Utah Hazardous Substances Emergency Events Surveillance

Annual Report
2009

UTAH DEPARTMENT OF
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Office of Epidemiology
Hazardous Substances Emergency Events Surveillance (HSEES)
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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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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. This report summarizes the characteristics of events reported to Utah in 2009. Information about acute events involving hazardous substances was collected, including the substance(s) released, number of victims, number and types of injuries, and number of evacuations. The data were computerized using an ATSDR-provided web-based data entry system.

A total of 252 events were reported in 2009. In 148 (58.7%) events, only one substance was released. The most commonly reported categories of substances were "paints and dyes". During this reporting period, 62 events (24.6%) resulted in a total of 108 victims, eight of whom died. The most frequently reported injuries were respiratory irritation, headache, and dizziness. Evacuations were ordered for eight (3.2%) events.

The findings regarding the percentage of events with victims during 2009 were significantly higher when compared to the previous year (9.6% of all reported events). The distribution of the types of injuries/symptoms reported showed a decrease in gastrointestinal symptoms although it was the most frequently occurring symptom reported in 2008. Headache was the second most common injury, though it decreased from 2008. Respiratory irritation was the most frequently occurring type of injury. More deaths occurred during 2009 than all years since Utah became a HSEES funded state in 2000. This is likely due to required reporting changes.

Prevention outreach efforts for 2009 focused on outreach for HazMat Responders and other community partners in Utah. These outreach activities shared indicator data, risk factors and prevention strategies for hazardous substance emergency events. These outreach activities also involved requests for agencies to report potential events to the Utah HSEES program.

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 due to the release 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 not reported 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 reported, 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 substance 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 recent 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 the data and develop appropriate prevention outreach activities to educate the public. These activities are intended to provide industry, responders, and the general public with information that can help prevent chemical releases and reduce morbidity and mortality if a release occurs.

This report provides an overview of HSEES activities for 2009 in Utah, 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 2009, 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.

Since 2005, an updated data-collection form approved by the Office of Management and Budget (OMB) at ATSDR was used for the collection of HSEES reported data. 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, Utah Division of Environmental Response & Remediation, Utah Highway Patrol, National Response Center, Utah Poison Control Center, Department of Transportation Hazardous Materials Information System, Utah News Clips (online media alert system), media (newspaper, radio, and television), local health agencies, and industries. Census data were used to estimate the number of residents in the vicinity for a majority of the events. All data were computerized using a web-based data entry system provided by ATSDR.

HSEES defines hazardous substances emergency events as acute, uncontrolled, or illegal releases, or threatened releases of hazardous substances. Events involving releases of petroleum only continued to be excluded.

A release is considered an event if it meets the following criteria:

a. the amount of substance released (or that might have been released) needed (or would have needed) to be removed, cleaned up, or neutralized according to federal, state, or local laws or
b. the release of a substance was threatened, but the threat lead to an action (for example, evacuation) that could have affected the health of employees, emergency responders, or members of the general public.

HSEES defines victims as people who experience at least one documented adverse health effect within 24 hours after the event or who die as a consequence of the event. Victims who receive more than one type of injury or symptom are counted once in each applicable injury type or symptom.

Events are defined as transportation-related if they occur:

a. during surface, air, pipeline, or water transport of hazardous substances, or
b. before being unloaded from a vehicle or vessel.

All other events are considered fixed-facility events.

For data analyses the substances released were categorized into 16 groups. The category "mixture" comprises substances from different categories that were mixed or formed from a reaction prior to 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 2009, a total of 252 acute hazardous substances events were captured by Utah HSEES. Four (1.6%) of these events were considered threatened releases. There were 92 (36.5%) events in which substances were both threatened to be released and actually released. A total of 114 (45.2%) events occurred in fixed facilities. The counties with the most frequent number of events were Salt Lake County (135 [53.6%]) and Davis County (28 [11.1%]) (Table 2).

For each fixed-facility event, one or two types of area(s) or equipment involved in the fixed facility where the event occurred could be selected. Examples include process vessels, piping, material handling areas, ancillary process equipment, transformers or capacitors, etc. Of all 114 fixed-facility events, 37 (32.5%) reported one type of area. Type of area was reported for mining, utilities, and manufacturing based on the industry code, yielding 77 (67.5%) fixed facility events without entry. Among events with one area type reported, the main areas were classified as follows: 11 (29.7%) process vessel, 9 (24.3%) piping, 9 (24.3%) ancillary process equipment, 4 (10.8%) storage area above ground, and 1 (2.7%) in each of the following categories: transportation within fixed facility, material handling area, transformer or capacitor, and laboratory (Figure 1).

Of the 138 transportation-related events, 128 (92.8%) occurred during ground transport (e.g., truck, van, or tractor), 8 (5.8%) involved transport by rail, 1 (0.7%) involved transport by water, and 1 (0.7%) involved transport by pipeline (Figure 2). There were no reported events in which air was the transportation type. The largest proportion of transportation-related events occurred while en route then later discovered at a fixed facility (71 [51.4%]) and from unloading of a stationary vehicle or vessel (28 [20.3%]). Of the 138 transportation-related events, 20 (14.5%) involved a moving vehicle or vessel and 19 (13.8%) involved a stationary vehicle or vessel such as those staged at a transfer station.

Factors contributing to the events consisted of primary and secondary factors. Primary factors relate to the factor that caused the actual release, where secondary factors relate to why the release occurred. Primary factors were reported for all 252 (100%) events (Figure 3a). Of the reported primary factors over half (53.5%) were fixed-facility events and involved equipment failure. For transportation-related events, nearly half (46.4%) involved human error. Secondary factors were reported for 150 (59.5%) events (Figure 3b). In the 80 fixed-facility events in which secondary factors were reported, 77 (96.3%) reported "no secondary factor". In the 70 transportation events in which secondary factors were reported, 70 (100%) reported "no secondary factor".

Four events (1.6%) involved the release of three or more substances. Two substances were released in 99 (39.3%) of the events and 149 (59.1%) involved the release of one substance (Table 3). Fifty-three (38.4%) transportation-related events had one substance released.

The number of events by month ranged from 11 (4.4%) in January to 36 (14.3%) in March, with the largest proportions occurring from January through March (23.8%). The proportion of events occurring during weekdays ranged from 13.1% to 20.6%, and during weekend days from 6.75% to 9.1%. Time categories were reported for 240 (95.2%) events. Of those reported 38 (15.8%) of events occurred between 12:00 a.m. and 5:59 a.m., 74 (30.8%) occurred from 6:00 a.m. to 11:59 a.m., 75 (31.3%) from 12:00 p.m. to 5:59 p.m., and 53 (22.1%) occurred from 6:00 p.m. until 11:59 p.m.

