Tennessee's National Toxic Substance Incidents Program (NTSIP)

2011 Summary Report

Tennessee Department of Health

Communicable and Environmental Diseases and Emergency Preparedness

Environmental Epidemiology Program

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Executive Summary

Tennessee was one of seven states awarded a cooperative agreement from the Agency of Toxic Substances and Disease Registry (ATSDR) for the National Toxic Substance Incidents Program (NTSIP). Through this cooperative agreement, health department staff collect information on uncontrolled or illegal acute (lasting less than 72 hours) releases of toxic substances and work towards preventing the public from coming into contact with them. A substance is considered toxic if it can reasonably be expected to cause an adverse human health effect. These materials include chemicals, radiation, and naturally occurring matter. The goals of the program are to: (1) describe what has occurred, (2) locate at-risk communities, and (3) identify, develop, and promote activities to prevent the public from coming into contact with harmful materials. Tennessee has participated in this surveillance program since 2010. This report summarizes the characteristics of events reported to the Tennessee Department of Health (TDH) in 2011. Information about acute releases of toxic substances was collected, including the substance(s) released, the number of victims involved in the release, the type of injuries sustained by victims, and the number of evacuations. These data were uploaded to ATSDR's web-based database.

In 2011, 325 incidents met the NTSIP case definition. Only one substance was released in all of the events. The most commonly released substances were methamphetamine, sodium hydroxide, and ammonia. During this reporting period, 50 events (15.4% of all reported events) resulted in a total of 111 victims. The most frequently reported injuries were respiratory system problems, burns, and trauma. Evacuations were ordered for 36 (11.1%) events.

Prevention outreach efforts for 2011 focused on coordination among federal, state, and local agencies involved in toxic substance activities and data collection of acute toxic substance releases. NTSIP findings were visually displayed using geographic information systems (GIS) technology and shared with stakeholders. Fact sheets on the most frequently released chemicals in Tennessee were developed as part of our prevention outreach and were made available on our website. Summary reports and success stories were also disseminated and posted on the TDH website as part of our outreach activity.

Introduction

The Centers for Disease Control and Prevention (CDC) 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, ATSDR has maintained active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) to describe the public health consequences of released hazardous substances. In 2010, HSEES was modified to the National Toxic Substance Incidents Program (NTSIP) to include a national approach to chemical surveillance.[2] The decision to initiate a surveillance system of this type was based on a study published in 1989 about the hazardous substance releases to three national databases: the National Response Center (NRC) Database, the Department of Transportation (DOT) Hazardous Material Information System (HMIS), and the Acute Hazardous Events Database.[3] 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 facilities. Other important information was not recorded such as the demographic characteristics of victims, the types of injuries sustained, and the number of person evacuated.

As a result of this review, ATSDR implemented the HSEES system from 1990 to 2009, and then followed with NTSIP in 2010, to more fully describe the public health consequences of toxic substance releases. The goal of NTSIP is to reduce the morbidity and mortality from toxic substance incidents. To accomplish this, NTSIP employs three components: a national database, state surveillance partners, and response teams.

A national database is being built through the collaboration of other agencies interested in reducing harm from chemical spills. These agencies include the U.S. DOT, NRC, state health departments, and the media. Combining data from several sources provides a clearer picture of toxic substance releases throughout the United States.[4]

In 2011, the state surveillance partners consisted of seven states contributing data to NTSIP: Louisiana, New York, North Carolina, Oregon, Tennessee, Utah, and Wisconsin. If a toxic spill occurred within one of these states, the health department collected information on the spill. Such information included the chemical spilled, the location and cause of the spill, and whether or not people were harmed by the spill. This information can be used by federal agencies and their partners to learn more about reducing harm caused by toxic substances and safer ways to manage them.[5]

Response teams are available at the request of local and state health departments when responding to large-scale toxic spills. ATSDR can provide response teams through its Assessment of Chemical Exposures (ACE) Program. ACE scientists can quickly report to a site and help interview people exposed to the toxic substance in order to get detailed information on their health effects and needs. ACE scientist can also collect and test samples that will measure the level of the toxic substance in people and the environment.[6]

For a surveillance system to be useful, it must not only be a repository for data, the data must also be used to protect public health. For the first year of NTSIP in Tennessee, initial efforts were focused on increasing personnel, establishing effective partnerships with key state emergency response agencies, negotiating agreements with relevant federal, state, local, and private agencies so that information on acute toxic spills can be collected in an accurate and timely manner. For the second year of NTSIP, Tennessee focused on data collection and data analysis. TN NTSIP developed strategies to reduce subsequent morbidity and mortality by analyzed the data and initiated appropriate prevention outreach activities. These activities were intended to provide data stewards, responders, and the general public with information to help prevent chemical releases and to reduce morbidity and mortality when a release occurred.

This report provides an overview of NTSIP activities in Tennessee for 2011. It summarizes the characteristics of acute toxic substance releases and their associated public health consequences, and demonstrates how data are translated into prevention activities to protect public health.

