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2016 ANNUAL REPORT

TRACKING WORK-RELATED DEATHS IN MICHIGAN



2016 Annual Report Tracking Work-Related Fatalities in Michigan

A Joint Report
of the
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Table of Contents

<i>Executive Summary.....</i>	<i>1</i>
<i>Background.....</i>	<i>2</i>
<i>Methods</i>	<i>3</i>
<i>Results.....</i>	<i>5</i>
<i>Demographics</i>	<i>6</i>
<i>Race</i>	<i>6</i>
<i>Age</i>	<i>6</i>
<i>Geographic Distribution.....</i>	<i>8</i>
<i>Occupation</i>	<i>9</i>
<i>Working Status of the Decedent</i>	<i>11</i>
<i>Location of Injury.....</i>	<i>11</i>
<i>Location of Death.....</i>	<i>13</i>
<i>Illegal Drug/Alcohol/Medication Use.....</i>	<i>13</i>
<i>Work-Related Fatality Incidence Rates</i>	<i>16</i>
<i>Industry Highlights, Michigan 2016.....</i>	<i>16</i>
<i>Agriculture.....</i>	<i>22</i>
<i>Means of Work-Related Death.....</i>	<i>24</i>
<i>Means of Death by Cause.....</i>	<i>25</i>
<i>Aircraft.....</i>	<i>25</i>
<i>Animal.....</i>	<i>25</i>
<i>Asphyxiation.....</i>	<i>25</i>
<i>Drowning</i>	<i>25</i>
<i>Drug Overdose.....</i>	<i>25</i>
<i>Electrocution</i>	<i>26</i>
<i>Fall</i>	<i>26</i>
<i>Fire/Explosion</i>	<i>27</i>
<i>Heat/Cold.....</i>	<i>27</i>
<i>Homicide</i>	<i>27</i>
<i>Machine</i>	<i>28</i>
<i>Motor Vehicle</i>	<i>29</i>
<i>Struck-by.....</i>	<i>32</i>
<i>Suicide</i>	<i>32</i>
<i>Toxic Exposure</i>	<i>32</i>
<i>MIOSHA Fatality Investigations.....</i>	<i>33</i>
<i>MIFACE Contact with Companies.....</i>	<i>35</i>
<i>Health and Safety Initiatives</i>	<i>35</i>
<i>Hispanic Initiative</i>	<i>35</i>
<i>Sensitivity of Injury at Work Box on Death Certificate.....</i>	<i>36</i>
<i>Number of 2016 Deaths Compared to Michigan CFOL.....</i>	<i>37</i>
<i>Case Narratives.....</i>	<i>37</i>
<i>Discussion.....</i>	<i>40</i>

<i>Importance of Using Multiple Data Sources</i>	<i>49</i>
<i>Prevention Material Dissemination.....</i>	<i>50</i>
Summary.....	50
Acknowledgement	51
APPENDIX I	52
<i>Aircraft.....</i>	<i>52</i>
<i>Animal.....</i>	<i>52</i>
<i>Asphyxiation.....</i>	<i>52</i>
<i>Drowning.....</i>	<i>52</i>
<i>Drug Overdose.....</i>	<i>53</i>
<i>Electrocution.....</i>	<i>53</i>
<i>Fall.....</i>	<i>56</i>
<i>Fire/Explosion.....</i>	<i>65</i>
<i>Heat/Cold.....</i>	<i>65</i>
<i>Homicide.....</i>	<i>65</i>
<i>Machine.....</i>	<i>67</i>
<i>Motor Vehicle Collision.....</i>	<i>73</i>
<i>Struck By.....</i>	<i>78</i>
<i>Suicide.....</i>	<i>84</i>
<i>Toxic Exposure.....</i>	<i>85</i>

Tables and Figures

[Table 1.](#) Demographic Characteristics of 162 Work-Related Fatalities, Michigan 2016

[Table 2.](#) Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2016

[Table 3.](#) County of Fatal Work-Related Injury, Michigan 2016

[Table 4.](#) Type of Work-Related Fatal Incident and Drug Found in Toxicological Analysis among 37 Individuals Where the Substance Detected was Considered a Possible Contributor to the Individual's Death, Michigan 2016

[Table 5.](#) Number of Traumatic Work-Related Fatalities by Industry and Rates by Number of Employees and by Hours Worked, Michigan 2016

[Table 6.](#) Traumatic Work-Related Fatalities by Industry Sector, Michigan Incidence Rates Compared to US Incidence Rates, 2016

[Table 7.](#) Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2016

[Table 8.](#) Work-Related Fatalities and Number of MIOSHA Work-Related Fatality Compliance Inspections, Michigan 2016

[Table 9.](#) Sensitivity of Death Certificate Injury at Work Box Predicting Fatal Injury at Work, Michigan 2016

[Table 10.](#) Industry and Number of Deaths and Number and Percent of Misidentified Deaths, Michigan 2016

[Table 11.](#) Traumatic Work-Related Fatality Narratives by Means of Death and Industry Sector, Michigan 2016

[Table 12.](#) Age at Time of Death, Agriculture, Michigan 2001-2016

[Table 13.](#) Cause of Death by Year, Michigan 2001-2016

[Table 14.](#) Number and Percent of Motor Vehicle-related Work-Related Deaths by Industry Sector, Michigan 2001-2016

[Table 15.](#) Number of Construction Deaths and Number and Percent of Fatal Falls by Year, Michigan 2001-2016

[Table 16.](#) Fatality Rate by Age Group and Employment Number and Percent of Civilian Non-institutional Population, Michigan 2016

[Table 17.](#) Number of Deaths per Year by Industry Sector for the Six Industry Sectors with the Largest Number of Deaths per Year, Michigan 2001-2016

[Figure 1.](#) Number and Incidence Rate per 100,000 Workers of Work-Related Fatalities in Michigan, 1995-2016

[Figure 2.](#) Age Distribution of Work-Related Fatalities, Michigan 2016

[Figure 3.](#) County of Fatal Work-Related Injury, Michigan 2016

[Figure 4.](#) Number of Deaths by Standard Occupational Classification, Michigan 2016

[Figure 5.](#) Location and Number of Fatal Work-Related Injuries, Michigan 2016

[Figure 6.](#) Number of Agriculture Work-Related Fatalities and MIOSHA Inspections, Michigan 2001-2016

Executive Summary

The Division of Occupational and Environmental Medicine at Michigan State University (MSU) began tracking work-related fatalities in the state of Michigan in January 2001. This is the 16th annual Michigan Fatality Assessment and Control Evaluation (MIFACE) report on acute traumatic work-related deaths in Michigan. There were **162 work-related deaths in 2016**, an increase of 26 deaths compared to 2015. There were 155 separate incidents (two deaths occurred in each of five separate incidents and one incident had three deaths). One hundred were employees, two of whom were temporary workers. Fifty-two were self-employed or the owner/co-owner of the business, and six were volunteer workers (work status was unknown for four individuals). A narrative summary of each work-related fatality is in [Appendix I](#). MIFACE educational material, including on-site Investigation Reports, Summaries of MIOSHA Investigations, and Hazard Alerts are located on the MIFACE webpage on the Michigan State University Division of Occupational & Environmental Medicine ([MSU OEM](#)) website. Key findings for 2016:

- The number of work-related deaths (162) and the fatal injury rate (3.5 deaths/100,000 workers) were up compared to 2015 (136 work-related fatalities, 3.0/100,000 workers). The 162 deaths in 2016 was the largest number of deaths since the inception of the MIFACE program in 2001; the number of work-related fatalities was 174 in 2001.
- Construction (40 deaths, 24.7% of all fatalities) had the largest *number* of work-related deaths and the highest *risk* of death (25.7 deaths/100,000 workers). Agriculture was second in the number of work-related deaths (19 deaths, 11.7%) and risk of death (22.3 deaths/100,000 workers). Transportation and Warehousing was third in number and risk (16 deaths, 9.9%; 11.6 deaths/100,000 workers) of a work-related death. Manufacturing, although fourth in the number of deaths (15 deaths, 9.3%) had one of the lower risks of death (2.5 deaths/100,000 workers).
- The most common cause of death was from a fall (32 deaths, 19.8%), followed by motor vehicle crashes (28 deaths, 17.3%), homicide incidents (22 deaths, 13.6%), struck by incidents (20 deaths, 12.3%), machines (19 deaths, 11.7%) and then suicides (13 deaths, 8.0%).
- Individuals who died were most likely to be men (93.8%), Caucasian (78.4%), 50-59 years of age (45 deaths, 27.8%) and born in the United States (149 deaths, 92.0%).
- The average age was 47.0 years old and ranged from 15 to 92 years of age.
- Illegal drugs, alcohol or side effects of prescribed and over-the-counter medication were potential factors in 25.7% of the non-suicide and non-drug abuse deaths.
- By occupational group, Management had the largest number of work-related deaths (40) followed by Construction & Extraction (26) and then Transportation & Material Moving (25).
- Fifty of Michigan's 83 (60.2%) counties had a work-related fatality. Wayne County had the highest number (32, 19.8%), followed by Oakland (13, 8.0%) and Macomb Counties (9, 5.6%).
- Of the 162 work-related fatalities, 43 (26.5%) were MIOSHA program-related and were investigated by a MIOSHA compliance officer.

Definitions

A **traumatic injury** is any unintentional or intentional wound or damage to the body resulting from acute exposure to energy or from the absence of such essentials as heat or oxygen caused by a specific event, incident or series of events within a single workday or shift.

Work is defined as legal duties, activities or tasks that produce a product as a result and that are done in exchange for money, goods, services, profit or benefit.

A **work relationship** exists if an event or exposure results in the fatal injury or illness of a person:

- (1) ON the employer's premises and person is there to work; or
- (2) OFF the employer's premises and person is there to work, or the event or exposure was related to the person's work or status as an employee

Incidence means the number of new cases of an illness, injury, or other health-related event that commence during a specified time period in a specified population.

Background

In 2001, MSU OEM instituted a tracking program for all traumatic work-related deaths, first with financial assistance from LARA and then from NIOSH. This is a joint project of LARA/MIOSHA and MSU OEM.

The purpose of the [MIFACE](#) tracking project is three-fold:

- Identify the types of industries and work situations where workers are dying from acute traumatic incidents;
- Identify the underlying causes of the work-related fatality, and
- Formulate and disseminate prevention strategies to reduce future work-related fatalities.