Industries

The largest proportion of HSEES events were associated with the transportation and warehousing (110 [43.6%]), followed by "unknown or not an industry" (47 [18.6%]) (Table 4). The largest number of events with victims occurred from unknown or not an industry (36 [58.1%]), accommodation and food services (4 [6.5%]), and Mining (3 [4.8%]). The total number of victims was greatest in the unknown or not an industry categories (67 [62.0%]), followed by information industries (7 [6.5%]) then accommodation and food services (5 [4.6%]) and wholesale trade (5 [4.6%]). Although the largest proportion of HSEES events were associated with transportation and warehousing (138 [54.8%]), none of these events reported victims.

Substances

A total of 366 substances were involved in events, 4 (1.6%) of which were substances reported as threatened to be released only. The substances most frequently involved were paint or coating NOS (46 [12.7%]), mixture (23 [6.3%]), sodium hydroxide (23 [6.3%]), and Corrosive liquid

basic inorganic NOS (15 [4.1%]) (Table 5). Substances were grouped into 16 categories. The most commonly released categories of substances were paints and dyes (58 [17.6%]), volatile organic compounds (56 [17.0%]), bases (47 [14.2%]), acids (40 [12.1%]), and other inorganic substances (40 [12.1%]) (Table 6). The substance categories most commonly released in fixed-facility events were other inorganic substances (30 [24.8%]), acids (20 [16.5%]), and other substances (19[15.7%]) (Table 6). In transportation-related events, the most common substance categories released were paints and dyes (51 [22.7%]), bases (43 [19.1%]), volatile organic compounds (41 [18.2%]), and acids (31 [13.8%]) (Table 5b).

Five types of releases (e.g., air releases, spills) were reported, including spills (188 [51.4%]), threatened releases (96 [26.2%]), air releases (60 [16.4%]), fire (21 [5.7%]), and explosion (1 [0.3%]). Two types of releases were listed for four events, including air releases (3 [75.0%]) and explosion (1 [25.0%]).

Victims

A total of 108 victims were involved in 62 events (24.6% of all events) (Table 6). Of the 62 events with victims, 42 (67.7%) involved only one victim, 11 (17.7%) involved two victims, and 9 (14.5%) involved three or more victims. A total of 54 (87.1%) victims were injured in fixed-facility events.

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 were counted once within that category. In events that involved two or more substances from different categories, substances were counted once in the "multiple substances" category. Substances released most often were not necessarily the most likely to result in victims (Table 7). For example, events categorized in the "multiple substances" category constituted 4.4% of all events; however, 27.3% of these events resulted in injuries. Conversely, events involving pesticides and oxy-organics accounted for 1.6% and 6.7% of all events respectively, but 50% of the pesticide events and 70.6% of oxy-organics events resulted in injuries.

Employees (65 [60.2%]) constituted the largest proportion of the population groups injured, followed by general public (36 [33.3%]), firefighters (6 [5.6%]) and a single police officer (0.9%) (Figure 4). There were no reported emergency medical technicians, hospital personnel, or students injured.

Victims were reported to sustain a total of 173 injuries or symptoms (Table 8). Some victims had more than one injury or symptom. A total of 148 injuries or symptoms were reported in fixed facility events. The most common injuries/symptoms in fixed-facility events were respiratory irritation (46 [31.1%]), headache (31 [20.9%]), and dizziness/central nervous system symptoms (30 [20.3%]). A total of 25 injuries/symptoms were reported in transportation events. The most common injuries/symptoms were respiratory irritation (14 [56.0%]) and eye irritation (8 [32.0%]).

Exact age for victims was reported for 84 (77.8%) of victims. The median age was 33.5 years (range: 3 – 89 years). Age category was reported for all 108 (100.0%) injured persons. A total of 27 (25.0%) of victims were under the age of 18 and 81 (75.0%) were age eighteen or older.

Sex was reported for all 108 victims; of these, 86 (79.6%) were males and 22 (20.4%) were females. Of all employees for whom sex was reported, 56 (86.15%) were males.

Of all 108 victims, 30 (27.8%) were treated on scene (administered first-aid), 43 (39.8%) were treated at a hospital (not-admitted), 20 (18.5%) were treated at a hospital (admitted), 4 (3.7%) were observed at hospital (no treatment), 1 (1.0%) was seen by a private physician within 24 hours, 2 (1.9%) injuries were reported within 24 hours by official, and 8 (7.4%) died at the scene or on arrival to hospital (Figure 5).

Seven out of eight deaths were accidental and consisted of carbon monoxide poisoning. One death was by suicide by mixing chemicals inside a car. All deaths reported put others at risk including general public and emergency response personnel.

The status of personal protective equipment (PPE) use during an event was reported for 10 (9.3%) of 108 victims: Level "A" (1 [0.9%]), Level "C" (1 [0.9%]), Level "D" (3 [2.8%]), firefighter turn out gear with respiratory protection (1 [0.9%]), and firefighter in turn out gear without respiratory protection (4 [3.7%]).

Two separate incidents resulted in the largest amount of victims. The first occurred when employees of a manufacturing plant began reporting headaches and nausea after being in the break room. Fire and ambulance responded and a total of 48 people were assessed by paramedics. The HSEES program received reports from the Utah Poison Control Center for seven of the employees (all admitted to hospital for treatment). Later investigation showed that a malfunctioning flue may have been the cause of the carbon monoxide release.

The second event also reported seven victims, six of which were treated at the hospital (not admitted) and one was treated on the scene. The incident occurred when a fire suppression system failed and released halon (fluorinated hydrocarbon) into the work environment. Victims complained of pulmonary irritation, dizziness, nausea, and headache.

Nearby populations

The proximity of the event location in relation to selected populations was determined using geographic information systems (GIS) or health department records. Event location coordinates were completed for 214 (84.9%) events. Residences were within ¼ mile of 139 (65.0%) events, schools were within ¼ mile of 13 (6.1%) events, hospitals were within ¼ mile of 2 (0.9%) events, nursing homes were within ¼ mile of 8 (3.7%) events, licensed daycare facilities were within ¼ mile of 6 (2.8%) events, industries or other businesses were within ¼ mile of 175 (81.8%) events, and recreational areas were within ¼ mile of 33 (15.4%) events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. Information was collected on the number of persons living in proximity of the event and on

the number of persons at home within a specific time frame of the event. Approximately 59.7% (28,866 of 48,322) of the persons living in proximity of the events were home when the events occurred. There were 114 (45.2%) events with persons living within ¼ mile of the event, 150 (59.5%) events with persons living within ½ mile, and 182 (72.2%) events with persons living within one mile of the event. Information on the number of persons living within ¼, ½, and one mile of the event was not reported for 40 events. There were 83 (32.9%) events with persons at home within ¼ mile of the event; 114 (45.2%) events with persons at home within ½ mile; and 145 (57.5%) events with persons at home within one mile. Information on the number of persons at home when the events occurred was not reported for 98 events.

