

# Hazardous Substances Emergency Events Surveillance in Michigan: 2015

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## SUMMARY

This report summarizes the characteristics of hazardous substances emergency events reported to the Michigan Department of Health and Human Services (MDHHS) for 2015. The Hazardous Substances Emergency Events Surveillance system (HSEES) was established in Michigan in 2004 with funding from the Agency for Toxic Substances and Disease Registry (ATSDR). This multi-state program followed standardized protocols and definitions for collection and compilation of hazardous substances release events. In late 2009, ATSDR funded a new surveillance program for hazardous substances releases modeled on HSEES, titled the National Toxic Substance Incidents Program (NTSIP), and funded 7 states, not including Michigan. The Michigan HSEES system was continued without ATSDR support. Then in 2014, the NTSIP database for tracking releases in Michigan was unavailable and a modified database was developed to record the incidents.

Releases tracked by states in the HSEES/NTSIP system include uncontrolled or illegal acute releases of any hazardous substance (except petroleum when petroleum is the only substance released). Some substances require a threshold minimum amount released in order to be included. Information collected about these events includes the substance(s) released, number of victims, number and types of injuries, and number of evacuations. Reports of releases come from a

variety of sources, primarily from the media and other state and federal agencies that are mandated to receive reports from industry and the public.

Because of resource constraints, beginning in 2010, the Michigan HSEES program limited the types of events included in its system to include for the most part only those that involved an agency response (e.g. hazmat, public health) and an injury, exposure, or evacuation.

A total of 90 reported events met MDHHS criteria for inclusion in 2015. Seventy-two of the events occurred at fixed facilities and the remainder were associated with transportation. The most commonly reported substances were natural gas/propane and gasoline, 90 (100%) of the events involved an injury, evacuation or shelter-in-place. Forty-seven of the events resulted in an injury. There were 4 fatalities reported.

## INTRODUCTION

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) has supported and maintained a state-based surveillance system through cooperative agreements with state health departments to describe the public health consequences of releases of hazardous substances. The system was titled "Hazardous Substances Emergency Events Surveillance" or HSEES until 2009, and then ATSDR funded a new surveillance program for hazardous substances releases modeled on HSEES, titled the National Toxic Substance Incidents Program (NTSIP), which involved collection of national data and data from seven participating states.

In October, 2004 the Michigan Department of Community Health (currently MDHHS) was funded to establish HSEES in Michigan, joining 13 other states. It was not funded for NTSIP. However, as an unfunded state, Michigan used the NTSIP database for tracking releases in Michigan, but did not follow all of the NTSIP protocols. Then in 2014, the NTSIP database for tracking releases in Michigan was unavailable and a modified database was developed to record the incidents.

The name of the Michigan system did not change with the change in the national program; it is still MI-HSEES.

The purpose of the national HSEES/NTSIP system has been to describe the public health consequences of releases of hazardous substances, with the goal being to reduce injury and illness from acute hazardous substance releases by linking the data to prevention programs. The objectives of the surveillance systems in Michigan and nationally are:

- To describe the distribution of hazardous substances emergencies within the participating states, and nationally.
- To describe the types and causes of morbidity and mortality experienced by employees, responders, and the general public as a result of hazardous substances emergencies.
- To analyze and describe risk factors associated with morbidity and mortality.
- To develop strategies to reduce subsequent morbidity and mortality when comparable events occur in the future.

This report summarizes the characteristics of hazardous substance releases and their associated public health consequences of events that occurred in 2015 in Michigan. The appendices include additional details about the data, and a brief narrative of each of the events.

Annual reports for MI-HSEES starting with 2005 can be found at [http://www.michigan.gov/mdhhs/0,5885,7-339-71548\\_54783\\_54784-110654--,00.html](http://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784-110654--,00.html) (A report for 2009 was not done because of the mid-year change in funding and event definitions.)

## METHODS

The general definition of a HSEES event in Michigan, which is shared with the national NTSIP program is: “An uncontrolled or illegal acute release of a toxic substance.”