MIFACE uses the National Institute of Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation ([FACE](#)) as a model. Since 1982, NIOSH has funded selected states to operate a state FACE program. MIFACE investigations have provided aggregate data to identify high-risk industries and work practices as well as provided the stories or “faces” necessary to make the statistics real and influence change in the workplace. Emphasis on information dissemination and translation of information into user-friendly materials is an important part of the MIFACE program.

The [MSU OEM](#) webpage has many [resources](#) available to assist employers, employees, safety and health professionals and others to understand more about work-related illnesses, injuries and deaths.

Who is Included? Any individual of any age who meets the criteria of “at work”, including volunteers and prison inmates, who are exposed to the same work hazards and perform the same duties or functions as paid employees. Suicides are included, following the protocol established by the NIOSH FACE program and the Bureau of Labor Statistics ([BLS](#)), which collects the official work-related death statistics in all states.

Who is Not Included? Individuals who die while “at work” from diseases, such as a heart attack or stroke, individuals commuting to/from work, volunteers not working for a non-profit, students, and homemakers.

Methods

MIFACE utilizes multiple sources to identify work-related fatalities in Michigan: MIOSHA, Death Certificates, Newspapers, Medical Examiners, Police/Fire/EMT Departments, Workers' Compensation Agency, MSU Extension, Michigan Farm Bureau, Federal Agencies (MSHA, NTSB, etc.), Internet searches, and Michigan citizens reporting a work-related death.

IDENTIFY INDIVIDUALS

- ◇ **Receive Report of Death**
- ◇ **Determine if WR Death**
 - Paid employee, self-employed?
 - Working at job or family business?
 - Traveling "while on-the-clock" or compensated travel?
 - Volunteer?
 - In parking lot of business?

ALL work-related deaths MUST be reported to MIOSHA within 8 hours of the death.

**The toll-free hotline to report a work-related death is:
1-800-858-0397**

GATHER INFORMATION

- ◇ **Contact MIOSHA**
 - If fatality is program-related
- ◇ **Gather source documents**
 - Reports from agencies that investigated the death/provided emergency services when event occurred
 - Death certificate
 - Medical examiner report and, when appropriate
 - MIOSHA fatality investigation narrative

CONTACT EMPLOYER/FARM FAMILY

- ◇ **Send MIFACE Introduction Letter and Brochure**
- ◇ **Follow-up phone contact**
 - Answer questions
 - Ask if employer and/or family will voluntarily participate
 - If Yes, schedule date and time for MIFACE site visit
 - If No, write case summary or MIFACE Summary of MIOSHA Investigation

MIFACE SITE VISIT

- ◇ **Explain MIFACE program**
- ◇ **Complete appropriate research forms**
- ◇ **Conduct interviews with appropriate personnel**
 - Learn about process, equipment involved, work activities of deceased, training, safety programs, etc.
- ◇ **Observe area and/or equipment involved**
- ◇ **Take pictures, removing identifiers**

MIFACE INVESTIGATION REPORT

Site Visit Report Includes:

- Summary statement
- Background information
- Detailed investigation narrative
- Cause of death as determined by the Medical Examiner
- Prevention recommendations, including discussion
- References
- Pictures, drawings, sketches

FOLLOW UP ACTIVITIES

◇ Identify Stakeholders

- Internet search for similar companies and/or trade groups

◇ Update Database

- Information collected from each site visit and statewide tracking entered into a database

◇ Analyze Data

- Annual Report developed analyzing and discussing data

◇ Educational Outreach

- MIFACE Summary of MIOSHA Investigation if MIOSHA investigation takes place
- Hazard Alert
- Post on MSU OEM website:
 - Investigation Report
 - MIFACE Summary of MIOSHA Investigation
 - Hazard Alert
- Send notice of posted publications to MIFACE e-mail distribution list
- Guest speaker, display booths at health and safety conferences, industry trade group training programs

The level of information collected for each fatality depended on the type of incident.

For homicides, suicides and most transportation-related fatalities that occurred while the individual was at work, MIFACE collected only source documents.

For the remaining work-related fatalities including agricultural fatalities, MIFACE initiated contact with employers, farm family, or family members of the deceased to request permission for an on-site investigation. It is important to note that MIFACE investigators did not enforce compliance with Michigan Occupational Safety and Health Act (MIOSHA) rules and regulations and did not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE accompanied the MIOSHA compliance officer with employer agreement. In addition, MIFACE interviewed the compliance officers about their investigation.



[Case 39](#). Tree trimmer in his 20s died when he fell approximately 40 feet when his Weaver Cougar Positioning Saddle Model 1075 rope bridge failed while ascending a tree.

All photographs used in this annual report are courtesy of MIOSHA, the responding police department or pictures taken at the time of the MIFACE investigation. Photographs have been modified as necessary to remove identifiers.

Results

There were 162 acute traumatic work-related fatalities in 2016. One hundred fifty nine (98.1%) of the 162 work-related traumatic incidents occurred in 2016; a description of the three individuals who died in 2016 due to complications from a work-related injury sustained in a previous year (as noted by the medical examiner on the death certificate) follows:

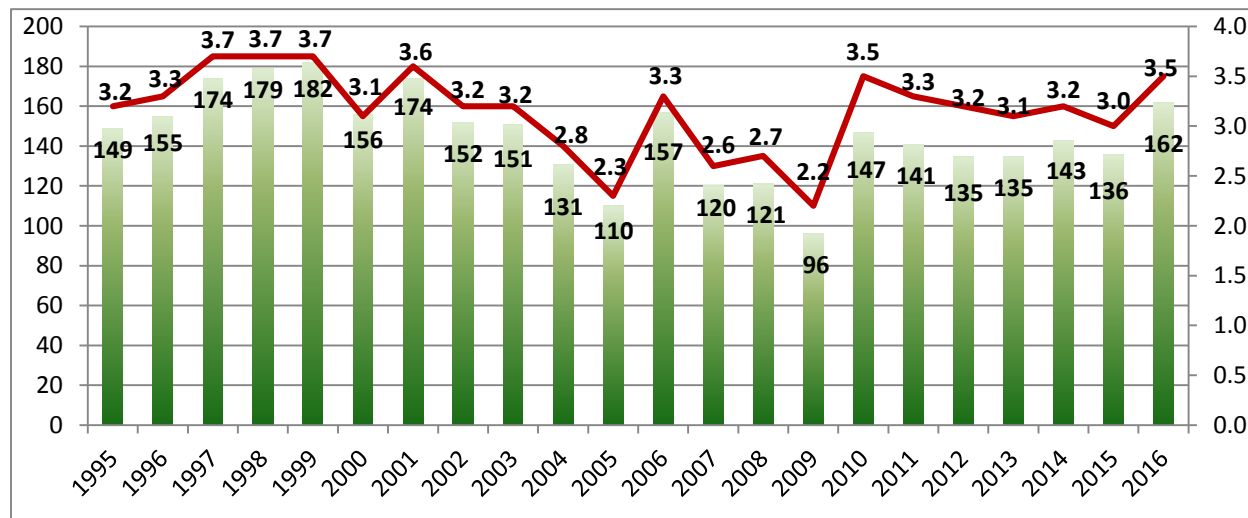
- A male telephone linesman in his 70s died from complications of a 1971 fall from a ladder.
- A male mobile home set up crew leader in his 50s died from complications of a 2001 injury when a house jack failed and a mobile home fell on his back.
- A male dairy parlor service technician in his 30s died from complications of a head injury sustained in 2007 while repairing a rotary milking parlor.

The 162 individuals who died had 94 different employers. An automobile manufacturing company, a police department and a construction firm had two separate incidents. Both individuals who worked at an auto manufacturing firm died from a drug overdose. A police department had two officers die from gunfire. The construction firm had three individual die in a motor vehicle crash and an electrocution.

Two separate construction firms, an apartment complex, a landscaping firm and court system each had two deaths occur during the same incident. One construction firm had two individuals die from overexposure to carbon monoxide, one construction firm had two individuals die in a motor vehicle crash, and the apartment complex and court system each had two individuals die due to gunfire. One construction firm had three individuals die in a motor vehicle crash.

Figure 1 shows the number of acute traumatic work-related deaths and incidence rate per year in Michigan since 1995.

Figure 1. Number and Incidence Rate per 100,000 Workers of Work-Related Fatalities in Michigan, 1995-2016



In Figure 1, the **red** line shows incidence rate per 100,000 workers. The **green** columns show the number of work-related deaths per year. Incidence rates shown from 1995-2000 were obtained from the [BLS](#) website. Rates shown for 2001-2016 were determined from MIFACE statistics.

Demographics

Table 1 shows the demographic characteristics of the 162 traumatic work-related fatalities in Michigan in 2016. Demographic characteristics were obtained from the individual's death certificate.

Race

Of the 152 males who died, 117 were Caucasian and 23 were African American. Ten women, all Caucasian, died in a work-related incident.

Seven individuals were of Hispanic ethnicity, all of whom were male. Death certificates indicated the race as Caucasian for three of the seven Hispanic individuals.

Age

The age at time of death ranged from 15 to 92 years. The average age was 47.0 years, down from 48.7 years of age in 2015. For men, the ages ranged from 15-92 years, and for women, the ages ranged from 20-61 years. The average age for men at the time of death was 47.2 years; for women, it was 43.4 years (**Table 1** and **Figure 2**).

Sixteen individuals were 66 years of age or older when they died due to an acute work-related event compared to 25

Table 1. Demographic Characteristics* of 162 Work-Related Fatalities, Michigan 2016		
Demographic Characteristics	Number	Percent
Gender		
Male	152	93.8
Female	10	6.2
Race		
White	127	78.4
Black	23	14.2
Asian/Pacific Islander	1	0.6
American Indian/Alaskan Native	2	1.2
Arab	2	1.2
Hispanic	3	1.9
White/American Indian	2	1.2
Asian Indian	2	1.2
Age		
<20	4	2.5
20-29	21	13.0
30-39	28	17.3
40-49	34	21.0
50-59	45	27.8
60-69	20	12.3
70-79	9	5.6
90+	1	0.6
Education		
Less than High School	22	11.6
High School Graduate	70	44.3
GED	1	0.6
Some College (1-4 years)	56	35.4
Post College (5+ years)	8	5.1
Vocational School	1	0.6
Unknown	4	--
Country of Origin		
United States	149	92.0
Mexico	2	1.2
Albania	1	0.6
Iraq	1	0.6
India	2	1.2
Guinea	1	0.6
St. Kitts/Nevis	1	0.6
Lebanon	1	0.6
Senegal	1	0.6
Vietnam	1	0.6
El Salvador	1	0.6
Ukraine	1	0.6
Totals	162	

* Source: Death Certificate (percent does not add to 100 due to rounding)

individuals in 2015. One (6.3%) of the 16 individuals was injured prior to 2016; the date of injury was 1971.

