred primarily from 6:00 AM to 12:00 PM, and 29.7% from 12:00 PM to 6:00 PM. Approximately 22% of events occurred on a Saturday or Sunday.

**Figure 3 — Primary and secondary factors reported as contributing to the occurrence of fixed-facility events, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

*Primary Contributing Factors*

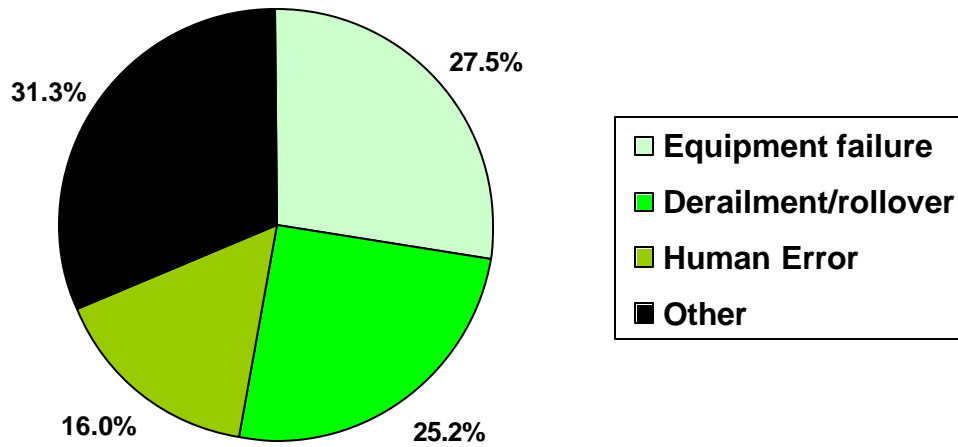


*Secondary Contributing Factors*

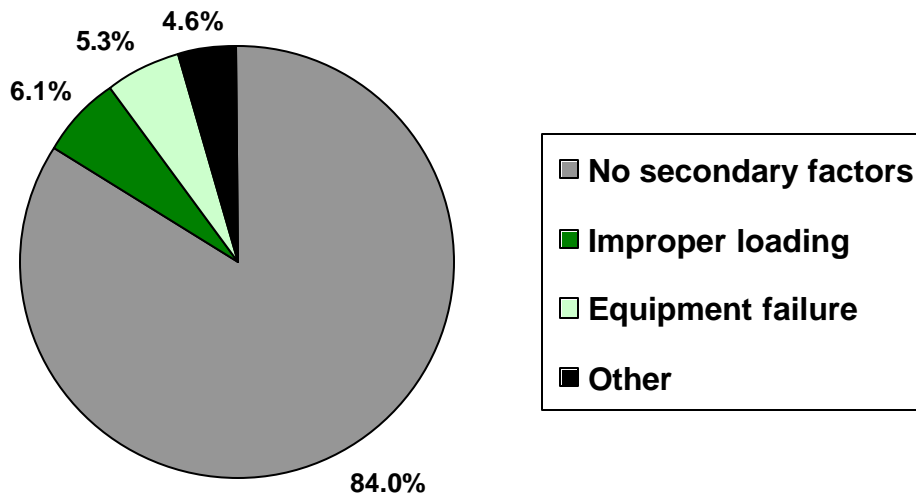


**Figure 4 — Primary and secondary factors reported as contributing to the occurrence of transportation events, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

*Primary Contributing Factors*



*Secondary Contributing Factors*



## SUBSTANCES

Of the 11 categories into which HSEES substances were grouped, the categories of substances most commonly released in fixed-facility events were “Other inorganic substances” (34.7%), “VOCs” (29.3%), and “Other” (16.7%) (Table 4). In transportation-related events, “Other” (26.2%), “VOCs” (18.4%), and “Other inorganic substances” (15.6%) were most frequently released (Table 4). The ten substances most frequently released in Louisiana for 2001 are listed in Appendix A.

