

Toxic Substance Releases in North Carolina—National Toxic Substance Incidents Program, 2013–2014

Definition

To help monitor and prevent unintentional releases of toxic substances, North Carolina participates in the Agency for Toxic Substances and Disease Registry's (ATSDR) National Toxic Substance Incidents Program (NTSIP). North Carolina has participated in NTSIP since its inception in 2010 and previously participated in a similar program called the Hazardous Substances Emergency Events Surveillance Program. For the purpose of this report, a toxic substance release is defined as an unintentional, acute emergency release (lasting 72 hours or less) of a toxic substance that meets NTSIP's eligibility criteria. These criteria are based on the toxicity of the chemical and the amount released.

This report summarizes surveillance findings for the years 2013 and 2014. During this time period, the program captured information on 562 toxic substance releases meeting NTSIP's eligibility criteria. In 2012, the most recent year for which ATSDR has released an annual NTSIP report, North Carolina had the 19th highest number of NTSIP-eligible releases in the United States (n=256). This ranking is based on data from other participating NTSIP states and estimates for non-participating states (NTSIP Annual Report 2012). For more information about NTSIP, please visit <http://www.atsdr.cdc.gov/ntsip/>.

Data Source

Toxic substance releases are identified through reports from the National Response Center, North Carolina Emergency Management, the U.S. Department of Transportation's Hazmat Intelligence Portal, the media, the Carolinas Poison Center, and on-call notifications from the N.C. Public Health Preparedness & Response Branch. All toxic substance releases that occur in North Carolina and come to the attention of North Carolina NTSIP staff are evaluated to determine whether they meet NTSIP eligibility criteria. All events meeting the criteria are promptly entered into the online NTSIP database.

If toxic substance releases involve injured persons, the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) may be used to determine a variety of victim information including type and severity of injury. NC DETECT contains data from emergency departments, the Carolinas Poison Center, and the Pre-hospital Medical Information System (PreMIS).

Findings

From January 1, 2013 through December 31, 2014, North Carolina's NTSIP database captured 562 chemical release incidents, of which 64 (11%) resulted in one or more injuries and 125 (22%) led to an official evacuation (Table 1). The total number of reported incidents increased slightly from 2013 (n=276) to 2014 (n=286). The number of incidents that resulted in injuries nearly doubled from 2013 (n=23) to 2014 (n=41), while the number of incidents that led to an evacuation of persons stayed virtually the same.

Toxic substance releases can occur when hazardous materials are transported or at a fixed-facility (i.e., if an event is not transportation related). Transportation releases and fixed-facility releases each accounted for approximately 50% of all incidents in 2013, but transportation releases were more common than fixed-facility releases in 2014 (Table 2). There was a decline in the number of fixed-facility releases and an increase in the number of transportation releases that were reported from 2013 to 2014.

From 2013 to 2014, 268 persons were injured as a result of toxic substance release incidents in North Carolina (Table 3). Headache was the most common type of injury reported, followed by respiratory system problems. Seven (3%) of the persons injured during a toxic substance release incident died from their injuries; 5 of these deaths were chemical related and 2 of these deaths were due to non-chemical related trauma (i.e., a traffic accident that caused a trauma-related death as well as a chemical release). Eighteen (7%) of all injured persons were admitted to a hospital, and 162 (60%) were treated at a hospital and not admitted (Table 4). Of the 5 reported chemical-related fatalities, 4 were the result of an unintentional chemical release and 1 was a chemical suicide (Table 5). Specific event circumstances related to the 4 fatalities due to unintentional chemical releases are described in Table 6.

While there were only 10 more reported NTSIP-eligible incidents in 2014 than in 2013, there were 114 more injured persons. This may be partly explained by the fact that there were more reported incidents involving multiple injured persons in 2014 (n=29) compared to 2013 (n=11). The circumstances of the 6 events that resulted in greater than 10 injured persons are described in Table 7. Five of these 6 events occurred in 2014, resulting in 89 (47%) of the 191 injured persons of that year.