Table 2 describes the age distribution of the victims across industry sectors.

Six (37.5%) of the 16 individuals aged 66 years or older died due to a fall, three (18.8%) individuals died in a struck-by incident (trees in two incidents and as a bystander near a bar fight in one incident). Two (12.5%) individuals died in machine-related incidents, and two individuals committed suicide at work. One (6.3%) individual each died from a gunshot wound (homicide), encounter with a bull (animal) and by drowning.



[Case 29](#). Electrician in his 70s died when he fell 24 feet to a cement pad when the scaffold tipped over.

Figure 2. Age Distribution of Work-Related Fatalities, Michigan 2016

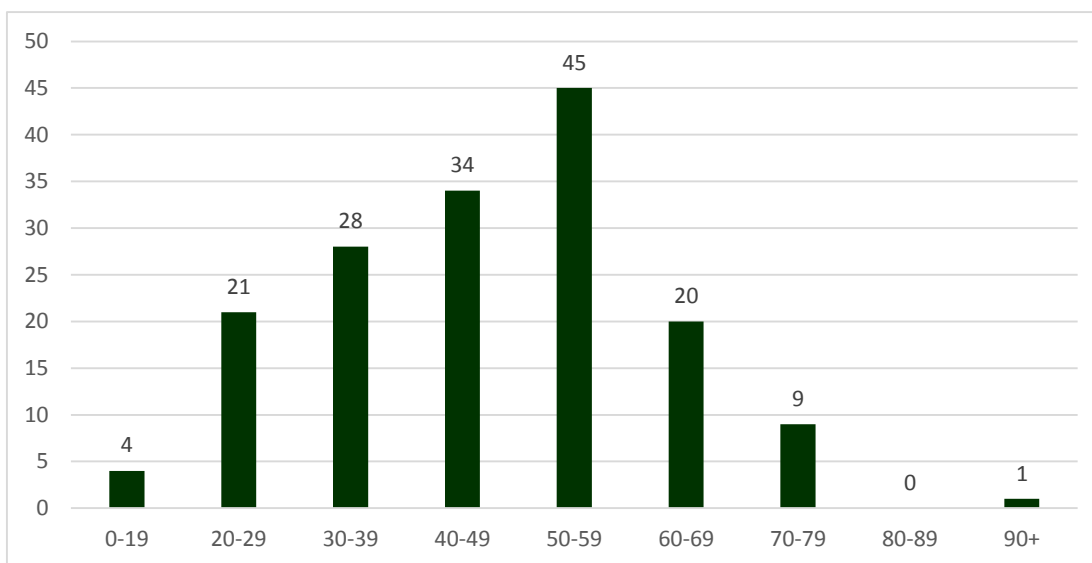


Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2016				
Industry Sector (NAICS Code)	0-19	18-65	66+	Total
	Number	Number	Number	
Agriculture, Forestry, Fishing & Hunting (11)	--	12	7	19
Mining (21)	--	1	--	1
Construction (23)	2	35	3	40
Manufacturing (31-33)	1	13	1	15
Wholesale Trade (42)	--	9	1	10
Retail Trade (44-45)	1	8	--	9
Transportation & Warehousing (48-49)	--	16	--	16
Information (51)	--	--	1	1
Real Estate & Rental & Leasing (53)	--	5	--	5
Professional, Scientific, & Technical Services (54)	--	1	--	1
Administrative & Support & Waste Management & Remediation Services (56)	--	10	2	12
Educational Services (61)	--	1	--	1
Health Care & Social Assistance (62)	--	5	--	5
Arts, Entertainment & Recreation (71)	--	3	--	3
Accommodation & Food Services (72)	--	5	1	6
Other Services (except Public Administration) (81)	--	8	--	8
Public Administration (92)	--	10	--	10
Totals	4	142	16	162

Geographic Distribution

Fifty (60.2%) of the 83 Michigan counties had at least one work-related injury that led to the death of the worker (**Figure 3 and Table 3**).

Collectively, the five southeast Michigan Counties of Macomb, Oakland, Washtenaw, Monroe and Wayne had 62 (38.3%) of all work-related deaths. Wayne County had the largest number of deaths (32, 19.8%), followed by Oakland (13, 8.0%) and Macomb Counties (9, 5.6%), and then Kent and Berrien (8 each, 4.9%), Genesee (7, 4.3%) and Kalamazoo, Livingston and Washtenaw (5 each, 3.1%).

Figure 3. County of Fatal Work-Related Injury, Michigan 2016

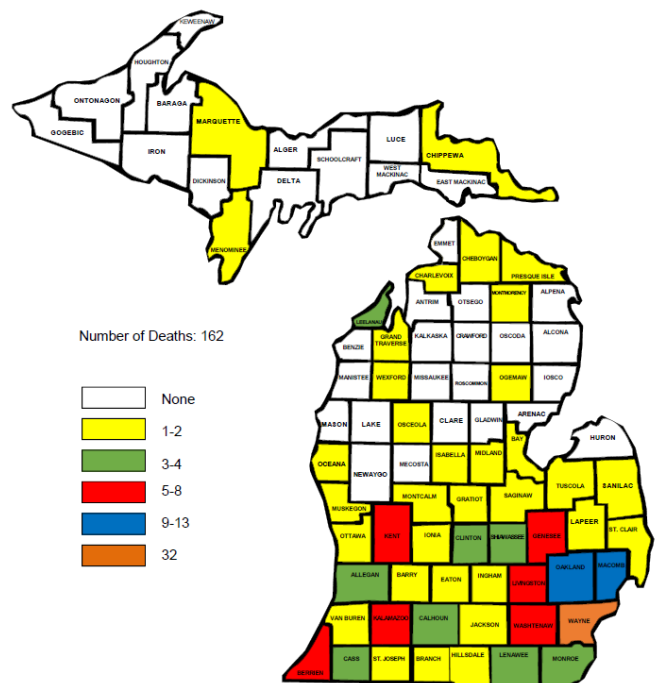


Table 3. County of Fatal Work-Related Injury, Michigan 2016

County	Number	Percent*	County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	--	--	Dickinson	--	--	Lake	--	--	Oceana	1	0.6
Alger	--	--	Eaton	1	0.6	Lapeer	2	1.2	Ogemaw	1	0.6
Allegan	4	2.5	Emmet	--	--	Leelanau	3	1.9	Ontonagon	--	--
Alpena	--	--	Genesee	7	4.3	Lenawee	3	1.9	Osceola	1	0.6
Antrim	--	--	Gladwin	--	--	Livingston	5	3.1	Oscoda	--	--
Arenac	--	--	Gogebic	--	--	Luce	--	--	Otsego	--	--
Baraga	--	--	Grand Traverse	1	.06	Mackinac	--	--	Ottawa	1	0.6
Barry	1	0.6	Gratiot	1	0.6	Macomb	9	5.6	Presque Isle	1	0.6
Bay	2	1.2	Hillsdale	1	0.6	Manistee	--	--	Roscommon	--	--
Benzie	--	--	Houghton	--	--	Marquette	2	1.2	Saginaw	2	1.2
Berrien	8	4.9	Huron	--	--	Mason	--	--	St. Clair	2	1.2
Branch	1	0.6	Ingham	2	1.2	Mecosta	--	--	St. Joseph	2	1.2
Calhoun	4	2.5	Ionia	2	1.2	Menominee	1	0.6	Sanilac	2	1.2
Cass	3	1.9	Iosco	--	--	Midland	1	0.6	Schoolcraft	--	--
Charlevoix	1	0.6	Iron	--	--	Missaukee	--	--	Shiawassee	3	1.9
Cheboygan	1	0.6	Isabella	1	0.6	Monroe	3	1.9	Tuscola	1	0.6
Chippewa	1	0.6	Jackson	2	1.2	Montcalm	1	0.6	Van Buren	2	1.2
Clare	--	--	Kalamazoo	5	3.1	Montmorency	1	0.6	Washtenaw	5	3.1
Clinton	3	1.9	Kalkaska	--	--	Muskegon	1	0.6	Wayne	32	19.8
Crawford	--	--	Kent	8	4.9	Newaygo	--	--	Wexford	1	0.6
Delta	--	--	Keweenaw	--	--	Oakland	13	8.0			

* percent does not add to 100 due to rounding

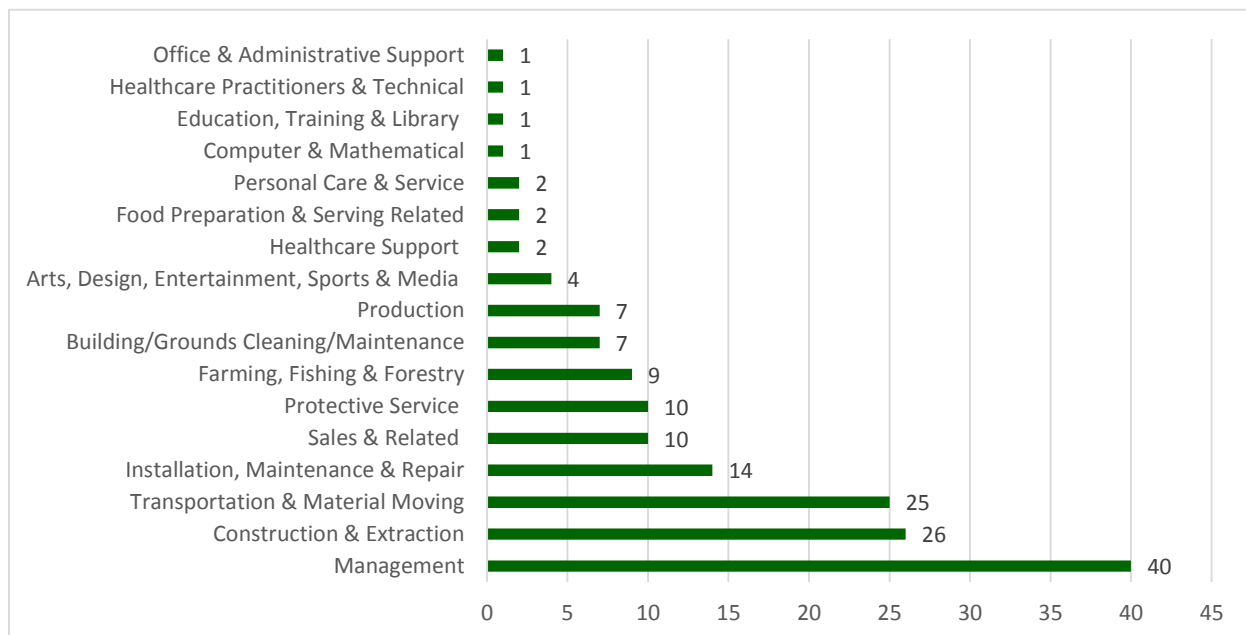
Occupation

Figure 4 shows the occupation distribution of the 162 work-related deaths utilizing 2000 Standard Occupational Classification (SOC) categories; the occupation of one individual was unknown. Occupation was determined from the reporting source data. The 2000 SOC categories are divided into 23 major groups called “job families”. The “job families” combine occupations according to the nature of the work performed, placing all people who work together into the same group regardless of their skill level.



