A Quantifying Comparison between the Hazardous Substance Emergency Event Surveillance Program and the National Toxic Substance Incidents Program in Louisiana

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Abstract

Beginning in 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences of releases of hazardous substances. In 2010, the National Toxic Substance Incidents Program (NTSIP) was formed to replace HSEES as a more comprehensive and efficient program by incorporating stakeholder suggestions. In the case of Louisiana, the main differences between the programs are the following:

- NTSIP no longer included threatened releases.
- Small paint releases (under 100 lbs.) do not qualify for NTSIP unless there is morbidity or mortality associated with the release or if there is some kind of public health action associated with the release.
- NTSIP does not record stack releases unless qualifying criteria were met while HSEES recorded all stack releases as long as the qualifying criteria were met (HSEES included many more stack releases).
- NTSIP includes petroleum only releases when qualifying criteria were met, HSEES did not include petroleum only events.

The Louisiana Department of Health and Hospitals (LDHH), Office of Public Health (OPH), Section of Environmental Epidemiology and Toxicology (SEET) participated in HSEES beginning in 2001 through its final year of 2009. During that time period, a total of 6987 acute hazardous substances events met the HSEES surveillance definition, releasing a total of 11,591 individual substances (includes threatened releases). There were a total of 653 victims associated with these releases.

Louisiana participated in NTSIP between January 1, 2010 and December 31, 2013. During that time period, a total of 2715 acute hazardous substances events met the NTSIP surveillance definition, releasing a total of 3306 individual substances. There were a total of 352 victims associated with these releases.

For Louisiana, the transition from HSEES to NTSIP was beneficial in several ways. First, by removing stack releases, small paint releases and threatened releases, Louisiana was able to focus on collecting and analyzing information about acute releases of hazardous substance releases that result in victims or a public health action such as an evacuation, which is the goal of both HSEES and NTSIP. Second, the time savings allowed for the discovery of new sources for information and also helped to allow SEET to develop an internal set of procedures used by LDHH to respond to chemical emergency events.

INTRODUCTION

Beginning in 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences of releases of hazardous substances. The decision to initiate a surveillance system of this type was based on a study published in 1989 about the reporting of hazardous substances release to three national databases: the National Response Center Database, the Hazardous Material Information System (HMIS), and the Acute Hazardous Events Database[1].

A review of these databases indicated limitations. Many events were missed because of specific reporting requirements (for example, the HMIS did not record events involving intrastate carriers or fixed-facility events). Other important information was not recorded, such as the demographic characteristics of victims, the types of injuries sustained, and the number of persons evacuated.

As a result of this review, ATSDR implemented the HSEES system to more fully describe the public health consequences of releases of hazardous substances.

The Louisiana Department of Health and Hospitals (LDHH), Office of Public Health (OPH), Section of Environmental Epidemiology and Toxicology (SEET) participated in this surveillance system beginning in 2001 through its final year of 2009.

In 2010, the National Toxic Substance Incidents Program (NTSIP) was formed to replace HSEES as **a more comprehensive and efficient** program by incorporating stakeholder suggestions. Louisiana participated in NTSIP between 2010 and 2013. This paper attempts to qualify the efficiency gained by implementing the change from HSEES to NTSIP in Louisiana without the loss of quality data.

HSEES Events

A HSEES event is defined as an uncontrolled or illegal acute release of any hazardous substance (except petroleum when petroleum is the only substance released), in any amount for substances listed on the HSEES Mandatory Chemical Reporting List, or, if not on the list, in an amount greater than or equal to 10 lbs. or 1 gallon. Threatened releases of qualifying amounts will be included if the threat led to an action (e.g., evacuation) to protect the public health. Petroleum-only releases are not included because of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). [Note: The Petroleum Exclusion clause of CERCLA excludes any form of petroleum that has not been refined to the point of becoming a single-chemical product]. HSEES defines victims as people who experience at least one documented adverse health effect within 24 hours after the event or who die as a consequence of the event. Victims who receive more than one type of injury or symptom are counted once in each applicable injury type or symptom. Events are defined as transportation related if they occur

(a) during surface, air, pipeline, or water transport of hazardous substances, or (b) before being unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

NTSIP Events

A NTSIP event is defined as **an uncontrolled or illegal acute release of any toxic substance,** in any amount for substances listed on the NTSIP Mandatory Chemical Reporting List, or, if not on the list, in an amount greater than or equal to 10 lbs. or 1 gallon. Petroleum only incidents, as well as stack or flare incidents are included only when there is a public health action or an injury caused by the chemical. NTSIP 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 totally unloaded from a vehicle or vessel. All other events are considered fixed-facility events.

Key Differences between HSEES and NTSIP Events

Although HSEES data and NTSIP data are very similar, they are not identical. There are several key differences between HSEES and NTSIP regarding what events qualify for collection into the system. In the case of Louisiana, the main differences are the following:

- NTSIP no longer included threatened releases.
- Small paint releases (under 100 lbs.) do not qualify for NTSIP unless there is morbidity or mortality associated with the release or if there is some kind of public health action associated with the release.
- NTSIP does not record stack releases unless qualifying criteria were met while HSEES recorded all stack releases as long as the qualifying criteria were met (HSEES included many more stack releases).
- NTSIP includes petroleum only releases when qualifying criteria were met, HSEES did not include petroleum only events.

METHODS

Data Collection

For both programs, detailed information was collected about each toxic substance incident, 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 the Louisiana Department of Public Safety and Corrections, Office of State Police (LSP), the Louisiana Department of Environmental Quality (LDEQ), the U.S. Coast Guard National Response Center (NRC), the media, and the U.S. Department of Transportation, Hazardous Materials Information System (HMIS). All data were computerized using a web-based data entry system provided by ATSDR. The Louisiana data is stored in a Microsoft Access database with the following tables: events, chemicals, victims, synopsis and comments.

