U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Agency for Toxic Substances and Disease Registry,
Division of Toxicology and Human Health Sciences,
Environmental Health Surveillance Branch, Atlanta, Georgia

NATIONAL TOXIC SUBSTANCE INCIDENTS PROGRAM (NTSIP) ANNUAL REPORT 2012

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences (DTHHS)

In 1980, Congress created the Agency for Toxic Substances and Disease Registry (ATSDR) to implement health-related sections of laws that protect the public from hazardous wastes and environmental spills of hazardous substances. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), commonly known as the Superfund Act, designated ATSDR as the lead agency within the U.S. Public Health Service to help prevent or reduce further exposure to hazardous substances and the adverse health effects that might result from such exposures and to expand the knowledge base about such effects.

In accordance with this legislative mandate, this publication reports results and findings of health studies, registries, or other health-related activities supported by ATSDR.

Comments regarding this report are welcome. Please send your comments to the following address:

Agency for Toxic Substances and Disease Registry
Attn: Chief, Environmental Health Surveillance Branch, DTHHS
4770 Buford Highway NE, Mailstop F-57, Atlanta, Georgia 30341

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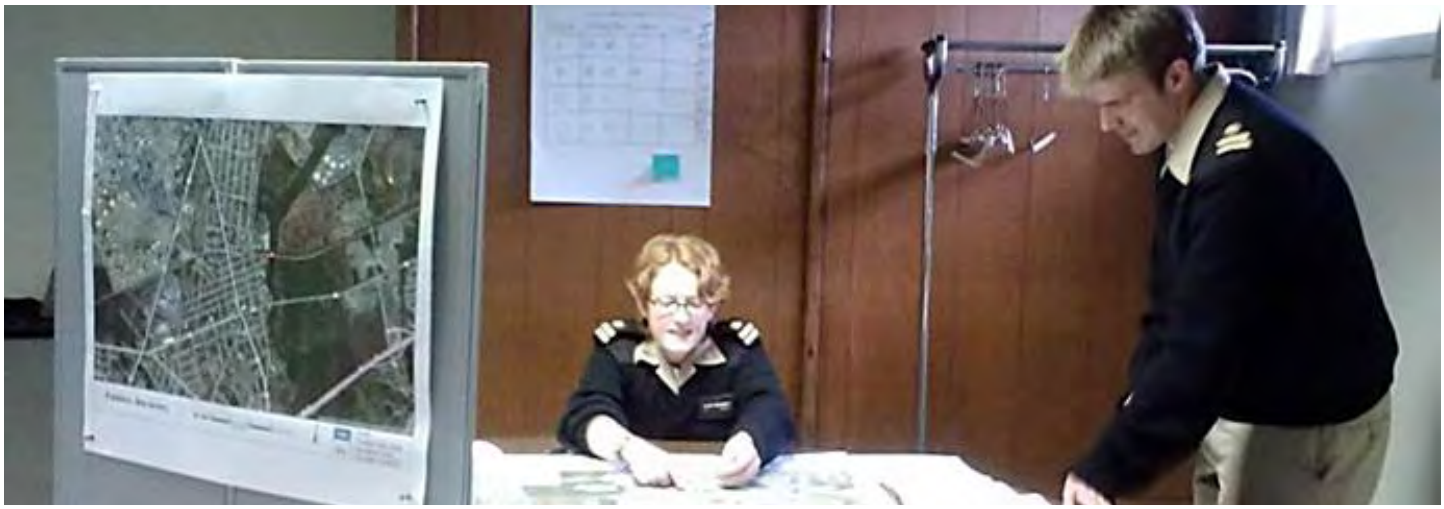
Definition of Acronyms

Acronym	Definition
ACE	Assessment of Chemical Exposures
ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control and Prevention
CNS	Central Nervous System
DOT	Department of Transportation
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
HAZMAT	Hazardous Materials
HIP	Hazmat Intelligence Portal
HSEES	Hazardous Substances Emergency Events Surveillance
MMWR	Morbidity and Mortality Weekly Report
NAICS	North American Industry Classification System
NIOSH	National Institute of Occupational Safety and Health
NRC	National Response Center
NTSIP	National Toxic Substance Incidents Program
PHAP	Public Health Associate Program



1.0 Executive Summary

This National Toxic Substance Incidents Program (NTSIP) is a preeminent chemical surveillance system that collects information on many aspects of acute hazardous chemical incidents. This report is intended to detail descriptive data from the three parts of the NTSIP program: state surveillance, national database, and incident investigations in 2012. Stories illustrating state's positive impacts are summarized throughout the annual report and show both the specificity and the variety of NTSIP's outreach activities.

The following are key 2012 findings:

- 15,483 total NTSIP qualifying incidents were estimated to have occurred across the United States; 9,800 incidents in fixed facilities and 5,683 incidents in transportation.
- In the seven surveillance states, 3,139 NTSIP incidents occurred resulting in 1,243 injured persons, of which 43 were fatalities.
- Twice as many incidents occurred in fixed facilities (n = 2,112) than during transport (n = 1,027). Yet, injured persons were disproportionately more likely (12 times) to have been associated with a fixed facility incident (n=1146) than a transportation incident (n=97).
- The same chemicals have been involved in the largest number of incidents for the last three years: natural gas, carbon monoxide, methamphetamine production chemicals, and ammonia for fixed facilities and alkaline (potassium and sodium) hydroxides, sulfuric acid, and hydrochloric acid for transportation.
- Over half (57%) of injured persons were attributed to six substances: carbon monoxide (n=351), natural gas (n=104), propane (n=64), sulfuric acid (n=58), chlorine (n=40), hydrochloric acid (n=38), and ammonia (n=29).
- Although the transportation and warehousing sector had the largest number of incidents, the educational services sector accounted for the largest number of injured persons.
- The most injuries (n = 490, 39.6%) occurred among the general public.
- When people had only one adverse health effect (77% of time), the most common symptom included respiratory system problems (23.9%); followed by dizziness or other CNS symptoms (14.4%) and burns (11.7%).
- An evacuation was ordered in 16.6% of incidents and1.6% of incidents resulted in a sheltering-in-place order.
- An ACE team investigation of a train derailment releasing vinyl chloride into a community in Paulsboro, New Jersey revealed critical communication gaps including: a lack of sufficient and timely information about the risk of exposure to vinyl chloride, the timing and duration of the evacuation, and when and how to shelter-in-place.

2.0 Introduction

Recent large-scale chemical events, including the explosion of a fertilizer plant in West, Texas that killed 15 and injured more than 300 people continue to garner attention in the media. Events such as this bring to light the importance of chemical surveillance activities in the United States.

To increase the accuracy of chemical release information and proactively use this data to prevent related adverse health effects, the Centers for Disease Control and Prevention (CDC), Agency for Toxic Substances and Disease Registry (ATSDR) introduced the National Toxic Substance Incidents Program (NTSIP) in January 2010. NTSIP is an acute chemical incident surveillance program that collects and combines information from many sources to protect populations from harm caused by acute toxic substance releases. From 2010–2012, 7 states participated in the program. States were chosen through a competitive program announcement for a 3-year cooperative agreement. These states report chemical releases occurring in their states to NTSIP through a web-based data portal. Chemical event information gathered and reported by the states include, among other things, the location of the incident, evacuation details, number of injured persons, adverse health effects experienced by those injured or exposed, and personal protective equipment (PPE) used by responders. The data are then compared with other national data on chemical incidents to develop national NTSIP incident estimates. This information is then used to prevent or reduce morbidity and mortality caused by these incidents and assist states and NTSIP in proactively planning for future chemical incidents.

While the concepts and fundamental principles of NTSIP have been described in detail previously [1], specific aspects of the program are reviewed below. NTSIP is based upon three primary components: (1) state surveillance, (2) a national database, and (3) incident investigation. Table 1 provides a summary description of each component and its core function, as well as the relevant partners.

Table 1. Summary information on the three primary components of NTSIP.