Case 129. Sign-hanging crew foreman in his 40s was struck by a semi- truck while taking a picture of a finished business mileage sign.

Figure 4. Number of Deaths by Standard Occupational Classification, Michigan 2016



The Management Occupations job family classification had the largest number of deaths (40, 24.7%), and included workers spanning multiple industries. Of the 40 individuals identified as conducting a work activity in this job family, 12 (30.0%) were farmers/ranchers working in the Agriculture, Forestry, Fishing & Hunting industry sector and 11 (27.5%) owned a business or were self-employed in the Construction industry. Three (7.5%) individuals who died owned a business or were self-employed in each of the following industry sectors: Administrative and Support and Waste Management and Remediation, Accommodation and Food Service and Other Services. Two (5.0%) deaths occurred in each of the following industries: Retail Trade, Transportation and Warehousing, and Real Estate and Rental and Leasing. Wholesale Trade and Protective Services each had one (2.5%) death.

Construction and Extraction Occupations had the second largest number of deaths (26, 16.0%). Eight (30.8%) individuals worked in roofing and six (23.1%) were construction laborers. Four (15.4%) individuals were painters and three (11.5%) were carpenters. Other professions in this industry sector included a heavy equipment operator, pipefitter, ironworker, boilermaker and a sign-hanger.



[Case 126](#). Caterpillar Model 320 excavator operator in his 60s died when a 45- to 47-foot long, 25-inch diameter oak tree fell on the cab of the excavator.

Transportation and Material Moving had the third largest number of deaths (25, 15.4%). Twenty (80.0%) individuals worked in a Transportation occupation and five (20.0%) worked in Material Moving occupations. Within Transportation, the majority of individuals who died were truck drivers (16, 80.0%). Other occupations included a cab driver, a vehicle transportation driver, a service station clerk and a laborer. Within Material Moving, three (60.0%) individuals were laborers, one was a forklift operator and one was an excavator operator.

Working Status of the Decedent

Ninety-four employers were associated with the 162 individuals who died in 155 separate incidents.

The employer/employee status was known for 158 of the 162 (97.5%) work-related deaths. One hundred (63.3%) individuals were employees, two of whom were temporary workers. Fifty-two (32.9%) were self-employed or the owner/co-owner of the business, and six (3.8%) individuals were volunteer workers.

The decedent was working alone in 92 (58.2%) incidents and with a coworker in 66 (41.8%) incidents. The work status was unknown in four incidents. For homicides, the decedent was working alone in 11 (55.0%) incidents and with a coworker in 9 (45.0%) incidents. For two homicides, it was unknown if the decedents were working alone or with a coworker at the time of the incident.

Location of Injury

The location of injury for the fatal incident was identified for all 162 deaths. In 2012, MIFACE changed the coding system for location. The revised system included:

- a) Designation of a specific building (such as “house, apartment” or “bar, nightclub”) include both the building itself and the area directly outside, such as a driveway, porch, or front walk;
- b) If a victim was injured in a variety of locations (e.g., the victim was stabbed on a bus and was pursued by the attacker off the bus and into a



Case 86. Sanitation worker in his 40s died when he was struck by mixing blades in a scrape surface steam jacketed mixing tank after entering the tank by unknown means.



Case 122. Farmer in his 50s died when unsecured wooden crates fell from the forks of a forklift attachment to the front of a Massey Ferguson 360-2-WD farm tractor and struck him.

store and stabbed a second time), the code for location was where the victim was first injured;

c) Events that occurred on public sidewalks were coded as “street,” with the exception of those occurring on sidewalks that were the private property of an adjacent building, which were coded to the building. For example, an incident that occurred on a walkway on the front lawn of a home was coded as “house, apartment”;

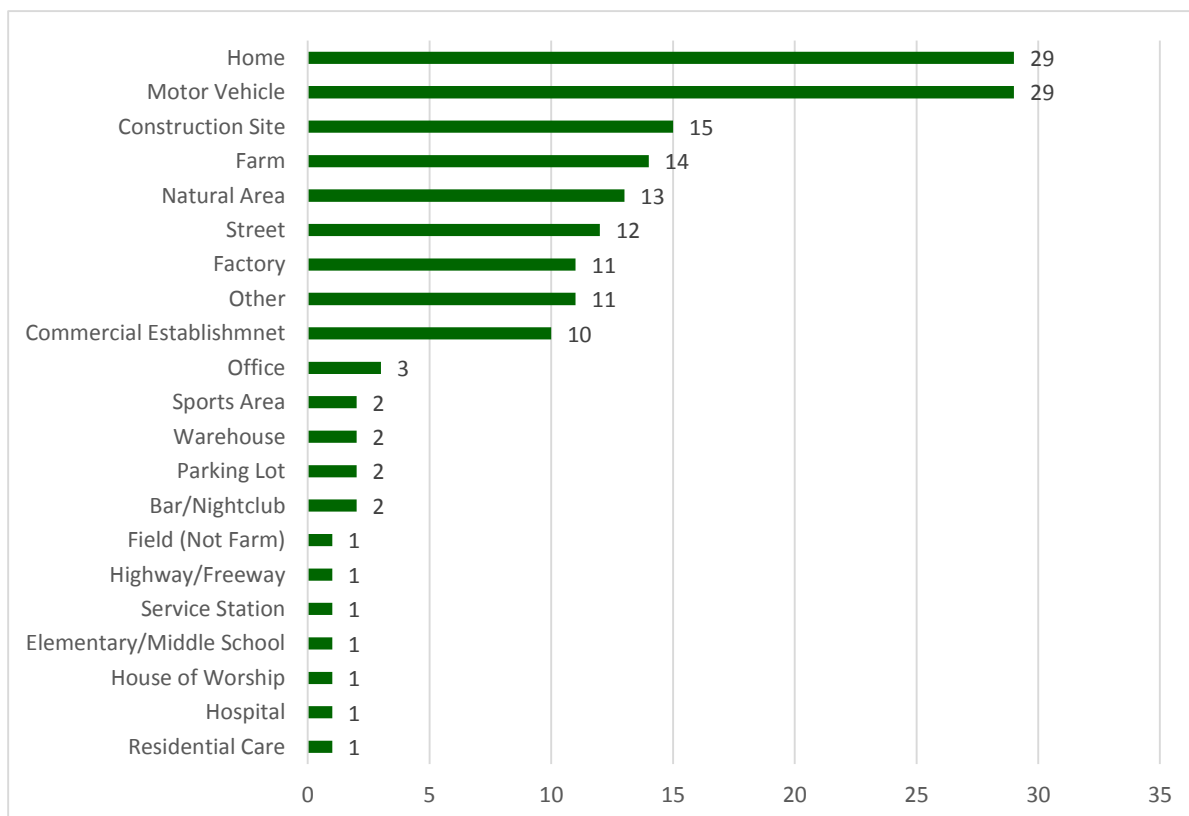
d) If an incident occurred in a garage at a private home, “house, apartment” was coded;

e) If an incident occurred in a commercial parking garage, parking lot, or a garage used by four or more different households (e.g., a garage serving a large apartment building), the location “parking lot/public parking garage” was used;

f) If an incident occurred while the victim was in a motor vehicle, the place of injury was coded as a “motor vehicle” - for annual report years 2001-2011, MIFACE coded the location (street/road) rather than “motor vehicle”.

Figure 5 depicts the distribution of incident locations for the 2016 traumatic deaths. A motor vehicle or a home was the location where the largest number of the fatal injuries occurred (29 each, 17.9%). Eight of the fatal incidents that occurred “at home” involved a tree trimming activity. A construction site was the location of the fatal incident for 15 (9.3%) fatalities and farms were the location of the incident for 14 (8.6%) deaths. The incidents in “Other” include two deaths at a county courthouse, two separate incidents in a pole barn, and two deaths in an apartment complex office. One incident each occurred at a beach, a boat launch, a storm drain, a railroad track, and a waste disposal facility.

Figure 5. Location and Number of Fatal Work-Related Injuries, Michigan 2016



Location of Death

For 89 (54.9%) individuals, the place of death was at the scene of the traumatic incident. For 69 (42.6%) individuals, the death certificate indicated the death occurred in the hospital. Three (1.9%) individuals died in a long-term care facility (two of whom were in hospice care) and one (0.6%) individual died at a residential home.

Illegal Drug/Alcohol/Medication Use

Of the 144 individuals whose death was not a suicide (13 deaths) or a drug overdose (5 deaths), a toxicology screen for alcohol, illegal drugs, prescription or non-prescription medications (excluding caffeine, naproxen, acetaminophen, nicotine, ibuprofen) was known to have been performed on 102 (70.8%) individuals; 58 of these (56.9%) individuals had detectable levels of alcohol, illegal drugs or medications. Thirty-seven (63.8%) of the 58 individuals with detectable levels of alcohol, illegal drugs, prescription and non-prescription medications had levels that were considered on review to possibly have contributed to the fatal incident (**Table 4**).

A number of states have adopted a legal limit of 5 µg/l (5 ng/ml) for marijuana (THC) in blood for being impaired while driving. Although this level does not directly correlate with impairment (as does blood alcohol levels), the THC level of 5 µg/l was used to define that marijuana use was possibly related to the death. It was unknown if the presence of hydrocodone, oxycodone, methadone, amphetamine, morphine and marijuana was from the use of a prescribed medication or from illegal use.



[Case 84](#). Caterpillar Model 320L excavator operator in his 40s died from complications of blunt head trauma while assisting another contractor with moving/setting pond liner material.