Analysis of HSEES Data

Events

From January 1, 2001 through December 31, 2009, a total of 6987 acute hazardous substances events met the HSEES surveillance definition. A total of 5777 (82.7%) events occurred in fixed facilities. The parishes with the most events were East Baton Rouge (1028 [14.7%]), Calcasieu (961 [13.8%]), and Ascension (790 [11.3%]) (Figure 1).

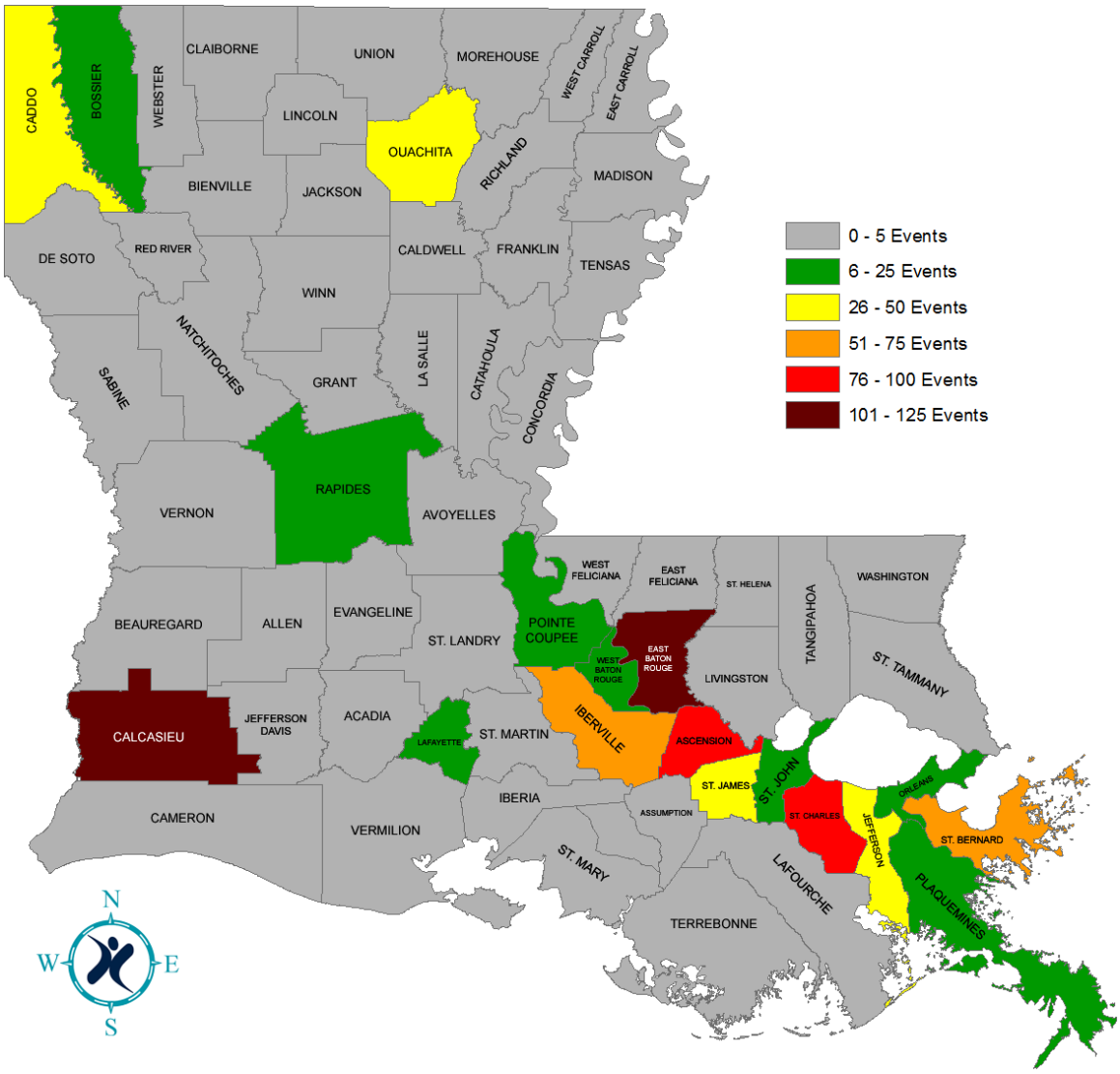

Figure 1: Average number of events per year that qualified for HSEES by parish.

The North American Industry Classification System (NAICS) was recorded for the location of the event. Before 2005, it was assumed that the NAICS code was the same for the responsible party and the location. This was changed beginning January 1, 2005, and a new responsible party NAICS code could be entered into the database. For the purposes of this data analysis, it was assumed that for pre-2005 events, the NAICS was the same for the responsible party and the location.

The largest proportions of events were associated with the manufacturing (5056 [72.4%]) and transportation / warehousing (1192 [17.1%]) industries. The industry with largest number of events with victims was the manufacturing industry (109 [42.1%]). The total number of victims was greatest in the manufacturing industry as well, specifically the "*Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)"* industry (234 [35.8%]). Of the events where the industry was identified, the "*Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)"* industry resulted in a large proportion of events with victims and the largest number of victims; however, only 4.8% of all 4925 events in that category resulted in victims. Conversely, 100.0% of events in the "*Accommodation and Food Services"* industry resulted in victims; however, this industry represents a small proportion (0.4%) of events with victims (Table 1).