Component Description	Partners	Core Functions
State Surveillance		
• State health departments collect detailed information on chemical spills for a central chemical incident surveillance database and conduct prevention and preparedness activities.	• Cooperative agreement states – Louisiana – New York – North Carolina – Oregon – Tennessee – Utah – Wisconsin	• Data gathered from a variety of national (DOT, NRC), state (department of natural resources, department of agriculture, division of emergency management, police, and bureaus of investigation) and local (health departments, emergency planning committees, media, regional epidemiologists) sources. • Data analyzed to develop prevention outreach programs aimed at decreasing the morbidity and mortality associated with acute chemical exposures. Activities focusing on green chemistry, inherently safer technologies, and vulnerability mapping are a major focus.
National Database		
• ATSDR working with the DOT has established a data repository that incorporates the states' data with supplemental data from the NRC and the DOT to create national chemical incident estimates.	• DOT • NRC • State Health Departments	• Used by federal, state, and local agencies, emergency responders, and researchers for preparedness planning activities. • Used to monitor trends and publish information regarding exposure prevention.
Incident Investigations		
• ATSDR supports state and local health departments to conduct large-scale chemical incident investigations through Assessment of Chemical Exposure (ACE) expert teams and toolkit.	• State Health Departments • Local Health Departments • National Institute of Occupational Safety and Health (NIOSH) • Other federal agencies responding to the incident • Emergency response management and personnel teams	• Collects information through interviews administered to key response personnel and to potentially exposed people and collects medical data on treated people. • Data and information gathered from these investigations aid in promoting emergency response and preparedness activities and in creating a cohort of exposed people who can be followed up in a later approved study of long-term health effects.

3.0 State Surveillance

The last year of the 3-year NTSIP state cooperative agreement was 2012. Seven states collected NTSIP data: Louisiana, Utah, New York, North Carolina, Oregon, Tennessee, and Wisconsin.

States monitor chemical incidents through a variety of sources. Other agencies and organizations collect information on chemical incidents, including the Chemical Safety Board, the U.S. Coast Guard's NRC, the National Fire Incident Reporting System, the Occupational Safety and Health Administration (OSHA) and the US DOT; however, many of these organizations and agencies collect data only as call logs, which makes the data unusable for surveillance purposes. Additionally data on the public health impacts of these incidents is lacking. NTSIP bridges this gap by collecting and combining information from many independent data sources to get a database suitable for public health outreach. Each state develops data-sharing agreements with the organizations most responsible for addressing the types of incidents reported in its state. These partnerships are synergistic, because the state develops a network of stakeholders from which to obtain incident data and in turn shares annual incident data with its stakeholders.

Definition of Terms

In order to allow full interpretation of the results discussed in this report, we provide the definitions for NTSIP incident, toxic substance, and injured person(s) in Table 2.

Table 2. Important definitions for interpreting 2012 NTSIP results.

Term	Definition
NTSIP incident	Any acute, uncontrolled, or illegal acute release of any toxic substance meeting NTSIP reporting criteria.*
Toxic Substance	Any substance that might reasonably be expected to cause adverse human health outcomes.
Injured person(s)	Anyone (e.g., members of the general population, employees, or emergency responders) who experiences at least one documented adverse health effect within 24 hours after an incident or who dies as a consequence of an incident. Injured persons may have been exposed to more than one chemical and may experience more than one injury or symptom as a result of exposure. Injured persons are not necessarily exposed to a toxic substance; e.g. hazmat truck driver ejected from the vehicle during a rollover,that then spills hazardous material or person is injured from falling debris in a factory explosion caused by a chemical reaction. All attempts are made to classify trauma and burn injuries as related to chemicals or not.

*For specific NTSIP reporting criteria see the NTSIP 2010 Final Report [1].

3.1 Incidents

In 2012, there were 5,569 incidents entered into the NTSIP system; of those, 3,139 (56.4%) were eligible and 2,430 (43.6%) were ineligible under the definition of NTSIP. With the requirement that 80% of chemical incidents must be entered into the NTSIP database within 48 hours, many states enter all chemical incidents into the system and later use additional information obtained about the incidents to classify their eligibility. The most common reason for ineligibility was there was no release or no public health action (26.3%), when a public health action is required to qualify the incident. The remainder of this section describes the characteristics of the 3,139 eligible incidents.

Twice as many incidents occurred in fixed facilities (n = 2,112) than during transport (n = 1,027). Yet, injured persons were disproportionately (about 12 times) more likely to have been associated with a fixed facility incident (n=1,146) than a transportation incident (n=97). This is because 21% of fixed facility incidents had injured persons (n=445) compared with 5% (n=49) of transportation incidents. Also there were more injured persons (n=1,153, 0.5 injured person/incident) in fixed facilities compared with transportation (n=82, 0.1 injured person/incident). More fatalities (2.6 times as many) occurred in fixed facility incidents (n=31, 0.015 fatalities/incident) than in transportation-related incidents (n=12, 0.012 fatalities/incident) All reporting states with the exception of Oregon and Utah recorded at least one fatality (Table 3).

The seven NTSIP states accounted for 15.5% of the US 2012 population, with 48,719,808 people estimated to be living in these states. [2]. Overall the ratio of incidents per 100,000 population was 4.3 (range 1.3 – 9.9) for fixed facilities and 2.1 (range 1.1 – 4.2) for transportation. The ratio of injured persons per 100,000 population was 2.4 (range 0.5 – 6.8) for fixed facilities and 0.2 (range 0.02 -0.5) for transportation. There does not appear to be a relationship between number of fixed facility or transportation incidents or number of injured

NTSIP promotes Safer Chemical Alternatives:

NTSIP helps organize a "Green Chemistry, Safer Alternatives and Work" symposium in Oregon

The Oregon Public Health Division (OPHD) NTSIP collaborated with the Center for Research on Occupational and Environmental Toxicology (CROET) at Oregon Health & Science University (OHSU) to host a symposium entitled "Green Chemistry, Safer Alternatives and Work" in Portland, OR on June 15th, 2012. The symposium was attended by about 95 participants. Roger McFadden, Vice President and Senior Scientist at Staples, Inc. detailed steps that businesses can take to discourage the use of hazardous materials in their supply chains. These and the remaining presentations made a compelling case for adopting safer chemical alternatives. Building on the success of this symposium, ORPHD NTSIP is now leading an effort to draft a tactical plan for safer alternative chemistry in Oregon. NTSIP staff worked with senior division leadership to identify funding and put out a request for application. Upon award, NTSIP staff will work with the contractor to oversee the development of a tactical plan for the state of Oregon.

persons and the state's population in our dataset (Table 4). There may be many other factors accounting for the variability in the number of incidents or injured persons by state, including the predominance of industry types and chemicals. It may also be influenced by the data sources available to each state, for example New York and Oregon had a high number of injured persons but they also were able to obtain additional patient data sources including Emergency Medical Services (EMS) call logs, state Occupational Safety and Health program data, and hospital discharge data.

Initial notification about a chemical incident can occur through a variety of sources. For fixed facility incidents the main primary reporting sources were emergency government (25.0%), the media (22.7%), and the state environmental division (21.3%). The main primary notification sources for transportation incidents were the DOT (55.9%) and emergency government (22.7%). The state must then verify and complete the data with supplemental data sources if necessary.

Fixed Facility

Fixed facility incidents include all incidents that occur in stationary structures (i.e., buildings) or through another form of transport within a stationary structure (i.e., a facility rail system for moving chemicals within a chemical manufacturing plant). A chemical spill that occurs during the loading of a chemical shipment onto a truck for transport, before the entire shipment is loaded, is considered a fixed facility event in our database. This differs from other databases like the DOT HMIS that considers it transportation, because NTSIP wants to target prevention to who was responsible for the substance at the time of release. There were 2,112 fixed facility incidents (67% of all incidents) in 2012.

The specification of the area or equipment involved in an incident is important for understanding of fixed facility incidents. Of the 814 total fixed facilities incidents in which either an area or equipment was reported as the primary cause of the spill, almost 60% (n = 481) of the incidents involved the following three areas or types of equipment:

- 217 incidents (10%) were attributable to a pipe failure.
- 144 incidents (7%) two or more equipment pieces or areas were involved.
- 120 incidents (6%) were caused by ancillary process equipment failure.

NTSIP promotes Surveillance:

Providing Surveillance Data during the Democratic National Convention (DNC) in North Carolina

During the 2012 DNC in Charlotte, Public Health surveillance was in high demand to ensure the health and safety of the state, region, and city where this event took place. NTSIP staff were deployed to a Joint Medical Operations Center to participate in active Public Health surveillance. Twice daily, NTSIP staff would send reports of any NTSIP incidents occurring in North Carolina to the Environmental Hazards Team using the information from databases typically utilized and monitored for NTSIP surveillance. While it was fortunate that no severe incidents were reported, the surveillance was in place to detect toxic chemical releases of potential concern to the public and the convention as a whole and to inform other health professionals quickly of any potentially threatening events.

