

# **North Carolina's National Toxic Substance Incidents Program (NTSIP)**

## **2015 Summary Report**

**North Carolina Department of Health and Human Services**

**North Carolina Division of Public Health**

**Occupational and Environmental Epidemiology Branch**



## Introduction

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. (For specific NTSIP reporting criteria, refer to the 2010 NTSIP final report available on the ATSDR NTSIP webpage.) This report summarizes surveillance findings for 2015. During 2015, NTSIP captured information on 275 toxic substance releases meeting NTSIP's eligibility criteria.

## Data Source

Toxic substance releases are identified through reports from the National Response Center, the North Carolina Office of Emergency Management, the U.S. Department of Transportation (Hazardous Materials Incidents), local health departments, the media and on-call notifications from the N.C. Public Health Preparedness and Response and Communicable Disease Branches. 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, 2015 through December 31, 2015, North Carolina's NTSIP database captured 275 chemical release incidents, of which 25 (9%) resulted in one or more injuries and 65 (24%) led to an official evacuation (Table 1). Primary notification sources included the Department of Transportation (n=143, 52%), emergency government services (n=67, 24%), and the media (n=36, 13%). Twenty-two (8%) of the spills involved chemical mixtures and five (2%) of the spills resulted in a chemical reaction. One chemical mixture spill resulted in one injury, and two chemical reactions resulted in one or more injury (Table 5). Mecklenburg County had the most releases (n=73, 27%) followed by Forsyth and Wake counties, which both had 18 (7%) releases. See *NTSIP-eligible Releases by County, North Carolina 2015* on page 12 for a map of releases by county.

Toxic substance releases can occur when hazardous materials are transported or can occur at a fixed-facility (i.e. if an event is not transportation-related). For 2015, 148 (54%) of the total number of spills involved transportation, while the number of spills involving a fixed facility

were slightly lower with 127 spills (46%). Of the 148 spills involving transportation, the majority were ground transportation (n=117, 79%), while railway transport and pipeline transport each had 14 (9%) spills. Fifty-eight (39%) of the transportation spills occurred during unloading, 41 (28%) occurred en route and were later discovered at a fixed facility, 18 (12%) were natural gas pipeline ruptures, 16 (11%) occurred from a moving vehicle or vessel, and 13 (9%) occurred from a stationary vehicle. Of the 127 spills involving fixed facilities, 52 (41%) occurred in a material handling area, 25 (20%) occurred in piping, 21 (17%) occurred in an above ground storage area, 21 (17%) occurred in another location within the facility, and 7 (6%) occurred during transportation within the fixed facility (Figure 1).

In 2015, 96 persons were injured as a result of toxic substance release incidents in North Carolina (Table 2), with 25 events (11%) having one or more injury. See page 13 for maps of injuries by county. Respiratory system problems were the most common type of injury reported followed by headache. Respiratory system problems were defined as breathing problems or difficulties, pneumonitis, cough, wheezing, sore throat, throat irritation, and shortness of breath. Ten people were admitted to a hospital, and 76 people were treated at a hospital and not admitted (Table 2). Four people suffered trauma injuries in events that involved NTSIP-eligible chemical releases. However, in all four cases, the trauma was not chemical related and therefore is not included in aggregate victim data. One of the four trauma victims was also exposed to chemicals; the chemical-related injury information is included in the data. There were two reported fatalities. One was a chemical suicide and the other resulted from a motor vehicle accident that caused an unintentional chemical release, though the cause of death was due to trauma and was not chemical-related. Only the chemical suicide death is included in the aggregate victim data.

Of the 96 injured persons, 53 were employees, 30 were members of the general public, 7 were students at school, 5 were police officers and 1 was a firefighter (Figure 2). In 2015, slightly more females (n=56) were injured than males (n=40). Sixteen of the injured persons were children under the age of 18, 34 were young adults ages 18-34, 40 injured people were ages 35-64, and two people were 65 years or older. Four victims ages are unknown (Figure 2). Human error was the primary factor in 183 (67%) of the chemical releases and equipment failure was the primary factor in 74 (27%) spills. Sixty-eight of the primary factors were specified as improper filling, loading, or packing; 43 were due to a loose closure, component or device; and 36 were due to a forklift puncture (Table 3). Ten chemical releases were due to illegal acts. Specifically, eight were illicit drug production related and two were vandalism. One release was due to a natural pocket of methane gas that was inadvertently ignited, two releases were due to bad weather conditions, one was an intentional act, and four events had an unknown primary factor. The majority of chemical releases (n=226) did not have a secondary factor listed, however, 19 releases listed human error as a secondary factor, and 11 listed equipment failure.

Human error was the primary factor for 18 events that resulted in one or more injury, while equipment failure was the primary factor for 4 events that resulted in one or more injury. Twelve spills were non-industry related, occurring at or in a private vehicle or residence, while the majority of spills (n=263) were industry-related. The number of injuries was significantly higher (n=90) for fixed facilities than the number of injuries that occurred during transportation (n=6), even though the total number of fixed facility spills were slightly lower (n=127) than

transportation spills (n=148). Twenty-five chemical releases resulted in one or more injury. In fixed facilities, 20 spills resulted in one or more injury, and for releases involving transportation, 5 spills resulted in one or more injury. Also of interest, while only 12 releases were non-industry related, 14 people were injured due to non-industry related releases. One third of non-industry related chemical spills (n=4) resulted in one or more injury.