Over half of the 125 evacuations lasted 5 hours or less (n=74), and over half involved 50 people or less (n=73) (Table 8).

From 2013 to 2014, natural gas was involved in the greatest number of NTSIP-eligible releases (n=57) (Table 9). The second most commonly released substance was sodium hydroxide (n=37), followed by carbon monoxide (n=22). Incidents involving these commonly released substances throughout the state are visually depicted in Figures 1-4.

Public Health Significance

Toxic substance releases are a public health concern in North Carolina. Natural gas contributed to the greatest number of releases in the state from 2013 through 2014, followed by sodium hydroxide, carbon monoxide, and methamphetamine chemicals. Toxic substance release incidents often result in evacuations and injuries and even in fatalities.

To provide guidance for local health departments when responding to chemical releases, the Chemical Release Investigation Kit & Template, also known as CRIKT, was initiated in 2013. A CRIKT is developed for each chemical of concern and is comprised of three distinct parts: 1) a step-by-step response guide; 2) a one-page chemical fact sheet; and 3) a line listing template. Each toolkit will ensure local health departments have easily accessible chemical information,

guidance on how to respond, and information on who to contact to strengthen public health response in the event of a chemical release. As of March 2016, CRIKTs have been developed for 35 chemicals, including all 4 of the chemicals that contributed to the greatest number of releases in 2013 and 2014. For more information about CRIKT, please visit <http://epi.publichealth.nc.gov/oe/chemrad/chemkit.html>.

Limitations

The toxic substance releases captured in North Carolina's database are limited to those meeting NTSIP eligibility criteria. NTSIP has developed a list of substances that must be reported at any quantity when released, as well as a list of substances that must be reported when at least one pound is released. Other toxic substances are only entered into NTSIP if at least 10 pounds or one gallon was released. For certain commonly released substances that are less toxic, such as paint, releases are only entered if the quantity released is above a certain threshold, and releases of petroleum fuels (including natural gas) are only entered if an injury or public health action (such as an evacuation) occurred. Releases that occur at a private residence are only entered if a public health action occurred.

It should also be noted that North Carolina NTSIP program staff stopped receiving methamphetamine laboratory incident reports from the State Bureau of Investigation (SBI) in 2011, so NTSIP staff has relied on media reports in their place. Since media reports do not include the same level of detail as SBI reports, many of these incidents may not be captured in NTSIP after 2010.

Reference

National Toxic Substance Incidents Program (NTSIP) Annual Report 2012. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Available from http://www.atsdr.cdc.gov/ntsip/docs/atsdr_2012_annual_report.pdf.

Appendix

Table 1. NTSIP-eligible toxic substance incidents in North Carolina, 2013–2014

| | 2013 | 2014 | Total |
|---|-------------|-------------|--------------|
| Toxic substance releases | 276 | 286 | 562 |
| Releases resulting in one or more injuries | 23 (8%) | 41 (14%) | 64 (11%) |
| Releases that led to an official evacuation | 63 (23%) | 62 (22%) | 125 (22%) |

Table 2. Fixed-facility and transportation NTSIP-eligible toxic substance incidents in North Carolina, 2013–2014

| | 2013 | 2014 | Total |
|--------------------------|-------------|-------------|--------------|
| Toxic substance releases | 276 | 286 | 562 |
| Fixed-facility releases | 139 (50%) | 117 (41%) | 256 (46%) |
| Transportation releases | 137 (50%) | 169 (59%) | 306 (54%) |