The remaining areas or equipment were an above-ground storage area (n=85), including a warehouse, a tank, or a storage shed ; a material handling area (n=66), such as a loading dock; other area or equipment not specified (n=56); a transformer or capacitor (n=35); a process vessel (n=25); heating or cooling for a building (n=25); transportation within the facility (n=14), a dump/waste area (n=12), an incinerator (n=9), a laboratory (n=4), or a storage area below ground (n=2).

Twenty-two percent (n= 468) fixed facility incidents resulted in an ordered evacuation.

Transportation

Of the 1,027 transportation-related incidents, over a third (n = 365, 36%) occurred during the unloading of a stationary vehicle or vessel, followed by while a shipment was en route, but not discovered until stopped (n=275, 27%), and from a moving vehicle or vessel (n=225, 22%) (Table 5). Although the largest number of incidents occurred while a shipment was en route but was not discovered until it reached a fixed facility, the transportation phase with the largest number of injuries was from a moving vehicle or vessel (n=61, 63%). However, many of these injuries were a result of trauma from a vehicle accidents or roll overs, not due to the chemical.

Of the various modes of transportation, most incidents occurred during ground transportation (n = 883, 86%), a category that represents transportation via tanker truck (n=640), non-tanker truck (n=133), or other types. Railway modes of transportation (including tank car (n=58), or other types also accounted for a large number of incidents (n = 81, 8%). These were followed by air (n=26, 3%, mostly cargo planes n=24), pipeline (n=22, 2%) and water (n=15, 1%, mostly barges n=12).

3.2 Chemicals

Of the 2,112 incidents reported in fixed facilities, the Top 10 chemicals were involved in half of the incidents; the chemicals accounting for the largest number of incidents were natural gas (14%), carbon monoxide (8%), chemicals involved in the production of methamphetamine (meth) (6%), and ammonia (5%) (Table 6).

It is important to note that these four chemicals were also the top chemicals involved in fixed facility incidents in 2010 and 2011. Also to note, not all natural gas incidents are included, they must have a public health action or an injury. Chemicals involved in the production of meth was used to capture a variety of chemicals that could not be individually identified, which is often the case in this type of illegal incident.

NTSIP promotes Education:

NTSIP networks to distribute pool chemical fact sheet they developed.

To coincide with CDC's Recreational Water Illness and Injury Prevention week, May 21-27, 2012, NY NTSIP developed and posted seven pool chemical fact sheets on their web site (http://www.health.ny.gov/environmental/chemicals/). In June, the National Swimming Pool Foundation provided a link to the fact sheets in the monthly issue of their newsletter, the "Prevention Advisor," which is sent electronically to more than 66,000 of their members and contacts. In June 2012, NTSIP staff contacted the employee who handles chemical distribution for Surpass Chemical Corporation, one of four pool chemical manufacturer in NY. The Surpass employee said that pool chemical safety has become a major focus so the fact sheets were very timely and that he planned to distribute them in the off season to lay a foundation for the next spring. He further offered to establish a connection with the Northeast Pool and Spa Association (NPSA) and to invite NYS NTSIP staff to a monthly meeting of the Capital District Chapter NPSA.

Of the 1,027 transportation-related incidents, the Top 10 chemicals accounted for about a third (32%) of all incidents. Alkaline hydroxides, including sodium hydroxide and potassium hydroxide, accounted for the most transportation-related incidents (9%), followed by sulfuric acid (4%), hydrochloric acid (4%), and flammable liquids not otherwise specified (3%) (Table 7).

These top released substances have a variety of harmful properties, i.e., volatile, caustic, corrosive, and reactive. However, the most frequently released substances did not necessarily cause the most injuries. Chemical spills (either in liquid or solid form) and volatilization of a chemical were the two most common release types in both fixed facility and transportation-related incidents. In fixed facility incidents, volatilization accounted for 43%, spills 38%, and two different release types 11%. Fires and explosions were around 1% each. For transportations incidents, spills accounted for the majority of incidents 85%, followed by two different types 6%, and volatilization 6%. For transportation incidents there was only 1 fire and no explosions. Volatilization occurs when a liquid or solid becomes a vapor following exposure to air. Injuries can occur if the chemical spilled readily volatilizes and exposes a large number of people before they have time to evacuate or shelter-in-place. Of all the various types of chemical releases resulting in injured person, volatilization contributed the largest percentage of both injured persons and fatalities; 974 incidents involved volatilization only with 635 injured persons, accounting for more than half (51%) of all reported injured persons. Over a third of all fatalities were attributable to volatilization (n = 15, 35%). In short, results show that future response plans should target reducing exposure following a volatile chemical incident.

To examine whether a combination of chemicals is more toxic and detrimental than a single chemical exposure, the total number of chemicals involved in each incident was analyzed. In 94% of all incidents (n = 2,955) only one chemical was involved, in 3.0% (n = 93) two chemicals, and 2.9% (n = 91) three or more chemicals. The proportion of people injured by a single chemical was similar to overall incidents (n = 1,173 persons, 94%) as was the proportion of fatalities (n = 38, 88%).

NTSIP promotes Solutions:

Carbon Monoxide Poisoning included as Reportable Event in Tennessee.

As a result of information presented by the Tennessee NTSIP, the Tennessee Department of Health (TDH) realized the gap in surveillance and burden of morbidity and mortality of carbon monoxide (CO) poisoning and CO became a reportable event in January 2013. After comparing mass exposure reports for CO NTSIP-eligibleincidents, TN NTSIP developed a reporting methodology and introduced it to health partners across 95 counties in the state. In less than three months, TN NTSIP investigated over 200 reported CO poisoning events. A descriptive analysis of the data at the end of the year will be conducted to better describe vulnerable populations that can be targeted for prevention outreach activities.

Chemical Trends

Fixed Facility

The top four chemicals involved in fixed facility events were the same each year between 2010 and 2012. They were natural gas, carbon monoxide, chemicals involved in the production or use of methamphetamine, and (4) ammonia.

Transportation

The top chemicals resulting in transportation incidents were the same each year between 2010 and 2012 as well. They were alkaline (sodium and potassium) hydroxide, sulfuric acid, and hydrochloric acid as in the previous two years. These chemicals differed from the top fixed-facility chemicals.

Substances causing the most injuries

Over half (57%) of injured persons were attributed to six substances: carbon monoxide (n=351), natural gas (n=104), propane (n=64), sulfuric acid (n=58), chlorine (n=40), hydrochloric acid (n=38), and ammonia (n=29). A large number of injuries resulting from these chemicals are expected, due to the toxic properties associated with each. These properties are briefly described below.

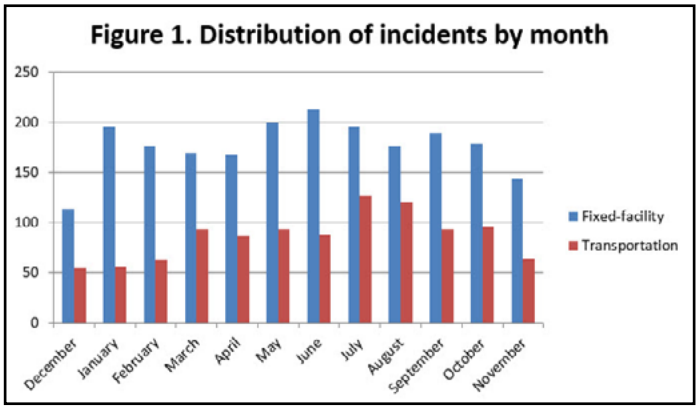
- Carbon monoxide is referred to as the "silent killer" because it is colorless and odorless and its victims often succumb to the effects of low blood oxygen levels, before knowing they have been exposed.
- Natural gas and propane are extremely volatile and explosive, resulting in injuries from burns, explosions, or irritation of the respiratory tract.
- Being volatile and caustic, ammonia and chlorine readily vaporize into the air upon release, resulting in a large number of people being exposed. They mainly react with mucous membranes causing respiratory system problems and eye irritation.
- Sulfuric and hydrochloric acids are both highly corrosive strong mineral acids that can have a corrosive effect on human tissue, with the potential to damage respiratory organs, eyes, skin, and intestines.