Table 1: Industries Involved in Toxic Substance Events and Events with Victims During the HSEES Program: 2001 - 2009

First 2 Digits of NAICS Code	Industry Category	Total Events		Events with Victims		Percentage of Events with Victims	Total Number of Victims (Maximum)^
		Number	%*	Number	%*	%*	
72	Accommodation and Food Services	1	0.0	1	0.4	100.0	3 (3)
56	Administrative, Support, Waste Management and Remediation Services	13	0.2	2	0.8	15.4	3 (2)
11	Agriculture, Forestry, Fishing and Hunting	16	0.2	5	1.9	31.3	7 (3)
71	Arts, Entertainment, and Recreation	4	0.1	2	0.8	50.0	13 (8)
23	Construction	23	0.3	3	1.2	13.0	13 (9)
61	Educational Services	9	0.1	5	1.9	55.6	34 (25)
52	Finance and Insurance	No HSEES Events					
62	Health Care and Social Assistance	6	0.1	1	0.4	16.7	10 (10)
51	Information	No HSEES Events					
55	Management of Companies and Enterprises	No HSEES Events					
31	Manufacturing (Food, Textile, Apparel)	21	0.3	4	1.5	19.0	7 (4)
33	Manufacturing (Metal, Electrical, Transport, Professional)	110	1.6	5	1.9	4.5	12 (7)
32	Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)	4925	70.5	100	38.6	2.0	234 (30)
21	Mining	148	2.1	4	1.5	2.7	5 (2)
N/A	Not an Industry / Not Identified / Unknown	204	2.9	25	9.7	12.3	40 (6)
81	Other Services (except Public Administration)	19	0.3	8	3.1	42.1	27 (17)
54	Professional, Scientific, and Technical Services	9	0.1	1	0.4	11.1	2 (2)
92	Public Administration	18	0.3	3	1.2	16.7	9 (7)
53	Real Estate and Rental and Leasing	3	0.0	0	0.0	0.0	0 (0)
44	Retail Trade I	17	0.2	3	1.2	17.6	13 (11)
45	Retail Trade II	13	0.2	0	0.0	0.0	0 (0)

48	Transportation and Warehousing I	1157	16.6	57	22.0	4.9	164 (50)
49	Transportation and Warehousing II	35	0.5	2	0.8	5.7	5 (4)
22	Utilities	103	1.5	11	4.2	10.7	22 (6)
42	Wholesale Trade	133	1.9	17	6.6	12.8	30 (5)
Total		**6987**	**100.0**	**259**	**100.1**	-	**653 (50)**

^Minimum number of victims per event = 1.
* Total percentage may not equal 100 due to rounding

Chemicals

During the HSEES program, qualifying events released a total of 11,591 individual substances (includes threatened releases). The most commonly released substance was sulfur dioxide (10.4%) (Table 2).

Table 2: Top 10 Individual Substances Released During the HSEES Program: 2001 – 2009

	Chemical Substance	Number of Releases	HSEES Average per Year (2001 - 2009)
1	Sulfur Dioxide	1210	134.4
2	Benzene	680	75.6
3	Nitrogen Oxides (NOx)	640	71.1
4	Hydrogen Sulfide	597	66.3
5	Volatile Organic Compounds NOS	450	50.0
6	Nitric Oxide	395	43.9
7	Ammonia	384	42.7
8	Hydrochloric Acid	317	35.2
9	Ethylene	298	33.1
10	Vinyl Chloride	297	33.0

*NOx includes Nitrogen Oxide, Nitrogen Oxides, and Nitrogen Oxides NOS

To represent the magnitude of the effects of substances involved in injuries, the number of events in a specific substance category was compared with the number of events in the same category that resulted in victims. In events that involved one or more substances from the same substance category, substances were counted once in that category. In events that involved two or more substances from different categories, substances were counted once in the multiple substance category. Substances released most often were not necessarily the most likely to result in victims (Table 3). For example, events categorized as volatile organic compounds constituted 18.4% of all events; however, only 0.9% of these events resulted in injuries. Conversely, events involving hetero-organics accounted for 0.9% of all events respectively, but 9.4% of these events resulted in injuries.

Table 3: Frequency of Substance Categories in All Events and Events with Victims During the HSEES Program: 2001 – 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	592	8.5	55	21.2	9.3
Agricultural Chemicals and Pesticides	176	2.5	7	2.7	4.0
Ammonia	343	4.9	26	10.0	7.6
Bases	223	3.2	20	7.7	9.0
Chlorine	261	3.7	25	9.7	9.6
Formulations	1	0.0	0	0.0	0.0
Hetero-organics	64	0.9	6	2.3	9.4
Hydrocarbons	49	0.7	1	0.4	2.0
Mixture Across Chemical Category[†]	116	1.7	12	4.6	10.3
Multiple Substance Category**	1377	19.7	19	7.3	1.4
Other[‡]	155	2.2	20	7.7	12.9
Other Inorganic Substances[§]	1629	23.3	27	10.4	1.7
Oxy-organics	121	1.7	10	3.9	8.3
Paints and Dyes	165	2.4	0	0.0	0.0
PCB's	6	0.1	0	0.0	0.0
Polymers	246	3.5	4	1.5	1.6
Indeterminate/Unknown	180	2.6	15	5.8	8.3
Volatile Organic Compounds	1283	18.4	12	4.6	0.9
Total	**6987**	**100.0**	**259**	**99.8**	**3.7**

*Total percentage may not equal 100 due to rounding

**Substances in events that involved multiple substances were counted only once in a substance category when all the substances were associated with the same category. If events involved multiple substances from different substance categories, they were counted only once in the multiple substance category.

[†]Substances from different categories that were mixed or formed from a reaction before the event.

[‡]Not classified.

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

Victims

A total of 653 victims were involved in 259 events (3.7% of all events) (Table 4). Of the 259 events with victims, 180 (69.5%) events involved only one victim, and 33 (12.7%) involved two victims. Of all victims, 414 (63.4%) were injured in fixed-facility events.