Beginning in 2010, MI-HSEES altered the specific definition of a release from the definition used in the earlier MI-HSEES system and the current definition used by ATSDR funded states for NTSIP in several ways, because of resource constraints. In order to be included as an event in Michigan the released chemical must have resulted in some kind of agency response (e.g. hazmat, fire, public health). In addition, it must have resulted in a human exposure, a human injury, an evacuation or a shelter-in-place. These events are included regardless of the amount of the chemical released. Second, all carbon monoxide releases/injuries are excluded, regardless of agency response, because they are being tracked in another public health surveillance system<sup>1</sup>. Finally, since 2010 MI-HSEES has been collecting information about natural gas/propane releases/explosions that result in injuries and evacuations.

Various sources are used to identify and obtain information about HSEES-eligible events in Michigan. These include reports to the National Response Center (NRC)<sup>2</sup>, the Federal Department of Transportation, the Michigan Department of Environmental Quality (DEQ), the Michigan Department of Agriculture and Rural Development, the Michigan State Police, the media, and others.

Information collected on Michigan HSEES events includes the following, when available:

- Type of event: Events are classified according to whether they occur at fixed facilities or during transportation. Fixed-facility events involve hazardous substances released at industrial sites, schools, farms, or other permanent facilities. Transportation-related events involve hazardous materials released during transport by surface, air, or water. The type of area or equipment within fixed facilities involved in the release is also recorded (e.g., piping, storage tank, and laboratory).
- Event location: The location of the event is identified by city or township and county of occurrence.
- Substance(s) released: Released substances are identified by chemical name or chemical category. Chemical constituents of brand name products are ascertained.
- Causes: A primary or root cause of the release is assigned (e.g., human error, equipment failure, bad weather).
- Victim(s): The number of individuals injured in the event is noted. Also recorded are the type(s) of injuries, and the severity of medical outcome.
- Evacuations or sheltering-in-place are recorded

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<sup>1</sup> <http://www.oem.msu.edu/AnnualReports.aspx>

<sup>2</sup> The NRC is the single portal for mandatory reporting of hazardous spills and releases to 16 federal agencies. See: <http://www.nrc.uscg.mil/>

Because of loss of funding, Michigan HSEES stopped conducting follow-up interviews to complete data fields where information was missing in the initial report.

## RESULTS

For 2015, 90 hazardous substance emergency events in Michigan were included in the Michigan MI-HSEES data set. The counties with the most frequent number of events were Wayne with 12 (13.3%) events and Oakland, Ottawa and Kent each with 6 (6.7%). A complete list of counties and event frequencies can be found in Appendix 1.