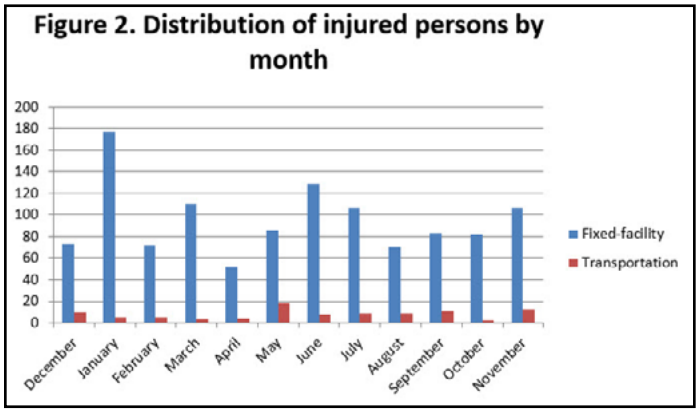
3.3 Incident Specifics

Timing of Incidents

Events were not evenly distributed by month, day of week, or time. For both fixed facility and transportation the slowest time was the winter months (December-February, 21 %), followed by fall (September through November, 24%) with spring (March through May, n=26%) and summer (June through August, 29%) having more incidents. Incidents peaked in June in fixed facilities and in July in transportation (Figure 1). The most injured persons occurred in January (n=177) for fixed facilities and May (n=18) for transportation (Figure 2.)

In addition, the majority of incidents occurred (n = 2,581, 84%) and the majority of persons were injured (n=1,029, 83%) during the weekdays of Monday through Friday, consistent with a standard business schedule and the occurrence of most commerce. Approximately 64% of incidents with injured persons occurred between 6:00 am and 5:59 pm (n = 1,983 and n=790 respectively) compared with the overnight hours of 6:00 pm to 5:59 am. Additionally, no time category was recorded for 30 events; these events only resulted in 1 injury.





Weather

The year 2012 reported some of the largest natural weather-related disasters on record, with Hurricane Sandy and over 63% of the continental United States suffering from drought [3]. Additionally, 2012 was the hottest year on record for the United States. Many of these weather events directly affected NTSIP reporting states, which can impact the number of reported chemical incidents.

All NTSIP-eligible incidents were analyzed for varying weather conditions. Weather conditions played a contributing role in more than 8% of incidents; of weather-related conditions reported, extreme heat was the most common factor (n = 170, 6%, of all incidents), rain (n = 54, 2%), and weather disasters, including hurricane, tornadoes, and flood (n = 17, 1%).

Primary/Secondary Contributing Factors

Understanding factors that contribute to a chemical release is the key to reducing chemical spills and the injuries associated with such spills. Primary contributing factors are the fundamental conditions that may have led to a hazardous release, while secondary contributing factors are not always present, they are any additional factors that may also have played a role in an incident. A primary factor was specified in 98% of all NTSIP-eligible incidents; 42% of incidents were the result of human error and 41% were caused by equipment failure (Table 8). Equipment failure was the leading factor in fixed facility incidents (47%), as opposed to human error (63%) in transportation incidents. More specific factor descriptions cited most often for fixed facilities were system process upset (n=189), illicit drug production related (n=189), overspray/ misapplication (n=127), and improper filling, loading, or packing (n=110). More specific factor descriptions cited most often for transportation were improper filling, loading, or packing (n=416), and forklift puncture (n=84). These specific factors might lend themselves to more specific prevention strategies.

The primary contributing factors of human error and equipment failure also resulted in the majority of injured persons (n = 601, 48% and n = 433, 35%, respectively). Events caused by human error resulted in the largest number of injuries for both fixed facility and more so transportation related incidents (n = 538, 47% and n = 59, 72%, respectively). Other primary factors contributing to the injuries of persons were in the categories of 'intentional', 'other', 'bad weather conditions/natural disasters,' and 'illegal act' (Table 8).

The majority of incidents did not have a secondary contributing factor (n = 2,261, 72%). For those incidents in which a secondary contributing factor was reported, equipment failure was the most frequent (n = 392, 12%).

3.4 Injury Characterization

Of the 3,139 NTSIP-eligible incidents, 494 (16%) resulted in a total of 1,243 injured persons. Forty-one fixed-facility and 3 transportation incidents had 6 or more people injured (Table 9). Six fixed-facility incidents had a large number of people (>20) injured, four of which involved carbon monoxide, one sulfuric acid and the other a floor cleaner. They were in areas where a large number of people, some chemically sensitive, are located and one would not necessarily expect a chemical release including: a community center, a junior high, a university, an assisted living center, and an office building. Only one was in a food manufacturing facility where a chemical release might be planned for. This stresses the importance of chemical response plans and drills for areas such as these and the need for carbon monoxide prevention and detectors.

Most injured people (61%) were treated at a hospital and not admitted, however this was higher in fixed facility incidents (63%) than transportation incidents (36%). A higher percent of transportation injured people died (12%) or were admitted to the hospital (25%), than fixed facility (3%, and 10% respectively), presumably due to the high percent of traumas (Table 10).

Category, Age, and Gender of Injured People

Injured people were categorized into a victim category; the public, consisting of both the general public and students at school, accounted for just over half of all injured persons (52%). Other victim categories included employees (39%) and responders, including hospital personnel (9%). Responders and hospital personnel were further separated into types. The public was more likely to be injured in fixed facility incidents (54%) versus transportation incidents (32%). Employees were less likely to be injured in fixed facility incidents (37%) versus transportation (60%). Also of note, firefighters of any type were the more likely responder to be injured in fixed facility incidents (7%) versus police (1%), but less likely in transportation incidents (0% vs. 6% respectively) (Table 11).

Of the 669 injured persons with reported gender, over twice as many (n=460) were male than female (n=209). However, the breakdown was dependent on the victim category, with more male than female employees injured (n=214 vs. n=36) (Table 12). All injuries to responders and hospital staff were reported as male responders (n=42); no female responders were injured (Table 12). In the public category, injuries reported by males and females were similar (204 males vs. 173 females). Of the 978 people injured for whom age category existed, 216 (22%) were children under 18 years of age.

Adverse Health Effects of Injured People

Depending on the types of chemicals and how and where it is released a variety of adverse health effects can be observed, including trauma, respiratory irritation, eye irritation, burns, headache, and others. The 1,243 injured persons could have reported up to 7 adverse health effects, but the majority (n = 925, 74%) reported only one adverse health effect. The most commonly reported adverse health effects were respiratory system problems (24%), dizziness or other CNS problems (14%), burns (12%), and trauma (8%). Respiratory system problems (24%) were the most common injury in fixed-facilities and trauma was most common in transportation injuries (44%). It is important to note that non-chemical-related traumas (n=64) were more frequent than chemical related ones (n=4) and may have been caused by the impact of a vehicle accident or debris from an explosion, not to direct exposure to a chemical. Additionally, there were quite a few thermal burns (n=54) that may have been due to a fire or explosion rather than direct exposure to a chemical (Table 13).

Personal Protective Equipment (PPE)

The level of personal protective equipment (PPE) worn by a first responder should help to reduce or mitigate adverse effects from chemical exposure; therefore it is imperative to document the type of protection that injured emergency responders were wearing when they were injured. This data can be used to determine if changes in the types of PPE responders wear should be studied and changes implemented.

Of the 107 injured responders, only 23% (n=25) were reported to have worn PPE, 16 were reported to have no PPE and 66 were missing PPE status. Of those with PPE,14 were firefighters who were wearing turnout gear with respiratory protection, 1 firefighter had on turnout gear without respiratory protection, 8 were responders wearing Level B (positive pressure, full face-piece self contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA; inner and outer chemical-resistant gloves; face shield; hooded chemical resistant clothing; coveralls; and outer chemical-resistant boots), 1 was wearing the most protective Level A (positive pressure, full face-piece self contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA; totally encapsulated chemical- and vapor-protective suit; inner and outer

NTSIP promotes Safety:

LA NTSIP assists with a Fire at a Chemical Plant in Ascension Parish

In March 2012, an early morning fire occurred at a large chemical plant in Geismar, LA. NTSIP GIS staff was tasked with creating an emergency response map that showed the fire location in relation to facilities of interest such as hospitals and daycares. NTSIP also created a map with the fire location and environmental sampling locations. In addition, LA NTSIP was tasked with tracking any patients that went to emergency rooms as a result of the incident. The fire was eventually extinguished; however, several roads were closed and a shelter-in-place was issued for the surrounding community. The Louisiana Department of Environmental Quality did hourly environmental sampling. Because of the work of LA NTSIP staff, Louisiana Department of Health and Hospitals (LDHH) was able to assist other agencies in responding to the situation.

chemical-resistant gloves; and disposable protective suit, gloves, and boots, 1 was wearing a basic work uniform Level D (gloves; coveralls; safety glasses; face shield; and chemical-resistant, steel-toe boots or shoes) [4]. Of the 482 employees who were injured, 94% (n=455) were reported as having no PPE. Of the PPE that was reported, there were 4 level A, 1 level B, 3 level D and 3 other types of protection, and 16 missing PPE information.