Evacuations

Evacuations were ordered for 8 (3.2%) of 252 events. There was one event in which in-place sheltering ordered by an official.

Decontamination

Of the 107 (99.1%) victims for whom decontamination status was known, 67 (62.6%) were not decontaminated, 14 (13.1%) were decontaminated at the scene, 18 (16.8%) were decontaminated at a medical facility, and 8 (7.5%) were decontaminated at both the scene and a medical facility.

Response

Of the 228 (90.3%) events with information detailing who responded to the event, 19 (8.3%) reported two categories of personnel who responded, 3 (1.3%) reported three categories, and 1 (4.4%) reported four or more categories. The personnel who responded most frequently were the

response team of the company where release occurred 161 (70.6%), followed by hospital personnel/poison control center, 22 (9.7%), and fire department, 14 (6.1%). Fourteen (6.1%) events were listed as having no response (Table 9).

2009 Prevention Outreach Activities

The first awareness prevention/outreach activity targeted hazardous material emergency responders and Local Emergency Planning Committee (LEPC) members in the state of Utah to increase awareness of and reporting to the HSEES program. This involved preparation of a presentation of the HSEES program including a trivia game that reviewed key concepts within the presentation. This was presented during two breakout sessions at the Intermountain Hazardous Material Conference in May 2009. In addition, the HSEES coordinator presented at four LEPCs sharing county or area-specific data to increase awareness and allow for discussion of county specific concerns. This presentation outreach activity provided crucial networking for obtaining additional information on events and increase overall reporting of releases to the HSEES program.

The second awareness prevention/outreach activity was to evaluate the alerting protocol development based on comparing the number of alerts from the previous years to the current number of alerts. In 2009 there were six alerts compared to six in 2008 and four in 2007.

The first data-driven activity was to work with Utah's Environmental Public Health Tracking (EPHT) Program to develop HSEES indicators and query modules for the Utah Indicator-Based Information System for Public Health (IBIS). The indicator and query was published on a public

portal of IBIS. Together, the programs developed HSEES indicators and query modules for the Utah Indicator-Based Information System for Public Health (IBIS-PH). The indicators and query modules were published on a public portal of the IBIS-PH. The posting of metrics of Utah HSEES preliminary data have continued to be updated throughout 2009. Metrics include the aggregate data for each month along with year to date totals. The numbers of victims (adult vs. children) and evacuations, and the top spilling industry are also posted. The link for the webpage with these metrics is:

http://health.utah.gov/epi/enviroepi/activities/monthly%20activity%20reports/monthly.htm

The second data-driven prevention outreach activity was the writing of a pesticide paper in conjunction with two other HSEES states. A data-sharing agreement was completed to acquire national HSEES data. This data was then analyzed using SAS and a paper was written describing the findings and specific information regarding outreach that has been completed targeting pesticide applicators. The data from 2008 showed that 16.7% of injuries were related to pesticide exposure.

Louise Saw, the previous HSEES coordinator, and Julia Shumway, data specialist with the Utah Department of Health (UDOH) worked together to complete the pesticide paper along with technical assistance from Perri Ruckart with the Agency for Toxic Substances and Disease Registry (ATSDR). This paper is still being evaluated for publishing.

SUMMARY OF RESULTS, 2000–2009

During the period 2000–2009, the largest proportion of events occurred in 2001 (Table 10). The number of transportation related-events has continued to increase since 2005. This could be due to the increase in reporting from the Utah Department of Transportation (UDOT). The number of total events reported in Utah dropped consistently from 2005 to 2008, but shows an increase from 209 events in 2008 to 252 events in 2009 (21.1%). This fluctuation in cases from year to year could be due to a variety of reasons including a change in the number of events actually occurring, change in the reporting/capturing of these events, or change in the HSEES case criteria, causing events to be reportable or non-reportable.

The number of substances released has continued to decrease since 2005. The number of events with victims increased exponentially since 2006, despite a significant decrease from 2005 to 2006. Although average percentage of events with victims during 2000–2009 was 6.2%, the percentage of events with victims in 2009 is significantly higher than it has been in the past nine years (62 or 24.6% events).

In previous years respiratory irritation has been the most frequently reported injury, but in 2008 headache took over as the injury that occurred the most. In 2009, respiratory irritation was the most frequently reported injury at 46, compared to a total of 31 reporting headache.

Employees as victims increased by more than 50% between 2008 and 2009 and were the most commonly reported victims of acute chemical releases (Figure 4). The number of injured responders remained consistent at zero.

REFERENCES

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2. Binder S. Death, injuries, and evacuations from acute hazardous materials releases. Am J Public Health 1989; 70:1042–4.

Appendices – Tables and Figures

Table 1. The ten substances most frequently involved in events—Utah Hazardous Substances Emergency Events Surveillance, 2009

Number	Standardized Substance Name	Frequency	Percentage*
1	Paint or Coating NOS	55	15.0
2	Mixture	23	6.3
3	Sodium Hydroxide	23	6.3
4	Corrosive Liquid Basic Inorganic NOS	15	4.1
5	Carbon Monoxide	13	3.6
6	Sulfuric Acid	11	3.0
7	Acetone	9	2.5
8	Chlorine	9	2.5
9	Hydrochloric Acid	9	2.5
10	Hydrogen Sulfide	7	1.9