Table 3. Number and type of injuries that resulted from NTSIP-eligible toxic substance incidents, North Carolina, 2013–2014

| Injury type | 2013 | 2014 | Total |
|--|-------------|-------------|--------------|
| Headache | 28 | 84 | 112 |
| Respiratory system problems | 23 | 81 | 104 |
| Gastrointestinal problems | 17 | 82 | 99 |
| Dizziness or other CNS symptoms | 17 | 71 | 88 |
| Heart problems | 4 | 22 | 26 |
| Eye irritation | 1 | 20 | 21 |
| Trauma | | | |
| Chemical-related | 0 | 1 | 1 |
| Not chemical-related | 2 | 13 | 15 |
| Shortness of breath | 8 | 7 | 15 |
| Skin irritation | 3 | 8 | 11 |
| Burns | | | |
| Chemical | 2 | 0 | 2 |
| Thermal | 4 | 3 | 7 |
| Other | 5 | 1 | 6 |
| Unknown | 4 | 0 | 4 |
| Total injuries | 118 | 393 | 511 |
| Total injured persons[†] | 77 | 191 | 268 |
| [†] Some victims sustained more than one type of injury | | | |

Table 4. Severity of injuries that resulted from NTSIP-eligible toxic substance incidents, North Carolina 2013–2014

| Severity of injury | 2013 | 2014 | Total |
|--|-------------|-------------|--------------|
| Death on scene or on arrival at hospital | 4 (5 %) | 3 (2%) | 7 (3%) |
| Treated at hospital | | | |
| Admitted | 7 (9%) | 11 (6%) | 18 (7%) |
| Not admitted | 53 (69%) | 109 (57%) | 162 (60%) |
| Admission status unknown | 0 | 4 (2%) | 4 (1%) |
| Treated on scene | 5 (6%) | 15 (8%) | 20 (7%) |
| Observed at hospital (not treated) | 3 (4%) | 41 (21%) | 44 (16%) |
| Other | 5 (6%) | 8 (4%) | 13 (5%) |
| Total injured persons | 77 | 191 | 268 |

Table 5. Types of NTSIP-eligible toxic substance incidents that led to chemical-related[†] fatalities, North Carolina, 2013–2014

| Type of incident | 2013 | 2014 | Total |
|--------------------------------|-------------|-------------|--------------|
| Unintentional chemical release | 3 | 1 | 4 |
| Chemical suicide | 1 | 0 | 1 |
| Total fatalities | 4 | 1 | 5 |

[†]Two fatalities in 2014 were due to non-chemical related trauma (i.e., impact in a traffic accident)

Table 6. Synopses of chemical-related unintentional fatalities, North Carolina, 2013–2014 (n=4)

| Substance | Year | Description of Incident |
|---------------------------|-------------|---|
| Methamphetamine chemicals | 2013 | A barn behind a residence was found engulfed in flames, resulting in one death. After the fire was extinguished, responders found materials used in the manufacture of methamphetamine. |
| Carbon monoxide | 2013 | A propane-fueled forklift used inside a trailer backed up to a warehouse resulted in the death of one employee from carbon monoxide poisoning. |
| Bath salts (illegal) | 2013 | A person was overcome by vapors while attempting to make illegal bath salts and was found deceased in their apartment. |
| Carbon monoxide | 2014 | A family used a propane cooker inside their home for cooking and left it on overnight, resulting in one fatality from carbon monoxide poisoning. |

Table 7. Synopses of NTSIP-eligible toxic substance incidents resulting in >10 injured persons, North Carolina, 2013–2014 (n=6)