Methods

In 2011, information such as the chemical released, the number of victims, injuries, and evacuations caused by the release, and factors contributing to the release were collected on every uncontrolled or illegal acute release of toxic substances. An acute release is considered to be a release lasting less than 72 hours. A substance is considered to be toxic if it can reasonably be expected to cause an adverse human health effect due to its properties or as documented in literature. Events were included (1) if the substance released is on the NTSIP mandatory reporting list, which consists of the Environmental Protection Agency (EPA) Extremely Hazardous Substances List and the Department of Homeland Security (DHS) Chemical Facilities Anti-Terrorism Standard (CFATS) Appendix A or (2) if not on the NTSIP mandatory reporting list, the released amount is greater than or equal to 10 pounds or 1 gallon with the exception of the following:

- Paint and coatings - included if the amount released is 100 pounds or more
- Polychlorinated biphenyls (PCBs) with a concentration greater than 50 parts per million (ppm) - included if the amount released is 10 gallons or more
- Propylene glycol or ethylene glycol – included if the amount released is 50 gallons or more
- Freons – included if the amount released is 100 gallons or more

Petroleum only incidents, were included only when there was a public health action, such as an evacuation, health advisory, or environmental sampling, or when there was an injury caused by the released chemical. Petroleum used as a fuel in a vehicle at the time of the incident was not included. Stack or flare incidents are defined as flammable and hazardous gasses vented and

incinerated through the flare stack, essentially a smokestack with a flame at the top. These types of incidents were included only when there was a public health action.

The mere existence of a methamphetamine lab does not qualify it as an incident. There must be an acute chemical release within 72 hours of the authorities initiating an investigation. If responders suffered injuries while entering the premises, even though there was no evidence of a release, it always qualified.

Several data sources were used to obtain information about these events. Sources included NRC, DOT's HMIS, Tennessee Highway Patrol, Tennessee Poison Center (TPC), Tennessee Emergency Management Agency (TEMA) WebEOC Database, Tennessee Department of Environment and Conservation (TDEC), Tennessee Methamphetamine Task Force (TMTF), Google Alerts (a web content monitoring service), Homeland Security Infrastructure Program (HSIP), local health agencies, and media (newspaper, radio, and television). US Census data were used to estimate the number of residents in the vicinity of most events. All data were uploaded using a web-based data entry system provided by ATSDR.

NTSIP defines victims as people who have at least one documented adverse health effect within 24 hours of an event for symptoms or injuries possibly associated with the event. The exception to the 24-hour stipulation was to count all victims who died as a result of the event as deaths, even if the death occurred much longer than 24 hours after the event, to the extent this information can be obtained. Victims who received more than one type of injury or symptom were counted in each applicable injury or symptom category.

Events were defined as transportation-related if they occurred (1) during ground, air, pipeline, or water transport of toxic substances or (2) before being completely unloaded from a vehicle or vessel. All other events were considered fixed facility events.

For data analysis, the substances released were categorized into 16 groups. The category "mixture" comprises substances from different categories that were mixed or formed from a reaction before the event. The category "other inorganic substances" comprises all inorganic substances except acids, bases, ammonia, and chlorine. The category "other" comprises substances that could not be grouped into one of the other existing categories.

Results

In 2011, a total of 325 acute hazardous substance events were captured by Tennessee NTSIP. Of these events, 174 (53.5%) occurred in fixed facilities and 151 (46.5%) occurred during transportation. Shelby and Davidson Counties had the greatest number of events with 100 (30.8%) and 41 (12.6%), respectively (Table 1).

Table 1: Number of events meeting the surveillance definition, by county and type of event

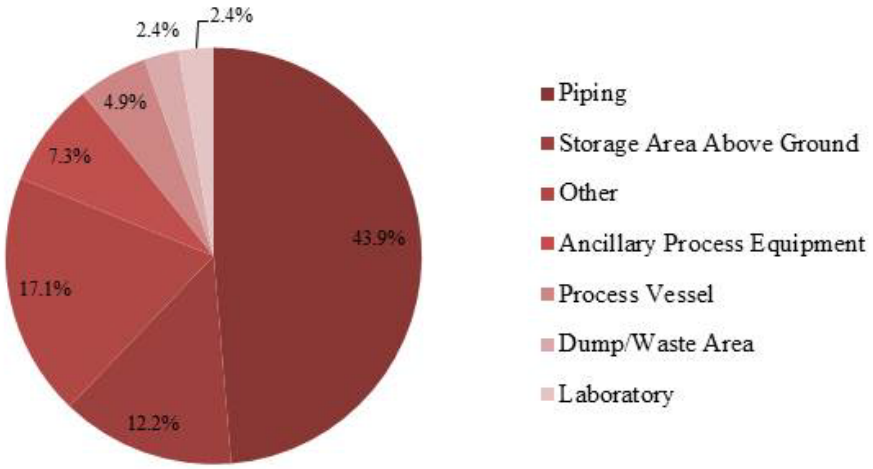
County	Type of Event				All Events	
	Fixed Facility		Transportation			
	No. Events	%*	No. Events	%*	No. Events	%
Bedford	1	100	0	0	1	0.3
Benton	3	75	1	25	4	1.2
Blount	2	67	1	33	3	0.9
Bradley	7	100	0	0	7	2.2
Campbell	2	50	2	50	4	1.2
Carter	3	100	0	0	3	0.9
Cheatham	1	50	1	50	2	0.6
Coffee	1	50	1	50	2	0.6
Cumberland	0	0	1	100	1	0.3
Davidson	11	27	30	73	41	12.6
Dickson	2	100	0	0	2	0.6
Dyer	1	100	0	0	1	0.3
Fayette	2	50	2	50	4	1.2
Gibson	1	100	0	0	1	0.3
Giles	1	100	0	0	1	0.3
Grainger	1	50	1	50	2	0.6
Greene	2	100	0	0	2	0.6
Hamblen	1	100	0	0	1	0.3
Hamilton	11	52	10	48	21	6.5
Hardeman	1	100	0	0	1	0.3
Hawkins	3	75	1	25	4	1.2
Haywood	1	50	1	50	2	0.6
Henry	3	100	0	0	3	0.9
Hickman	2	100	0	0	2	0.6
Humphreys	4	80	1	20	5	1.5
Jefferson	1	100	0	0	1	0.3
Johnson	1	33	2	67	3	0.9
Knox	7	47	8	53	15	4.6
Lawrence	0	0	1	100	1	0.3
Lincoln	1	100	0	0	1	0.3
Loudon	1	100	0	0	1	0.3
Madison	1	25	3	75	4	1.2
Marion	0	0	3	100	3	0.9
Maury	7	78	2	22	9	2.8
McMinn	1	33	2	67	3	0.9
McNairy	1	100	0	0	1	0.3
Monroe	0	0	1	100	1	0.3
Montgomery	4	100	0	0	4	1.2
Moore	1	100	0	0	1	0.3
Obion	2	67	1	33	3	0.9
Polk	0	0	1	100	1	0.3
Putnam	0	0	1	100	1	0.3
Rhea	1	100	0	0	1	0.3
Robertson	2	67	1	33	3	0.9
Rutherford	4	36	7	64	11	3.4
Sevier	2	100	0	0	2	0.6
Shelby	46	46	54	54	100	30.8
Stewart	2	100	0	0	2	0.6
Sullivan	10	67	5	33	15	4.6
Sumner	3	75	1	25	4	1.2
Tipton	0	0	2	100	2	0.6
Unicoi	1	50	1	50	2	0.6
Washington	2	100	0	0	2	0.6
White	1	50	1	50	2	0.6
Williamson	3	100	0	0	3	0.9
Wilson	2	67	1	33	3	0.9
Total	**174**		**151**		**325**	**100**