Evacuations were ordered for 65 (24%) of the NTSIP eligible releases. Of the 65 evacuations, 44 evacuations reported the length of time the evacuation was in effect. Thirty-four evacuations lasted five hours or fewer, and two evacuations lasted for twenty-four hours or longer. Of the 65 evacuations ordered, 35 involved 50 people or fewer, and three involved more than 500 people (Figure 4). Out of the 65 evacuations, 45 evacuations had no injuries associated with the event and 20 events that had evacuations also had one or more injury. For five NTSIP-eligible releases, there were injuries associated with the release, and there was no evacuation. However, in all five cases, there were three or fewer injuries.

There were 230 NTSIP-eligible incidents with responders. In 45 of the releases, there was no response. Of the 230 incidents with responders, company response teams had the highest number of responses (n=107) followed by fire departments (n=80). Third party clean up contractors responded to 63 events, law enforcement responded to 48 events, EMTs responded to 32 events, certified hazmat teams responded to 31 events, and emergency management responded to 29 events (Table 4). Six responders were injured. One firefighter was treated at the hospital but not admitted and five law enforcement officers were treated at the hospital and admitted.

Most NTSIP-eligible releases occurred during normal business hours. This is unsurprising as most releases were industry related. Specifically, 106 spills occurred during the hours of 6:00am-11:59am and 71 spills occurred during the hours of 12:00pm-5:59pm. Most releases also occurred during the work week, with the most occurring Tuesday, Wednesday, and Thursday. There was no apparent trend for number of releases by month. January, February, and July had the lowest number of releases, while September and October had the highest number of releases (Figure 5).

For 2015, natural gas was involved in the greatest number of NTSIP-eligible releases (n=28) (Table 5). The second most commonly released substance was sodium hydroxide (n=22), followed by hydrogen peroxide (n=13). While natural gas and sodium hydroxide were the most commonly released chemicals, carbon monoxide releases resulted in the highest victim count (n=37). In 2015, out of ten total carbon monoxide releases, nine releases resulted in one or more injury. Three natural gas releases resulted in one or more injury each, and bleach, sulfuric acid, and Petroleum Distillates each had one release that resulted in a high victim count (Table 6). The occurrence of commonly released substance incidents throughout the state are visually depicted on pages 14-15.

### **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 for 2015. Natural gas was also the most commonly

released chemical for both 2013 and 2014. However, carbon monoxide releases resulted in the highest victim count. Toxic substance release incidents often result in evacuations, 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 February 2017, CRIKTs have been developed for 35 chemicals, including all 7 of the chemicals that contributed to the greatest number of releases in 2015. 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 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.

### **References**

National Toxic Substance Incidents Program (NTSIP) Annual Report 2010. 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\\_Annual%20Report\\_031413\\_FINAL.pdf](http://www.atsdr.cdc.gov/ntsip/docs/ATSDR_Annual%20Report_031413_FINAL.pdf).

Toxic Substance Releases in North Carolina—National Toxic Substance Incidents Program, 2013–2014. Department of Health and Human Services, Department of Public Health, Occupational and Environmental and Epidemiology Branch. Available from [http://epi.publichealth.nc.gov/oe/docs/ToxicSubstanceReleasesFullReport\\_2013\\_2014.pdf](http://epi.publichealth.nc.gov/oe/docs/ToxicSubstanceReleasesFullReport_2013_2014.pdf).

Appendix: Tables, Figures, and Maps

Table 1. NTSIP-eligible toxic substance releases information for North Carolina, 2015

NTSIP-eligible releases	Toxic substance releases total	275
	Releases resulting in one or more injuries	25 (9%)
	Releases that led to an official evacuation	65 (24%)
Type of release	Fixed-facility releases	127 (46%)
	Transportation releases	148 (54%)
Chemical-related fatalities	Chemical suicide	1
Primary notification source	Department of Transportation	143 (52%)
	Emergency Government Services	67 (24%)
	Media	36 (13%)
	National Response Center	23 (8%)
	Other Government Services	6 (2%)

Table 2. Number, type, and severity of injuries that resulted from NTSIP-eligible toxic substance releases, North Carolina, 2015

Injury type <sup>a</sup>		Severity of injury <sup>a</sup>	
Respiratory system problems	41 (43%)	Death on scene or on arrival at hospital	1 (1%)
Headache	35 (36%)	Treated at hospital (admitted)	10 (10%)
Gastrointestinal problems	34 (35%)	Treated at hospital (not admitted)	76 (79%)
Dizziness or other CNS symptoms	29 (30%)	Treated on scene (first aid)	9 (9%)
Heart problems	22 (23%)	<b>Number of injuries sustained by each victim<sup>a</sup></b>	
Eye irritation	6 (6%)	One injury	46 (48%)
Shortness of breath	4 (4%)	Two injuries	29 (30%)
Skin irritation	2 (2%)	Three injuries	11 (11%)
Chemical Burns	2 (2%)	Four injuries	7 (7%)
Heat Stress	1 (1%)	Five injuries	2 (2%)
<b>Total injuries: 176</b>			
<b>Total injured persons: 96</b>			
<sup>a</sup> Non-chemical related injuries were not included; percentages are out of total injured persons (n=96)			