| Substance(s) | Year | Number of Injured Persons | Description of Incident |
|-----------------------------------|-------------|----------------------------------|---|
| Carbon monoxide | 2013 | 15 | A propane-fueled forklift used inside a trailer backed up to a warehouse resulted in carbon monoxide accumulation. 1 employee died and another was hospitalized and received hyperbaric treatment. 11 responders and 2 bystanders received treatment at a hospital. |
| Carbon monoxide | 2014 | 13 | A faulty HVAC system in a restaurant kitchen caused an accumulation of carbon monoxide. The restaurant was evacuated and 13 employees were transported to the emergency department for treatment. |
| Perchloroethylene | 2014 | 20 | 8 gallons of perchloroethylene were released during movement of a dry cleaning machine at a county jail. 14 employees were treated for symptoms at the hospital and 6 were observed for symptoms without treatment. No inmates were exposed. |
| Carbon monoxide | 2014 | 18 | Construction workers used a propane powered tile cutter indoors for 4 hours while renovating a grocery store, resulting in carbon monoxide accumulation. 30 workers were evacuated and 18 were transported to the hospital for treatment of symptoms; 11 received hyperbaric treatment. |
| Aluminum phosphide & Cypermethrin | 2014 | 18 | Employees at a food processing warehouse set off numerous insecticide foggers and sealed the facility for the weekend without proper ventilation. The insecticides were not labeled for use in a food warehouse. Employees experienced symptoms of insecticide poisoning upon return to work. 9 employees were observed at a hospital for symptoms, 4 employees and 1 police officer were treated and released, and 4 employees were admitted overnight. The facility was closed for 6 weeks. |
| Hydrogen sulfide & Sulfuric acid | 2014 | 20 | A bed battery (a backup power source) overheated, causing an emission of chemical fumes at a surgical center. 18 employees and 2 non-employees reported symptoms and were taken to a hospital for observation. |

Table 8. Evacuations after NTSIP-eligible toxic substance incidents, North Carolina, 2013–2014

| | 2013 | 2014 | Total |
|------------------------------------|-----------|-----------|------------|
| Length of evacuation | | | |
| Less than 3 hours | 28 (44%) | 26 (42%) | 54 (43%) |
| 3 to 5 hours | 8 (13%) | 12 (19%) | 20 (16%) |
| >5 to 24 hours | 8 (13%) | 9 (15%) | 17 (14%) |
| More than 24 hours | 1 (2%) | 0 | 1 (1%) |
| Unknown | 18 (29%) | 15 (24%) | 33 (26%) |
| Number of people evacuated | | | |
| 1 to 5 | 10 (16%) | 7 (11%) | 17 (14%) |
| 6 to 20 | 12 (19%) | 18 (29%) | 30 (24%) |
| 21 to 50 | 12 (19%) | 14 (23%) | 26 (21%) |
| 51 to 100 | 4 (6%) | 11 (18%) | 15 (12%) |
| 101 to 500 | 7 (11%) | 5 (8%) | 12 (10%) |
| 501-1000 | 2 (3%) | 0 | 2 (2%) |
| More than 1000 | 0 | 1 (2%) | 1 (1%) |
| Unknown | 16 (25%) | 6 (10%) | 22 (18%) |
| Total number of evacuations | 63 | 62 | 125 |

Table 9. Chemicals involved in >15 NTSIP-eligible toxic substance incidents, North Carolina, 2013–2014

| Chemical | Releases | Deaths | Treated at hospital (admitted) | Treated at hospital (not admitted) | Treated on scene | Observed at hospital (no treatment) | Severity of injury unknown | Total victims |
|---------------------------|----------|--------|--------------------------------|------------------------------------|------------------|-------------------------------------|----------------------------|---------------|
| Natural gas | 57 | 0 | 0 | 11 | 0 | 0 | 0 | 11 |
| Sodium hydroxide | 37 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Carbon monoxide | 22 | 2 | 3 | 76 | 8 | 5 | 1 | 95 |
| Methamphetamine chemicals | 21 | 1 | 2 | 7 | 0 | 1 | 0 | 11 |
| Mixture | 19 | 0 | 0 | 6 | 2 | 0 | 1 | 9 |
| Ammonia | 18 | 0 | 2 | 9 | 0 | 2 | 0 | 13 |
| Sulfuric acid | 18 | 0 | 0 | 7 | 0 | 20 | 0 | 27 |
| Acetone | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Figure 1. Frequency of all toxic substance release events (n=562) by county, North Carolina, 2013-2014