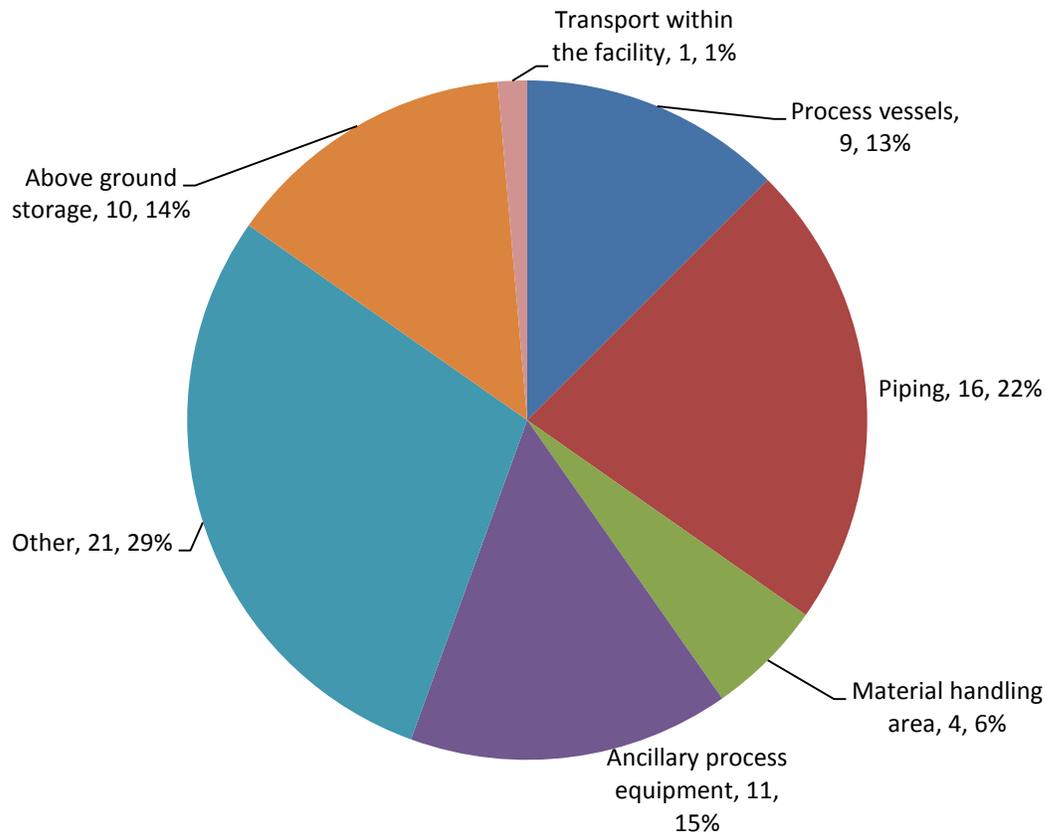
### Facility type

A total of 72 (80%) events occurred in fixed facilities.

The locations for the 72 (80%) events where an area was identified included; piping 16 (16.7%), materials handling area 4 (4.1%), ancillary process equipment 11 (11.5%), above ground storage 10 (10.4%), transport within the facility 1 (1.0%) and other 21 (21.9%). (Figure 1)

Of the 18 (20.0%) transportation events, 7 (38.9%) occurred during ground transport, and 8 (44.4%) by pipeline, 3(16.7%) by water.

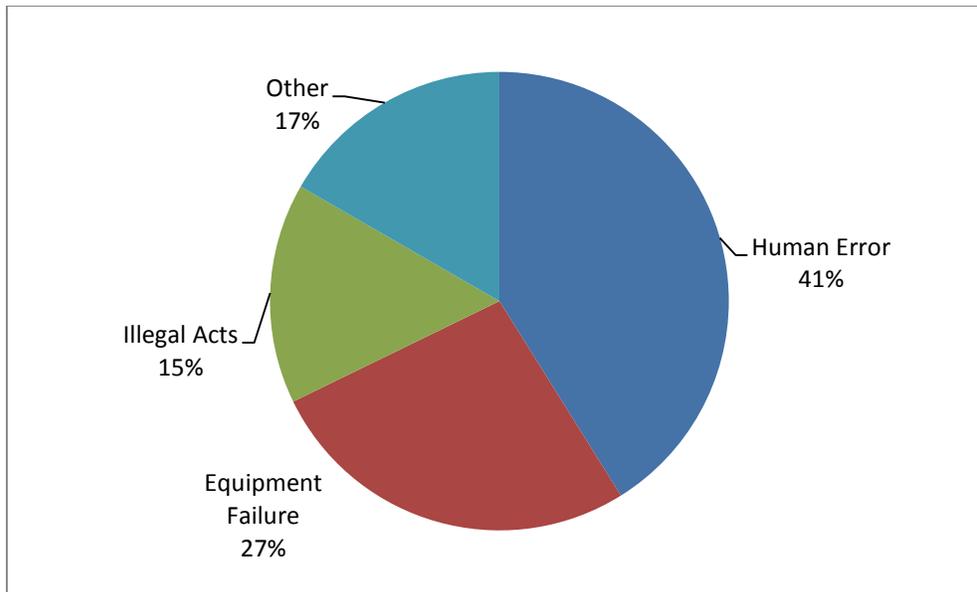
**Figure 1 – Distribution of fixed facility related events, (N=72) - Michigan HSEES 2015.**



## Causes of events

Primary or root cause factors were reported in all 90 events. Of the reported primary factors, human error, 37 (41.1%), and equipment failure, 24 (26.7%) accounted for most of the factors. For transportation incidents human error, 12 (63.2%), were responsible for the most incidents (Figure 2 and Table 1)