Source: Tennessee National Toxic Substance Incidents Program, 2011

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

For each fixed facility event in which the North American Industry Classification System (NAICS) was used the following coding numbers have been assigned: 21 for mining, 22 for utilities, 23 for construction, or 31 – 33 for manufacturing. One or two choices can be selected to specify the type of area where the event occurred or the equipment involved in the event. Of 174 fixed facility events, 41 (23.6%) reported one type of area or equipment. Among events with one type of area or equipment reported, the main areas or equipment were classified as follows: 18 (43.9%) piping, 7 (17.1%) other, and 5 (12.2%) storage area above ground (Figure 1).

Figure 1: Areas of fixed facility involved in events



Source: Tennessee National Toxic Substance Incidents Program, 2011

Of the 151 transportation-related events, 121 (80.1%) occurred during ground transport (e.g., tanker truck, non-tanker truck, bus, van, or automobile), 13 (8.6%) involved transport by rail, and 17 (11.3%) involved transport by air (Figure 2a). No events involved water or pipeline modes of transportation. The largest proportions of transportation-related events occurred during unloading of a stationary vehicle or vessel [60 (39.7%)] or from a moving vehicle or vessel [44 (29.1%)] or en route but were not discovered until the vehicle reached a fixed facility destination [42 (27.8%)] or from a stationary vehicle or vessel [5 (3.3%)] (Figure 2b).