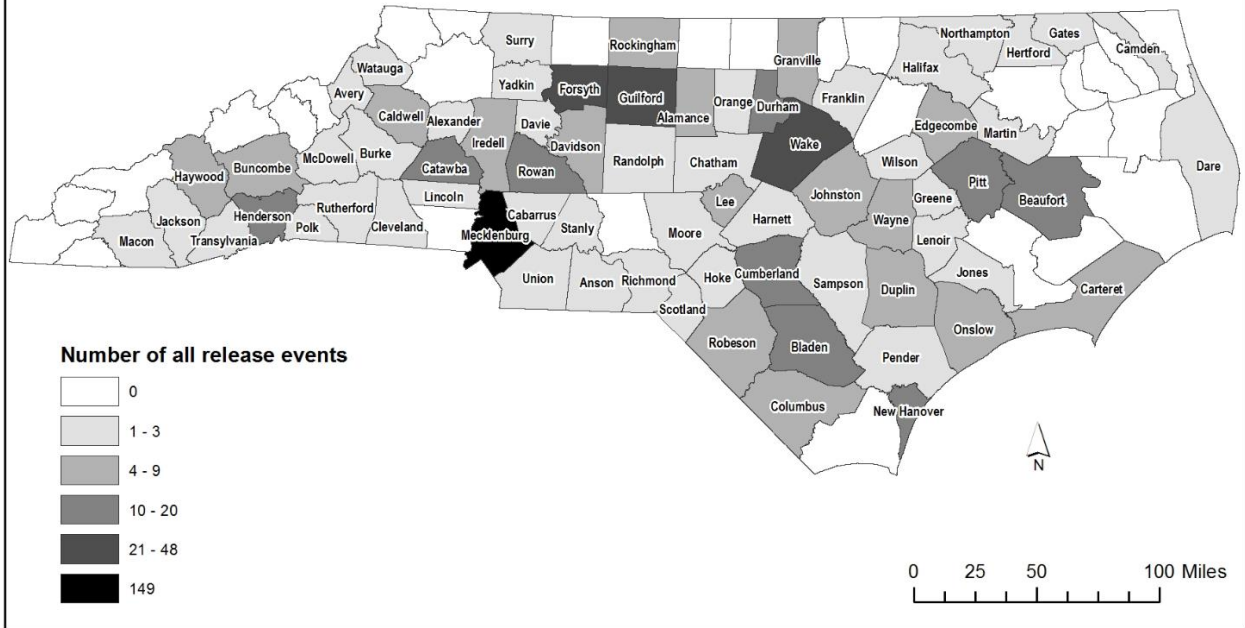


Figure 2. Frequency of natural gas release events (n=57) by county, North Carolina, 2013-2014