**Figure 2 - Primary Causes of Events - Michigan HSEES 2015 (N=90).**



**Table 1 – Primary factors associated with events by event type – Michigan HSEES 2015.**

Primary Factor	Event Type					
	Fixed Facility*		Transportation		All Events	
	Number of Events	%	Number of Events	%	Number of Events	%
Human Error	25	35.2	12	63.2	37	41.1
Equipment Failure	19	26.8	5	26.3	24	26.7
Illegal Act	14	19.7	0	0	14	15.6
Other	13	18.3	2	10.5	15	16.7
<b>Total</b>	<b>71</b>		<b>19</b>		<b>90</b>	

## Substances

A total of 25 substances were associated with the 90 events. The substances that were released in more than one event and the numbers of events for each of these are listed in Table 2. The list of all 25 substances/mixtures released is provided in Appendix 2.

**Table 2 - Substances/mixtures involved released in more than one event - Michigan HSEES 2015**

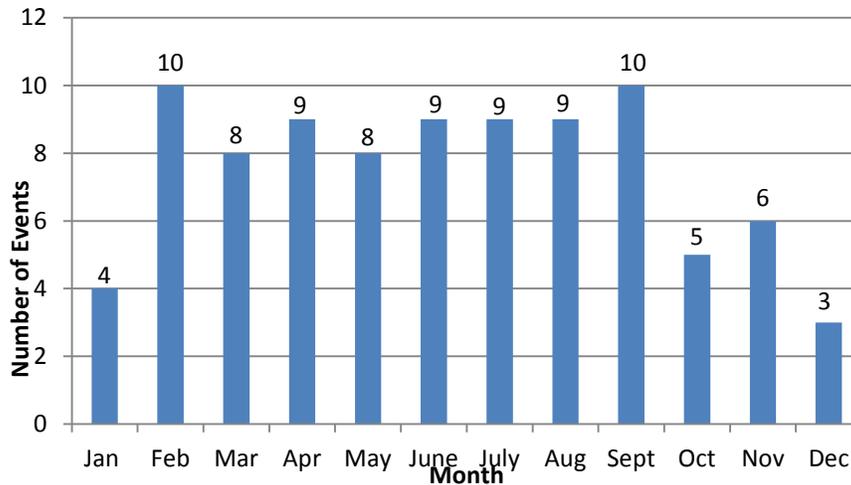
Substance	Number of times released
Natural Gas or Propane	29
Gasoline	12
Methamphetamine chemicals	9
Black powder including fireworks	8
Chemical NOS*	8
Mercury	3
Hash Oil	2
Flammable NOS*	2

\*NOS – Not Otherwise Specified

## Time of release

The number of events by month ranged from 10 (11.1%) in January and September to 3 (3.3%) in December. (Figure 3)

**Figure 3 – Month distribution of events - Michigan HSEES 2015.**



## Victims

Eighty-six victims were reported in 47 events (52.2% of the 90 events) (Table 3). Of the 47 events with victims, 32 (68.1%) involved only one victim, 8(17.0%) involved two victims, 3 (6.4%) had three victims, and 4 (8.5%) had four or more victims. Of all victims, 60 (69.8%) were injured in fixed facility events (Table 3).

**Table 3 - Number of victims per event, by type of events - Michigan HSEES 2015.**

Number of Victims	Type of event						All Events		
	Fixed Facility			Transportation					
	No. of Events	%	Total Victims	No. of Events	%	Total Victims	No. of Events	%	Total Victims
1	26	68.4	26	6	66.7	6	32	68.1	32
2	6	15.8	12	2	22.2	4	8	17.0	16
3	3	7.9	9	0	0	0	3	6.4	9
≥4	3	7.9	13	1	11.1	16	4	8.5	29
Total	38		60	9		26	47		86

## Fatalities

Among the 86 victims there were 4 (4.8%) fatalities. Of the fatalities 1 was from a propane explosion, 1 was from fireworks, 1 was from a flammable chemical not otherwise specified and 1 was from a traffic accident that resulted in a fire from fireworks in transit.