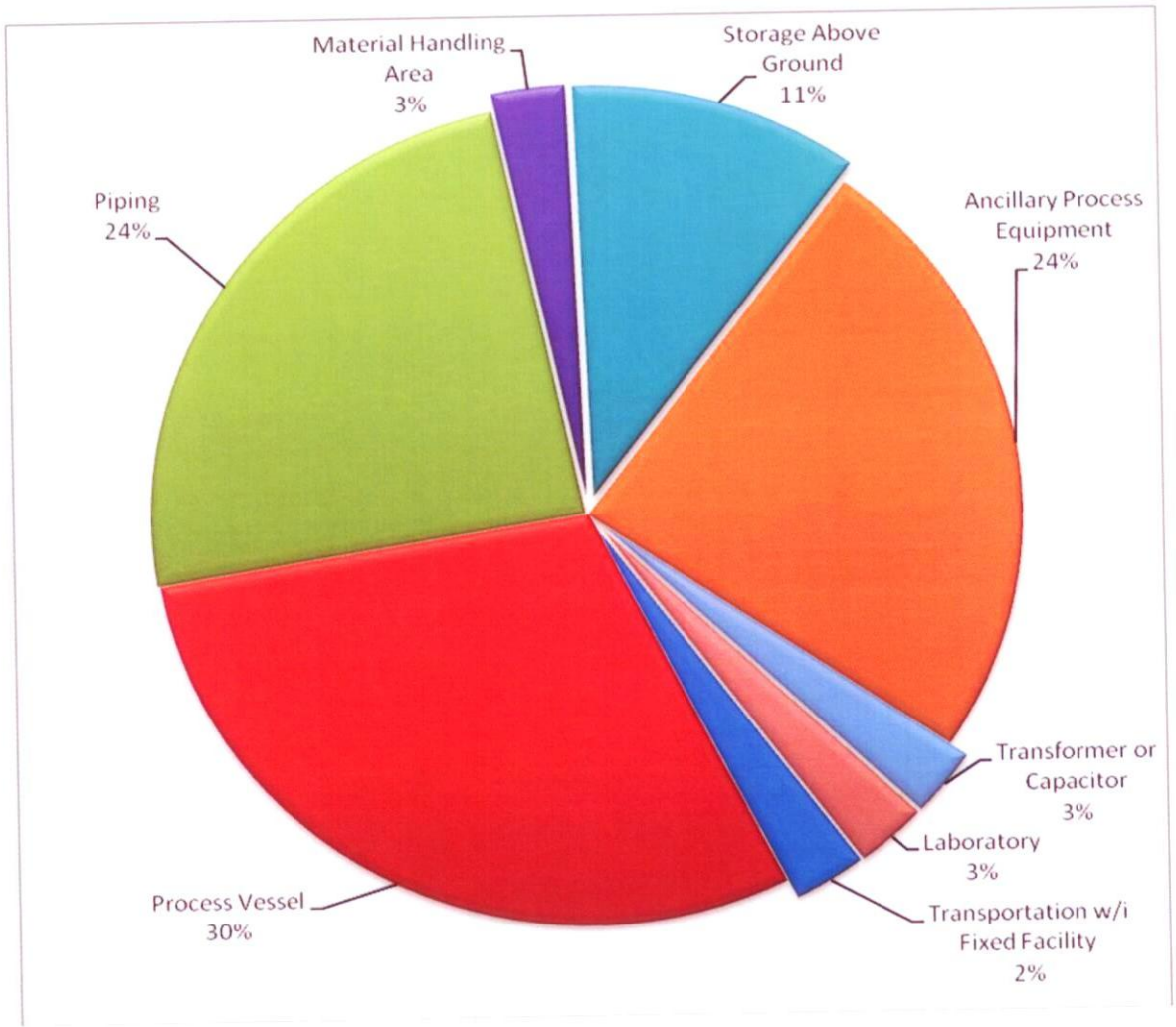
*Percentage of all substances released (N=366)

Table 2. Number of events meeting the surveillance definition, by county and type of event—Utah Hazardous Substances Emergency Events Surveillance, 2009

County	Type of event				All events
	Fixed facility		Transportation		
	No. events	%*	No. events	%*	Total no. events (%)
Beaver	1	50.0	1	50.0	2 (0.8)
Box Elder	2	40.0	3	60.0	5 (2.0)
Cache	5	83.3	1	16.7	6 (2.4)
Carbon	2	66.7	1	33.3	3 (1.2)
Daggett	0	0.0	0	0.0	0 (0.0)
Davis	11	39.3	17	60.7	28 (11.1)
Duchesne	5	83.3	1	16.7	6 (2.4)
Emery	0	0.0	0	0.0	0 (0.0)
Garfield	0	0.0	0	0.0	0 (0.0)
Grand	2	100.0	0	0.0	2 (0.8)
Iron	1	50.0	1	50.0	2 (0.8)
Juab	1	100.0	0	0.0	1 (0.4)
Kane	1	100.0	0	0.0	1 (0.4)
Millard	4	80.0	1	20.0	5 (2.0)
Morgan	0	0.0	0	0.0	0 (0.0)
Piute	0	0.0	0	0.0	0 (0.0)
Rich	0	0.0	0	0.0	0 (0.0)
Salt Lake	44	32.6	91	67.4	135 (53.6)
San Juan	1	50.0	1	50.0	2 (0.8)
Sanpete	1	100.0	0	0.0	1 (0.4)
Sevier	1	33.3	2	66.7	3 (1.2)
Summit	2	100.0	0	0.0	2 (0.8)
Tooele	6	50.0	6	50.0	12 (4.8)
Uintah	5	62.5	3	37.5	8 (3.2)
Utah	6	46.2	7	53.8	13 (5.2)
Wasatch	1	100.0	0	0.0	1 (0.4)
Washington	2	100.0	0	0.0	2 (0.8)
Wayne	1	100.0	0	0.0	1 (0.4)
Weber	9	81.8	2	18.2	11 (4.4)
	114		138		252 (100.0)

* Percentage = (number of events by type of event per county ÷ total number of events in that county) x 100
Percentages do not equal 100% because of rounding.

Figure 1. Areas of fixed facilities involved in events for Mining, Utilities or Manufacturing (*NAICS 21, 22, 31, 32, 33)—Utah Hazardous Substances Emergency Events Surveillance, 2009



*NAICS: North American Industry Classification System

Figure 2. Distribution of transportation-related events, by type of transport—Utah Hazardous Substances Emergency Events Surveillance, 2009