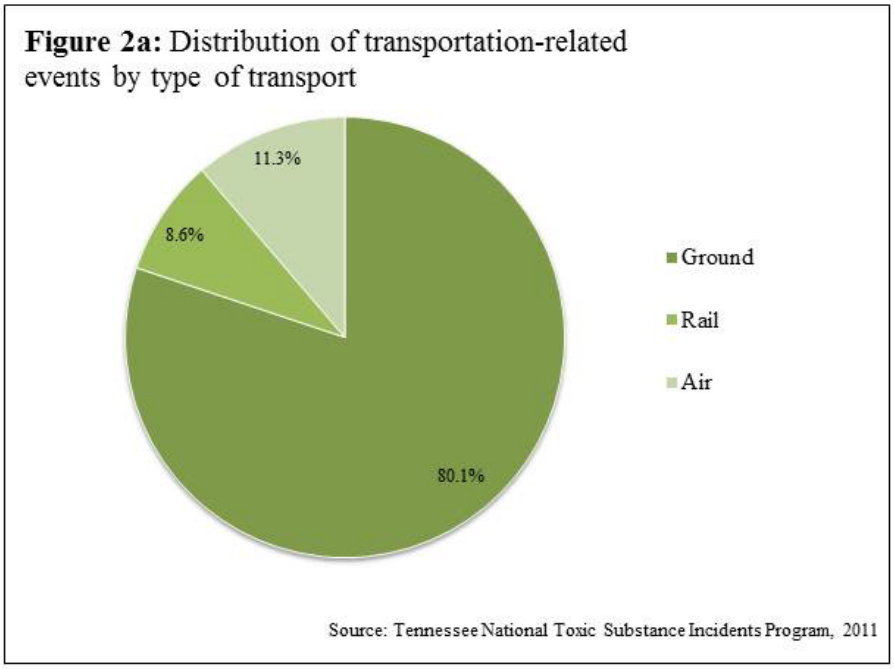


Figure 2a: Distribution of transportation-related events by type of transport

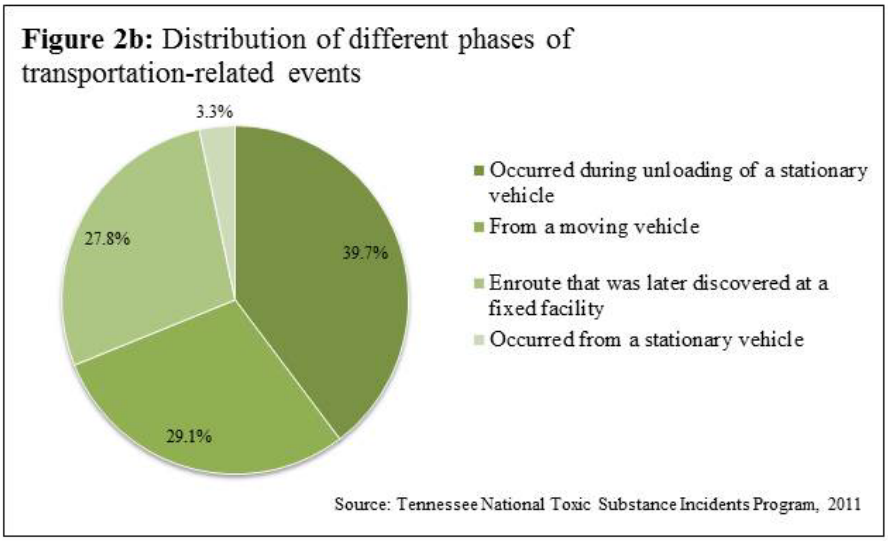
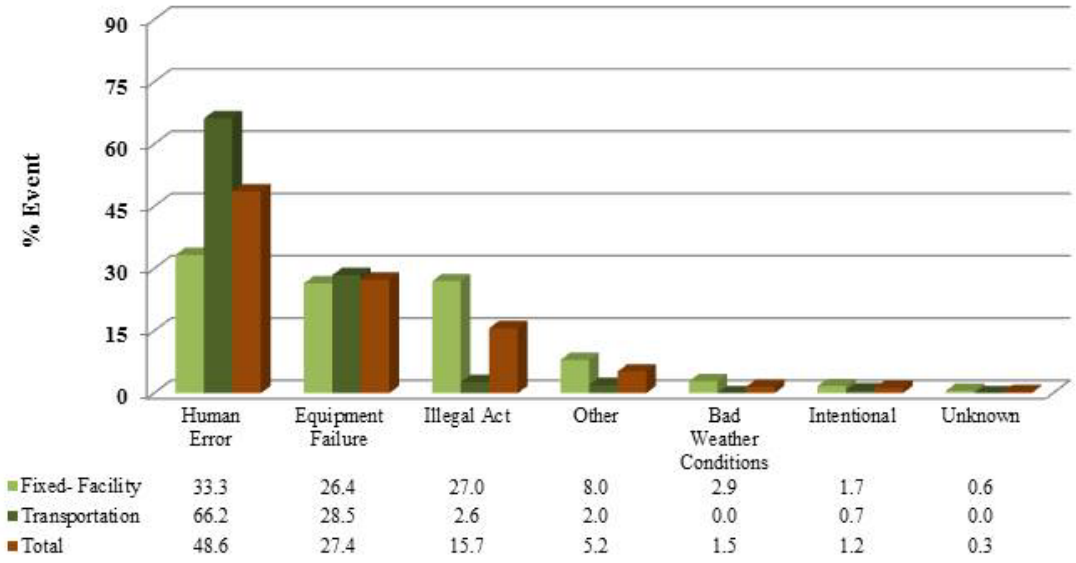


Figure 2b: Distribution of different phases of transportation-related events

Primary and secondary factors contributing to the events were reported. 48.6% of the events reported human error as the primary factor. Most (33.3%) fixed-facility events reported human error as the primary factor and most (66.2%) transportation-related events also reported human error as the primary factor (Figure 3a). Of the reported specified primary factors, 25.5% events involved improper filling, loading, or packing and 22.5% events were reported for other factors such as dropping packages or bringing generator inside (Figure 3b). All events involved the release of only one substance.

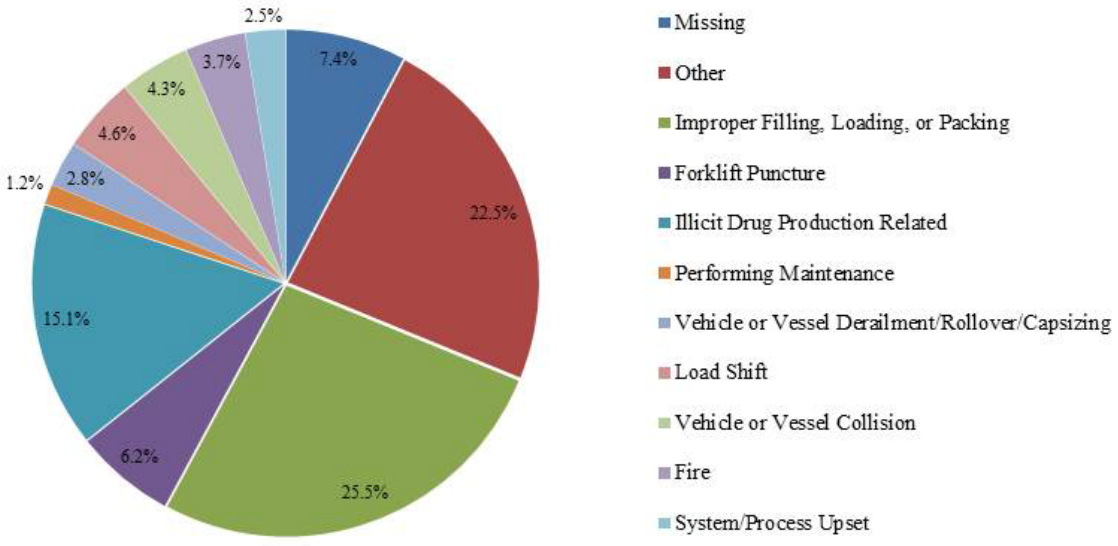
Figure 3a: Primary Factors Reported as Contributing to Events