## Appendix 1 – Events by county – Michigan HSEES, 2015

County	Event Type				Total	
	Fixed Facility		Transportation		All Events	
	Number	%	Number	%	Number	%
Allegan	2	2.8	0	0	2	2.2
Antrim	1	1.4	0	0	1	1.1
Berrien	1	1.4	1	5.6	2	2.2
Branch	1	1.4	0	0	1	1.1
Calhoun	3	4.2	1	5.6	4	4.4
Cheboygan	1	1.4	0	0	1	1.1
Eaton	2	2.8	0	0	2	2.2
Genesee	5	6.9	2	11.1	7	7.8
Grand Traverse	1	1.4	0	0	1	1.1
Huron	1	1.4	0	0	1	1.1
Ingham	3	4.2	2	11.1	5	5.6
Ionia	1	1.4	0	0	1	1.1
Isabella	0	0	1	5.6	1	1.1
Jackson	2	2.8	0	0	2	2.2
Kalamazoo	3	4.2	1	5.6	4	4.4
Kalkaska	1	1.4	0	0	1	1.1
Kent	6	8.3	0	0	6	6.7
Lapeer	1	1.4	0	0	1	1.1
Livingston	0	0	1	5.6	1	1.1
Macomb	4	5.6	1	5.6	5	5.6
Mason	1	1.4	0	0	1	1.1
Montcalm	0	0	1	5.6	1	1.1
Montmorency	1	1.4	0	0	1	1.1
Muskegon	2	2.8	0	0	2	2.2
Oakland	6	8.3	0	0	6	6.7
Osceola	0	0	1	5.6	1	1.1
Oscoda	1	1.4	1	5.6	2	2.2
Ottawa	5	6.9	1	5.6	6	6.7
Roscommon	1	1.4	0	0	1	1.1
Saginaw	2	2.8	0	0	2	2.2
Sanilac	1	1.4	0	0	1	1.1
Shiawassee	1	1.4	0	0	1	1.1
St. Clair	1	1.4	0	0	1	1.1
Washtenaw	2	2.8	1	5.6	3	3.3
Wayne	9	12.5	3	16.7	12	13.3
<b>Total</b>	<b>72</b>		<b>18</b>		<b>90</b>	

**Appendix 2 – Complete list of substances released and frequencies  
– Michigan HSEES, 2015**

<b>Chemical Name</b>	<b>Number of Events</b>	<b>Percent</b>
Natural Gas or Propane	29	32.2
Gasoline	12	13.3
Methamphetamine chemicals	9	10
Black powder including fireworks	8	8.9
Chemical NOS*	8	8.9
Mercury	3	3.3
Hash Oil	2	2.2
Flammable NOS*	2	2.2
Ammonia	1	1.1
Chlorine	1	1.1
Compressed air	1	1.1
Crude Oil	1	1.1
Explosive NOS*	1	1.1
Formic Acid	1	1.1
Hydrochloric acid	1	1.1
Hydrofluoric acid	1	1.1
Hydrofluorosilicic acid	1	1.1
Isopropyl alcohol	1	1.1
Kerosene	1	1.1
Liquid Nitrogen	1	1.1
Nitric Acid	1	1.1
Oxidizer NOS*	1	1.1
Pepper spray	1	1.1
Phosphoric acid	1	1.1
Tannerite	1	1.1
<b>Total</b>	<b>90</b>	

\*NOS – Not Otherwise Specified

### **Appendix 3- Events - Michigan HSEES, 2015**

**MI20150001** - During a snow storm, 193 vehicles were involved in an accident. A formic acid tanker and a large semi-trailer of fireworks caught on fire. There was one fatality and 16 injuries.

**MI20150002** - A homeowner was injured by a natural gas explosion.

**MI20150003** - Gasoline vapors resulting from auto repair activities ignited in a garage collapsing three walls of the garage. The resident was in close proximity to the explosion but was not injured.

**MI20150004** - Gasoline was mixed in a kerosene storage tank at a retail store. The kerosene was used inside a home for heating and exploded, injuring one. There were two other fires possibly related; one in a home and the other in a garage.

**MI20150005** - A methamphetamine lab caused a fire in a home resulting in four injuries.

**MI20150006** - A natural gas main broke for unknown causes releasing gas resulting in an evacuation of 4 homes. A resident fell when evacuating and was hospitalized.