Decontamination Status

Decontamination is the reduction or removal of chemical agents. Chemical decontamination is generally accomplished through detoxification or neutralization. Because the decontamination process can be involved, costing both time and money, it is important to know the number of people decontaminated at a site, what chemical exposures resulted in decontamination, and the place where decontamination occurs (i.e., at the scene of the incident, at a medical facility, or both). This information helps first responders as well as hospital staff better prepare for chemical incidents. The decontamination status of all injured people shows that the majority were not decontaminated (n = 1,023, 82%).

Of the total number of injured people, 8% (n = 100 injured people) were decontaminated at the scene of the incident, 6% (n = 72 injured people) at a medical facility. Additionally, 11 injured people (1%) were decontaminated at both the scene of the incident as well as at a medical facility and decontamination status was missing for 37 injured people (4%).

Decontamination in general (injured or uninjured people) did not occur that frequently; 2,857 (91%) incidents had nobody decontaminated at the scene and 2,881(92%) nobody decontaminated at the hospital. Of the remaining incidents, 7% were missing information on whether anyone was decontaminated on scene or at the hospital, 61 (2%) had 20 or fewer people decontaminated on scene, 3 incidents (.1%) had greater than 20 people decontaminated on scene, 39 (1%) had 20 or fewer people decontaminated at a medical facility. No incidents had more than 20 decontaminated at a medical facility.

NTSIP promotes Outreach Education:

WI conducts a table-top exercise to identify chemical vulnerabilities

To aid in the identification of vulnerable populations during chemical releases, WI NTSIP staff created and integrated software allowing mapping and graphic depiction of multiple data sources providing information about transportation corridors, chemical spills, chemical storage data, population/demographics, and locations of schools, universities, nursing homes, and hospitals. To pilot test the software, the Kenosha County Health Department selected the Recreational Complex (RecPlex), located in Pleasant Prairie, Wisconsin as it serves between 800,000 and 1,000,000 members and guests of all ages annually for baseball, swimming, water park activities, and hockey. The RecPlex, its playing fields, and recreational lake and beach front sits less than 300 feet from the Amtrak rail line which runs as many as 16 passenger and freight trains per day at speeds approaching 70 mph. In addition, two chemical processing plants and a major, regional electric power generating station are located less than 1.5 miles from the facility. DHS staff and partners from other state agencies agreed to conduct a table-top exercise simulating a freight train derailment of acrylonitrile. Following the conclusion of the exercise, areas for improvement (i.e., appointment of a liaison from the responder community to work with the RecPlex on a regular basis to build rapport) were identified, making the RecPlex feel less vulnerable if a chemical event occurs near the complex.

3.5 Response and Evacuation

Emergency Response

The majority (n = 2,416, 77%) of NTSIP-eligible incidents did not require any public health actions. More public health actions were taken in fixed facility incidents than in transportation-related incidents (n = 644, 31% of fixed facility incidents and n = 34, 4% of transportation-related incidents). In fixed facility and transportation incidents, the public health action undertaken most frequently was environmental sampling (n = 509 and 25 incidents respectively).

Notable health actions included five incidents that required a health investigation; these investigations are generally necessary following the release of a chemical that exposes a large number of people and, depending on the severity of the injuries, can result in an epidemiological study, medical monitoring of the exposed person(s) over time, or an exposure assessment. Additionally, four chemical release incidents resulted in a health advisory being issued. In six incidents, the chemical release affected a drinking water source, resulting in communities being asked to use an alternative water source. In two incidents, the chemical spill affected groundwater wells, causing the need for a well survey to be conducted. In one incident water intakes were shut in order to prevent the contaminated water from affecting the drinking water source.

An examination of the type of responders aiding in NTSIP-eligible incidents shows that 44% of incidents were responded to by a company response team. Thirty-nine percent of incidents (n = 1,224) required multiple types of responders. Only 66 incidents (2%) did not require responders (Table 14).

Evacuation and in-place sheltering

Evacuation was required when an exposure occurred and people needed to leave the contaminated area for the protection of their health. When evacuation was not be feasible, people in the exposure area were alerted to shelter-in-place which is to remain inside with exterior doors and windows closed and the heating, ventilation, and air conditioning systems turned off until the threat had been remediated. In 2012, there were 514 incidents (16%) with an evacuation order, while an additional 48 incidents (2%) resulted in a shelter-in-place order.

The majority of incidents that required an evacuation order (n = 398 or 77%) required the evacuation of 50 or fewer people. A larger percent of fixed facility incidents required evacuations than did transportation-related incidents (n = 22% vs 4%) respectively. Approximately a third of NTSIP eligible incidents that required an ordered evacuation (n = 169, 33%) affected a single general land use. The most common single general land use was: residential (n = 96 incidents), industrial (n = 34 incidents), commercial (n = 30 incidents), agricultural (n = 5 incidents),

undeveloped (n = 3 incidents), and recreational areas (n = 1 incident). When we evaluated mixed land use (consisting of any two different land uses), we found that over 45% of incidents (n = 231) occurred in a combination of both commercial and residential areas. This was followed by the mixed land uses of industrial and residential areas (n = 45), any two areas not previously defined (n = 34), undeveloped and residential areas (n = 28), and industrial and commercial areas (n=4).

Vulnerable populations

The proximity of a chemical release to vulnerable populations is of concern because vulnerable populations may need additional time or assistance during an evacuation and may be more sensitive to the affects of a chemical. Therefore, it is critical that these populations be identified prior to the occurrence of a chemical incident to ensure that they receive additional assistance when an evacuation or a sheltering-in-place is issued. Examples of places were there may be vulnerable populations include residences, schools, hospitals, nursing homes, licensed day care facilities, or recreational areas (e.g., parks). Over 98% (n=506) of all NTSIP incidents requiring an ordered evacuation had at least one type of vulnerable population within a quarter-mile of the release, and 233 (45%) had three or more different vulnerable population facilities within a quarter-mile.

3.6 Industry

For all qualifying NTSIP-eligible incidents, an Industry Code based on the North American Industry Classification System (NAICS) was entered into the database. The NAICS is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

In 2012, the largest number of NTSIP-eligible incidents (n = 986, 31%) were attributed to the transportation and warehousing sector (NAICS codes 48 and 49) (Table 15). This sector includes transportation by air, rail, water, truck, transit, as well as ground passenger, pipeline, scenic and sightseeing, transportation support activities, postal services, and couriers. We do not know whether this is an abnormally high number based on the number of establishments with this NAICS code because we were not able to get 2012 Economic Census data specifically for our seven states. Second in the number of incidents was the manufacturing sector (NAICS codes 31, 32, and 33) (n = 544 or 17%). The largest number of incidents within this code grouping was in NAICS code 32 (n = 414 or 13%), the manufacturing of wood, paper, printing, petroleum and coal, chemical, plastic and rubber, and non-metallic minerals.

However, private vehicles and residences, not businesses, had the greatest number of people injured (n=318, 26%), followed by NAICS code 61 educational services with 176 injured persons (14%). This is particularly concerning considering children are more likely to be exposed at these locations and there may not be formal plans for evacuation and sheltering. In section 3.25 it's reported that 22% of person with an age category were children under 18 years of age. The next highest business sector with injured persons was NAICS code 31-33 manufacturing (n=165, 13%) (Table 15). The fact that although transportation and warehousing incidents were the most frequent, yet had less injured persons than other categories is consistent with our finding in 3.11 that fixed-facility incidents were more likely to have injured persons and to have more injured persons.

4.0 National Database

NTSIP uses data collected and reported from the cooperative agreement partner states, coupled with supplemental data from governmental reporting agencies (i.e., DOT and NRC), to create annual national estimates of chemical incidents. These national estimates are important for monitoring trends and publishing information regarding relevant chemical exposure prevention. For a detailed description of the national database, its core functions, and key partnerships, refer to Table 1.