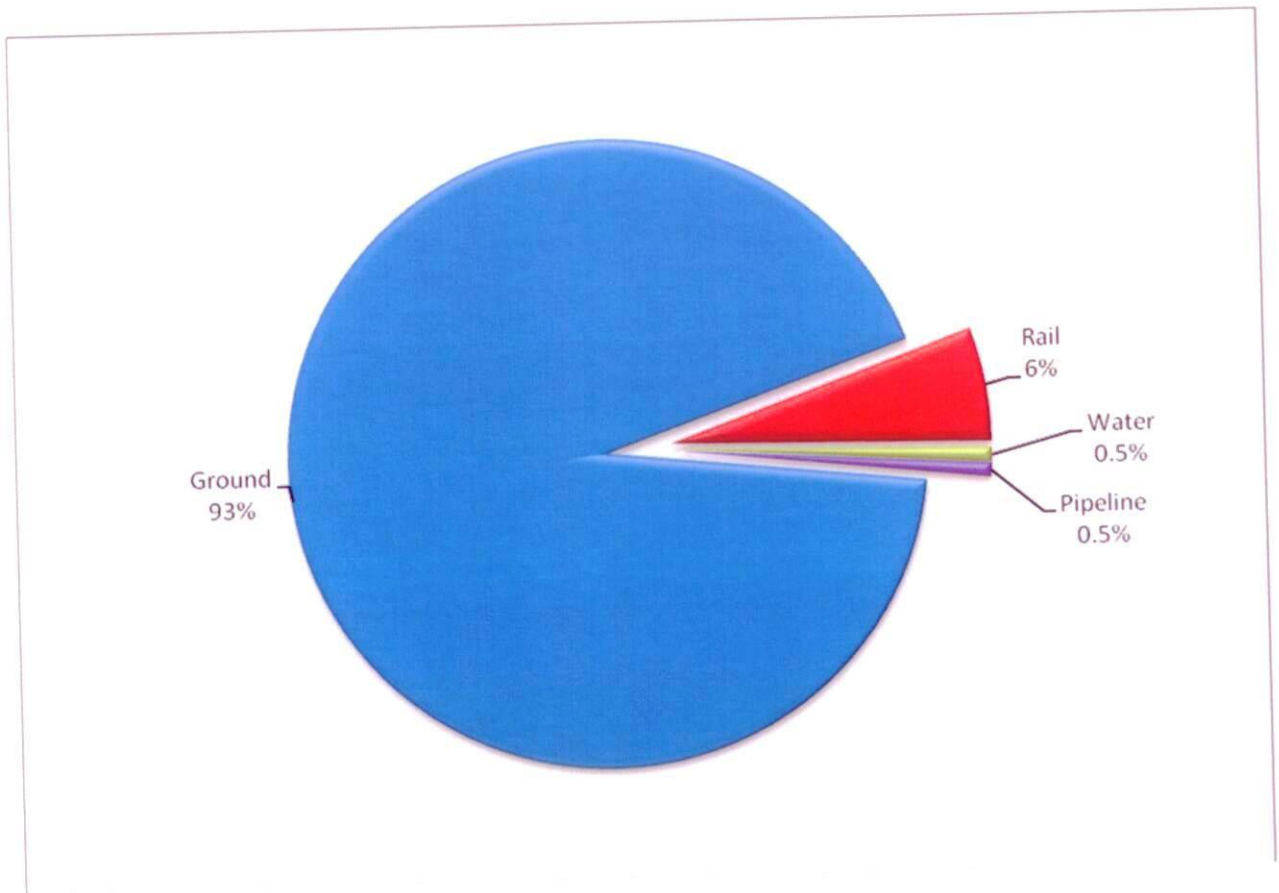
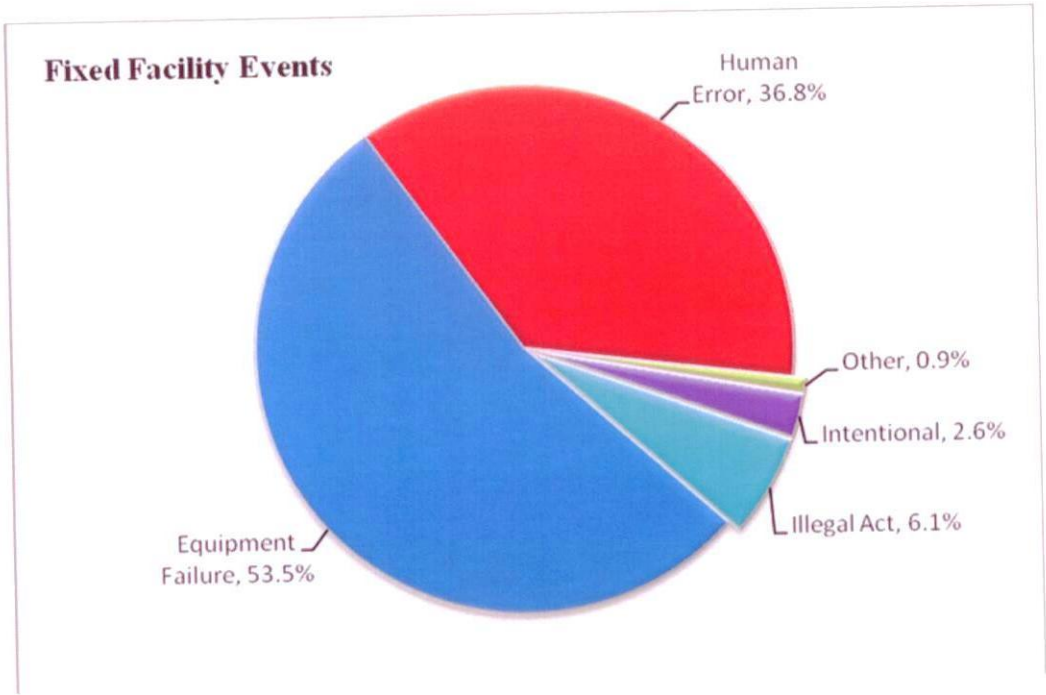


Figure 3a. Primary factors reported as contributing to events — Utah Hazardous Substances Emergency Events Surveillance, 2009