	Human Error	Equipment Failure
Improper loading, filling, or packing	65 (23%)	3 (1%)
Loose Closure, Component or Device	29 (11%)	14 (5%)
Forklift Puncture	36 (13%)	0 (0%)
Ruptured Pipeline	18 (7%)	6 (2%)
Other	2 (0.7%) <sup>b</sup>	0 (0%)
Valve Failure	1 (0.4%)	18 (7%)
System or process upset	5 (2%)	8 (3%)
Aging Machinery	1 (0.4%)	7 (3%)
Defective Equipment	0% (0%)	7 (3%)
Impact with sharp or protruding object	4 (1%)	2 (0.7%)
Vehicle or vessel collision	5 (2%)	0 (0%)
Vehicle derailment, rollover or capsize	4 (1%)	0 (0%)
Performing maintenance	1 (0.4%)	2 (0.7%)
Load shift	2 (0.7%)	1 (0.4%)
Improper mixing	3 (1%)	0 (0%)
Improper ventilation	3 (1%)	1 (0.4%)
Power failure or electrical problem	0 (0%)	2 (0.7%)
Unauthorized or improper dumping	2 (0.7%)	0 (0%)
Extreme heat	0 (0%)	1 (0.4%)
System start up and shutdown	1 (0.4%)	1 (0.4%)
Overspray or misapplication	1 (0.4%)	0 (0%)
Primary factor not specified	0 (0%)	1 (0.4%)
<b>Total</b>	<b>183 (67%)</b>	<b>74 (27%)</b>

<sup>a</sup> Percentages are out of total number of chemical releases (n=275) <sup>b</sup> improper PPE and broken thermometer

Type of Response	Number of Responses <sup>a</sup>	Responder injuries
Company's response teams	107 (39%)	
Fire department	80 (29%)	1 (17%)
Third party clean-up contractor	63 (23%)	
Law enforcement	48 (17%)	5 (83%)
EMTs	32 (12%)	
Certified hazmat teams	31 (11%)	
Emergency management	29 (11%)	
Dept. of works, utilities, transportation (includes Coast Guard)	16 (6%)	
Other	6 (2%)	
Environmental agency or EPA	5 (2%)	
Health department or agency	2 (0.7%)	
Specialized multi-agency team	2 (0.7%)	
<b>Total</b>	<b>421</b>	<b>6</b>
No Response	45 (16%)	
Total incidences	275	

<sup>a</sup> Percentages are out of total number of chemical releases (n=275); 87 events had more than one response

Table 5. Chemicals that contributed to  $\geq 10$  NTSIP-eligible toxic substance releases, North Carolina, 2015

Chemical <sup>1</sup>	Releases	Treated at hospital (admitted)	Treated at hospital (not admitted)	Treated on scene	Severity of injury unknown	Total victims
Natural gas	28	3	4	8	0	13
Sodium Hydroxide	22	0	2	0	0	1
Hydrogen Peroxide	13	0	0	0	0	0
Sulfuric Acid	13	0	10	0	0	10
Acetone	12	1	1	0	0	2
Ammonia	10	0	0	0	0	0
Carbon Monoxide	10	5	31	0	1	37

<sup>1</sup> Chemicals that were released as a mixture or reaction are also included as part of this table

Table 6. NTSIP-eligible chemical releases contributing to injuries and corresponding number of evacuations in 2015

Chemical	Total number of releases	Releases with one or more victim	Total number of victims	Evacuations
Carbon monoxide	10	9	37	8
Natural gas	28	3	13	23
Bleach	1	1	12	1
Sulfuric Acid	12	1	9	3
Mixture: Bleach, Sulfuric Acid	1	1	1	1
Petroleum Distillates	2	1	9	2
Chlorine Dioxide <sup>1</sup>	1	1	5	1
Liquefied Petroleum Gas	1	1	2	1
Methenamine	1	1	1	0
Acetone	12	1	2	2
Hydrogen Cyanide Gas <sup>2</sup>	1	1	1	1
Nitrous Oxide	2	1	1	2
Diesel fuel	1	1	1	1
Hydrogen sulfide	1	1	1	1
Sodium Hydroxide	22	1	1	2

<sup>1</sup> Reaction: Hydrochloric Acid, and Sodium Chlorite  
<sup>2</sup> Reaction: Hydrochloric Acid, Oxalic Acid, Phenylhydrazine, Potassium Ferrocyanide, and Sodium Hydroxide

Figure 1. Phases of transportation and areas involved in NTSIP eligible releases in 2015