**MI20150007** - An explosion occurred in a boiler room in a school blowing out the boiler room walls. There were no reports of injuries.

**MI20150008** – A rail car flange was not secured causing a spill that resulted in one injury.

**MI20150009** – A contractor hit a natural gas line between two condominium units. The gas was ignited and caught the complex on fire.

**MI20150010** - A tanker of hydrochloric acid was found to be leaking while on the roadway. Nearby businesses were evacuated during the cleanup.

**MI20150011** - An oil worker opened the door to the well and an explosion occurred. The worker received severe burns.

**MI20150012** - A man was injured when his compressed air device exploded injuring his hand.

**MI20150013** - A meth lab exploded in a hotel room causing the hotel to be evacuated.

**MI20150014** - Chemicals were mixed causing a reaction which tripped an evacuation alarm.

**MI20150016** - A car caused an accident with a gasoline tanker. The tanker spilled gasoline and a fire occurred. The freeway and the sewer system required repair before the road could be reopened.

**MI20150017** - Two houses were evacuated during a natural gas leak. The gas exploded breaking a window and injuring one person.

**MI20150018** - A metal finishing company caught on fire resulting in an evacuation of surrounding homes as a precaution due to burning chemicals.

**MI20150019** - A popping sound was heard in a store and numerous people experienced respiratory irritation. The store was evacuated and aired out. No source was found.

**MI20150020** - A van caught fire and exploded causing damage to a home and garage.

**MI20150021** - Three people experienced burns when a methamphetamine lab exploded and caught fire.

**MI20150022** - A methamphetamine lab in a home caught fire damaging the house.

**MI20150023** - Fireworks were thrown into a clothes hamper causing a fire resulting in damage and an evacuation of the housing complex.

**MI20150024** - Two schools were evacuated after an odor of pepper spray was detected.

**MI20150025** - A fire and gas leak resulted in a restaurant evacuation. The suspect cause was a lightning strike.

**MI20150026** - A car struck a building severing the natural gas line.

**MI20150027** - An individual was burned when a methamphetamine lab caught on fire.

**MI20150028** - A propane explosion destroyed a home under construction.

**MI20150029** - A natural gas explosion caught a house on fire. The house was destroyed.

**MI20150030** - A car hit a natural gas line. A school was evacuated while repairs were made.

**MI20140031** - A resident was dismantling fireworks when they exploded.

**MI20150032** - An equipment failure caused a boat to explode injuring the two passengers.

**MI20150033** - Gasoline vapors were ignited from a bonfire causing burns to the individual.

- MI20150034** - A liquid nitrogen relief valve failed releasing liquid nitrogen.
- MI20150035** - An individual was attempting to pour gasoline on a fire when the vapors exploded causing severe burns to the individual.
- MI20150036** - A gasoline tanker overturned on a freeway ramp closing the freeway while major repairs were undertaken.
- MI20150037** - Construction workers struck a natural gas main causing an evacuation of a downtown area while repairs were made.
- MI20150038** - A methamphetamine lab caught on fire making an apartment building uninhabitable.
- MI20150039** - A science experiment did not work properly creating smoke. The school was evacuated while the smoke dissipated.
- MI20150040** - A lawn mower caught gasoline vapors on fire burning two individuals.
- MI20150041** - Two motorists were hurt when a construction crew struck a natural gas pipeline resulting in an explosion and fire.
- MI20150042** - A go-cart overturned spilling gasoline on the driver and catching on fire.
- MI20150043** - The ice cooling system at an ice area failed, leaking ammonia. The building was evacuated while repairs were made.
- MI20150044** - Two homes were destroyed when a lawn mower hit a natural gas line which caught on fire.
- MI20150045** - A forklift battery caught fire and ignited a propane tank when the building was unoccupied. The tank exploded causing structural damage to the building.
- MI20150046** - A leak occurred in a large natural gas pipeline. A shelter-in-place order was given until the leak was stopped.
- MI20150047** - An individual was fatally injured from fireworks.
- MI20150048** - An individual was severely injured from a homemade firework.
- MI20150049** - An individual was severely injured from a mortar-type firework.
- MI20150050** - A worker was injured during a fireworks display when a mortar misfired.
- MI20150051** - An individual was severely injured from a mortar-type firework.