Table 4: Number of Victims per Event, by Type of Event During the HSEES Program: 2001 – 2009

No. Victims	Type of Event						All Events		
	Fixed facility			Transportation					
	No. Events	%*	Total Victims	No. Events	%*	Total Victims	No. Events	%*	Total Victims
1	112	65.9	112	68	76.4	68	180	69.5	180
2	24	14.1	48	9	10.1	18	33	12.7	66
3	7	4.1	21	3	3.4	9	10	3.9	30
4	6	3.5	24	3	3.4	12	9	3.5	36
<= 5	21	12.4	209	6	6.7	132	27	10.4	341
Total	**170**	**100.0**	**414**	**89**	**100.0**	**239**	**259**	**100.0**	**653**

*Total percentage may not equal 100 due to rounding

Victims were reported to have sustained a total of 896 injuries or symptoms (Table 5). Some victims had more than one injury or symptom. Of all reported injuries/symptoms, the most common in fixed-facility events were respiratory system problems (189 [32.8%]), gastrointestinal system problems (83 [14.4%]) and eye irritation (72 [12.5%]). In transportation-related events, respiratory system problems (71 [22.3%]) and headaches (39 [12.2%]) were reported most frequently.

Table 5: Frequencies of Injuries / Symptoms, by Type of Event During the HSEES Program: 2001 – 2009[^]

Injury/Symptom	Fixed Facility		Transportation		All Events	
	No. injuries	%*	No. injuries	%*	Total no.	%*
Burns (Chemical)	47	8.1	12	3.8	59	6.6
Burns (Thermal)	12	2.1	6	1.9	18	2.0
Burns (Both Chemical and Thermal)	0	0.0	0	0.0	0	0.0
Burns (Unknown)	3	0.5	2	0.6	5	0.6
Dizziness/Central Nervous System Symptoms	24	4.2	29	9.1	53	5.9
Eye Irritation	72	12.5	35	11.0	107	11.9
Gastrointestinal System Problems	83	14.4	49	15.4	132	14.7
Headache	41	7.1	39	12.2	80	8.9
Heart Problems	2	0.3	5	1.6	7	0.8
Heat Stress	3	0.5	0	0.0	3	0.3
Other	20	3.5	5	1.6	25	2.8
Respiratory System Problems	189	32.8	71	22.3	260	29.0
Shortness of Breath	25	4.3	6	1.9	31	3.5
Skin Irritation	18	3.1	11	3.4	29	3.2
Trauma (Chemical-Related)	18	3.1	7	2.2	25	2.8
Trauma (Not Chemical-Related)	9	1.6	30	9.4	39	4.4
Trauma (Both Chemical and Not Chemical-Related)	1	0.2	0	0.0	1	0.1
Trauma (Unknown)	0	0.0	9	2.8	9	1.0
Unknown	10	1.7	3	0.9	13	1.5
Total	**577**	**100.0**	**319**	**100.1**	**896**	**100.0**

[^]The number of injuries is greater than the number of victims (996) because a victim could have had more than one injury.

*Total percentage may not equal 100 due to rounding

Analysis of NTSIP Data

Events

Between 2010 and 2013, a total of 2715 acute toxic substances events met the NTSIP surveillance definition; 1882 (69.3%) events occurred in fixed facilities. The parishes with the most events were East Baton Rouge (481 [17.7%]), Calcasieu (290 [10.7%]), and Ascension (287 [10.6%]) (Figure 2).