**Table 4 — Distribution of the number of substances released, by substance category and type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. of substances	%	No. of substances	%	No. of substances	%
Acids	45	4.4	21	14.9	66	5.7
Ammonia	58	5.7	10	7.1	68	5.8
Bases	17	1.7	12	8.5	29	2.5
Chlorine	35	3.4	3	2.1	38	3.3
Mixtures*	13	1.3	1	0.7	14	1.2
Other inorganic substances	354	34.7	22	15.6	376	32.3
Other substances	170	16.7	37	26.2	207	17.8
Paints and dyes	2	0.2	2	1.4	4	2.6
Pesticides	23	2.3	7	4.9	30	0.3
Polychlorinated biphenyls	4	0.4	0	0	4	0.3
Volatile organic compounds	300	29.4	26	18.4	326	28
<b>Total</b>	<b>1021</b>	<b>100</b>	<b>141</b>	<b>100</b>	<b>**1162</b>	<b>100</b>

\* Mixtures of substances from different categories.

\*\* Type of category was indeterminate in two releases.

## VICTIMS

Out of 815 events, there were a total of 63 victims (Table 5) in 20 events (2.5% of all releases). Of the events with victims, 70% involved only one victim, and 80% involved either one or two victims. Of the transportation events, 5.3% involved victims, while only 1.9 % of the fixed-facility events involved victims. Approximately 13% of the victims were injured in transportation-related events and 87.3% were injured in fixed facilities.

**Table 5 — Distribution of the number of victims, by type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

No. of victims	Type of event						All events		
	Fixed facility			Transportation					
	No. of events	%	No. of victims	No. of events	%	No. of victims	No. of events	%	No. of victims
1	8	61.5	8	6	85.7	6	14	70	14
2	1	7.7	2	1	14.3	2	2	10	4
3	1	7.7	3	0	0	0	1	5	3
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
≥ 6	3	23.1	42	0	0	0	3	15	42
<b>Total</b>	<b>13</b>	<b>100</b>	<b>55</b>	<b>7</b>	<b>100</b>	<b>8</b>	<b>20</b>	<b>100</b>	<b>63</b>

The substances released may not necessarily be the most likely to result in victims (Table 6). For example, “Other inorganic substances” were released during 376 events; however, only 3 (0.8%) of these events resulted in adverse health effects. Conversely, chlorine was released in only 38 events, and 5 (13.2%) of these events resulted in adverse health effects, indicating its greater potential for immediate harm.

The types of adverse health effects sustained by victims are shown in Table 7 and Figure 5. Some victims had more than one adverse health effect. The most commonly reported adverse health effect in fixed-facility events was respiratory system problems (83.6%). Trauma was reported in 37.5% of all transportation-related events, but was not reported in any fixed-facility events. The trauma may have been caused by the sequence of events (for example, a motor vehicle accident) leading to the release of a hazardous substance, and not by exposure to the hazardous substance itself.

Out of 63 victims, 16 (25.4%) were male and the other 47 (74.6%) were of unknown gender. Age was unknown for all but 2 victims. As shown in Figure 6, among the 63 victims, 22 (34.9%) were treated on scene (first aid), 27 (42.9%) were treated at a hospital but not admitted, 9 (14.3%) were treated at a hospital and admitted, 1 (1.6%) was observed at a hospital with no treatment, 2 (3.2%) were fatalities and 2 (3.2%) were unknown.