Table 4. Type of Work-Related Fatal Incident and Drug Found in Toxicological Analysis Among 37 Individuals Where the Substance Detected was Considered a Possible Contributor to the Individual's Death, Michigan 2016

Incident Type	Alcohol (blood level %)	Prescription	Marijuana &/or marijuana metabolite	Cocaine, Heroin, metabolites	Other Illegal	Unknown Prescription/ Non Prescription
Fall				√		
Motor Vehicle	0.22					
Homicide	0.054		√			
Motor Vehicle	0.126	Barbiturates Phenobarbital Benzodiazepine	√			
Toxic Exposure	0.13		√			
Machine	0.198					
Homicide		Atenolol	√			
Drowning			√			
Electrocution			√			
Machine			√			Methadone
Toxic Exposure			√			
Machine			√ (U*)			
Motor Vehicle			√			
Struck By			√			
Fall			√			
MVC			√			
Homicide					Fentanyl	
Struck By			√			Hydrocodone Oxycodone
Machine			√			
Toxic Exposure			√			
Machine		Lorazepam Quetiapine Venlafaxine	√			
Homicide			√			
Homicide			√			
Fall			√			
Motor Vehicle			√			
Motor Vehicle			√(U)			
Fall		Benzodiazepine Diazepam	√(U)			Oxycodone (U)
Fall					Fentanyl	Amphetamine
Fall		Fentanyl	√			

Table 4. Type of Work-Related Fatal Incident and Drug Found in Toxicological Analysis Among 37 Individuals Where the Substance Detected was Considered a Possible Contributor to the Individual's Death, Michigan 2016, Cont.

Incident Type	Alcohol (blood level %)	Prescription	Marijuana &/or marijuana	Cocaine, Heroin, metabolites	Other Illegal	Unknown Prescription/ Non Prescription
Fall		Trazadone				
Motor Vehicle		Tramadol				
Motor Vehicle						Morphine Oxycodone
Motor Vehicle		Midazolam				
Fall						Hydrocodone
Electrocution						Hydrocodone
Fall					Fentanyl	Hydrocodone
Struck-by					Fentanyl Ketamine Paroxetine	

*U – Urine



Case 19. Hispanic male carpenter in his 50s died from a 20-foot fall when the window jack scaffold collapsed.

Work-Related Fatality Incidence Rates

Employment-based incidence rates measure the risk of fatal injury for those employed during a given period of time, regardless of hours worked.

Hours-based incidence rates measure fatality risk per standardized length of exposure. Hours-based rates use the average number of employees at work and the average hours each employee works (40 hours/week, 50 weeks/year).

The BLS uses hours-based incidence rates to measure fatality risk for industry sectors.

Employment-based and hours-based incidence rates will be similar for industries, which tend to have full-time employees. However, differences will be observed for industries that tend to have a high percentage of part-time workers, such as in the fast food industry.

The number of hours worked was not available for several industry sectors. When provided, MIFACE calculated the hours-based work-related fatality incidence rate (See **Table 5**).

Michigan data shows that in industry sectors with a large number of part-time workers (30 hours or less), the work-related fatality hours-based rate is higher than the employment-based incidence rate, such as in Retail Trade and

Accommodation & Food Service. When the number of hours worked is 40 hours or more, the hours-based incidence rate is similar to the employment-based incidence rate, such as in Construction, Manufacturing, and Wholesale Trade.

Industry Highlights, Michigan 2016

Table 5 shows the number of traumatic work-related fatalities and Michigan's annual incidence rate by industry sector for number of employees and hours worked.

Highlights from Table 5:

Six industry sectors had fewer work-related deaths and a lower employment-based incidence rate in 2016 compared to 2015:

Industry	Decrease in Number of Deaths from 2015	Number of 2016 WR Deaths	2016 Incidence Rate	Number of 2015 WR Deaths	2015 Incidence Rate
Agriculture	2	19	22.3	21	24.7
Manufacturing	1	15	2.5	16	2.7
Transportation & Warehousing	2	16	11.6	18	13.3
Real Estate & Rental & Leasing	1	5	9.5	6	11.7
Professional, Scientific, & Technical Services	1	1	0.3	2	0.7
Arts, Entertainment & Recreation	2	3	5.8	5	10.0

Seven industry sectors had a higher number of work-related deaths and a higher employment-based incidence rate in 2016 compared to 2015:

Industry	Increase in Number of Deaths from 2015	Number of 2016 WR Deaths	2016 Incidence Rate	Number of 2015 WR Deaths	2015 Incidence Rate
Construction	12	40	25.7	28	18.9
Wholesale Trade	6	10	5.8	4	2.4
Administrative & Support & Waste Management & Remediation Services	2	12	4.1	10	3.4
Health Care & Social Assistance	4	5	0.8	1	0.2
Accommodation & Food Service	1	6	1.6	5	1.4
Other Services	5	8	4.7	3	1.8
Public Administration	3	10	5.0	7	3.0

One industry sector had the same number of work-related deaths and the same employment-based incidence rate in 2016 compared to 2015.

Industry	Number 2015 & 2016 WR Deaths	Incidence Rate 2016	Incidence Rate 2015
Retail Trade	9	1.9	1.9

One industry sector had a work-related death in 2015 but did not have a death in 2016:

Industry	Number of 2015 WR Deaths	Incidence Rate 2015
Finance & Insurance	1	0.6

Three industry sectors had a work-related fatality in 2016 but did not have a death in 2015:

Industry	Number of 2016 WR Deaths	Incidence Rate 2016
Mining	1	18.2
Information	1	1.7
Educational Services	1	0.3

The industry sector with the highest employment-based industry rate was Construction (25.7 deaths/100,000 workers), followed by Agriculture (22.3/100,000 workers) and then Mining (18.2 deaths/100,000 workers). Within Construction, Specialty Trade Contractors subsector had the highest incidence rate (32.2 deaths/100,000 workers), although the industry subsector with the highest overall incidence rate was Forestry and Logging (under Agriculture), which had an incidence rate of 218.2 deaths/100,000 workers.



[Case 40](#). Tree trimming service owner in his 60s died when he fell 14-16 feet when using the boom of an articulating boom truck to “crane” cut maple tree branches to the street.

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Rates by Number of Employees and by Hours Worked, Michigan 2016						
Industry Sector (NAICS Code)	Number	Percent	Employment-Based		Hours-Based	
			Number Employees^{ab}	Rate^c	Number Hours^a	Rate^d
Agriculture, Forestry, Fishing & Hunting (11)	19	11.7	85,298^{ef}	22.3	**	**
Crop Production (111) (Owners/Operators)	7	4.3	51,281 ^e	13.7	**	**
Animal Production (112) (Owners/Operators)	2	1.2	29,023 ^e	6.9	**	**
Crop Production (111) (Hired Workers)	2	1.2	65,177 ^e	3.1	38.1 ^{fe}	5.0 ^g
Animal Production (112) (Hired Workers)	2	1.2	18,274 ^e	10.9		
Forestry & Logging (113)	4	72.5	1,833	218.2	**	**
Unknown	2	1.2	**	**	**	**
Mining (21)	1	0.6	5,500	18.2	**	**
Mining (except Oil and Gas) (212?)	1	0.6	5,500	18.2	**	**
Construction (23)	40	24.7	155,600	25.7	38.5	26.7
Construction of Buildings (236)	3	1.9	36,500	8.2	39.9	8.2
Heavy & Civil Engineering Construction (237)	1	0.6	16,500	6.1	**	**
Specialty Trade Contractors (238)	33	20.4	102,600	32.2	39.9	32.2
Unknown	3	1.9	**	**	**	**
Manufacturing (31-33)	15	9.3	599,998	2.5	41.1	2.4
Food (311)	3	1.9	36,500	8.2	**	**
Wood Product (321)	2	1.2	9,974	20.1	**	**
Paper (322)	1	0.6	11,941	8.4	**	**
Chemical (325)	2	1.2	29,592	6.8	**	**
Plastics & Rubber Products (326)	1	0.6	41,700	2.4	**	**
Nonmetallic Mineral Product (327)	1	0.6	10,600	9.4	**	**
Transportation Equipment (336)	4	2.5	180,100	2.2	45.2	2.0
Miscellaneous (339)	1	0.6	22,240	4.5	**	**
Wholesale Trade (42)	10	6.2	172,000	5.8	39.4	5.9
Merchant Wholesalers, Durable Goods (423)	5	3.1	97,100	5.1	39.7	5.2
Merchant Wholesalers, Non-durable Goods (424)	4	2.5	51,100	7.8	**	**
Electronic Markets and Agents/Brokers (425)	1	0.6	23,749	4.2	**	**
Retail Trade (44-45)	9	5.6	472,200	1.9	29.9	2.5
Motor Vehicle & Parts Dealers (441)	3	1.9	62,600	4.8	37.4	5.1
Food & Beverage Stores (445)	2	1.2	79,200	2.5	**	**
Gasoline Stations (447)	1	0.6	26,700	3.7	**	**
General Merchandise Stores (452)	1	0.6	111,900	0.9	**	**
Miscellaneous Store Retailers (453)	1	0.6	26,300	3.8	**	**
Nonstore Retailers (454)	1	0.6	8,379	11.9	**	**
Transportation & Warehousing (48-49)	16	9.9	137,400	11.6	**	**
Truck Transportation (484)	9	5.6	47,100	19.1	**	**
Transit & Ground Passenger Transportation (485)	2	1.2	9,030	22.1	**	**
Pipeline Transportation (486)	1	0.6	1,196	83.6	**	**
Support Activities for Transportation (488)	2	1.2	14,889 ^f	13.4	**	**
Couriers and Messengers (492)	1	0.6	12,584	7.9	**	**
Warehousing & Storage (493)	1	0.6	15,371	6.5	**	**

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Rates by Number of Employees and by Hours Worked, Michigan 2016, Cont.