	Human Error	Equipment Failure	Illegal Act	Other	Bad Weather Conditions	Intentional	Unknown
Fixed- Facility	33.3	26.4	27.0	8.0	2.9	1.7	0.6
Transportation	66.2	28.5	2.6	2.0	0.0	0.7	0.0
Total	48.6	27.4	15.7	5.2	1.5	1.2	0.3

Source: Tennessee National Toxic Substance Incidents Program, 2011

Figure 3b: Specified primary factors reported as contributing to events



Source: Tennessee National Toxic Substance Incidents Program, 2011

NTSIP events were more likely to occur when there was greater industrial, commercial or agricultural activity, such as, in the 6 hours before noon (30.8%) and the 6 hours after and including noon (30.5%) compared with the 6 hours before midnight (14.2%) and the 6 hours after and including midnight (24.6%). 36 events did not have a time specified. Additionally, 85.1% of events occurred on weekdays compared to 14.7% occurring on weekends (Tables 2a and 2b). May through October had 52% of the events and the remaining 6 months of the year had 48%.

Table 2a: Frequencies of events by time range

Event Day	No. of Events	%
Monday	52	16.0
Tuesday	57	17.5
Wednesday	56	17.2
Thursday	58	17.8
Friday	54	16.6
Saturday	30	9.2
Sunday	18	5.5
Total	**325**	**100.0**

Table 2b: Frequencies of events by day

Time Range	No. of Events	%
0-5:59AM	80	24.6
6:00-11:59AM	100	30.8
12:00-5:59PM	99	30.5
6:00-11:59PM	46	14.2
Total	**325**	**100.0**

Source: Tennessee National Toxic Substance Incidents Program, 2011.

Industries

The largest proportions of NTSIP events were associated with the manufacturing (69 [21.2%]) and transportation (118 [36.3%]) industries (Table 3). Within manufacturing industries, chemical manufacturing (45 [65.2%]) and food manufacturing (9 [13.0%]) accounted for most of the events. The largest number of events with victims occurred in the manufacturing industry (7 [14.0%]). The highest number of victims was in the manufacturing industry (12 [10.1%]). The subcategory chemical manufacturing accounted for 41.7% of all victims in the manufacturing industry.

Table 3: Industries involved in hazardous substance events and events with victims by category

Industry Category	Total Events		Events with Victims		Percentage of Events with Victims	Total No. of Victims
	No.	%	No.	%		
Accommodation and Food Services	1	0.3	1	2	100	5
Administrative and Support Services	5	1.5	1	2	20	1
Construction	4	1.2	1	2	25	1
Finance and Insurance	2	0.6	0	0	0	0
Health Care and Social Assistance	3	0.9	0	0	0	0
Information	2	0.6	2	4	100	5
Manufacturing	69	21.2	7	14	10.1	12
Mining, Quarrying, and Oil and Gas Extraction	2	0.6	0	0	0	0
Not an Industry	66	20.3	22	44	33.3	56
Other Services	2	0.6	1	2	50	1
Professional, Scientific, and Technical Services	5	1.5	1	2	20	2
Public Administration	3	0.9	1	2	33.3	3
Real Estate, Rental, and Leasing	1	0.3	0	0	0	0
Retail Trade	8	2.5	3	6	37.5	7
Transportation and Warehousing	118	36.3	6	12	5.1	9
Utilities	5	1.5	2	4	40	2
Wholesale Trade	29	8.9	2	4	6.9	7
Total	**325**	**100.0**	**50**	**100.0**		**111**

Source: Tennessee National Toxic Substance Incidents Program, 2011

Substances

A total of 325 substances were released in all events. The individual substances most frequently released were methamphetamine chemicals, sodium hydroxide, and ammonia (Appendix). Substances were grouped into 16 categories. The substance categories most commonly released in fixed facility events were other (74 [42.5%]), volatile organic compounds (18 [10.3%]), ammonia (14 [8.0%]), and acids (12 [6.9%]). In transportation-related events, the most commonly released substance categories were volatile organic compounds (32 [21.2%]), acids (29 [19.2%]), other (21 [13.9%]), bases (19 [12.6%]), and other inorganic substances (16 [10.6%]) (Table 4).

Two types of releases can be reported for each substance (e.g., spill and volatilization). Only one type of release was associated with the event as follows: spill (210 [64.6%]), volatilization (98 [30.2%]), fire (16 [4.9%]), and explosion (1 [0.3%]). Of events with two types of releases, the following combinations were reported: spill and fire (1 [5.9%]), volatilization and fire (3 [17.6%]), volatilization and explosion (1 [5.9%]), and the 12 (70.6%) involved a fire and explosion.

Table 4: Number of substances involved, by substance category and type of event

Substance Category	Type of event				All Events	
	Fixed Facility		Transportation			
	No. Substances	%	No. Substances	%	No. Substances	%
Acids	12	6.9	29	19.2	41	12.6
Ammonia	14	8.0	2	1.3	16	4.9
Bases	10	5.7	19	12.6	29	8.9
Chlorine	11	6.3	0	0.0	11	3.4
Hetero-Organics	3	1.7	3	2.0	6	1.8
Hydrocarbons	1	0.6	1	0.7	2	0.6
Indeterminate	0	0.0	1	0.7	1	0.3
Mixtures*	7	4.0	5	3.3	12	3.7
Other†	74	42.5	21	13.9	95	29.2
Other Inorganic Substances‡	11	6.3	16	10.6	27	8.3
Oxy-Organics	6	3.4	11	7.3	17	5.2
Paints and Dyes	0	0.0	4	2.6	4	1.2
Pesticides/Agricultural	5	2.9	2	1.3	7	2.2
Polymers	1	0.6	5	3.3	6	1.8
Polychlorinated Biphenyls (PCBs)	1	0.6	0	0.0	1	0.3
Volatile Organic Compounds (VOCs)	18	10.3	32	21.2	50	15.4
Total	**174**	**100**	**151**	**100**	**325**	**100**

Source: Tennessee National Toxic Substance Incidents Program, 2011.