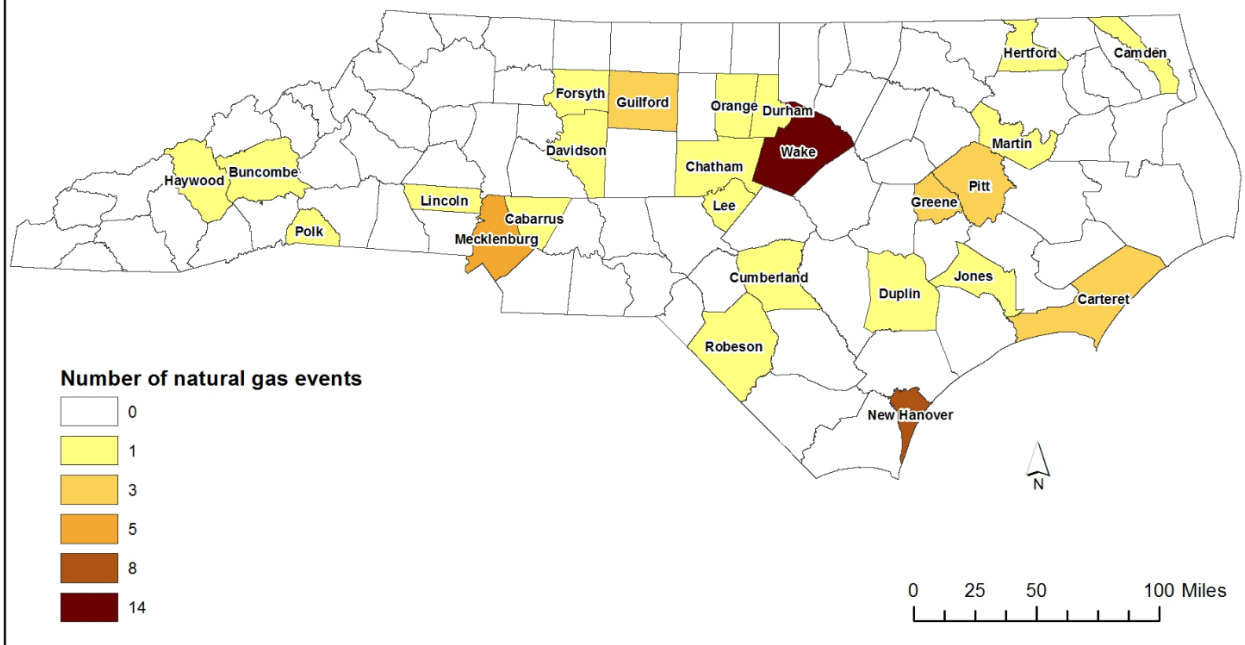


Figure 3. Frequency of sodium hydroxide release events (n=37) by county, North Carolina, 2013-2014

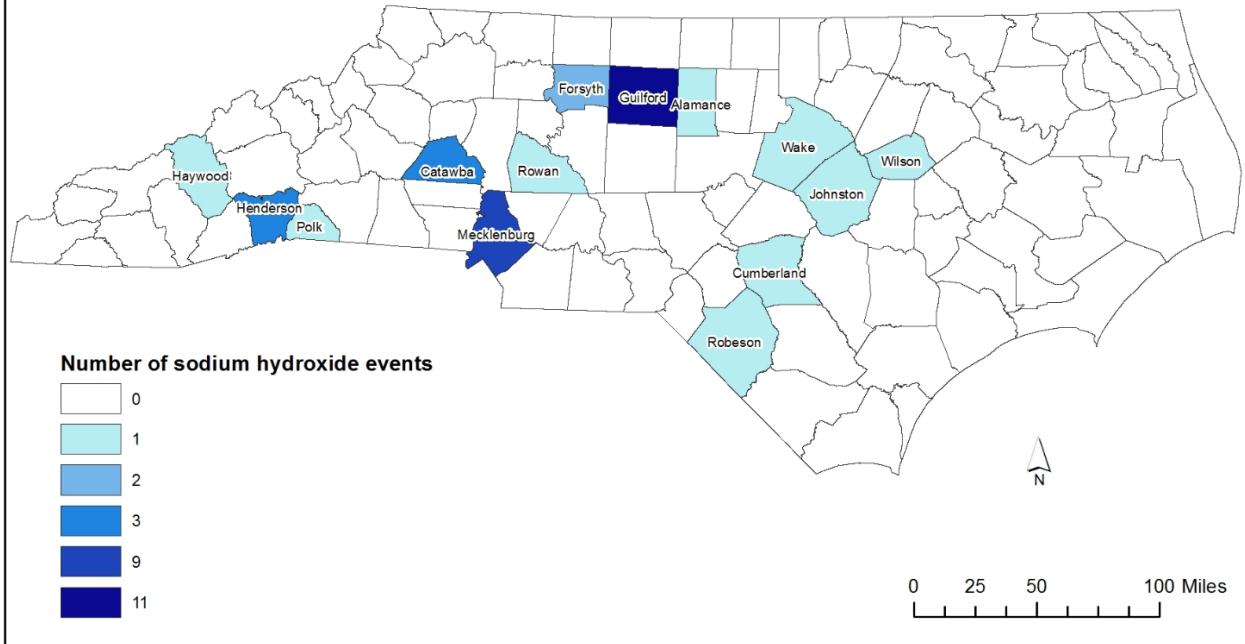


Figure 4. Frequency of carbon monoxide release events (n=22) by county, North Carolina, 2013-2014