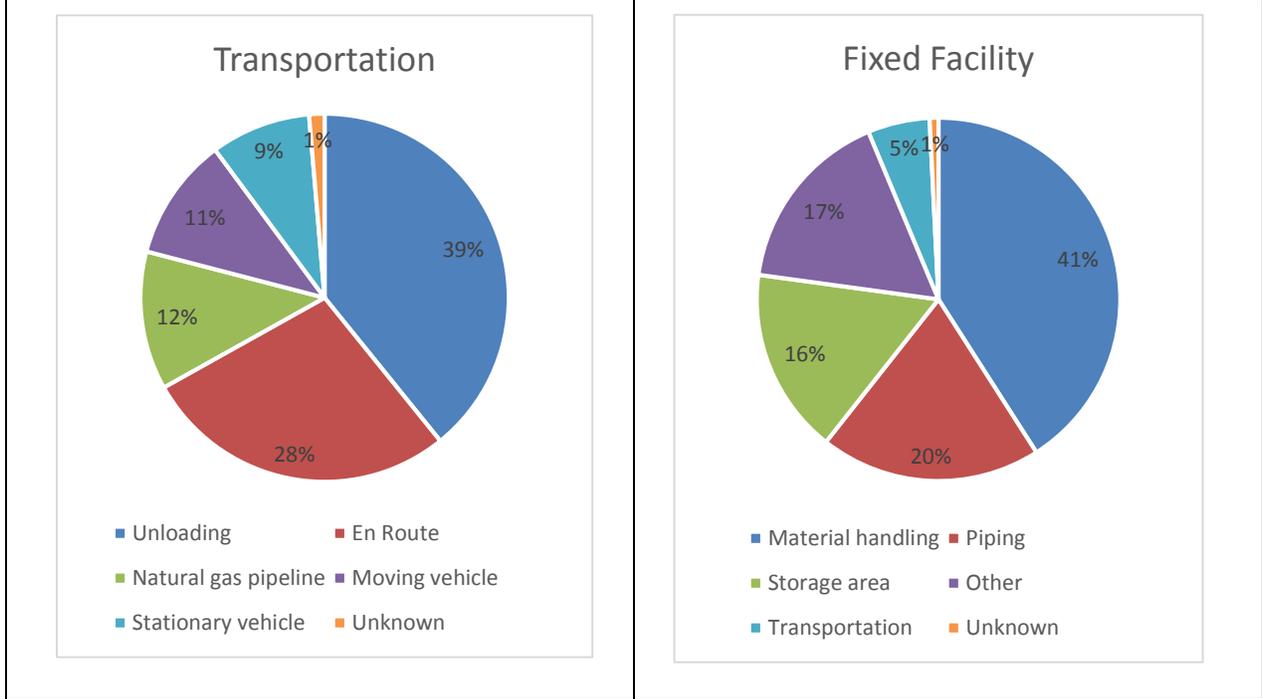


Figure 2. Victim Role and Age Distribution

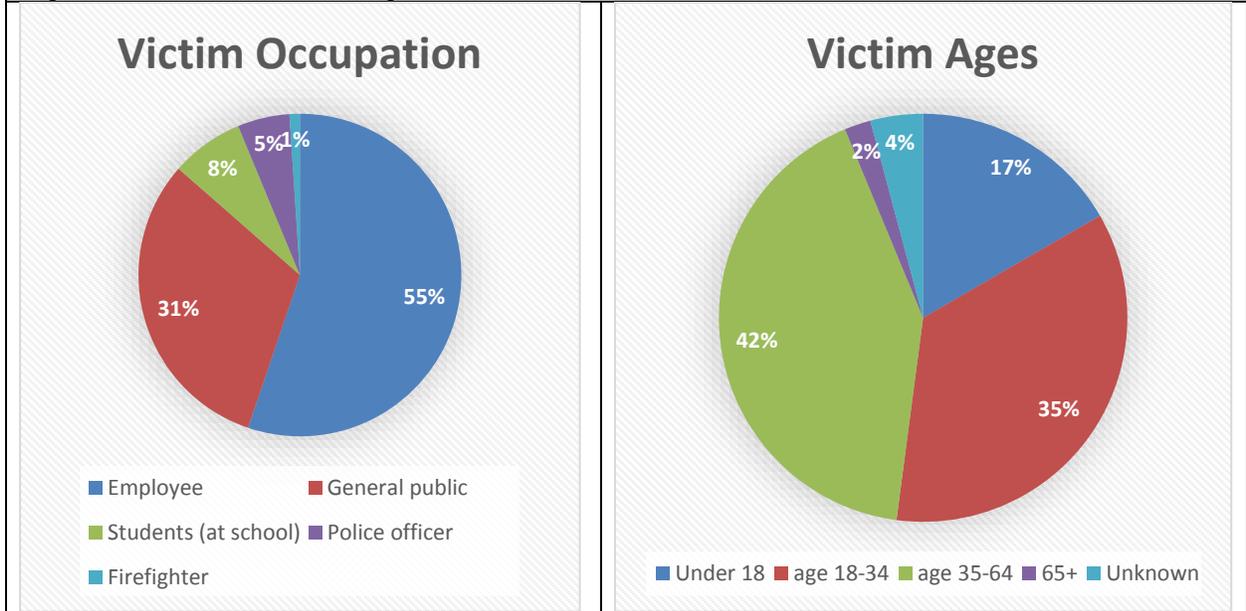


Figure 3. Event and injury totals comparing transportation and fixed facilities events and industry related releases versus private vehicle or residence