*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.

§Percentage does not total 100% due to rounding.

Victims

In fifty of total 325 incidents (15.4% of all events) someone was harmed or killed. A total of 111 victims were recorded in those 50 events (Table 5). Of the 50 events with victims, 31 (62.0%) events involved only one victim, and 8 (16.0%) involved two victims. Of all victims, 96 (86.5%) were injured in fixed facility events. Persons who were observed at a hospital or medical facility but did not have symptoms resulting from the event were not counted as victims.

Table 5: Number of victims per event, by type of event

No. Victims	Type of event						All Events		
	Fixed Facility			Transportation					
	No. Events	%	Total Victims	No. Events	%	Total Victims	No. Events	%	Total Victims
1	23	59.0	23	8	72.7	8	31	62.0	31
2	6	15.4	12	2	18.2	4	8	16.0	16
3	2	5.1	6	1	9.1	3	3	6.0	9
4	2	5.1	8	0	0.0	0	2	4.0	8
5	3	7.7	15	0	0.0	0	3	6.0	15
7	1	2.6	7	0	0.0	0	1	2.0	7
9	1	2.6	9	0	0.0	0	1	2.0	9
16	1	2.6	16	0	0.0	0	1	2.0	16
Total	**39**	**100.0**	**96**	**11**	**100.0**	**15**	**50**	**100.0**	**111**

Source: Tennessee National Toxic Substance Incidents Program, 2011.

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 categories. Substances released most often were not necessarily the most likely to result in victims (Table 6). For example, events categorized as acids constituted 12.6% of all events; however, only 2.4% of these events resulted in injuries. Conversely, events involving hydrocarbons accounted for 0.6% of all events respectively, but 50.0% of the events resulted in injuries.

Table 6: Frequency of substance categories in all events and events with victims¶

Substance Category	All Events		Events with victims		
	No.	%	No.	Percentage of all releases with victims!	Percentage of events with victims in substance category
Acids	41	12.6	1	2.0	2.4
Ammonia	16	4.9	3	6.0	18.8
Bases	29	8.9	0	0.0	0.0
Chlorine	11	3.4	2	4.0	18.2
PCB's	1	0.3	0	0.0	0.0
Hetero-Organics	6	1.8	0	0.0	0.0
Hydrocarbons	2	0.6	1	2.0	50.0
Indeterminate	1	0.3	0	0.0	0.0
Mixtures*	12	3.7	4	8.0	33.3
Other†	95	29.2	32	64.0	33.7
Other Inorganic Substances‡	27	8.3	2	4.0	7.4
Oxy-Organics	17	5.2	2	4.0	11.8
Paints and Dyes	4	1.2	0	0.0	0.0
Pesticides/Agricultural	7	2.2	0	0.0	0.0
Polymers	6	1.8	0	0.0	0.0
Volatile Organic Compounds (VOCs)	50	15.4	3	6.0	6.0
Total	**325**	**100.0**	**50**	**100.0**	

Source: Tennessee National Toxic Substance Incidents Program, 2011.

¶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.

!Total numbers of events with victims were 50.

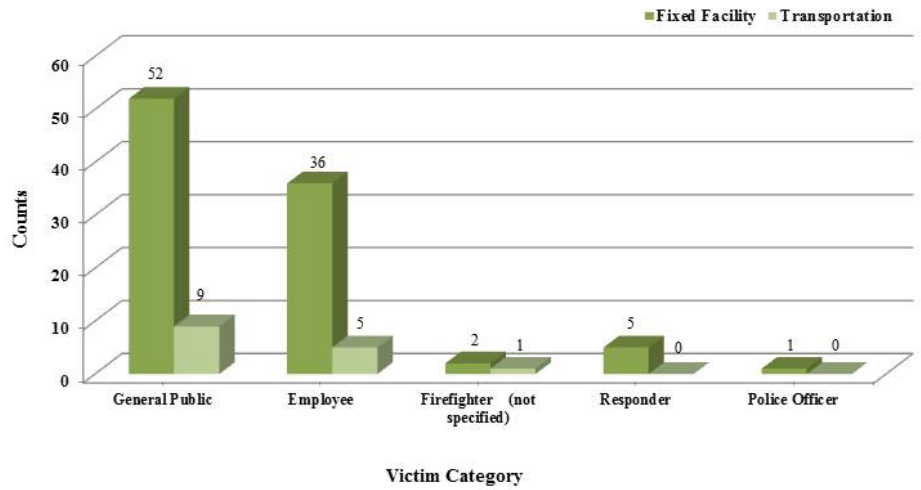
*Substances from different categories that were mixed or formed from a reaction before the event.

† Not belonging to one of the existing categories.

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

General public (61 [55.0%]) constituted the largest proportion of the population groups injured followed by employees (41 [36.9%]) (Figure 4). In fixed facility events, 8 emergency response personnel were injured. Two of those were firefighters and one was a police officer. Five non-specified responders were injured in fixed facility events. One responder (firefighter) was injured in a transportation-related event.