**Table 6 — Number of substances released in all events and events with victims, by substance category, Hazardous Substances Emergency Surveillance Events, Louisiana, 2001**

Substance category	Total releases		Releases with victims		
	Number	Percentage of total releases	Number	Percentage of all releases with victims	Percentage of releases in substance category
Acids	66	5.70%	4	17.40%	6.10%
Ammonia	68	5.90%	6	26.10%	8.80%
Bases	29	2.50%	1	4.30%	3.50%
Chlorine	38	3.30%	5	21.70%	13.20%
Mixtures	14	1.20%	1	4.30%	7.10%
Other inorganic substances	376	32.40%	3	13.00%	0.80%
Other, not otherwise specified	207	17.80%	2	8.70%	1.00%
Paints and dyes	4	0.30%	0	0.00%	0.00%
Pesticides	30	2.60%	0	0.00%	0.00%
Polychlorinated biphenyls	4	0.30%	0	0.00%	0.00%
Volatile organic compounds	326	28.10%	1	4.30%	0.30%
<b>Total*</b>	<b>**1162</b>	<b>100.00%</b>	<b>23</b>	<b>100.00%</b>	

\* Total of 1162 releases exceeds the total number of 815 events because the events at which more than one substance was released were counted more than once.

\*\* Substance category was indeterminate in 2 releases.



**Table 7 — Distribution of type of adverse health effect, by type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

Type of adverse health effect	Type of event				All events	
	Fixed facility		Transportation			
	No.	%	No.	%	No.	%
Chemical burns	2	3.3	2	25	4	5.8
Heart problems	0	0	0	0	0	0
Dizziness/CNS <sup>†</sup>	5	8.2	0	0	5	7.2
Eye irritation	0	0	0	0	0	0
Headache	0	0	0	0	0	0
Heat stress	1	1.6	0	0	1	1.4
Gastrointestinal problems	0	0	0	0	0	0
Respiratory problems	51	83.6	2	25	53	76.8
Shortness of breath	0	0	0	0	0	0
Skin irritation	1	1.6	0	0	1	1.4
Thermal burns	1	1.6	1	12.5	2	2.9
Trauma	0	0	3	37.5	3	4.3
Other	0	0	0	0	0	0
<b>Total</b>	<b>61</b>	<b>100</b>	<b>8</b>	<b>100</b>	<b>69</b>	<b>100</b>

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

<sup>†</sup> Central nervous system symptoms.