Fixed facility estimates are calculated by use of the NRC IRIS data, while transportation-related incidents are estimated by use of the DOT HMIS data. Estimated fixed facility and transportation data are calculated through use of a matching ratio derived from the comparison of state-reported NTSIP incidents and incidents reported from the appropriate data source (NRC for fixed facility and DOT for transportation) for current NTSIP reporting states. This ratio is then applied to NRC or DOT records for non-participating NTSIP states for the derivation of an estimate of NTSIP-eligible chemical incidents for a particular year. The NTSIP national database can be accessed via the NTSIP Web site http://www.atsdr.cdc.gov/ntsip/.

Annual maps are included in the national database for both fixed facility and transportation-related incidents. In the NTSIP website, a user can view a cumulative map that represents data from all modeled years, or users can query by a specific year of interest.

Currently, NTSIP has modeled estimates for national chemical incidents dating back to 2000. Table 16 shows the estimated number of incidents for the remaining 43 states that currently do not report to NTSIP. These estimates are just a crude estimate and may not be reflective of the true number, depending on how well incidents are reported to their respective system (DOT/NRC) in each state.

Table 16. NTSIP-eligible incident estimates for fixed facility and transportation incidents for the 43 states not currently reporting to NTSIP and actual counts for the seven bolded, NTSIP funded states.

2012 Estimated or Reported Incidents[1]			
State	**State Abbreviation**	**Fixed Facility**	**Transportation**
Alabama	AL	215	69
Alaska	AK	82	65
Arizona	AZ	49	97
Arkansas	AR	115	66
California	CA	707	465
Colorado	CO	72	140
Connecticut	CT	119	76
Delaware	DE	42	6
Florida	FL	524	252
Georgia	GA	185	191
Hawaii	HI	55	5
Idaho	ID	34	11
Illinois	IL	270	427
Indiana	IN	107	175
Iowa	IA	116	59
Kansas	KS	110	109
Kentucky	KY	159	135
Louisiana	**LA**	**457**	**222**
Maine	ME	46	9
Maryland	MD	133	84
Massachusetts	MA	121	92
Michigan	MI	162	116
Minnesota	MN	81	94
Mississippi	MS	101	37
Missouri	MO	127	125
Montana	MT	21	16
Nebraska	NE	68	21
Nevada	NV	16	45
New Hampshire	NH	25	13
New Jersey	NJ	392	137
New Mexico	NM	43	19
New York	**NY**	**899**	**195**
North Carolina	**NC**	**131**	**125**
North Dakota	ND	40	22
Ohio	OH	262	353
Oklahoma	OK	176	51
Oregon	**OR**	**78**	**98**
Pennsylvania	PA	358	287
Rhode Island	RI	7	13
South Carolina	SC	75	54
South Dakota	SD	7	11
Tennessee	**TN**	**221**	**205**
Texas	TX	1,747	517
Utah	**UT**	**198**	**39**
Vermont	VT	9	6
Virginia	VA	222	82
Washington	WA	363	77
West Virginia	WV	83	18
Wisconsin	**WI**	**128**	**143**
Wyoming	WY	42	9
	Total[2]	**9,800**	**5,683**

[1] Actual reported incidents are in bold and unbolded numbers are calculated estimates.

[2] The total number of incidents for both fixed facility and transportation-related events may not add up to the numbers reported on the website because estimates may change slightly over time due to the matching ratio changing and DOT making edits to their data.

Overall, 15,434 chemical incidents were estimated to have occurred in 2012; 9,795 occurred in fixed facilities, while transportation-related incidents were estimated at 5,639. Unfortunately, no incident database currently exists that is based on reported data from all states; therefore, NTSIP has to estimate chemical incidents that occur in states that do not participate in NTSIP. When 2012 estimations were compared to 2011 estimations, it was determined that 537 less incidents occurred in 2012, resulting in an overall decrease in incidents of 3.5%. Comparing fixed facility and transportation estimates between 2011 and 2012 shows that 3.4% less fixed facility events were estimated in 2012 than in 2011; there was, however, an increase of 2.9% increase in transportation-related incidents.

As additional data sources are determined to complement the state-reported data and as the methodology is further refined, more precise estimates of national chemical incidents and injuries will be derived.

5.0 ACE Investigations

When large-scale chemical incidents occur, state and local governments often need assistance to respond to and collect pertinent information about spills. In these instances, a state can request the assistance of the Assessment of Chemical Exposures (ACE) team, members of which will assist with the characterization of exposure data as well as the gathering of information about acute health effects that may result from exposure. Since the inception of the program, the ACE team has responded to a number of large-scale chemical exposure incidents across the country covered in previous reports including a chlorine release at a metal recycling facility in California, an ammonia release from a refrigeration facility in Alabama, and a chlorine gas release in a chicken processing plant in Arkansas.

5.1 Paulsboro Train Derailment Releases Vinyl Chloride: An ACE Investigation

In November 2012, a railroad bridge collapse caused four tanker cars to derail into a creek in a New Jersey town with approximately 6,100 residents. One tanker was breached, releasing 32,000 pounds of vinyl chloride. The streets closest to the derailment site were evacuated the day of the incident. A shelter-in-place order was established for surrounding areas, then was lifted and reestablished repeatedly over four days. As vinyl chloride levels in the air fluctuated due to weather conditions, the evacuation area was extended. The National Transportation and Safety Board (NTSB) released a detailed accident report for the derailment; see http://www.state.nj.us/dca/divisions/dfs/pdf/paulsboro_vinyl_chloride_rpt_by_ntsb.pdf for additional information.

Vinyl chloride is a carcinogen and acute exposure to high levels can cause health effects, including death. At least 253 people presented to area hospitals for evaluation. The New Jersey Department of Health requested assistance from the ACE program to investigate the public health impact of the incident. The ACE team enlisted help from the ATSDR Regional Office to perform the investigation. To address occupational exposures from first responders, the ACE team also collaborated with experts from NIOSH, who evaluated the impact on local emergency responders and made recommendations for responder safety and health in similar incidents. A summary of the assessment with emergency responders involved in the incident was published as a Morbidity and Mortality Weekly Report (MMWR) [5].

Using materials from the ATSDR Assessment of Chemical Exposures toolkit, household surveys were developed to assess levels of exposure, health effects, and communication during the incident. The town was divided into four sampling areas based on evacuation status. To assess healthcare demands and response, hospital staff that provided care to exposed persons were interviewed. Medical charts were reviewed to better evaluate the health effects that were experienced. The New Jersey Department of Health created a community and first responder health survey factsheet (http://www.state.nj.us/health/documents/qa/qa_survey_purpose.pdf) to better prepare those exposed to answer the health survey questions.

Conducting household surveys after vinyl chloride incident in New Jersey. **In photo:** Left: Jason Wilken (EIS Officer); Right: Kim Brinker (EIS Officer). **Photo by:** Mary Anne Duncan.

Four hundred fifty-nine residents of 154 households were interviewed. Two hundred fifty-six (56%) of residents reported experiencing acute health effects consistent with vinyl chloride exposure, including ocular and respiratory tract irritation, headache, dizziness, and nausea. Common communication issues reported included: lack of sufficient/timely information about the risk of exposure to vinyl chloride, timing and duration of the evacuation, and when and how to shelter-in-place. Residents were concerned about both short-term and long-term health effects associated with vinyl chloride exposure. Many were instructed to shelter-in-place, but did not know how to effectively do so. Effective risk communication messaging to the affected public is a critical public health priority during chemical releases with mass casualty potential. This "lesson learned" is being disseminated to public health agencies. See http://www.nj.gov/health/ceohs/documents/pau/factsheet.pdf for more information.

6.0 Conclusions

Both NTSIP federal and state staff will continue to monitor the data to determine specific trends in chemical incidents and develop outreach and prevention activities targeted at reducing injuries and deaths associated with these trends. This report highlights important data, like the same chemicals being released every year and the sector of private residences and educational services where children may be affected. This knowledge is useful for many audiences including local emergency planning committees, first responder communities, State Departments of Environmental Quality and Health, and other Federal Agencies to evaluate chemical spills and focus resources to further mitigate risk and save lives.

The ACE team continues to be a vital resource to use when large-scale spills occur and when states need additional assistance. They were able to show how important timely and effective risk communication to the public is during a chemical emergency.