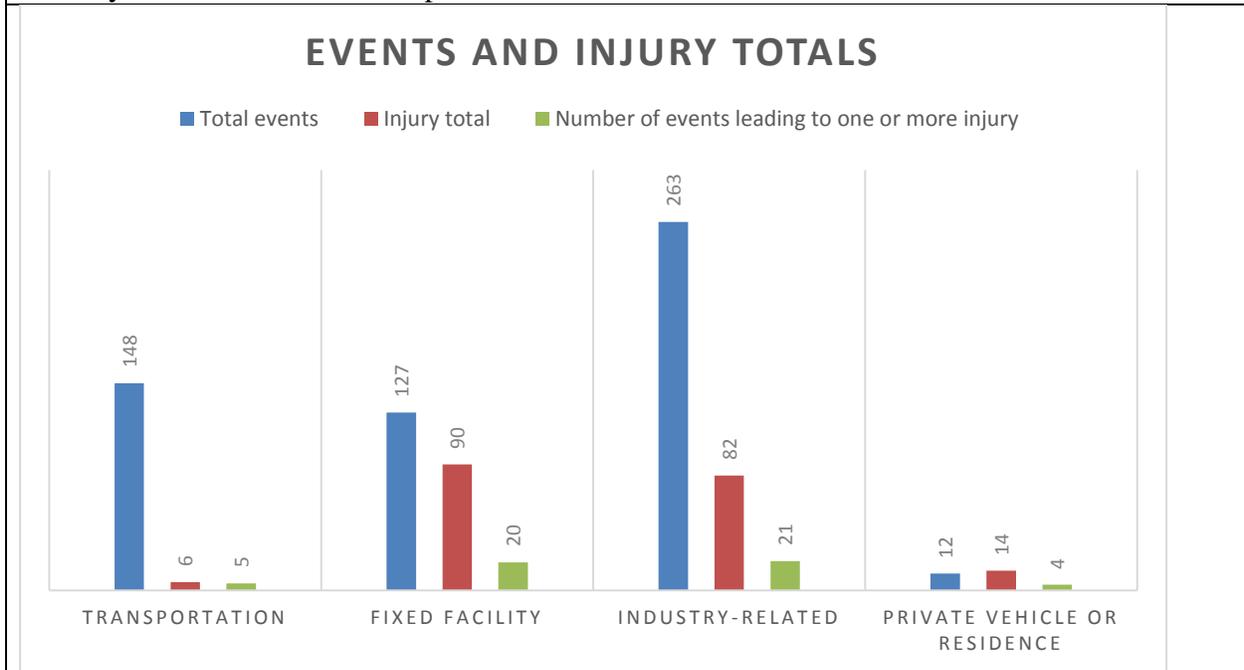


Figure 4. Evacuations after NTSIP-eligible toxic substance releases, North Carolina, 2015