**Figure 5 — Distribution of type of injury, by type of events, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

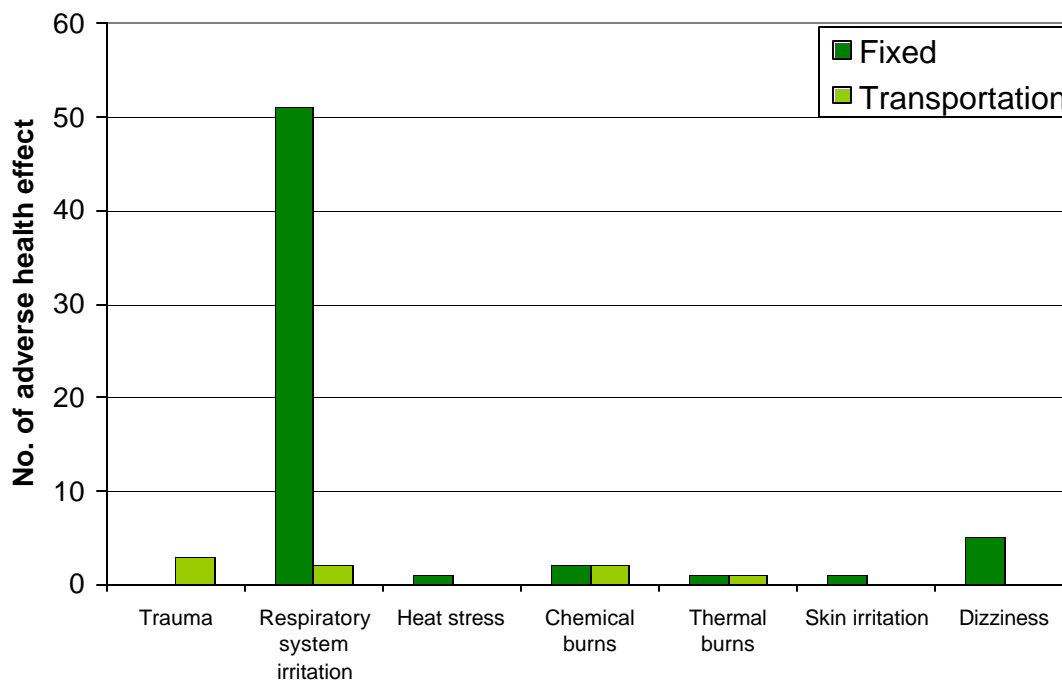


Figure 6 — Injury outcome, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001

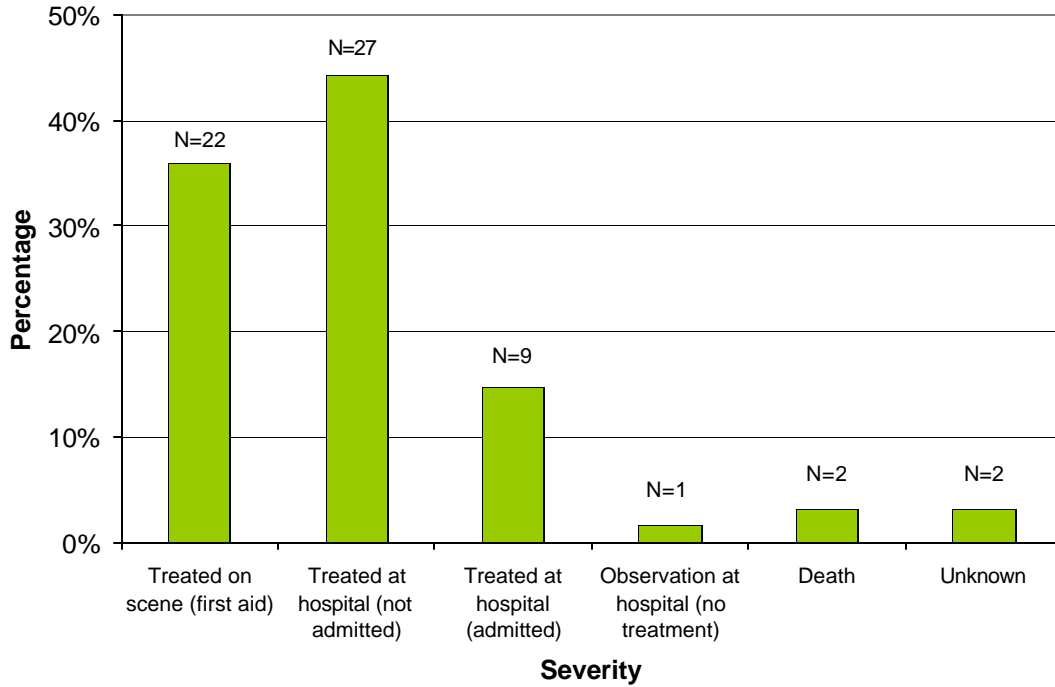
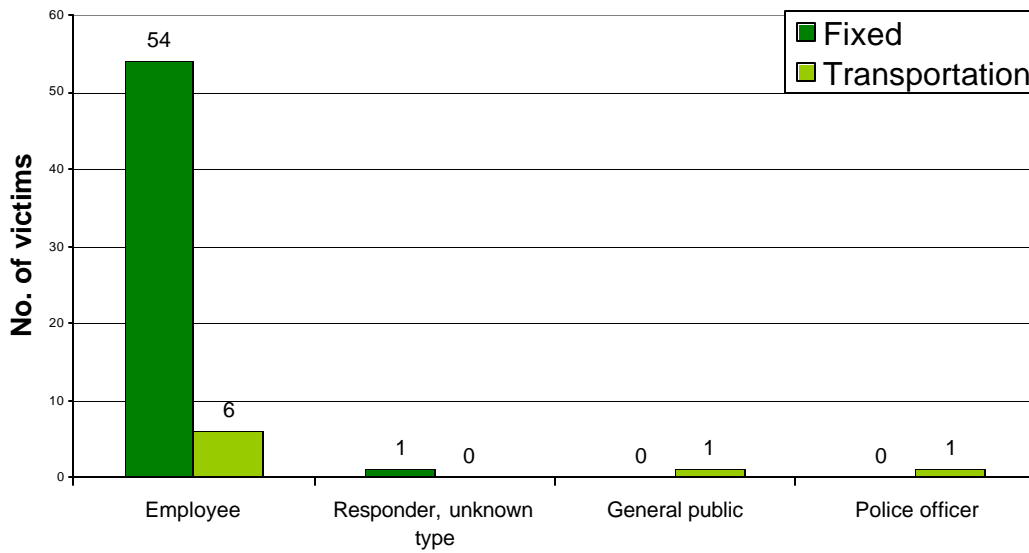