The data collected through individual state reporting, coupled with the information gained through both the national database estimates and ACE incident investigation, ensures that a history of chemical incidents is recorded. As these chemical disasters and incidental releases continue to occur, the data collected by this program will become even more important for proactive chemical release prevention and for focusing critical limited resources towards key priorities revealed.

For additional information on State Surveillance activities, the ACE team, the National Database estimates, or any of the programs' resources and updates, please visit the NTSIP website at www.atsdr.cdc.gov/ntsip/.

7.0 References

[1] Agency for Toxic Substances and Disease Registry (ATSDR) (2013). National Toxic Substance Incidents Program (NTSIP) Annual Report, 2010. U.S. Department of Health and Human Services, Environmental Health Surveillance Branch, Division of Toxicology and Human Health Sciences. Atlanta, Georgia.

[2] US Census Bureau. Table 1. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2012 (NST-EST2012-01) Release Date: December 2012 http://www.census.gov/popest/data/state/totals/2012/index.html. Accessed 12//23/2014.

[3] Levin, Kelly. (2013). "A Look Back on 2012, the Year of Extreme Weather Events". World Resources Institute. http://www.wri.org/blog/look-back-2012-year-extreme-weather-events-0. Accessed 10/13/2013.

[4] Environmental Protection Agency (EPA). (2011). Personal Protective Equipment. Emergency Hazardous Substances. Available at: http://www.epa.gov/osweroe1/content/hazsubs/equip.htm. Accessed 01/02/2014.

[5] Brinker, K, M Lumia, KV Markiewicz, MA Duncan, C Dowell, A Rey, J Wilken, A Shumate, J Taylor, R Funk . (2015). "Assessment of Emergency Responders After a Vinyl Chloride Release from a Train Derailment — New Jersey, 2012". Morbidity and Mortality Report 63(53): 1233-1237. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6353a1.htm. Accessed 03/20/2015.

Appendix A: 2012 NTSIP Publications

Ruckart, PA, A Anderson and WL Welles. (2012). Using Chemical Release Surveillance Data to Evaluate the Public Health Impacts of Chlorine and Its Alternatives. Journal of Environmental Protection 3(12): 1607-1614.

Trachtman, WC, X Nie, SA Ahsan and AN Koehler. (2012). Considerable Increase in Methamphetamine Events Louisiana, 2011. Louisiana Morbidity Report 23(2): 2-6.

Appendix B: Supporting Data from NTSIP 2012 Report

Table 3. NTSIP incidents with injured people/fatalities, by type of incident and reporting state, NTSIP 2012.

State	Fixed Facility Incidents			Transportation Incidents			Total Incidents		
	# i	# with injured people	Total # injured people (fatalities)	#	# with injured people	Total # injured people (fatalities)	#	# with injured people	Total # injured people (fatalities)
Louisiana	457	34	52 (3)	222	16	25 (2)	679	50	77 (5)
New York	899	190	634 (20)	195	13	25 (7)	1,094	203	659 (27)
North Carolina	131	12	47 (3)	125	8	17 (3)	256	20	64 (6)
Oregon	78	14	85 (0)	98	6	21 (0)	176	20	106 (0)
Tennessee	221	26	61 (4)	205	3	6 (0)	426	29	67 (4)
Utah	198	157	193 (0)	39	2	2 (0)	237	159	195 (0)
Wisconsin	128	12	74 (1)	143	1	1 (0)	271	13	75 (1)
Total	**2,112**	**445**	**1,146 (31)**	**1,027**	**49**	**97 (12)**	**3,139**	**494**	**1,243 (43)**

[a]Injured people counts include fatalities.

Table 4. Ratio of number of NTSIP incidents and injured persons, by population, by type of incident and state, NTSIP 2012.

State	2012 estimated population	Fixed facility		Transportation	
		Ratio incidents/ population	Ratio injured persons/ population	Ratio incidents/ population	Ratio injured persons/ population
New York	10,570,261	4.6^{-5}	3.2^{-5}	1.1^{-5}	0.1^{-5}
North Carolina	9.752,073	1.3^{-5}	0.5^{-5}	1.3^{-5}	0.2^{-5}
Tennessee	6,456,243	3.4^{-5}	0.9^{-5}	3.2^{-5}	0.1^{-5}
Wisconsin	5,726,398	4.5^{-5}	1.3^{-5}	2.5^{-5}	0.02^{-5}
Louisiana	4,601,893	9.9^{-5}	1.1^{-5}	4.2^{-5}	0.5^{-5}
Oregon	3,899,353	2.0^{-5}	2.2^{-5}	2.5^{-5}	0.1^{-5}
Utah	2,855,287	6.9^{-5}	6.8^{-5}	1.4^{-5}	0.1^{-5}
Total	**48,719,808**	**4.3^{-5}**	**2.4^{-5}**	**2.1^{-5}**	**0.2^{-5}**

Table 5. Transportation incidents, transportation incidents with injured people/fatalities, and total number of injured people/fatalities by transportation stage, NTSIP 2012.

	# of Transportation Incidents	Total # of Injured People (fatalities)
Occurred during unloading of a stationary vehicle or vessel	365	17
From a moving vehicle or vessel	225	61 (9)
En route and later discovered at a fixed facility	275	2
Occurred from a stationary vehicle or vessel	121	16 (3)
Other	29	0
Missing transportation route	12	1
Total	**1027**	**97 (12)**

Table 6. The Top 10 most common individual chemicals released in fixed facility NTSIP incidents, 2012.

Top 10 Chemicals Involved in NTSIP-eligible Fixed Facility Incidents, 2012			
Rank	**Chemical Name**	**#**	**Percentage of Total Fixed Facility Incidents (%)[a]**
(1)	Natural Gas	303	14
(2)	Carbon Monoxide	180	8
(3)	Methamphetamine Chemicals	121	6
(4)	Ammonia	111	5
(5)	Sodium Hydroxide[b]	79	4
(6)	Propane	65	3
(7)	Mercury	59	3
(8)	Hydrochloric Acid	56	3
(9)	Sulfuric Acid	53	3
(10)	Chlorine	52	2
Total number of incidents with Top 10 chemicals involved in fixed facility incidents		**1,079**	**51**

[a] Percentages calculated on the basis of the total number of fixed facility incidents (n = 2,112)

Table 7. The Top 10 most common individual chemicals released in NTSIP transportation incidents, 2012.

Top 10 Chemicals Involved in NTSIP-eligible Transportation Incidents, 2012			
Rank	**Chemical Name**	**#**	**Percentage of Total Transportation Incidents (%)[a]**
(1)	Alkaline hydroxide	91	9
(2)	Sulfuric Acid	45	4
(3)	Hydrochloric Acid	44	4
(4)	Flammable Liquid, NOS[c]	28	3
(5)	Acetone	25	2
(6)	Resin, NOS[c]	24	2
(7)	Natural Gas	18	2
(8)	Isopropanol, NOS[c]	16	2
(9)	Hydrogen Peroxide	15	2
(10)	Nitric Acid	15	2
Total number of incidents with Top 10 chemicals involved in transportation incidents		**321**	**32**

[a] Percentages calculated on the basis of the total number of transportation incidents (n = 1,027)

[b] Alkaline hydroxide includes both sodium hydroxide and potassium hydroxide

[c] NOS = not otherwise specified

Table 8. NTSIP incidents and injured people by primary contributing factors and type of incident, NTSIP 2012.

Primary Contributing Factor	NTSIP-eligible Incidents					
	Fixed Facilities		Transportation		Total	
	#	%	#	%	#	%
Equipment failure	990	46.9	305	29.7	1,295	41.3
Human error	684	32.4	648	63.1	1,332	42.4
Other	65	3.1	34	3.3	99	3.2
Intentional	42	2.0	5	0.5	47	1.5
Bad weather condition/natural disasters	31	1.5	5	0.5	36	1.1
Illegal act	230	10.9	25	2.4	255	8.1
Missing primary contributing factor	70	3.3	5	0.5	75	2.4
Primary Contributing Factor	**NTSIP-Number Injured People**					
	Fixed Facilities		**Transportation**		**Total**	
	#	**%**	**#**	**%**	**#**	**%**
Equipment failure	423	36.9	10	10.3	433	34.8
Human error	530	46.2	71	73.2	601	48.4
Other	24	2.1	2	2.1	26	2.1
Intentional	27	2.4	5	5.2	32	2.6
Bad weather condition/natural disasters	5	0.4	0	0	5	0.4
Illegal act	53	4.6	8	8.2	61	4.9
Missing primary contributing factor	84	7.3	1	1.0	85	6.9

Table 9. Number of injured people per incident and type of incident, NTSIP 2012.