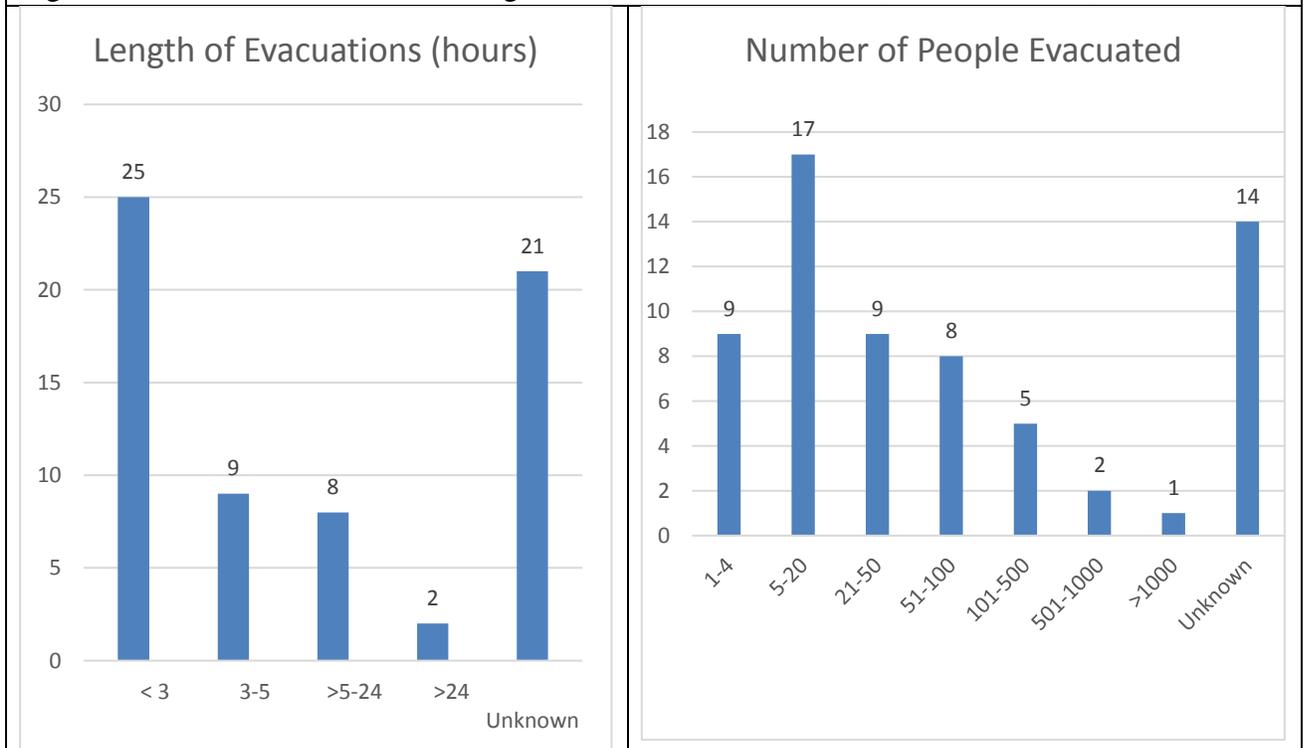
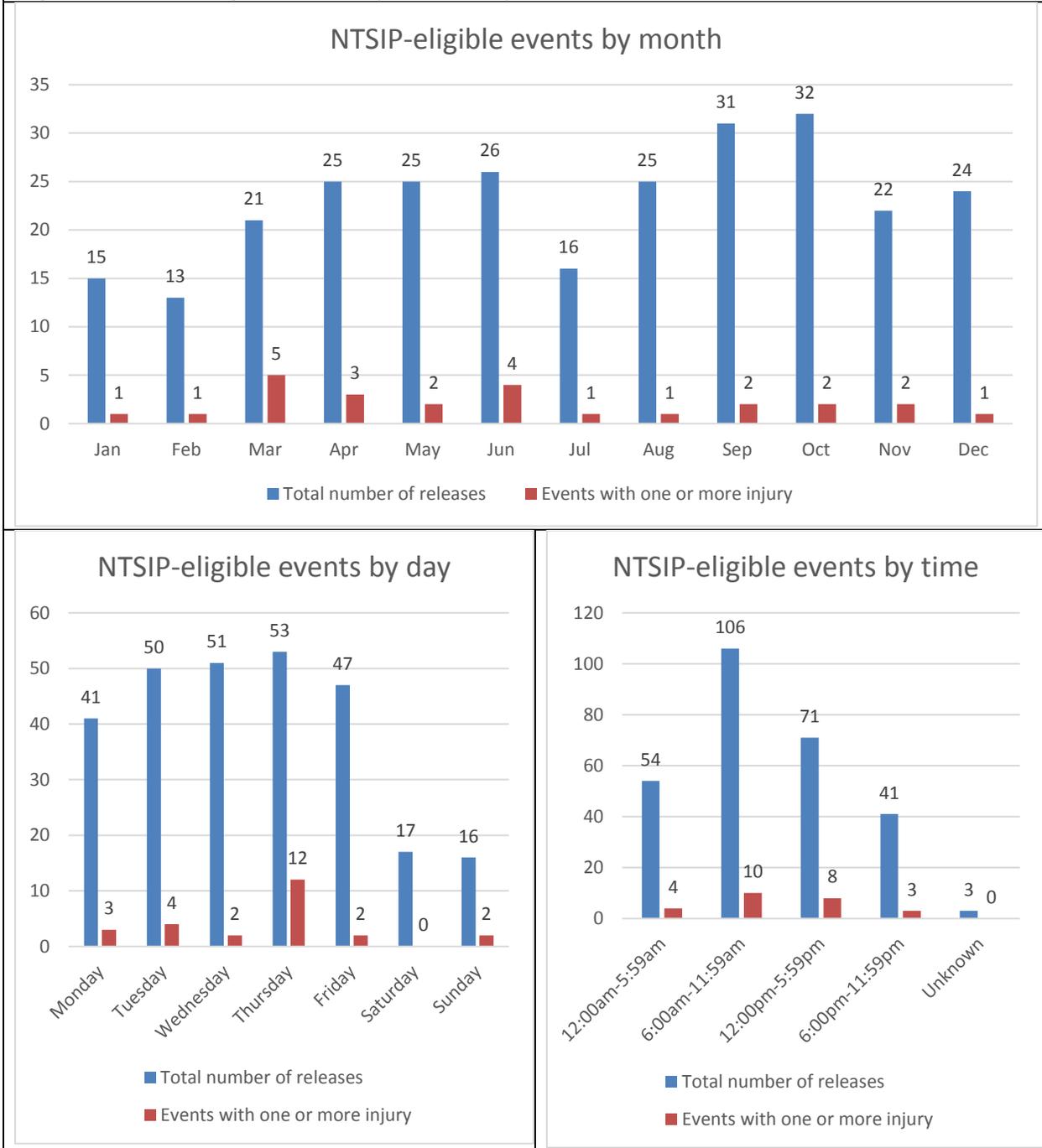
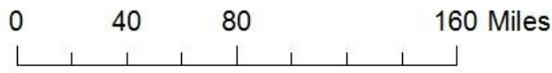
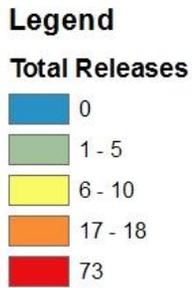
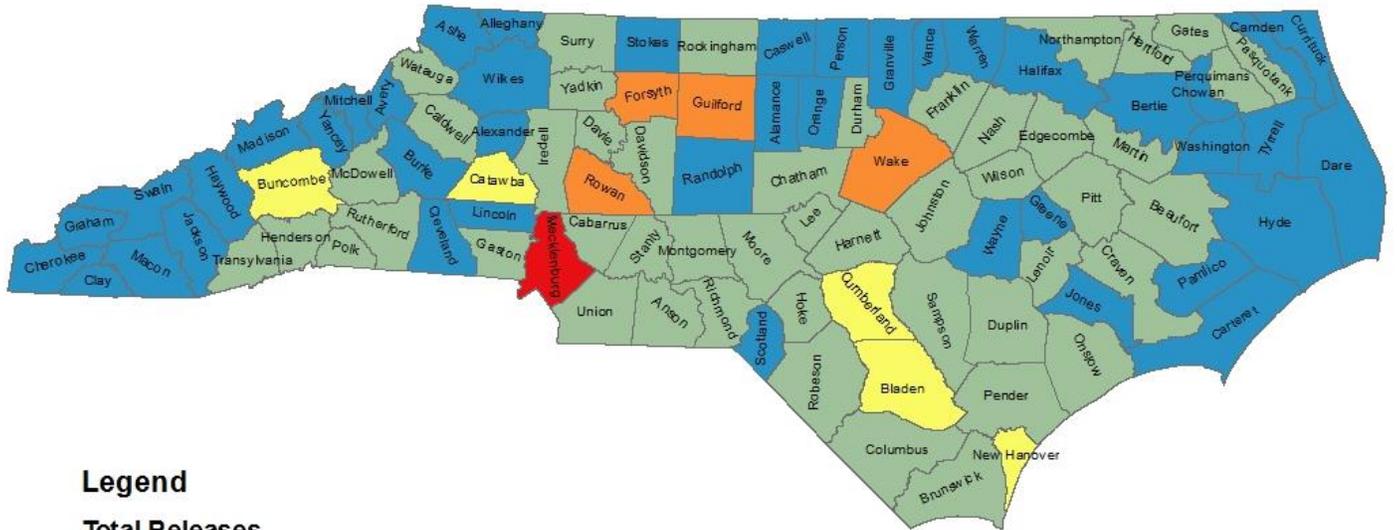