Figure 7 — Distribution of victims by population group and type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001



As shown in Figure 7, among the 63 victims, 60 (95.2%) were “Employees”, 1 (1.6%) was a “Responder”, 1 (1.6%) was “General public” and 1 (1.6%) was a “Police officer”. Out of the 60 employees, 39 (65.0%) were reported as wearing PPE, 19 (31.7%) had not worn any form of PPE and 2 (3.3%) were unknown. Of the 39 employee victims wearing PPE, 37 (94.9%) were wearing fire fighter turn-out gear, 1 (2.6%) was wearing level “A” protection and 1 (2.6%) was wearing “Other type of protection”.

Level "A" PPE is worn when the highest level of respiratory, skin, and eye protection is needed. It includes: a supplied-air respirator approved by the Mine Safety and Health Administration of the U.S. Department of Labor and the National Institute for Occupational Safety and Health; pressure-demand, self-contained breathing apparatus; fully encapsulating chemical-resistant suit; coveralls; long cotton underwear; chemical resistant gloves (inner); boots, chemical-resistant, steel toe and shank; hard hat; disposable gloves and boot covers; cooling unit; and 2-way radio communications. Level "D" PPE is worn as a work uniform and is not recommended for sites with respiratory or skin hazards. Level "D" PPE includes coveralls, gloves, boots/shoes (leather or chemical-resistant, steel toe and shank), safety glasses or chemical splash goggles, and hard hat. Level "D" PPE provides no protection against chemical hazards. Firefighter turnout gear is protective clothing normally worn by firefighters during structural fire-fighting operations, and is similar to level "D" PPE.

Of the 2 persons who died as a result of hazardous substances releases, one was a driver of a truck loaded with phosphoric acid. The victim suffered from severe burns when the truck turned over and caught fire. The other fatality resulted from a chemical release in a hospital X-ray room. The victim was an employee of the hospital and suffered from a respiratory system problem.

### ***EVACUATIONS***

Evacuations were ordered in 22 (2.7%) events, with the evacuation status of all events being known. Among the 22 evacuations, 11 (50.0%) were of a building or the affected part of a building, 5 (22.7%) were of affected circle or radius, 4 (18.1%) were reported as having no criteria, and 2 (9.1%) were down wind/down stream. The numbers of people evacuated were known in three events and they were 12, 20, and 40. The median length of evacuation was 2 hours (range: 1–24 hours). In 17 additional events, in-place sheltering was ordered by an official and instructions regarding precautions to take during in-place sheltering were provided by an official in 16 (94.1%) of the events.

### ***CONTINGENCY PLANS***

The types of contingency or preparedness plans used during an event varied. Five-hundred forty-one (72.2%) events were reported as using “Company’s operation procedures”, 82 (11.0%) involved “Incident specific ad hoc plan”, 81 (10.8%) involved “Hazardous materials/response team’s standard operating procedures”, 3 (0.4%) involved “RCRA contingency plan”, and 42 (5.6%) were unknown.