Figure 4: Distribution of victims, by population group and type of event



Source: Tennessee National Toxic Substance Incidents Program, 2011

Victims were reported to sustain a total of 150 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 (34 [25.6%]) and burns (29 [21.8%]). In transportation-related events, chemical and non-chemical related trauma injuries (7 [41.2%]) were reported most frequently. Not all of the trauma injuries in transportation-related events were substance-related; these injuries resulted from a chain of events, such as a motor vehicle accident leading to the release of a hazardous substance, and not from exposure to the substance itself.

Table 7: Frequencies of injuries/symptoms, by type of event*

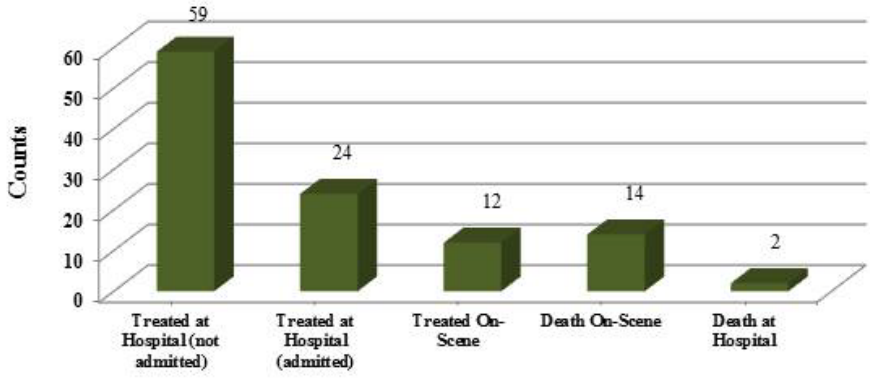
Injury/Symptom	Fixed facility		Transportation		All Events	
	No. Injuries	%	No. Injuries	%	Total no. injuries	%
Respiratory	34	25.6	0	0.0	34	22.7
Chemical Related Trauma	25	18.8	0	0.0	25	16.7
Non-Chemical Related Trauma	10	7.5	4	23.5	14	9.3
Chemical and Non-Chemical Related Trauma	6	4.5	7	41.2	13	8.7
Thermal Burns	21	15.8	2	11.8	23	15.3
Chemical Burns	1	0.8	0	0.0	1	0.7
Chemical and Thermal Burns	7	5.3	2	11.8	9	6.0
Shortness of Breath	19	14.3	1	5.9	20	13.3
Heat Stress	6	4.5	0	0.0	6	4.0
Eye Irritation	3	2.3	0	0.0	3	2.0
Dizziness/CNS Symptoms	1	0.8	1	5.9	2	1.3
Total	**133**	**100.0**	**17**	**100.0**	**150**	**100.0**

Source: Tennessee National Toxic Substance Incidents Program, 2011.

*The number of injuries is greater than the number of victims (111) because a victim could have had more than one injury.

For the 111 injured persons for whom an age category was reported, 5 (4.5%) were children under 18 years of age, 106 (95.5%) were 18 years old or greater. Sex was known for 62 (55.9%) of the victims. Of these, 51 (82.3%) were males. Of the 111 victims, 59 (53.2%) were treated at a hospital and not admitted and 24 (21.6%) were treated at hospital and admitted. 16 (14.4%) fatalities were reported (Figure 5).

Figure 5: Injury disposition



Source: Tennessee National Toxic Substance Incidents Program, 2011

The status of personal protective equipment (PPE) use was reported for 4 (3.6%) victims. Most of the victims (96.4%) had not worn any form of PPE. One employee-victim reported wearing Level D PPE.

Two events involved 25 injured people. These events resulted in 16 victims and 9 victims, respectively. In the event involving nine victims, carbon monoxide was released in a duplex. One died of carbon monoxide poisoning after using a generator inside the duplex unit for power that also affected eight others. In the event resulting in sixteen victims, an active methamphetamine laboratory was involved.

Nearby populations

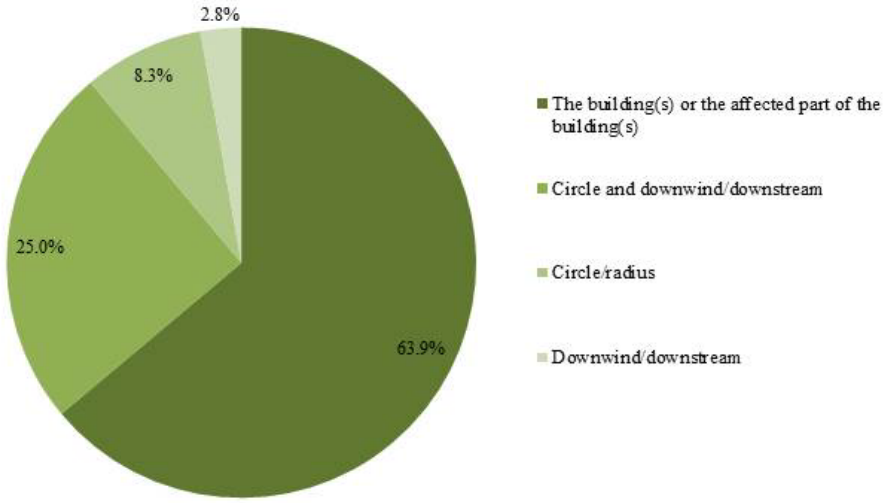
The proximity of the event location in relation to selected populations was determined using GIS. Residences were within ¼ mile of 275 (84.6%) events, schools were within ¼ mile of 9 (2.8%) events, hospitals were within ¼ mile of 1 (0.3%) event, nursing homes were within ¼ mile of 6 (1.8%) events, licensed daycares were within ¼ mile of 25 (7.7%) events, industries or other businesses were within ¼ mile of 234 (72.0%) events, and recreational areas were within ¼ mile of 16 (4.9%) events.