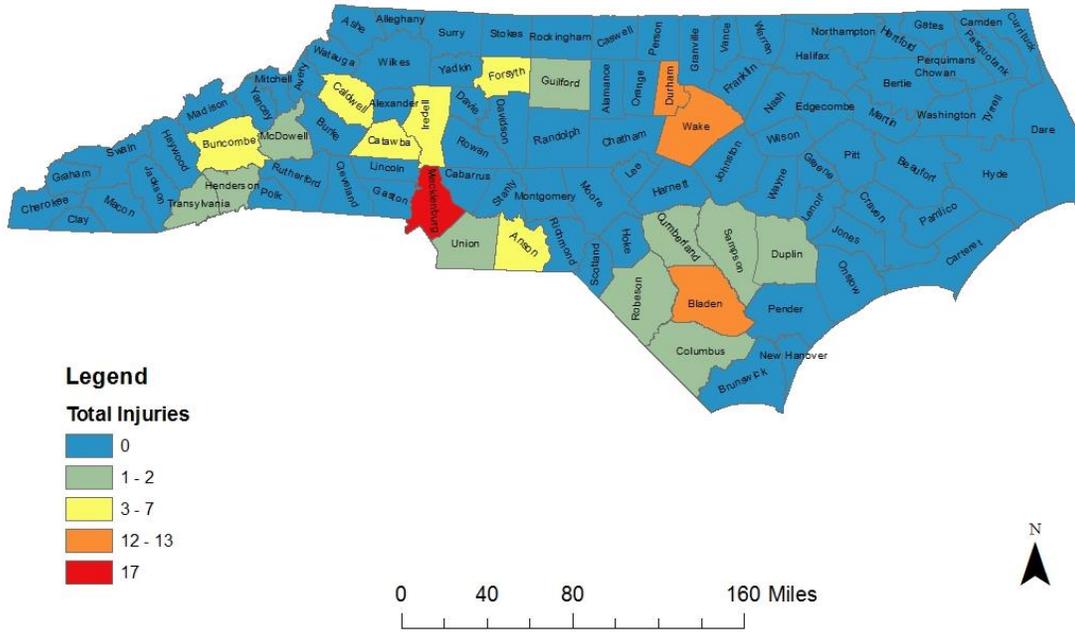
Figure 5. NTSIP-eligible events by month, day, and time of occurrence



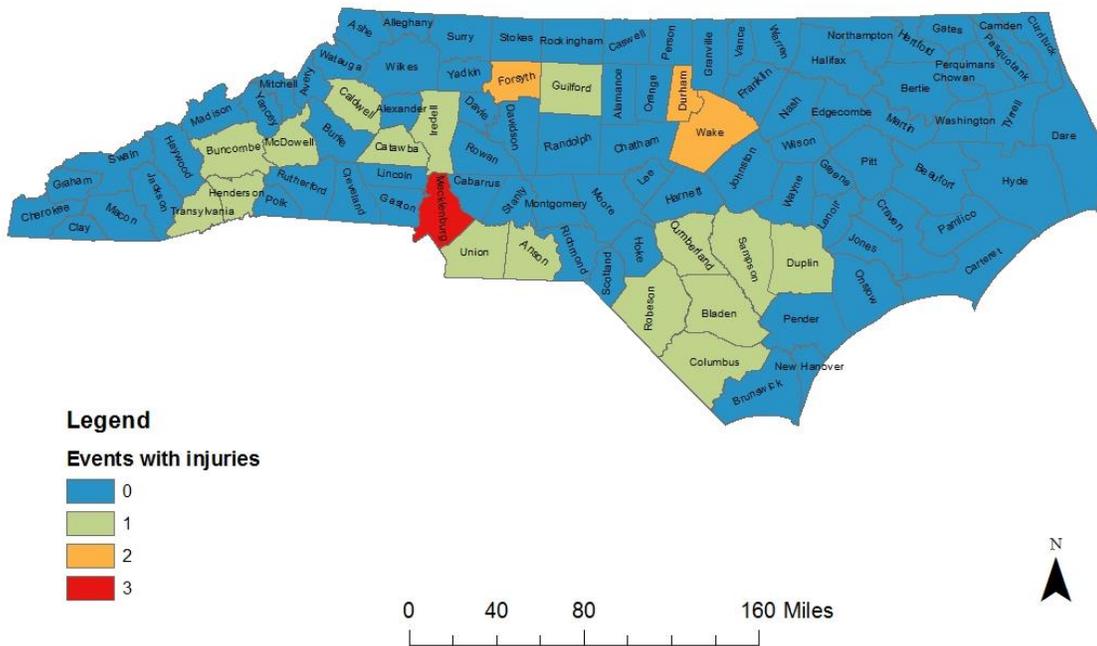
# NTSIP-eligible Releases by County, North Carolina 2015



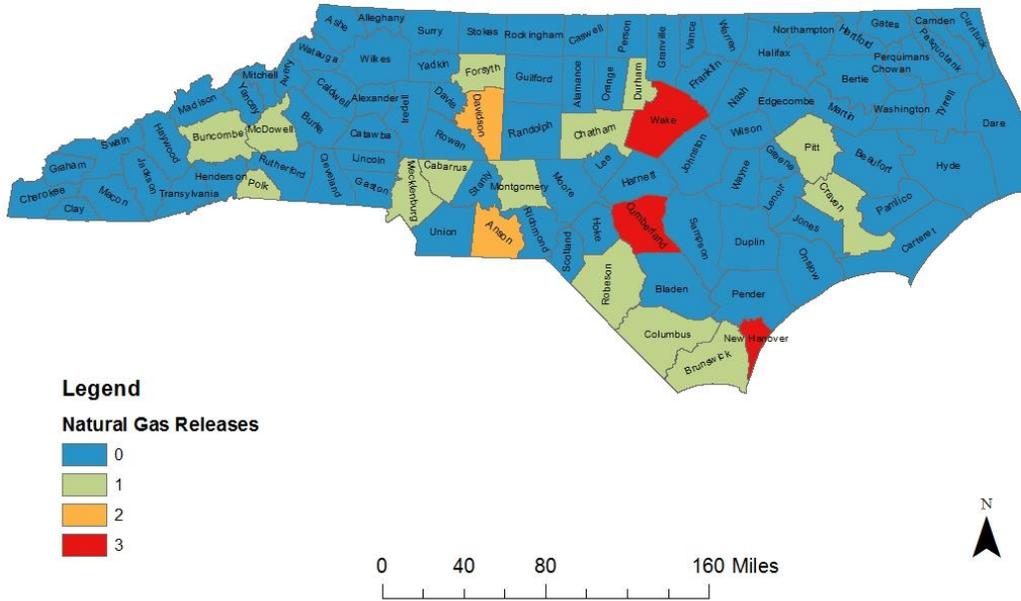
## Total Number of Injuries for NTSIP-eligible Releases by County, North Carolina 2015