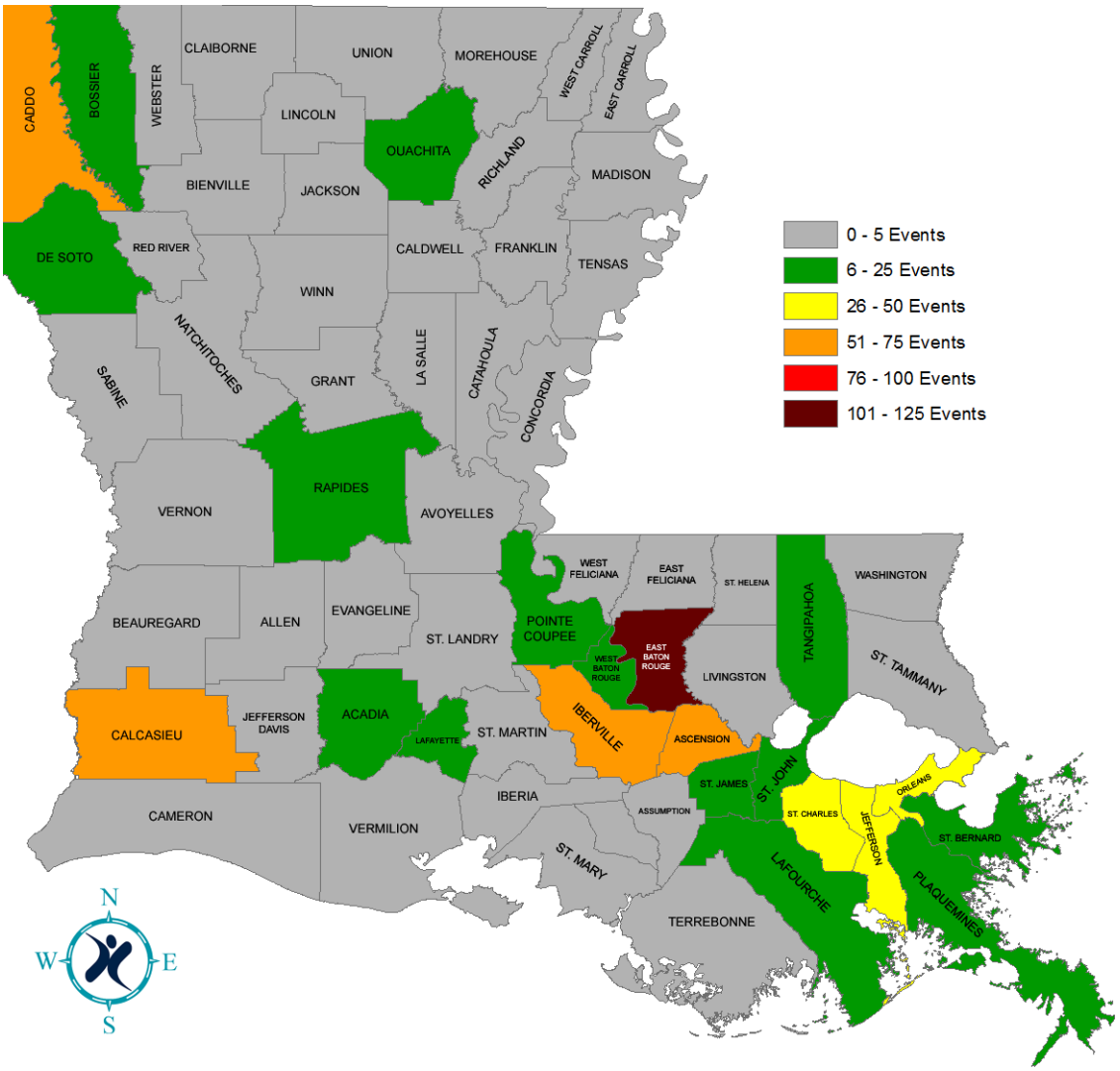

Figure 2: Average number of events per year that qualified for NTSIP by parish.

The largest proportions of LaTSIP events were associated with the manufacturing (1244 [45.8%]) and transportation / warehousing (736 [27.1%]) industries (Table 6). The industry with largest number of events with victims was the manufacturing industry (74 [37.0%]). Additionally, there were 37 (18.5%) events with victims where an industry was not involved (ex. methamphetamine manufacturing) or the industry was not identified. The total number of victims was greatest in the "*Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)"* industry (170 [48.3%]) followed by the number of victims in the "*Transportation and Warehousing I"* industry (58 [16.5%]). Of the events where the industry was identified, the "*Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)"* industry resulted in a large proportion of events with victims and the largest number of victims; however, only 5.9% of all 1222 events in that category resulted in victims. Conversely, 50.0% of events in the "*Arts, Entertainment, and Recreation"* industry resulted in victims; however, this industry represents a small proportion (0.3%) of events with victims.

Table 6: Industries Involved in Toxic Substance Events and Events with Victims During the NTSIP Program: 2010 - 2013

First 2 Digits of NAICS Code	Industry Category	Total Events		Events with Victims		Percentage of Events with Victims	Total Number of Victims (Maximum)^
		Number	%*	Number	%*	%*	
72	Accommodation and Food Services	2	0.1	0	0.0	0.0	0
56	Administrative, Support, Waste Management and Remediation Services	30	1.1	0	0.0	0.0	0
11	Agriculture, Forestry, Fishing and Hunting	7	0.3	0	0.0	0.0	0
71	Arts, Entertainment, and Recreation	2	0.1	1	0.5	50.0	1 (1)
23	Construction	43	1.6	6	3.0	14.0	9 (2)
61	Educational Services	10	0.4	1	0.5	10.0	1 (1)
52	Finance and Insurance	No NTSIP Events					
62	Health Care and Social Assistance	10	0.4	3	1.5	30.0	10 (10)
51	Information	2	0.1	0	0.0	0.0	0
55	Management of Companies and Enterprises	No NTSIP Events					
31	Manufacturing (Food, Textile, Apparel)	8	0.3	1	0.5	12.5	1 (1)
33	Manufacturing (Metal, Electrical, Transport, Professional)	14	0.5	1	0.5	7.1	3 (3)
32	Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber, Stone)	1222	45.0	72	36.0	5.9	170 (25)
21	Mining	52	1.9	7	3.5	13.5	8 (2)
N/A	Not an Industry / Not Identified / Unknown	293	10.8	37	18.5	12.6	47 (2)
81	Other Services (except Public Administration)	5	0.2	1	0.5	20.0	1 (1)
54	Professional, Scientific, and Technical Services	19	0.7	5	2.5	26.3	5 (1)
92	Public Administration	16	0.6	2	1.0	12.5	6 (5)
53	Real Estate and Rental and Leasing	2	0.1	0	0.0	0.0	0
44	Retail Trade I	8	0.3	2	1.0	25.0	2 (1)
45	Retail Trade II	11	0.4	3	1.5	27.3	6 (3)

48	Transportation and Warehousing I	701	25.8	40	20.0	5.7	58 (6)
49	Transportation and Warehousing II	35	1.3	3	1.5	8.6	4 (2)
22	Utilities	66	2.4	3	1.5	4.5	5 (3)
42	Wholesale Trade	157	5.8	12	6.0	7.6	18 (4)
Total		**2715**	**100.2**	**200**	**100.0**	**-**	**352 (25)**

^Minimum number of victims per event = 1.
* Total percentage may not equal 100 due to rounding

Chemicals

During the NTSIP program, qualifying events released a total of 3306 individual substances. The most frequently released substances were Methamphetamine Chemicals NOS and Hydrochloric Acid (Table 7).

Table 7: Top 10 Individual Substances Released During the NTSIP Program: 2010 – 2013

	Chemical Substance	Number of Releases	HSEES Average per Year (2001 - 2009)
1	Sulfur Dioxide	1210	134.4
2	Benzene	680	75.6
3	Nitrogen Oxides (NOx)	640	71.1
4	Hydrogen Sulfide	597	66.3
5	Volatile Organic Compounds NOS	450	50.0
6	Nitric Oxide	395	43.9
7	Ammonia	384	42.7
8	Hydrochloric Acid	317	35.2
9	Ethylene	298	33.1
10	Vinyl Chloride	297	33.0

*NOx includes Nitrogen Oxide, Nitrogen Oxides, and Nitrogen Oxides NOS

To represent the magnitude of the effects of substances involved in injuries, the number of events in a specific substance category was compared with the number of events in the same category that resulted in victims. In events that involved one or more substances from the same substance category, substances were counted once in that category. In events that involved two or more substances from different categories, substances were counted once in the multiple substance category. Substances released most often were not necessarily the most likely to result in victims (Table 8). For example, events categorized as volatile organic compounds constituted 25.7% of all events; however, only 4.3% of these events resulted in injuries.