Industry Sector (NAICS Code)	Number	Percent	Employment-Based		Hours-Based	
			Number Employees ^{ab}	Rate ^c	Number Hours ^a	Rate ^d
Information (51)	1	0.6	57,500	1.7	35.9	1.9
Telecommunications (517)	1	0.6	18,900	5.3	**	**
Real Estate & Rental & Leasing (53)	5	3.1	52,900	9.5	**	**
Real Estate (531)	4	2.5	38,461	10.4	**	**
Rental & Leasing Services (532)	1	0.6	13,261	7.5	**	**
Professional, Scientific, & Technical Services (54)	1	0.6	295,700	0.3	36.3	0.4
Professional, Scientific, & Technical Services (541)	1	0.6	295,700	0.3	**	**
Administrative & Support & Waste Management & Remediation Services (56)	12	7.4	293,200	4.1	**	**
Administrative & Support Services (561)	12	7.4	278,381	4.3	**	**
Educational Services (61)	1	0.6	381,900	0.3	**	**
Educational Services (611)	1	0.6	2,611	38.3	**	**
Health Care & Social Assistance (62)	5	3.1	623,800	0.8	31.6	1.0
Ambulatory Health Care (621)	4	2.5	203,175	2.0	**	**
Nursing and Residential Care Facilities (623)	1	0.6	106,664	0.9	**	**
Arts, Entertainment, & Recreation (71)	3	1.9	51,300	5.8	24.1	9.7
Performing Arts, Spectator Sports, & Related Industries (711)	2	1.2	9,321	21.5	**	**
Amusement, Gambling & Recreation Industries (713)	1	0.6	37,899	2.6	**	**
Accommodation & Food Services (72)	6	3.7	374,400	1.6	22.1	2.9
Accommodation (721)	1	0.6	41,800	2.4	**	**
Food Services & Drinking Places (722)	5	3.1	332,600	1.5	**	**
Other Services (except Public Administration) (81)	8	4.9	169,600	4.7	31.4	6.0
Repair & Maintenance (811)	6	3.7	41,500	14.5	**	**
Personal and Laundry Services (812)	1	0.6	41,500	2.4	**	**
Religious, Grantmaking, Civic, Professional & Similar Organizations (813)	1	0.6	42,189	2.4	**	**
Public Administration (92)	10	6.2	239,200	5.0	**	**
Executive, Legislative & Other Government Support (921)	1	0.6	**	**	**	**
Justice, Public Order, & Safety Activities (922)	9	5.6	**	**	**	**
Totals	162		4,616,000^h	3.5		

^a Source: Michigan Department of Technology, Management and Budget, Office of Labor Market Information and Strategic Initiatives, Industry-Current Employment Estimates by Industry (CES), Michigan, Year: 2016. January 17, 2018. <http://milmi.org/datasearch>

^b Source: Michigan Department of Technology, Management and Budget, Office of Labor Market Information and Strategic Initiatives, Industry-Employment and Wages by Industry (QCEW), Michigan, Year: 2016. January 17, 2018. <http://milmi.org/datasearch>

^c Incidence rates calculated per 100,000 workers.

^d Rate represents the number of fatal occupational injuries per 100,000 full time equivalent workers and was calculated as: $(N/EH) \times 200,000,000$ where N= Number of fatal injuries; EH = total hours worked by employees in the industry sector during the calendar year (number of hours x 50 weeks per year); 200,000,000 = base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

^e Source: USDA, National Agricultural Statistics Service. 2012 Census of Agriculture, AC-12-A-22, Released May 2015. Accessed August 9, 2017. Michigan State and County Data, Table 68. Summary by North

American Industry Classification System: 2012.

https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_1_State_Level/Michigan/st26_1_068_068.pdf

Note: previous annual reports have utilized the number of farms (from the Table 51. Selected Characteristics of Farms by North American Industry Classification System) to estimate the number of owner/operators and hired farm labor, which contributes to the change in rates calculated here compared to those from previous years.

^f [USDA Farm Labor Report, Released November 17, 2016 by the National Agricultural Statistics Service \(NASS\), Agricultural Statistics Board, United States Department of Agriculture \(USDA\)](#), Average Number of Workers, Lake Region. Accessed January 22, 2018.

^g Rate represents the number of fatal occupational injuries per 100,000 full time equivalent workers and was calculated as: $(N+EH/EH) \times 200,000,000$ where N= Number of fatal injuries for hired workers; EH = total hours worked by employees in the industry sector during the calendar year (number of hours x 50 weeks per year); 200,000,000 = base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

^h Source: Employment status of the civilian non-institutional population by sex, race, Hispanic or Latino ethnicity, and detailed age, 2016 annual averages – Michigan. Bureau of Labor Statistics, Local Area Unemployment Statistics <https://www.bls.gov/lau/ptable14full2016.pdf> Accessed January 17, 2018.

** No Data provided on DTMB CES report.

Table 6 compares the employment-based and hours-based work-related fatality incidence rates by industry in Michigan to national hours-based rates for 2016 as computed by the Bureau of Labor Statistics (BLS). When calculating the fatal injury rates for the United States, BLS excludes workers under the age of 16 years, volunteers and the resident military.

Employment-based fatality rates were calculated using estimates of employed civilian workers (aged 16 and older) from the Current Population Survey (CPS) supplemented with counts for resident armed forces provided by the Department of Defense (DOD). **The overall employment-based fatality rate per 100,000 workers in Michigan for 2016 (3.5) and hours-based fatality incidence rate (3.5) was lower than the United States hours-based fatality incidence rate (3.6/100,000 FTEs).**

Hours-based fatal injury rates should not be directly compared to employment-based rates because of the differences in the denominators used.



[Case 13](#). Welder in his 30s was electrocuted while lying on his back with the welding lead across his body on a floating platform while welding the underside of a dock.

Table 6. Traumatic Work-Related Fatalities by Industry Sector, Michigan Incidence Rates Compared to US Incidence Rates, 2016				
Industry Sector	Number of Fatalities	2016 MI Employment-based Rate^{ab}	2016 MI Hours-Based Rate^b	2016 US Hours-Based Rate^{fc}
Agriculture, Forestry, Fishing and Hunting	19	22.3	38.7 ^d	23.2
Mining	1	18.2	**	10.1
Construction	40	25.7	26.7	10.1
Manufacturing	15	2.5	2.4	2.0
Wholesale Trade	10	5.8	5.9	4.8
Retail Trade	9	1.9	2.5	1.9
Transportation & Utilities	16	11.6	6.8 ^c	14.3
Information	1	1.7	1.9	**
Real Estate and Rental and Leasing	5	9.5	**	**
Professional & Business Services	13	2.1 ^c	2.9 ^e	3.1
Educational & Health Services	7	0.1 ^c	**	0.7
Leisure & Hospitality	9	2.4 ^c	2.7 ^e	2.6
Other Services (except Public Administration)	8	4.7	6.0	3.2
Public Administration	10	5.0	6.8 ^e	2.2
Total	162	3.5	3.5	3.6

^{ab} **Sources:** USDA, National Agricultural Statistics Service. 2012 Census of Agriculture, AC-12-A-22, Released May 2015. Accessed August 9, 2017. Michigan State and County Data, Table 68. Summary by North American Industry Classification System: 2012, Michigan Department of Technology, Management and Budget, Office of Labor Market Information and Strategic Initiatives, Industry-Current Employment Estimates by Industry (CES), Michigan, Year: 2016. January 17, 2018. <http://milmi.org/datasearch>, Michigan Department of Technology, Management and Budget, Office of Labor Market Information and Strategic Initiatives, Industry-Employment and Wages by Industry (QCEW), Michigan, Year: 2016. January 17, 2018. <http://milmi.org/datasearch>.

^b Incidence rates calculated per 100,000 full-time equivalent (FTE) workers (from Table 5)

^c US Bureau of Labor Statistics, Census of Fatal Occupational Injuries (CFOI) - Current and Revised Data. Accessed January 26, 2018. <https://www.bls.gov/iff/oshwc/cfoi/cfch0015.pdf>

^d U.S. Bureau of Labor Statistics, 2016 Fatal Injury Rates by State of Incident and Industry Release Date: Final data released November 9, 2017. Accessed January 26, 2018. <https://www.bls.gov/iif/oshwc/cfoi/staterate2016.htm>

^e Rate represents the number of fatal occupational injuries per 100,000 full time equivalent workers and was calculated as: $(N+N/EH) \times 200,000,000$ where N= Number of fatal injuries for hired workers; EH = total hours worked by employees in the industry sector during the calendar year (number of hours x 50 weeks per year); 200,000,000 = base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

** No data available from respective sources

New in 2016, the Bureau of Labor Statistics calculated a State-based hourly rate that was based on using national-level "average hours" and "at work" information from the Current Population Survey (CPS) to calculate the average annual number of hours for each employee, since these data are not available at the state level. When available, MIFACE used Michigan-specific hourly rates from Michigan DTMB CES; when unavailable, MIFACE used the BLS State-based hourly rate for Michigan

State industry rates are not directly comparable to national industry rates. Because state rates include government workers in their respective industry and are not broken out separately, both the numerator and denominator include a different group of workers than that of the national rates. State industry rates are not comparable to other states because of

the large differences in the industry composition of employment by state.

Overall, Michigan's work-related fatality rate was lower than the U.S. national rate. Although not directly comparable, most Michigan industry groups had a higher rate than the U.S. National rate for their industry. Exceptions included the Transportation and Utilities industry sector (6.8 compared to 14.3) and the Professional and Business Services (2.9 compared to 3.0). (**Table 6**).

Agriculture

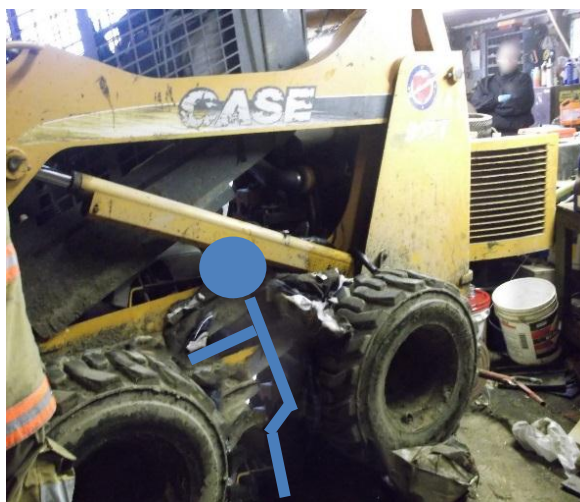
Traditional farm operations (Crop and Animal Production) accounted for 15 of the 19 (78.9%) deaths in 2016. Eleven of the 15 (13.7 deaths/100,000 operators) known work-related deaths were identified as a farm operator, while four (4.9 deaths/100,000 hired hands) were identified as hired labor.

Hired labor includes paid family members, bookkeepers, office workers, maintenance workers, etc., if their work was primarily associated with agricultural production on the operation. Hired labor excludes contract (migrant) laborers. The Census divides hired farm workers into two categories based on the duration of work in a calendar year: working 150 days or more (25,710 workers) or less than 150 days (57,741 workers). All of the hired farm workers who died in 2016 worked more than 150 days in a calendar year.

Unpaid workers include agricultural workers not on the payroll who performed activities or work on a farm or ranch. MIFACE was unable to identify if an individual was an unpaid worker.