## **AMMONIA**

Additional analyses were conducted involving ammonia releases to determine their association with the adverse public health consequences of personal injuries and evacuations. Ammonia was the second most commonly released substance reported to the surveillance system in Louisiana during 2001 (See Appendix). A total of 63 releases of ammonia were reported to the system; of these, 58 (92.1%) involved ammonia only. Fifty-three (84.1%) ammonia events occurred at fixed facilities, while the remaining 10 (15.9%) events were transportation related. Out of 63 releases, there was information on 2 (3.2%) events that were reported in gallons, 31 (49.2%) events were reported in pounds. The amount ranged from 24 pounds to 14,490 pounds with a median of 595 pounds. The amount released was unknown for 30 (47.6%) events.

Five (8.6%) of the 58 events that only involved ammonia resulted in a total of 21 victims; these were 19 (90.5%) “Employees”, 1 (4.8%) “Responder unknown type”, and 1 (4.8%) member of the “General public”. Injuries resulting from these events included “Respiratory irritation” (87.0%), “Dizziness or other central nervous system symptoms” (8.7%), and “Heat Stress” (4.3%). No deaths were associated with ammonia releases. Fourteen (66.7%) victims were treated on the scene with first aid, 3 (14.3%) were treated at a hospital but not admitted, 3 (14.3%) were admitted to a hospital, and the medical outcome of 1 (4.8%) victim was unknown.

Evacuations were ordered in 5 (8.6%) of the 58 events involving only ammonia. Twelve people were evacuated in 1 event, and the number of people evacuated was unknown for the other 4 events. The length of evacuation was only available for 1 event, it was 12 hours.

## **USES OF HSEES DATA**

Data generated by Louisiana’s HSEES system have been used in quarterly meetings, where government and private-industry stakeholders are updated on current information pertaining to fixed-facility and transportation-related events. Louisiana’s HSEES system will also use data in presentations to appropriate audiences on reducing future morbidity (injuries) and mortality (deaths) associated with hazardous substances emergencies and conduct outreach activities for employees and manufacturers to increase awareness about the health effects of acute exposures to specific chemicals.

## SUMMARY OF RESULTS, LOUISIANA 2001

The numbers of hazardous substance events, specific substances released, events with victims, and deaths for the year 2001 in Louisiana are shown in Table 8. In the year 2001, 815 events qualified for HSEES surveillance. Among them, 684 were fixed-facility events and 131 were associated with transportation. There were 1,164 substances released, and the most frequent releases involved sulfur dioxide (149 releases or 12.8%). There was a total of 63 victims resulting from 20 events; these victims included 2 (3.2%) fatalities.

**Table 8 — Cumulative data, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001**

Year	Type of event			No. of substances released	No. of deaths	No. of victims	Events with victims	
	Fixed facility	Transportation	Total				No.	%
2001	684	131	815	1164	2	63	20	2.5
<b>Total</b>	<b>684</b>	<b>131</b>	<b>815</b>	<b>1164</b>	<b>2</b>	<b>63</b>	<b>20</b>	<b>100</b>

# APPENDIX

## The 10 Most Frequently Released Substances, Hazardous Substances Emergency Events Surveillance, Louisiana, 2001.

Number	Standardized Substance Name	Frequency
1.	Sulfur Dioxide	149
2.	Ammonia	63
3.	Vinyl Chloride	63
4.	Benzene	53
5.	Hydrogen Sulfide	50
6.	Chlorine	37
7.	Nitric Oxide	37
8.	Hydrochloric Acid	32
9.	Ethylene Dichloride	27
10.	Carbon Tetrachloride*	26
<b>Total</b>		<b>537</b>

\* Propane was also released 26 times. Even though this is a petroleum product, it is captured by HSEES when released with another qualifying hazardous substance.