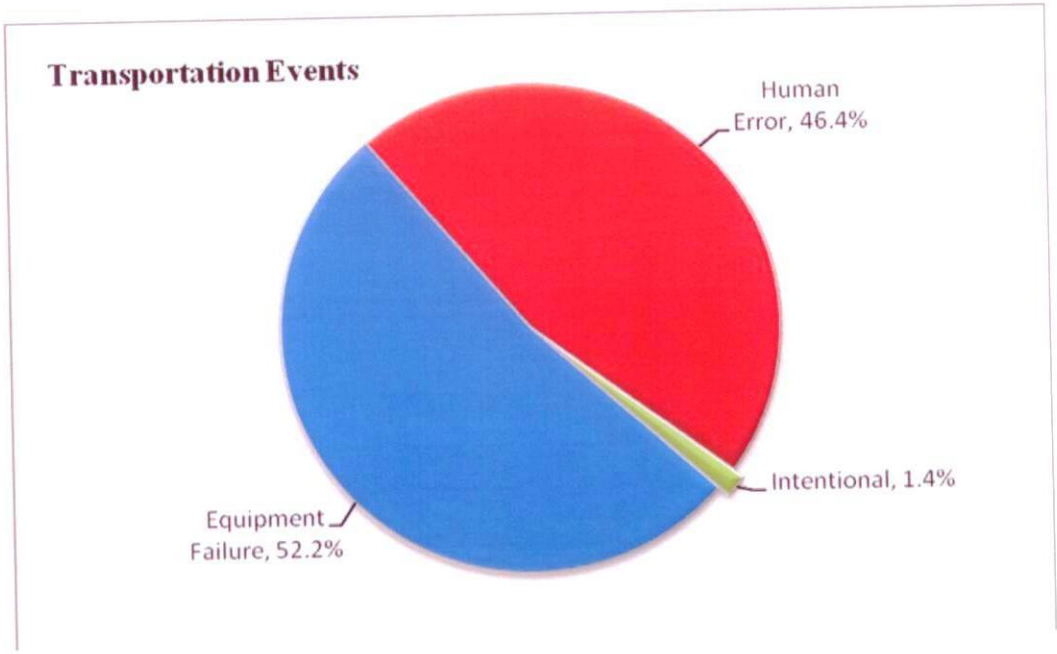
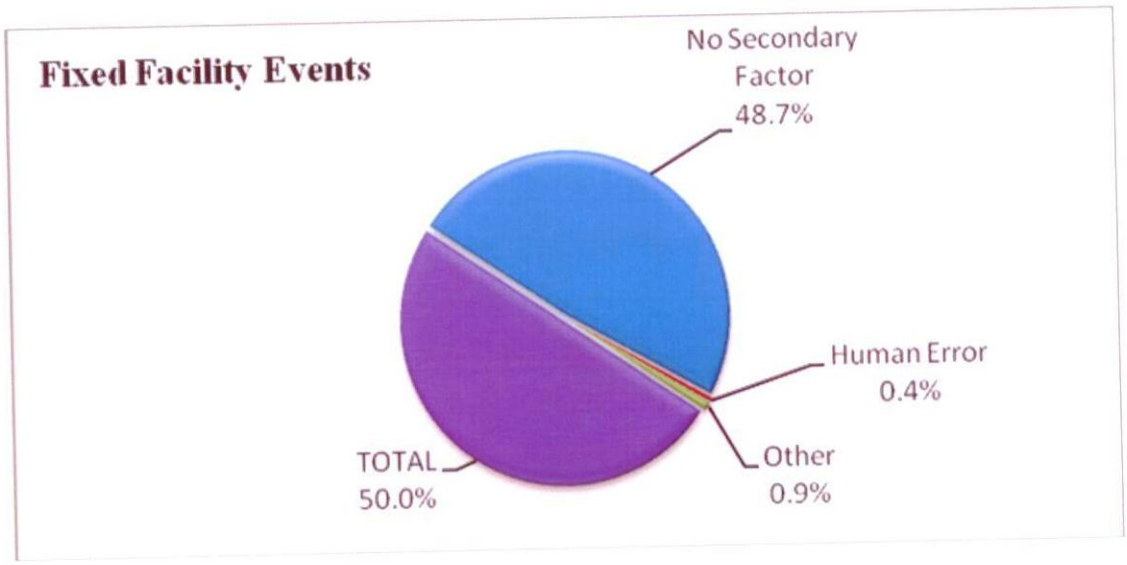


Figure 3b. Secondary factors reported as contributing to events— Utah Hazardous Substances Emergency Events Surveillance, 2009



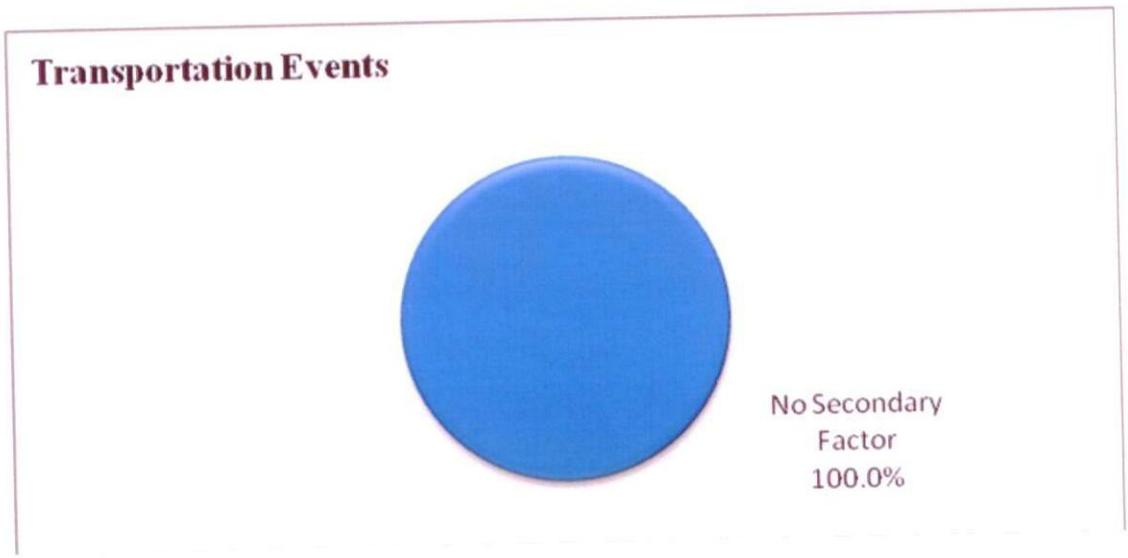


Table 3. Number of substances involved per event, by type of event –Utah Hazardous Substances Emergency Events Surveillance, 2009

No. substances	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total substances	No. events	%	Total substances	No. events	%	Total substances
1	95	64.2	95	53	35.8	53	148	100.0	148
2	16	16.0	32	84	84.0	168	100	100.0	200
3	2	100.0	6	0	0.0	0	2	100.0	6
4	0	0.0	0	1	100.0	4	1	100.0	4
≥ 5	1	100.0	8	0	0.0	0	1	100.0	8
Total	**114**	**45.2**	**141**	**138**	**54.8**	**225**	**252**	**100.0**	**366**

Table 4. Industries involved in hazardous substance events, by category—Utah Hazardous Substances Emergency Events Surveillance, 2009