The number of migrant workers was not noted on the 2012 Agricultural Census, only the number of farms utilizing migrant labor. The Michigan Migrant and Seasonal Farmworker Enumeration Profiles Study (Update June 2013)

estimated 49,135 migrant and seasonal farm laborers in 2013. Seasonal farm labor was described as "an individual whose principal employment is in agriculture on a seasonal basis, who has been so employed within the last twenty-four months." Migrant farm workers were



[Case 80](#). Dairy farm owner in his 30s died when he was caught between the lowering arm and frame of a skid steer loader. The decedent and a coworker were in the process of finding a hydraulic leak.



[Case 79](#). Farm laborer in her 50s died when her clothing became entangled in the unguarded rotating power take off (PTO) shaft of a tractor she was using to power a corn elevator.

defined as meeting the seasonal farm labor definition but “establishes for the purposes of such employment a temporary abode” (U.S. Code, Public Health Services Act, “Migrant Health”). Migrant farm workers include both individuals who met the definition of a migrant but only travel within the state of Michigan (intrastate migrants) and others who come from outside the state to work in Michigan (interstate migrants)

(https://www.michigan.gov/documents/dhs/FarmworkerReport_430130_7.pdf). Thirteen thousand six hundred-twenty farm operators indicated they hired labor and 3,906 farm operators indicated they hired contract labor (Table 68, 2012 Agricultural Census, Michigan: https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_1_State_Level/Michigan/st26_1_068_068.pdf).

If the total number of Agricultural operators (80,304), hired farm labor (83,451), and unpaid workers (53,797) identified in the 2012 Agriculture Census are added to the above estimate for migrant and seasonal farm laborers (49,135), as well as to the number of employees working in Forestry & Logging (1,833), Fishing, Hunting and Trapping (176) and Agricultural Support Activities (2,985) in 2016, the total number of workers in Agriculture was 271,681. The increase in the number of workers in Agriculture, Fishing, Forestry and Hunting would dramatically lower the NAICS 11 Agriculture, Forestry, Hunting and Fishing work-related fatality incidence rate from 22.3/100,000 to 7.0 deaths/100,000 workers. With the use of either denominator, there is a slight decrease in the rate of agricultural deaths from 2015 to 2016; 24.7 to 22.3 or 7.7 to 7.0/100,000, largely reflecting the decrease in the number of deaths (from 21 to 19). Both rates are appreciably lower than the official BLS rate, which only includes hired employees.

There are a number of issues associated with summing these counts of hired labor, unpaid workers, and migrant/seasonal laborers in the Agriculture denominator. In Michigan, only 33.6% of agricultural production operations had hired labor and/or migrant/seasonal workers. Seven hundred sixty-eight farms indicated that they utilized migrant workers as part of their hired or contract workers in the 2012 Agricultural Census. Additionally, 94 farms reported that they did not have hired farm workers but they *did* have migrant contract workers on their operation. This suggests that these estimates may contain a classification error and/or classification overlaps, in which a worker may be counted more than once in different categories.



[Case 124](#). Tree feller in his 60s died when a tree fell onto him.

The transient nature of crop production further complicates the picture of Agricultural employment. More farm operators hire workers in the summer than during the winter. A single farm may produce a number of crops utilizing hired labor to harvest. Workers may come and go (leave the state) to harvest other crops. Of the 83,451 hired farm workers, a

large number (57,741, 69.2%) work less than 150 days (approximately 5 months) and it is unknown if they are working in Michigan for 5 days or 149 days. A similar uncertainty exists for hired hands reported as working 150 days or more. Given that many of these work stints may be for durations significantly shorter than a year, it is possible that many hired workers will work at multiple farms in a year, each of which may count the worker in their reported number of hired workers, again leading to a worker being counted more than once.

Due to these uncertainties regarding the true total number of hired, unpaid, and seasonal/migrant workers, and which of these categories may be overlapping or enveloped by others, the incidence rate of work-related fatalities across Agriculture (22.3/100,000 workers) utilizes only the total number of operators in Crop and Animal Production combined with employee counts for Forestry & Logging. It is likely that the most accurate incidence rate lies somewhere between this number and the rate given when all possible counts of hired, unpaid, and migrant labor are combined (7.0/100,000 workers).

Means of Work-Related Death

The means of death was known for all of the 162 work-related deaths in Michigan in 2016 (**Table 7**). Falls were the leading cause of a work-related death (32, 19.8%) in Michigan in 2016. Motor vehicle crashes were the second leading causes of death (28, 17.3%) followed by homicide incidents (22, 13.6%) and then struck by incidents (20, 12.3%).

Falls were the leading cause of death in Administrative and Support and Waste Management and Remediation (7 of 12 deaths, 58.3%) and Construction (15 of 40 deaths, 37.5%). A work-related fall and a machine were the leading causes of death in Manufacturing (3 each, 20.0%). The Construction industry sustained approximately 47% of all work-related fatal falls (15 of 32).



[Cases 101 & 102](#). Two painters in their teens died when the pickup truck driven by the older teen rear-ended a semi-trailer.

Motor vehicles were the primary cause of death in Transportation & Warehousing (7 of 16 deaths, 43.87%) and Wholesale Trade (5 of 10 deaths, 50.0%). A motor vehicle crash was the second-leading cause of death in Construction (10 deaths, 25.0%).

Homicides were the primary causes of death in Other Services (4 of 8 deaths, 50.0%) and Public Administration (4 of 10 deaths, 40.0%).

Although Toxic Exposure did not have a large number of deaths in 2016, the number of deaths more than doubled compared to 2015 (nine in 2016 compared to four in 2015). The

leading chemical contaminant leading to death was carbon monoxide; four individuals died due to overexposure (two individuals died in the same incident).



[Case 28](#). Self-employed construction worker in his 50s was replacing floodlights on a home when he fell approximately 13 feet from either a ladder or a scaffold.



Table 7. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2016

Industry Sector (NAICS Code)	Aircraft (0.6%)	Animal (0.6%)	Asphyxiation (0.6%)	Drowning (1.9%)	Drug Overdose (3.1%)	Electrocution (3.1%)	Fall (19.8%)	Fire/Explosion (1.2%)	Heat/Cold (0.6%)	Homicide (13.6%)	Machine (11.7%)	Motor Vehicle (17.3%)	Struck-by (12.3%)	Suicide (8.0%)	Toxic Exposure (5.6%)	Totals
Agriculture, Forestry, Fishing & Hunting (11)	--	1	--	--	--	--	1	--	--	1	8	--	5	2	1	19
Mining (21)	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Construction (23)	--	--	--	--	--	4	15	--	1	1	3	10	2	1	3	40
Manufacturing (31-33)	--	--	--	--	--2	--	3	--	--	1	4	3	2			15
Wholesale Trade (42)	--	--	--	--	--	--	--	--	--	--	1	5	--	3	1	10
Retail Trade (44-45)	--	--	--	--	1	--	--	--	--	3	--	1	2	2	--	9
Transportation & Warehousing (48-49)	--	--	--	--	--	--	1	--	--	2	--	7	3	--	3	16
Information (51)	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1
Real Estate & Rental & Leasing (53)	--	--	--	--	--	1	--	--	--	2	1	--	--	--	1	5
Professional, Scientific, & Technical Services (54)	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
Administrative & Support & Waste Management & Remediation Services (56)	--	--	1	2	--	--	7	--	--	--	--	--	1	1	--	12
Educational Services (61)	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Health Care & Social Assistance (62)	--	--	--	--	1	--	--	1	--	2	--	1	--	--	--	5
Arts, Entertainment, & Recreation (71)	--	--	--	--	--	--	1	--	--	1	--	--	1	--	--	3
Accommodation & Food Services (72)	--	--	--	1	1	--	1	1	--	1	--	--	1	--	--	6
Other Services (ex. Public Administration) (81)	--	--	--	--	--	--	--	--	--	4	1	--	2	1	--	8
Public Administration (92)		--	--	--	--	--	2	--	--	4	--	1	1	2	--	10
Totals	1	1	1	3	5	5	32	2	1	22	19	28	20	13	9	162

Means of Death by Cause

Aircraft

One individual died in a plane crash. The certified flight instructor was a passenger in a single-engine aircraft while entering the traffic pattern to land.

Animal

One herdsman died when a bull struck him multiple times.

Asphyxiation

One individual died from asphyxiation when she choked to death on a piece of food.

Drowning

Three individuals died from drowning. All three individual had been standing on shore and were attempting to retrieve a drifting boat when they drowned. One incident involved two individual trying to rescue coworkers. None of the individuals wore a life preserver.

Drug Overdose

Five individuals, four males and one female, died due to a drug overdose. Two individuals, both males, were in their 50s (automotive millwright and paint mix room attendant), two individuals were in their 40s (male forklift driver and female registered nurse) and one individual was in his 20s (bartender). Drugs included fentanyl, heroin, cocaine, morphine, propoxyphene, cyclobenzaprine, codeine, alprazolam, and alcohol,



[Case 6](#). Campground worker in his 20s drowned while attempting to retrieve a 2-person paddleboat.

Electrocution

Five individuals died from coming into contact with electrical current. One individual indirectly contacted an overhead power line. He was smoothing concrete with a metal pole when the pole contacted a 7,200-volt overhead power line. One individual was performing welding activities on a pontoon boat when the energized welding leads contacted his body. One college student lifeguard was struck by lightning while watching a storm come in over a lake. One individual directly contacted an ungrounded 7000/8750-watt portable generator and one individual was in the crawl space of a home under repair when he contacted an energized line of unknown voltage.



Case 14. Gutter installer in his 30s died when he was electrocuted by an ungrounded 7000/8750-watt portable generator located inside the back of his box truck.

Fall

Falls accounted for 32 (19.8%) of the 2016 work-related fatalities. The height of the fall ranged from ground level to 55 feet. Nine (28.1%) individuals fell 20-29 feet, eight (25.0%) individuals fell 30 feet or more and eight individuals fell 10-19 feet. Seven (21.9%) individuals fell 10 feet or less (five of the falls were ground level falls).