The number of events at which persons were at risk of exposure was determined primarily using GIS. There were 276 (84.9%) events with persons living within ¼ mile of the event; 291 (89.5%) events with persons living within ½ mile; and 321 (98.8 %) events with persons living within 1 mile.

Evacuations

Evacuations were ordered in 36 (11.1%) events. Of these evacuations, 63.9% were of buildings or affected parts of buildings; 25.0% were of circle and downwind/downstream; and 8.3% were of defined circular areas surrounding the event locations (Figure 6). The number of people evacuated was 324. The median length of evacuation was 2 hours (range: less than one hour to 24 hours). 34 of 36 events (94.4%) had access to the restricted area.

Figure 6: Area of Evacuation Criteria



Source: Tennessee National Toxic Substance Incidents Program, 2011

Decontamination

Of the 111 (100%) victims for whom decontamination status was known, 84 (75.7%) were not decontaminated, 19 (17.1%) were decontaminated at the medical facility and 8 (7.2%) were decontaminated at the scene.

Response

Three hundred forty-five (99.1%) events had information on the number of responders to each event; 24.6% reported 2 categories of personnel who responded, 16.8% reported 3 categories, and 10.4% reported 4 categories. Company response teams (34.0%) responded most frequently to events followed by law enforcement agencies (17.6%), fire department (14.1%), and other (12.0%) (Table 8). No one responded in 4 (0.6%) events.

Table 8: Distribution of personnel who responded to the event

Responder Category	No. of Responders	%
Company's Response Team	212	34.0
Law Enforcement Agency	110	17.6
Fire Department	88	14.1
Other	75	12.0
Third Party Clean-Up Contractor	42	6.7
EMS	40	6.4
Certified HazMat Team	26	4.2
Department of Works/Utlities/Transportation (includes Coast Guard)	13	2.1
State, County, or Local Emergency Managers/Coordinators/Planning Committees)	12	1.9
No response	4	0.6
Health Department/Health Agency	1	0.2
Environmental Agency/EPA Response Team	1	0.2

Source: Tennessee National Toxic Substance Incidents Program, 2011.

Prevention Activities

During 2011, the Tennessee NTSIP continued to focus their efforts on partnering with and collecting data from key federal, state, and local agencies involved in toxic substance activities. These agencies included: TDEC, DOT, TEMA, Local Emergency Planning Committees (LEPCs), TMTF, TPC, and ATSDR. TN NTSIP has been able to sufficiently coordinate with other agencies and accomplish the goals and sustainability requirements of the program through surveillance, data collection, data entry, and data management.

While continuing to collaborate with and collect data from key federal, state, and local agencies involved in toxic substance activities, year 2011 also focused on analyzing and mapping the collected data. Through analyzing and mapping data gathered, TN NTSIP gained a better understanding of the areas and causes of acute hazardous substance emergency releases as they occurred throughout Tennessee. TN NTSIP identified vulnerabilities in industry, transportation, and communities in order to effectively develop and promote methods that could prevent future releases and mitigate the consequences when a release does occur. Information gathered and lessons learned were disseminated to the public, partnering agencies, and key organizations in annual reports, presentations, and fact sheets. All NTSIP reports, successes stories, and fact sheets are available on our website.

Summary of Results, 2010-2011

From 2010-2011, 673 toxic substance incidents have been identified (Table 9). 52.2% of the events occurred during transportation in 2010-2011, but the number of transportation-related events decreased in 2011. The number of total events slightly decreased (6.6%) in 2011. This decrease could be due to fewer events actually occurring or a decrease in the reporting of the events. Almost no change has been observed in the number of substances released. Of these incidents, 98 (14.45%) events resulted in 218 victims. 25 (11.5%) of those victims died due to the incidents. 183 (83%) of the victims occurred due to the fixed facility incidents of which 17 (68%) were died. Almost 50% of the incidents were due to human error.

Table 9: Cumulative data by year – Tennessee National Toxic Substance Incidents Program

Year	Type of event			No. substances released	No. of victims			No. of deaths			Events with victims	
	Fixed facility	Transportation	Total		Fixed facility	Transportation	Total	Fixed facility	Transportation	Total	No.	%*
2010	148	200	348	351	87	20	107	5	4	9	48	13.8
2011	174	151	325	325	96	15	111	12	4	16	50	15.4
Total	**322**	**351**	**673**	**676**	**183**	**35**	**218**	**17**	**8**	**25**	**98**	**14.6**

*Percentage of events with victims.

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Appendix

The 10 substances most frequently involved in events,
Tennessee's National Toxic Substance Incidents Program, 2011

Number	Chemical Substance	Total Substance Releases	
		No.	%
1	Methamphetamine Chemicals NOS	51	15.7
2	Sodium Hydroxide NOS	19	5.8
3	Ammonia NOS	15	4.6
4	Natural Gas	11	3.4
5	Sulfuric Acid NOS	12	3.7
6	Hydrochloric Acid NOS	10	3.1
7	Nitric Acid NOS	8	2.5
8	Hydrogen Peroxide	7	2.2
9	Carbon Monoxide	7	2.2
10	Chlorine NOS	7	2.2