Table 8: Frequency of Substance Categories in All Events and Events with Victims During the NTSIP Program: 2010 – 2013

Substance Category	All Events		Events with Victims		
	No.	%*	No.	Percentage of all Releases with Victims*	Percentage of Events with Victims in Substance Category
Acids	377	13.9	27	13.5	7.2
Agricultural Chemicals and Pesticides	87	3.2	4	2.0	4.6
Ammonia	91	3.4	6	3.0	6.6
Bases	197	7.3	22	11.0	11.2
Chlorine	100	3.7	14	7.0	14.0
Formulations	6	0.2	2	1.0	33.3
Hetero-organics	53	2.0	4	2.0	7.5
Hydrocarbons	78	2.9	4	2.0	5.1
Mixture Across Chemical Category[†]	44	1.6	4	2.0	9.1
Multiple Substance Category**	194	7.1	18	9.0	9.3
Other[‡]	345	12.7	46	23.0	13.3
Other Inorganic Substances[§]	272	10.0	12	6.0	4.4
Oxy-organics	60	2.2	5	2.5	8.3
Paints and Dyes	7	0.3	1	0.5	14.3
PCB's	1	0.0	0	0.0	0.0
Polymers	87	3.2	1	0.5	1.1
Indeterminate/Unknown	17	0.6	0	0.0	0.0
Volatile Organic Compounds	699	25.7	30	15.0	4.3
Total	**2715**	**100.0**	**200**	**100.0**	**7.4**

*Total percentage may not equal 100 due to rounding

**Substances in events that involved multiple substances were counted only once in a substance category when all the substances were associated with the same category. If events involved multiple substances from different substance categories, they were counted only once in the multiple substance category.

[†]Substances from different categories that were mixed or formed from a reaction before the event.

[‡]Not classified.

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

Victims

A total of 352 victims were involved in 200 events (7.4% of all events) (Table 9). Of the 200 events with victims, 136 (68.0%) events involved only one victim, and 37 (18.5%) involved two victims. Of all victims, 273 (77.6%) were injured in fixed-facility events.

Table 9: Number of Victims per Event, by Type of Event During the NTSIP Program: 2010 – 2013

No. Victims	Type of Event						All Events		
	Fixed facility			Transportation					
	No. Events	%*	Total Victims	No. Events	%*	Total Victims	No. Events	%*	Total Victims
1	95	66.0	95	41	73.2	41	136	68.0	136
2	27	18.8	54	10	17.9	20	37	18.5	74
3	12	8.3	36	4	7.1	12	16	8.0	48
4	4	2.8	16	0	0.0	0	4	2.0	16
<= 5	6	4.2	72	1	1.8	6	7	3.5	78
Total	**144**	**100.1**	**273**	**56**	**100.0**	**79**	**200**	**100.0**	**352**

*Total percentage may not equal 100 due to rounding

Victims were reported to have sustained a total of 415 injuries or symptoms (Table 10). Some victims had more than one injury or symptom. Of all reported injuries/symptoms, the most common in fixed-facility events were respiratory system problems (89 [27.5%]), chemical burns (40 [12.3%]) and thermal burns (35 [10.8%]). In addition, there were an additional 8 burns (2.5%) that were either both thermal and chemical in origin or unknown in origin. In transportation-related events, non-chemical related trauma (28 [30.8%]) and chemical burns (21 [23.1%]) were reported most frequently.

Table 10: Frequencies of Injuries / Symptoms, by Type of Event During the NTSIP Program: 2010 – 2013^

Injury / Symptom	Fixed Facility		Transportation		All Events	
	No. injuries	%*	No. injuries	%*	Total no.	%*
Burns (Chemical)	40	12.3	21	23.1	61	14.7
Burns (Thermal)	35	10.8	1	1.1	36	8.7
Burns (Both Chemical and Thermal)	4	1.2	0	0.0	4	1.0
Burns (Unknown)	4	1.2	0	0.0	4	1.0
Dizziness/Central Nervous System Symptoms	6	1.9	3	3.3	9	2.2
Eye Irritation	35	10.8	3	3.3	38	9.2
Gastrointestinal System Problems	13	4.0	2	2.2	15	3.6
Headache	14	4.3	1	1.1	15	3.6
Heart Problems	1	0.3	0	0.0	1	0.2
Heat Stress	No Injuries of this Type Reported					
Other	8	2.5	7	7.7	15	3.6
Respiratory System Problems	89	27.5	13	14.3	102	24.6
Shortness of Breath	13	4.0	0	0.0	13	3.1
Skin Irritation	16	4.9	5	5.5	21	5.1
Trauma (Chemical-Related)	19	5.9	5	5.5	24	5.8
Trauma (Not Chemical-Related)	18	5.6	28	30.8	46	11.1
Trauma (Unknown)	1	0.3	2	2.2	3	0.7
Unknown	8	2.5	0	0	8	1.9
Total	**324**	**100.0**	**91**	**100.0**	**415**	**100.0**

^The number of injuries is greater than the number of victims (352) because a victim could have had more than one injury.
*Total percentage may not equal 100 due to rounding

Reanalysis of HSEES Data using NTSIP Criteria

HSEES data was then reanalyzed by using the NTSIP criteria, basically removing all HSEES events that fell into the three criteria listed above. Because petroleum incidents were not included in HSEES, the average number of petroleum events per year from NTSIP was added to each HSEES data year.