Industry category	Total events		Events with victims		Percentage of events with victims	Total no. victims
	No.	%	No.	%		
Wholesale Trade	6	2.4	2	3.2	33.3	10
Manufacturing	23	9.1	2	3.2	8.7	2
Transportation and Warehousing	110	43.7	0	0.0	0.0	0
Unknown or not an Industry	47	18.7	36	58.1	76.6	39
Other Services	1	0.4	1	1.6	100.0	24
Utilities	7	2.8	1	1.6	14.3	2
Health Care and Social Assistance	2	0.8	2	3.2	100.0	3
Educational Services	2	0.8	2	3.2	100.0	2
Retail Trade	4	1.6	2	3.2	50.0	4
Accommodation and Food Services	4	1.6	4	6.5	100.0	5
Administrative and Support and Waste Management and Remediation Services	20	7.9	0	0.0	0.0	0
Agriculture, Forestry, Fishing and Hunting	1	0.4	1	1.6	100.0	1
Arts, Entertainment, and Recreation	3	1.2	2	3.2	66.7	2
Mining	11	4.4	3	4.8	27.3	3
Construction	5	2.0	2	3.2	40.0	3
Professional, Scientific, and Technical Services	4	1.6	1	1.6	25.0	1
Management of Companies and Enterprises	1	0.4	0	0.0	0.0	0
Information	1	0.4	1	1.6	100.0	7
Total	**252**	**100.0**	**62**	**100.0**	**24.6**	**108**

Table 5. Number of substances involved, by substance category and type of event –Utah Hazardous Substances Emergency Events Surveillance, 2009

Substance category	Type of event				All events	
	Fixed facility		Transportation			
	No. substances	%	No. substances	%	No. substances	%
Acids	9	6.4	31	13.8	40	10.9
Ammonia	4	2.8	0	0.0	4	1.1
Bases	4	2.8	43	19.1	47	12.8
Chlorine	10	7.1	2	0.9	12	3.3
Formulations	0	0.0	0	0.0	0	0.0
Hetero-organics	0	0.0	0	0.0	0	0.0
Hydrocarbons	0	0.0	0	0.0	0	0.0
Mixture*	19	13.5	5	2.2	24	6.6
Other†	14	9.9	24	10.7	38	10.4
Other inorganic substances‡	30	21.3	10	4.4	40	10.9
Oxy-organics	17	12.1	0	0.0	17	4.6
Paints and dyes	7	5.0	51	22.7	58	15.8
Pesticides	8	5.7	7	3.1	15	4.1
Polychlorinated biphenyls	1	0.7	0	0.0	1	0.3
Polymers	3	2.1	11	4.9	14	3.8
Volatile organic compounds	15	10.6	41	18.2	56	15.3
Total	**141**	**100.0**	**225**	**100.0**	**366**	**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.

Table 6. Number of victims per event, by type of event –Utah Hazardous Substances Emergency Events Surveillance, 2009

No. victims	Type of event						All events		
	Fixed facility			Transportation					
	No. events	%	Total victims	No. events	%	Total victims	No. events	%	Total victims
1	37	68.5	37	5	62.5	5	42	67.7	42
2	9	16.7	18	2	25.0	4	11	17.7	22
3	2	3.7	6	0	0.0	0	2	3.2	6
4	3	5.6	12	0	0.0	0	3	4.8	12
6	1	1.9	6	1	12.5	6	2	3.2	12
7	2	3.7	14	0	0.0	0	2	3.2	14
Total	**54**	**100.0**	**93**	**8**	**100.0**	**15**	**62**	**100.0**	**108**

Table 7. Frequency of substance categories in all events and events with victims –Utah Hazardous Substances Emergency Events Surveillance System, 2009*

Substance category	All events		Events with victims		
	No.	%	No.	Percentage of all releases with victims	Percentage of events with victims in substance category
Acids	26	10.3	4	6.5	15.4
Ammonia	4	1.6	1	1.6	25.0
Bases	32	12.7	3	4.9	9.4
Chlorine	10	4.0	7	11.3	70.0
Hetero-organics	1	0.4	1	1.6	100.0
Hydrocarbons	0	0.0	0	0.0	0.0
Mixture†	20	7.9	7	11.3	35.0
Multiple Substances*	11	4.4	3	4.8	27.3
Other‡	21	8.3	2	3.2	9.5
Other inorganic substances§	29	11.5	8	12.9	27.6
Oxy-organics	17	6.7	12	19.4	70.6
Paints and dyes	32	12.7	2	3.2	6.3
Pesticides	4	1.6	2	3.2	50.0
Polychlorinated biphenyls	1	0.4	0	0.0	0.0
Polymers	8	3.2	2	3.2	25.0
Volatile organic compounds	36	14.3	8	12.9	22.2
Total	**252**	**100.0**	**62**	**100.0**	

*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 substances 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.

Figure 4. Distribution of victims by population group –Utah Hazardous Substances Emergency Events Surveillance, 2009.