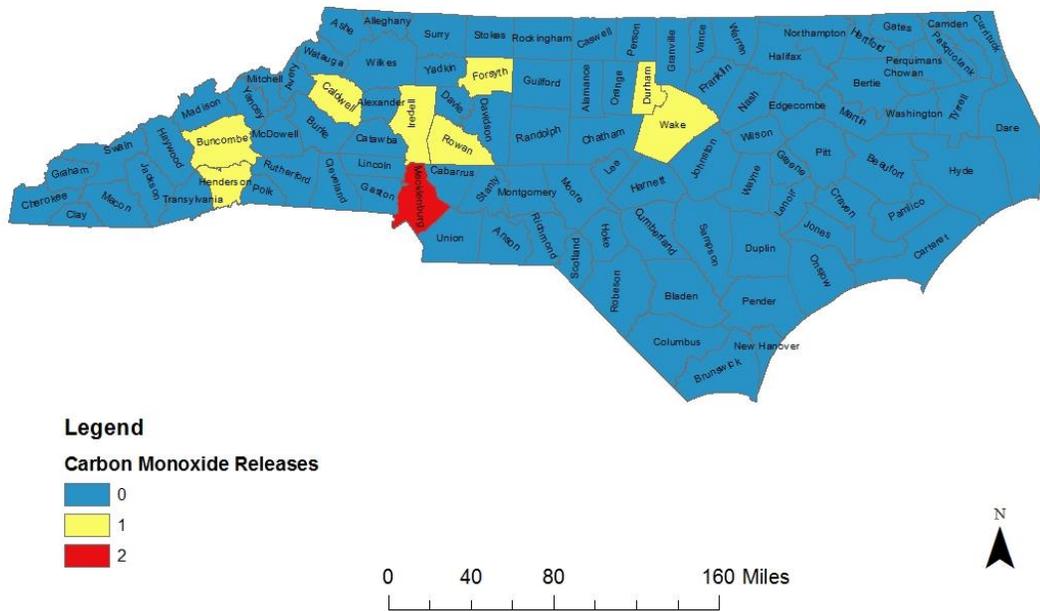
## NTSIP-eligible Releases Resulting in One or More Injury by County, North Carolina 2015



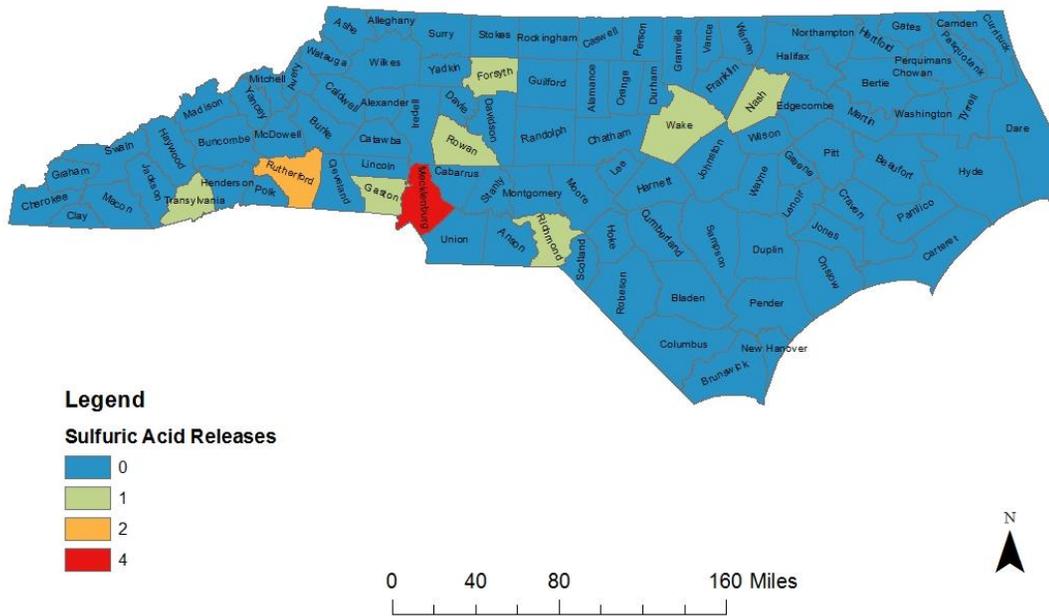
### Total Number of Natural Gas Releases by County Captured by NTSIP, North Carolina 2015



### Total Number of Carbon Monoxide Releases by County Captured by NTSIP, North Carolina 2015



Total Number of Sulfuric Acid Releases by County Captured by NTSIP, North Carolina 2015



Total Number of Sodium Hydroxide Releases by County Captured by NTSIP, North Carolina 2015