**MI20150052** - Fireworks stored in a vehicle caught fire in a residential neighborhood resulting in multiple explosions. The fireworks broke through windows and caught the car on fire as people quickly evacuated from the area.

**MI20150053** - A chemical reaction occurred in a refrigerator in a chemistry laboratory. The refrigerator exploded.

**MI20150054** - A chemical reaction occurred while products were being packaged. Workers evacuated the area.

**MI20150055** - An individual was welding a 55 gallon drum when it exploded causing fatal injuries.

**MI20150056** - A storage tank failed spilling water treatment chemicals. A beach was closed until the chemicals dissipated.

**MI20150057** - A propane line exploded under a home knocking the house off the foundation.

**MI20150058** - A car struck a natural gas line leading into a home. An explosion occurred, damaging five homes.

**MI20150059** - Water treatment chemicals were mixed causing a chemical reaction. The plant was evacuated until the reaction was controlled.

**MI20150060** - A worker was treated at the scene after mixing cleaning chemicals.

**MI20150061** - A boat exploded on a lake burning a water skier.

**MI20150062** - Two people were burned when a methamphetamine lab exploded.

**MI20150063** - Mercury was found in a storage cabinet in a building undergoing demolition and spilled. The mercury was recovered and the area was decontaminated.

**MI20150064** - A vehicle hit a natural gas line. Residents were evacuated as a precaution.

**MI20150065** - A car ran into a house breaking the natural gas service line. The house was evacuated.

**MI20150066** - A man was operating a backhoe in his yard and broke the natural gas line. Five houses were evacuated until the leak was secured.

**MI20150067** - A faulty weld caused two cleaning chemicals to mix creating vapors. Two workers sought medical treatment for respiratory irritation.

**MI20150068** - A lightning strike damaged a natural gas line causing a leak. The gas exploded in an unoccupied home. There were no injuries reported.

**MI20150069** - A vacant house exploded from natural gas.

**MI20150070** - Propane was recently reconnected to a property. The house exploded due to a propane leak, one person was fatally injured.

**MI20150071** - A man was injured when an explosive was used in an attempt to launch a 55 gallon drum in the air. The drum exploded producing shrapnel which severely injured a bystander.

**MI20150072** - A mercury thermometer was broken in a work place. The facility was evacuated while cleanup was performed.

**MI20150073** - Four people were exposed to methamphetamine chemicals.

**MI20150074** - A person was injured when he stepped on an explosive device.

**MI20150075** - Mercury was spilled on a porch contaminating two individuals.

**MI20150076** – Butane used in the manufacture of hash oil was stored in a freezer in an unoccupied home. The butane exploded blowing the door off the freezer and ending up 35 feet into the backyard. The explosion also knocked over the kitchen oven breaking the natural gas line.

**MI20150077** - A firefighter was injured by a falling wall from a house that was on fire from a natural gas explosion.

**MI20150078** - A methamphetamine lab exploded burning the operator.

**MI20150080** - A chlorine leak at a high school injured a worker and resulted in the evacuation of the school.

**MI20150081** - An assisted living facility was evacuated due to a natural gas leak.

**MI20150082** - A propane explosion destroyed an occupied home, injuring the resident.

**MI20150083** - A natural gas explosion occurred in a townhouse injuring the two occupants.

**MI20150084** - A resident in an apartment complex was using isopropyl alcohol in an attempt to kill bedbugs. The vapors ignited destroying 48 apartment units injuring 2 residents and 3 firefighters fighting the resulting fire.

**MI20150085** - Two residents were filling up a gasoline generator on the back porch of a home. The gasoline exploded injuring the individuals and destroying the home.

**MI20150086** - A resident was using gasoline to burn leaves. The gas can exploded injuring three people.

**MI20150087** - A resident in an apartment complex received severe burns from a butane explosion due to hash oil extraction.

**MI20150088** - Two people were injured when a drum of nitric acid exploded at a factory.

**MI20150089** - A crude oil tanker overturned spilling part of its contents.

**MI20150090** - A man was injured when a propane tank exploded at a medical marijuana grow facility.