# of Injured People per Incident	NTSIP-eligible Incidents					
	Fixed Facility		Transportation		Total	
	# of incidents	Total # of injured people	# of incidents	Total # of injured people	# of incidents	Total # of injured people
None	1,667	0	978	0	2,645	0
1 person	*295*	*295*	*31*	*31*	*326*	*326*
2 people	*49*	*98*	*7*	*14*	*56*	*112*
3 people	*32*	*96*	*7*	*21*	*39*	*117*
4 people	*20*	*80*	*1*	*4*	*21*	*84*
5 people	*8*	*40*	*0*	*0*	*8*	*40*
6+ people	*41*	*537*	*3*	*27*	*44*	*564*
Total	**2,112**	**1,146**	**1,027**	**97**	**3,139**	**1,243**

Table 10. Number of injured people by severity/disposition and type of incident, NTSIP 2012.

Severity and Disposition of Injured People	Number of Injured People in NTSIP-eligible incidents					
	Fixed Facility		Transportation		Total	
	#	%	#	%	#	%
Treated on scene (first aid)	165	14.4	10	10.3	175	14.1
Treated at hospital (not admitted)	723	63.1	35	36.1	758	61.0
Treated at hospital (admitted)	111	9.7	24	24.7	135	10.9
Treated at hospital (admission unknown)	67	5.8	5	5.2	72	5.8
Observation at hospital; no treatment	38	3.3	5	5.2	43	3.5
Seen by private physician within 24 hours	4	0.3	2	2.1	6	0.5
Injuries experienced within 24 hours of incident and reported by official (e.g., fire department, EMT)	4	0.3	0	0	4	0.3
Death on scene/on arrival at hospital	22	1.9	10	10.3	32	2.6
Death after arrival at hospital	9	0.8	2	2.1	11	0.9
Missing severity/disposition	3	0.3	4	4.1	7	0.6

Table 11. Injured people by category and type of incident, NTSIP 2012.

Category of Injured People	Number of Injured People					
	Fixed Facility		Transportation		Total	
	#	%	#	%	#	%
Missing	9	0.8	0	0	9	0.7
Employee	**424**	**37.0**	**58**	**59.8**	**482**	**38.8**
Public	**614**	**53.6**	**31**	**32.0**	**645**	**51.9**
General public	466	40.7	31	32.0	497	40.0
Student (at school)	148	12.9	0	0	148	11.9
Responders/hospital personnel	**99**	**8.6**	**8**	**8.2**	**107**	**8.6**
Responder (not specified)	3	0.3	1	1.0	4	0.3
Career firefighter	28	2.4	0	0	28	2.3
Volunteer Firefighter	9	0.8	0	0	9	0.7
Firefighter (not specified)	46	4.0	0	0	46	3.7
Police officer	13	1.1	6	6.2	19	1.5
3rd party clean-up contractor	0	0	1	1.0	1	0.1

Table 12. Injured people by category and gender and age, NTSIP 2012.

Category of Injured People	Number of Injured People					
	Gender			Age Category		
	Male	Female	Missing	Child*	Adult**	Missing
Missing	0	0	9	0	0	9
Employee	214	36	231	2	368	111
Public	**204**	**173**	**261**	**216**	**297**	**125**
General public	183	163	144	117	271	102
Student *(*at school*)*	21	10	117	99	26	23
Responders/hospital personnel	**42**	**0**	**65**	**0**	**95**	**12**
Responder (not specified*)*	1	0	3	0	3	1
Career firefighter	9	0	19	0	28	0
Volunteer firefighter	7	0	2	0	8	1
Firefighter *(*not specified*)*	11	0	35	0	40	6
Police officer	13	0	6	0	15	4
3rd party clean-up contractor	1	0	0	0	1	0
Total # of Injured People	**460**	**209**	**566**	**218**	**760**	**257**

* Child: under 18 years old
** Adult: 18 years old or greater

Table 13. Injured people by adverse health effects and type of incident, NTSIP 2012.

Adverse Health Effects	Total # of Injured People					
	Fixed Facilities		Transportation		Total	
	#	%	#	%	#	%
Trauma	**52**	**4.5**	**43**	**44.3**	**95**	**7.6**
Chemical-related	*1*		*3*		*4*	
*Not chemical-related**	*31*		*33*		*64*	
Both	*4*		*5*		*9*	
Missing	*16*		*2*		*18*	
Respiratory system problems	278	24.3	20	20.6	298	24.0
Eye irritation	76	6.7	1	1.0	77	6.2
Gastrointestinal problems	5	0.4	0	0	5	0.4
Heat stress	16	1.4	0	0	16	1.3
Burns	**138**	**12.0**	**6**	**6.2**	**144**	**11.6**
*Thermal**	*53*		*1*		*54*	
Chemical	*56*		*5*		*61*	
Both	*22*		*0*		*22*	
Missing	*7*		*0*		*7*	
Other	41	3.6	5	5.2	46	3.7
Skin irritation	28	2.4	2	2.1	30	2.4
Dizziness or other CNS symptoms	174	15.2	4	4.1	178	14.3
Headache	32	2.8	0	0	32	2.6
Heart problems	4	0.4	0	0	4	0.3
Shortness of breath (unknown cause)	4	0.4	0	0	4	0.3
TWO adverse health effects	213	18.6	7	7.2	220	17.7
THREE adverse health effects	57	5.0	3	3.1	60	4.8
More than THREE adverse health effects	6	0.5	0	0	6	0.5
Missing adverse health effect	22	1.9	6	6.2	28	2.3

*Non-chemical related traumas and thermal burns may be related to a fire, explosion, or a traffic accident, rather than from exposure to a chemical.

Table 14. Type of responder to the incident, NTSIP 2012.

Responder	Total	
	#	%
No response	66	2.1
Certified HazMat team	21	0.7
Company response team	1,380	44.0
Law enforcement agency	89	2.8
Fire department	148	4.7
EMS	6	0.2
Other	8	0.3
Health department/health agency	7	0.2
Environmental agency/EPA response team	20	0.6
3rd Party clean-up contractor	80	2.6
Department of works/utilities/transportation (includes Coast Guard)	68	2.2
State, county, or local emergency manager/coordinators/planning committees	4	0.1
Poison Center	8	0.3
Two types of responders	726	23.1
Three types of responders	325	10.4
More than three types of responders	173	5.5
Missing responder types	10	0.3

Table 15. Type of industries by incidents and injuries, NTSIP 2012[a].

NAICS Code	# Incidents (%)	# Injured persons (%)
11—Agriculture, Forestry, Fishing, and Hunting	34 (1)	4 (>1)
21—Mining	34 (1)	7 (1)
22—Utilities	179 (6)	19 (2)
23—Construction	41 (1)	9 (1)
31-33— Manufacturing	544 (17)	165 (13)
42—Wholesale Trade	85 (3)	15 (1)
44-45—Retail Trade	64 (2)	45 (4)
48-49—Transportation and Warehousing	986 (31)	64 (5)
51—52 Information, Finance and Insurance	16 (1)	13 (1)
53—Real Estate and Rental Leasing	146 (5)	136 (11)
54—Professional, Scientific, and Technical Services	18 (1)	4 (>1)
56—Administrative, Support, Waste Management and Remediation Services	58 (2)	10 (1)
61—Educational Services	93 (3)	176 (14)
62—Health Care and Social Assistance	42 (1)	47 (4)
71—Arts, Entertainment and Recreation	26 (1)	69 (6)
72—Accommodation and Food Services	55 (2)	35 (3)
81—Other Services	26 (1)	10 (1)
92—Public Administration	30 (1)	12 (1)
No NAICS Industry Code (Vehicle or Residence)	485(15)	318 (26)
Not Identified	62 (2)	49 (4)
Not an Industry	115 (4)	36 (3)
Total	**3,139**	**1,243**

[a] Total percentages do not equal 100 due to rounding

Comments regarding this report are wlecome. Please send your comments to the following address:

Agency for Toxic Substances and Disease Registry
Attn: Chief, Environmental Health Surveillance Branch, DTHHS
4770 Buford Highway NE, Mailstop F-57, Atlanta, Georgia 30341