Threatened Releases

Events where no chemicals were released were removed from the data analyzed (80 events from the event table). Chemicals associated with those events were also removed from the data analyzed (117 chemicals from the chemical table). Events where some but not all chemicals were released were included; however, the non-released chemicals were excluded from the data analyzed (42 chemicals from the chemical table).

Small Paint Related Releases
Events that met the following criteria were removed from the database:

- "*Substance Category*" in the HSEES database was "*Paints and Dyes*"
- No other chemicals were released during the event
- No injuries associated with the release
- Less than 100 lbs. of chemical were released (assuming that 1 gallon of paint weighs 10 lbs)

This resulted in the removal of 147 incidents being removed from both of the events and chemicals tables.

Stack Releases
There is no definitive way to differentiate a stack release from other types of releases in the HSEES database, so the following criteria were used to attempt to identify stack releases that would not have been included in the NTSIP database had the release occurred between 2010 and 2013:

- The release must have occurred from a fixed facility
- The release must have occurred outside
- The release must have been a vapor
- The release must have occurred from a facility using a North American Industry Classification System (NAICS) code beginning with the numbers "*32*" which corresponds to the NAICS category "*Manufacturing (Paper, Printing, Chemicals, Petroleum, Leather, Lumber or Stone)*"
- The release must have occurred in the "*Area Type*" of "*Process Vessel*" or "*Ancillary Process Equipment*"

Under these assumptions, 2090 individual chemicals could be removed from chemicals table and 1101 events could be removed from the events table.

Additional Petroleum Events from NTSIP Data
Because HSEES did not include petroleum only events, these numbers must be estimated from the NTSIP data during years 2010 – 2013. In those 4 years, there were 77 events where only a hydrocarbon was released (HSEES included events where hydrocarbons were released along with other chemicals), or 19.25 events per year. If we factor in 19.25 events per year to the 9 years that the HSEES program was running, that results in an additional 173 events.

ANALYSIS

Events / Chemicals

HSEES data results were taken directly from the database, no editing was required. From January 1, 2001 through December 31, 2009, a total of 6987 acute hazardous substances events met the HSEES surveillance definition. These events released a total of 11,591 individual chemicals (includes threatened releases).

Reanalysis of the HSEES data using the NTSIP criteria resulted in a total of 1328 events being removed from the database, and 2396 chemicals being removed from the database.

An additional 173 events and 173 chemicals would need to be added to the database to factor in the "*petroleum only*" events.

Table 11: Total Events and Chemicals Actually Recorded in the HSEES Database vs. Estimated Total Events and Chemicals That Would have been Recorded Using NTSIP Criteria Between 2001 – 2009.

	HSEES Total (2001 - 2009)		Estimated HSEES Total (Using NTSIP Criteria) (2001 - 2009)	
	Events	Chemicals	Events	Chemicals
All Years	6987	11,591	5832	9368
Average Year	776.3	1287.9	648.0	1040.9

Victims

Although one of the criteria for NTSIP events is that if there is an injury, it gets included in the database; however, there must be a chemical released during the event. Because of this criteria, several events with victims were removed from the re-analyzed HSEES database. A total of 6 events and the 9 corresponding victims were removed from the re-analyzed database. In 5 of these events, the 5 victims (1 victim per event) could either be the result of precautionary treatment or there could have been an actual chemical release that was not recorded in the HSEES database. In the case of the 6th event, 4 people were injured due to trauma and not a chemical release. Unfortunately, all 4 victims died.

However, injuries must be factored in when calculating "*petroleum only*" events. Over the 4 years that Louisiana participated in NTSIP, "*petroleum only*" events accounted for 5 victims, or 1.25 victims per year. If this number is factored in over the 9 years of HSEES, an additional 11 victims could have been expected over the HSEES time period.

Table 12: Total Events and Victims Actually Recorded in the HSEES Database vs. Estimated Total Events and Victims That Would have been Recorded Using NTSIP Criteria Between 2001 – 2009.

	HSEES Total (2001 - 2009)		Estimated HSEES Total (Using NTSIP Criteria) (2001 - 2009)	
	Events	Victims	Events	Victims
All Years	6987	653	5832	655
Average Year	776.3	72.6	648.0	72.8

CONCLUSION

For Louisiana, the transition from HSEES to NTSIP was beneficial in several ways. First, the goal of both HSEES and NTSIP is to collect and analyze information about acute releases of hazardous substance releases that result in victims or a public health action such as an evacuation. Unfortunately, due to the criteria of eligibility for HSEES, a large percentage of HSEES events in Louisiana were "stack" releases from large petro-chemical companies that had no discernible immediate health effect as described by the case definitions of both HSEES and NTSIP. This can be visualized in Figure 3 where there is a large decrease in the average number of qualifying events per parish per year in St. James (-49.4 events per year), St. Bernard (-43.2 events per year) and Calcasieu (-34.3 events per year).

In addition, HSEES also captured many small paint releases that also had no discernible immediate health effect. In Caddo parish alone, there were 48 small paint events during the HSEES program (5.3 per year). Although this number sounds low, if it were factored into NTSIP calculations, there would have been an increase of 29.1 average events per year in Caddo parish vs. 23.8 (Figure 3).