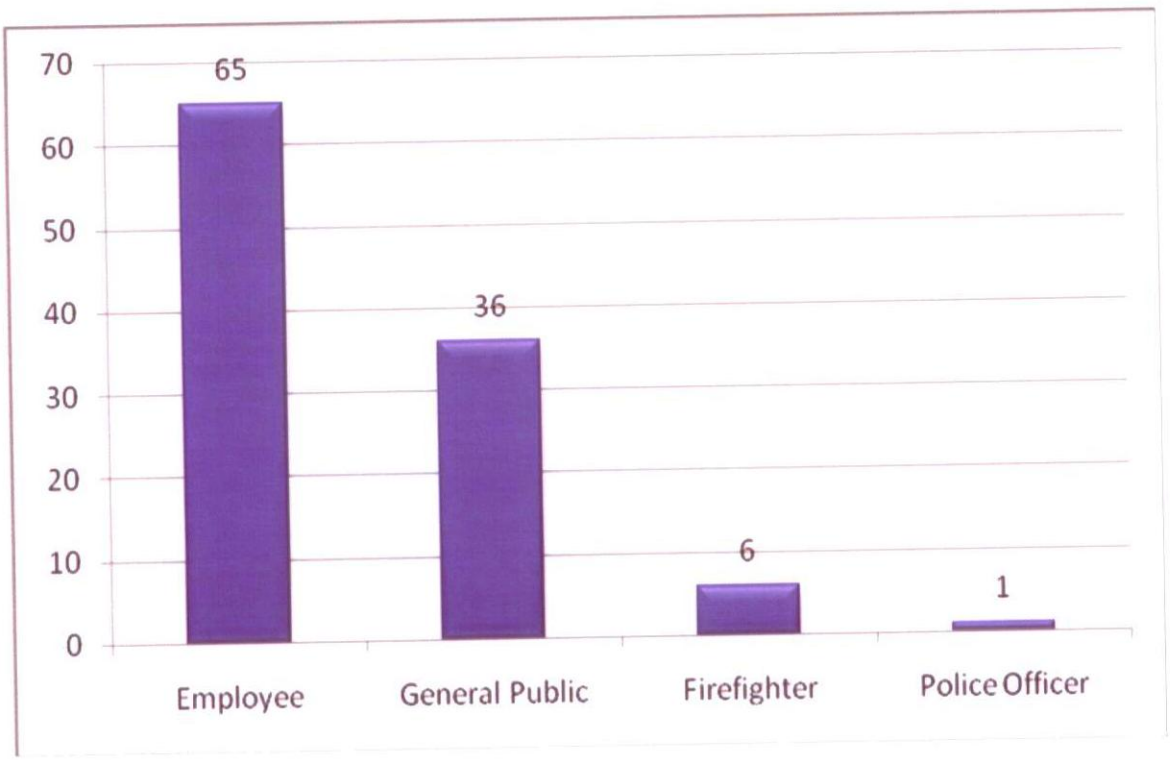


Table 8. Frequencies of injuries/symptoms, by type of event*-Utah Hazardous Substances Emergency Events Surveillance System, 2009

	Fixed facility		Transportation		All events	
Injury/symptom	**No. injuries**	**%**	**No. injuries**	**%**	**Total no.**	**%**
Burns	7	4.7	1	4.0	8	4.6
Dizziness/central nervous system symptoms	30	20.3	0	0.0	30	17.3
Eye irritation	4	2.7	8	32.0	12	6.9
Gastrointestinal system problems	20	13.5	0	0.0	20	11.6
Headache	31	20.9	1	4.0	32	18.5
Other	4	2.7	0	0.0	4	2.3
Respiratory irritation	46	31.1	14	56.0	60	34.7
Shortness of breath	1	0.7	0	0.0	1	0.6
Skin irritation	5	3.4	1	4.0	6	3.5
Total‡	**148**	**100.0**	**25**	**100.0**	**173**	**100.0**

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

Figure 5. Frequency of Injury Disposition–Utah Hazardous Substances Emergency Events Surveillance, 2009.

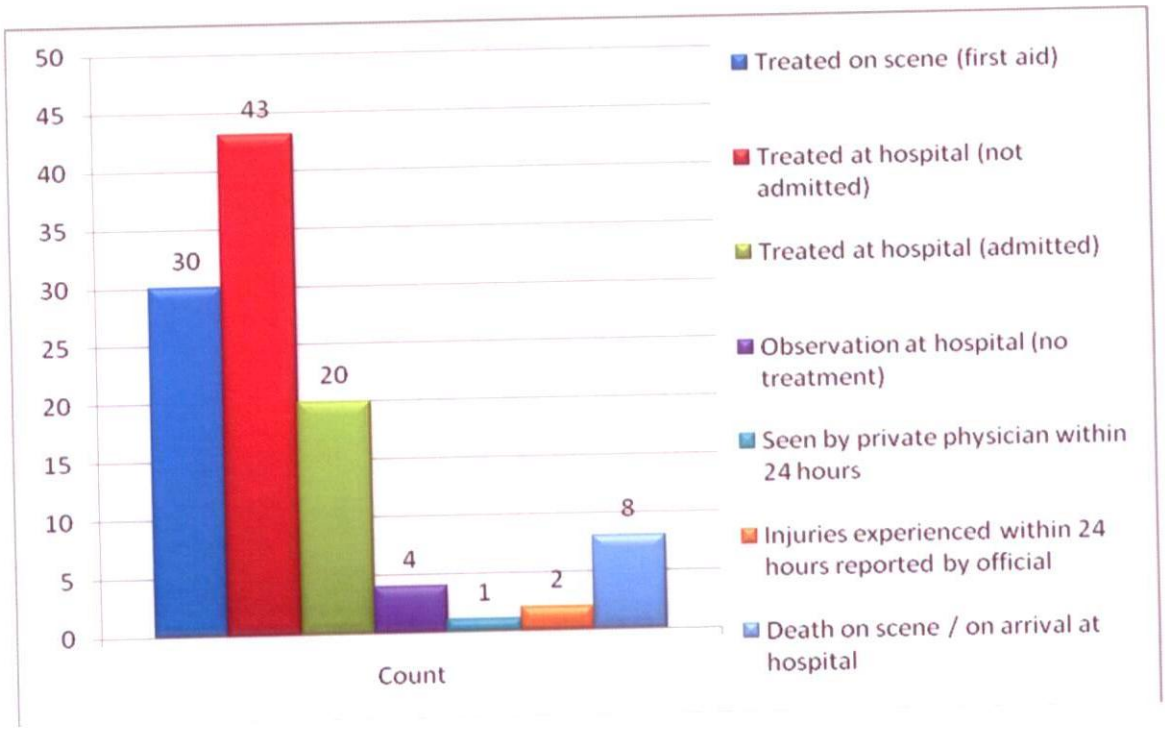


Table 9. Distribution of personnel who responded to the event–Utah Hazardous Substances Emergency Events Surveillance System, 2009

Responder category	No.	%*
3rd Party Clean-up Contractor	16	6.3
Certified HazMat team	5	2.0
Department of works/ utilities/ transportation	2	0.8
Emergency medical services	12	4.8
Environmental agency/ EPA† response team	2	0.8
Fire department	20	7.9
Health department/health agency	8	3.2
Hospital or Poison Control personnel	28	11.1
Law enforcement agency	12	4.8
No Response	14	5.6
Other	1	0.4
Response team of company where release occurred	161	63.9
Specialized multi-agency team	0	0.0
State, county, or local emergency managers/coordinators/planning	1	0.4

*Percentages are based on total events and total greater than 100% because multiple responder categories could be reported per event.
†Environmental Protection Agency.

Table 10. Cumulative data by year–Utah Hazardous Substances Emergency Events Surveillance, 2000-2009

Year	Type of event			No. substances released	No. victims	No. deaths	Events with victims	
	Fixed facility	Transportation	Total				No.	%†
2000	140	163	303	375	46	0	11	3.6
2001	408	126	534	1104	94	0	13	2.4
2002	329	117	446	939	76	0	8	1.8
2003	364	110	474	1000	32	0	8	1.8
2004	397	107	504	1138	93	0	38	7.5
2005	442	75	517	1347	176	1	55	10.6
2006	375	56	431	1243	31	0	15	3.4
2007	308	84	392	970	63	1	20	5.1
2008	91	118	209	276	67	0	20	9.6
2009	114	138	252	366	108	8	62	24.6
Total	**2968**	**1094**	**4062**	**8758**	**786**	**10**	**250**	**6.2**

† Percentage of events with victims.