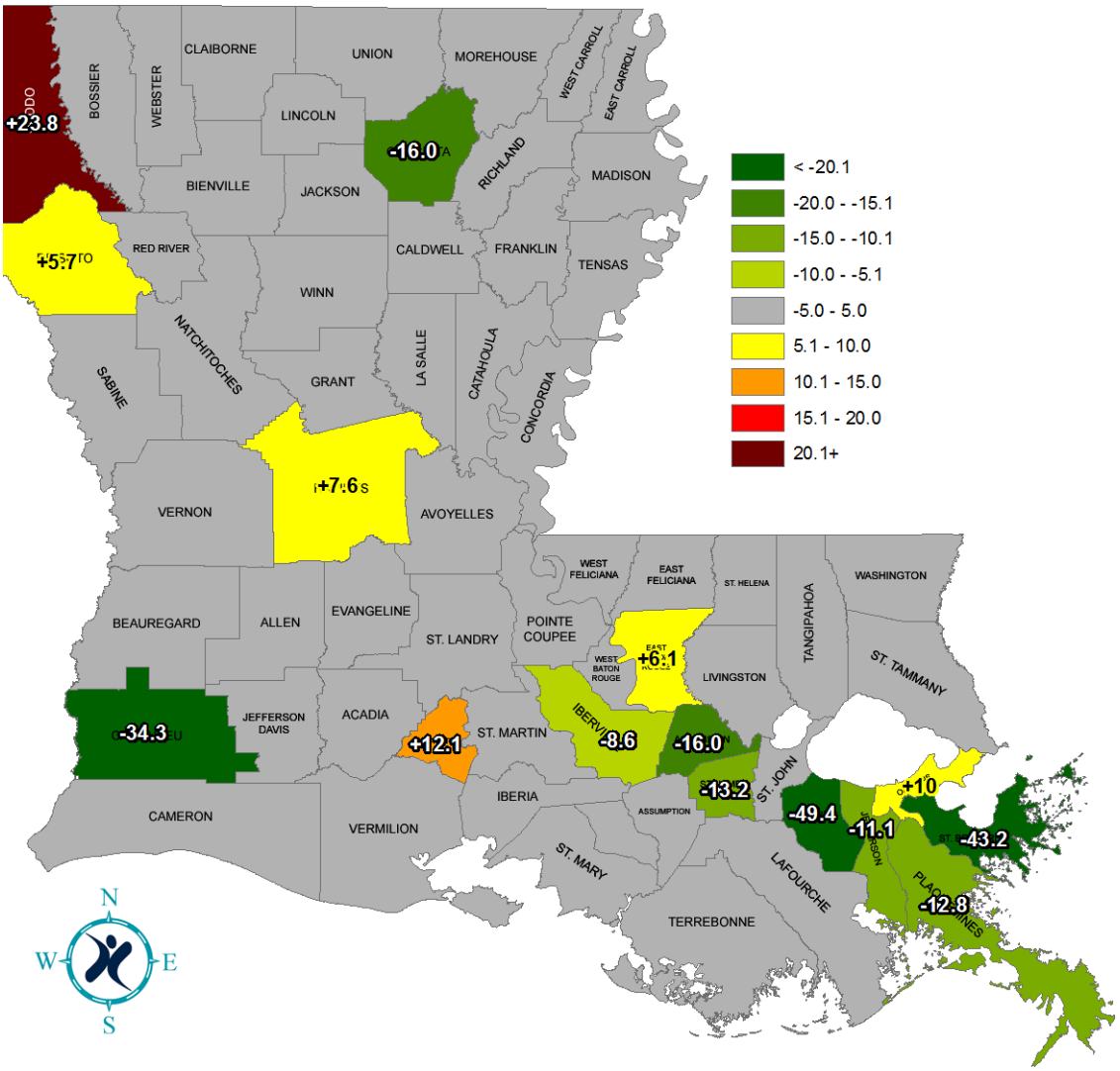

Figure 3: Change in average number of events per year that qualified for NTSIP vs. HSEES by parish.

The inclusion of stack releases and paint events in HSEES resulted in SEET staff spending a large amount of time entering and analyzing events that really did not result in victims or a public health action (using the web-based interface, it takes approximately 30-45 minutes to enter an event into either database depending on the complexity of the event) which was not the goal of HSEES.

Because of the time saved not entering these events, additional time could be devoted to investigating more pertinent events as well as discovering new sources for information. This is evidenced by the number of methamphetamine events that were discovered that qualified for NTSIP vs. HSEES. During the HSEES time period, at total of 32 methamphetamine events were discovered that qualified for HSEES (3.6 per year), while during the NTSIP time period, 225 methamphetamine events were discovered (56.3 events per year). It is also evidenced by the

additional amount of time that was allowed to investigate incidents that were discovered from the HMIS database. During the 9 years of HSEES, approximately 43 incidents were discovered from the HMIS database (4.8 per year); however, during the 4 years of NTSIP, 183 incidents were discovered from the HMIS database (45.8 per year).

The time savings also helped allow SEET to develop an internal set of procedures used by LDHH to respond to chemical emergency events. This internal set of procedures was formalized on May 1, 2012. Chemical event email notifications received from the LSP and the NRC through the HSEES / NTSIP programs are forwarded to regional OPH staff as a courtesy to let the regional staff know about chemical events occurring in their areas. In addition, SEET responds to qualifying events by providing an emergency response packet consisting of information about the event, the chemical(s) of concern, health effects and medical management, and map(s) of the area, which display the incident location, points of interest, hospitals, schools, day care centers, nursing homes, and current contact information and a material safety data sheet.

Since implementation of these new procedures, SEET responded to 48 events between May 1, 2012 and December 31, 2013. In addition, notifications by SEET resulted in other public health actions such as the shutdown of drinking water intakes or sanitary investigations.

In conclusion, NTSIP captures all of the same events that HSEES would have caught, but no longer captures routine chemicals that had no discernible immediate health effect. In addition, because NTSIP catches "*petroleum only*" events, NTSIP would catch "*petroleum only*" events with victims that would not have been captured by HSEES. Not only are the data improved under NTSIP, but the time savings allows for other projects to be performed, such as emergency response.

REFERENCES

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