The reason for the fall was identified in 30 (93.8%) of the 32 incidents. The individual most likely slipped/tripped/lost balance in 10 (30.0%) incidents. The structure gave way in eight (26.7%) incidents. Five (16.7%) incidents involved individuals trimming trees; four involved a tree climber. In two incidents, the climber inadvertently cut the rope, the climbing rope unknotted in one incident and in one incident the climber's saddle rope broke. In one incident, a tree limb struck the bucket of a bucket truck propelling the decedent out of the bucket. Two (6.7%) incidents involved a forklift; in one incident, a lifting cage slid from the forks and in another incident, the forklift tipped over. Additional causes of a fatal fall in 2016 include walking into an unguarded 2nd story, a fall from a horse, and an office chair tipping over resulting in the individual striking his head. The cause of the fall was due to a medical reason in two (6.7%) incidents. The cause of the fall was unknown in two incidents.



Case 43. Tree trimmer in his 70s died when he fell approximately 20 feet after the branch he was sitting on broke at the crotch while he was readjusting his lifeline.

The location from which the decedent fell was identified for all 32 fall-related deaths; from a ladder or scaffold in seven (21.9%) incidents, from a vehicle/machine/equipment in six (18.8%) incidents,

a tree in five (15.6%) incidents, while at ground level in five (15.6%) incidents, and from/through a roof in four incidents. Two (6.3%) incidents involved stairs; a flight of stairs and improperly guarded stair opening. One (3.1%) individual each fell from a building parapet, steel tubing, and a horse.

The condition of the working surface was known in 27 (84.4 %) of the 32 cases. The working surface was dry in 25 (92.6%) incidents; in seven (28.0%) of the 25 incidents other factors contributed to the fatal fall. In three of the 25 incidents, the condition of the work surface was described as damaged/worn *and* improperly secured. In two of the 25 incidents, the surface was described as damaged/worn. In one incident, the work surface was rutted and in another incident, it was hot outside.

Frost/ice/snow-covered was a factor for two (7.4%) fall incidents; one of these incidents occurred at an ice rink while a referee was skating.



Case 26: Carpenter in his 20s died when he stepped on plywood partially covering a stairway hole and fell approximately 22 feet to the concrete floor of a residential home under construction.

The worksite of the fatal falls was identified for all of the 32 falls. Fourteen (43.8%) occurred at construction sites – eight falls occurred residential sites and six at commercial sites. Seven (21.9%) falls occurred during tree trimming activities at residential sites. Three (9.4%) falls occurred at manufacturing facilities. Eight distinct sites were the location of one fall each: an ice skating rink, a fruit cooling room at a warehouse, a restaurant, outside a business fixing a phone line, a farm, a roadway, the top of a van, and from a horse during a parade.

Fire/Explosion

Two individuals died from injury complications of a fire/explosion. One individual, a hospice worker, died when her client's home was involved in a fast-moving fire caused by a natural gas explosion. One restaurant owner died from smoke inhalation when he attempted to extinguish a fire in his restaurant.

Heat/Cold

A male roofer died from environmental hyperthermia while performing roofing activities.

Homicide

There were 22 work-related homicides; 19 (86.4%) men and 3 (13.6%) women.

Eleven (50.0%) work-related homicide victims were African American males and six (27.3%) were Caucasian males. The death certificate identified the additional two males as Asian/Pacific and Asian/Indian. All of the women who died due to a work-related homicide were Caucasian.

Eighteen of the 22 (81.8%) homicides occurred among individuals born in the United States. The country of origin for the additional four homicides was Guinea, India, Senegal, and Vietnam.

Work-related homicides occurred primarily in Wayne County (13 of 22, 59.1%). Genesee County had three individuals die in two work-related homicide incidents. Berrien County had one homicide incident in which two individuals died. The counties with one incident each were Oakland, Kent, Jackson, and Gratiot.

There were 20 separate homicide incidents. Two incidents each had two individuals working together were killed; these incidents occurred in Berrien county and Genesee county. The decedent was working alone in 11 (55.0%) homicide incidents and with coworkers in 7 (35.0%) homicide incidents. For two (10.0%) homicide incidents, it is unknown if coworkers were present when the homicide occurred.

The average age of a homicide victim was 43.7 years, up from 2015's average age of 42.1 years. Ages ranged from 20 years of age to 67 years of age.

The day of the week for a homicide incident was known for 20 (90.9%) of the 22 homicides. The most common day of the week among the 20 homicides was Monday (6, 30.0%), followed by Sunday (4, 20.0%), and then Tuesday and Wednesday (3 each, 15.0%), then Thursday and Saturday (2 each, 10.0%).

The time of the incident was known/estimated for 17 of the 22 homicide cases; six homicides occurred between noon and 3:59 p.m., four homicides each occurred between 8 a.m. and 11:59 a.m. and 8 p.m. and midnight, two homicides occurred between 4 p.m. and 7:59 p.m. and one homicide occurred between midnight and 3:59 a.m.

A gun was the cause of death in 21 (95.5%) of the 22 homicides. One individual died from a blunt instrument.

Machine

There were 19 machine-related fatalities. Nine of the 19 (47.4%) machine-related fatalities involved machines that are common on a farm; eight of the 9 deaths occurred in Agriculture and one death occurred in Wholesale Trade. Farm machines included agricultural tractors and/or their implements (power take off unit (PTO), brush hog), an ATV, a skid steer, milking parlor equipment and a log skidder.

Five of the eight (62.5%) machine-related fatalities in Agriculture involved a tractor. Three incidents involved the overturn of a tractor; none of the tractors were equipped with a rollover protection structure and all of the individuals were pinned under the tractor. In one incident, the farmer fell

from the tractor and was run over by the tractor and trailing brush hog, and in one incident, the farm laborer was entangled in an unguarded, rotating PTO shaft powered by a tractor.

In one Agricultural incident, the decedent was pinned when the log skidder he was operating overturned to the side.

An agricultural tractor was used while clearing land in a Construction death; the operator fell from the tractor and was run over.

In one incident, the individual who worked in Wholesale Trade was repairing milking parlor equipment on a farm when he was pinned by a rotating carousel.

Eleven machine-related deaths occurred in the following industries: Other Services (overturned garden tractor mowing church lawn), Real Estate and Rental and Leasing (overturned crane), Manufacturing (mixing blades in mixing tank, crushed between mini-dumpster and compactor, pinned between rotary carousel and platen framework of a thermal forming machine, crushed between platens of a mold press), Construction (fall from tractor clearing land, operating excavator when head struck cab, crushed between aerial lift basket and angle iron in doorway), and Mining (pinned between front end loader and mining equipment).

Motor Vehicle

There were 28 motor-vehicle-related fatalities in 25 collisions. There were two incidents with multiple fatalities; both occurred during Construction travel to a worksite in a pickup truck. One crash killed two individuals and one crash killed three individuals.

For each of the motor-vehicle related deaths, MIFACE reviewed the responding police/sheriff department crash and/or written report(s) to gather and summarize the data.



[Case 91](#). Equipment sales owner in his 50s died when the crane he was using to lift a Hewitt Robius Vibrex gravel shaker from a lowboy trailer tipped over onto a lowboy trailer gooseneck, crushing the cab.



[Case 114](#). Truck driver in his 20s died in a multi-vehicle crash. Snowfall was heavy, visibility diminished and traffic slowing. Prior crashes blocked the road and the decedent was unable to avoid striking the rear of another semi-tractor trailer.

Motor Vehicle Crash Terminology

A “**unit**” is identified as a motor vehicle, bicycle, pedestrian or train involved in the crash and individually reported; therefore, a car-animal crash or a car-tree crash is categorized as a single-unit crash.

The **crash type** is based on the intended direction of travel, regardless of points of impact or the direction the vehicles ultimately face after the crash.

- ◆ **Single motor vehicle:** cases in which a motor vehicle was (a) the only traffic unit and (b) the only motor vehicle involved collided with a bicyclist, pedestrian, animal, railroad train or any other non-motorized unit.
- ◆ **Head On:** direction of travel of both vehicles must be toward each other.
- ◆ **Head On-Left Turn:** two vehicles are approaching head on and at least one is attempting a left turn.
- ◆ **Angle:** direction of travel is basically perpendicular for both drivers and there is a side impact of approximately 90 degrees.
- ◆ **Rear End:** vehicles traveling in the same direction one behind the other and no turn is involved.
- ◆ **Sideswipe – Opposite:** vehicles traveling in opposite directions and made side contact.

Highlights of Motor Vehicle Incidents

Driver/Passenger/Pedestrian (28 deaths)

- ◆ Drivers: 25 (89.3%) individuals
- ◆ Passengers: 3 (10.7%) individuals

Number of Units (25 incidents)

- ◆ 1 unit: 8 (32.0%) incidents
- ◆ 2 units: 14 (56.0%) incidents
- ◆ 3 units: 2 (8.0%) incidents
- ◆ 5 units: 1 (4.0%) incident

Crash Type (25 incidents)

- ◆ Single motor vehicle: 9 (36.0%) incidents
- ◆ Head On: 2 (8.0%) incidents (2 drivers)
- ◆ Head On-Left Turn: 1 (4.0%) incident
- ◆ Angle: 4 (16.0%) incidents
- ◆ Rear End: 8 (32.0%) incidents
- ◆ Sideswipe-Opposite: 1 (4.0%) incident

Weather (25 incidents)

- ◆ Clear: 16 (64.0%) incidents
- ◆ Cloudy: 8 (32.0%) incidents
- ◆ Snow/Blowing Snow: 1 (4.0%) incident

Amount of Light (25 incidents)

- ◆ Daylight: 24 (96.0%) incidents
- ◆ Dark – Unlit: 1 (4.0%) incident

Number of Roadway Lanes (25 incidents)

- ◆ 1 lane: 1 (4.0%) incident
- ◆ 2 lanes: 18 (72.0%) incidents
- ◆ 3 lanes: 2 (8.0%) incidents
- ◆ 4 lanes: 2 (8.0%) incidents
- ◆ 5 lanes: 1 (4.0%) incident

Speed Limit (25 incidents)

- ◆ 35 mph: 1 (4.0%) incident
- ◆ 45 mph: 1 (4.0%) incident
- ◆ 55 mph: 12 (48.0%) incidents
- ◆ 60 mph: 1 (4.0%) incident
- ◆ 65 mph: 2 (8.0%) incidents
- ◆ 70 mph: 8 (32.0%) incidents

Surface Conditions (25 incidents)

- ◆ Dry: 19 (76.0%) incidents
- ◆ Wet: 4 (16.0%) incidents
- ◆ Icy: 1 (4.0%) incident
- ◆ Slushy: 1 (4.0%) incident

Type of Trafficway (25 incidents)

- ◆ Not physically divided (2-way traffic): 12 (48.0%) incidents
- ◆ Divided highway, median strip, without traffic barrier: 8 (32.0%) incidents
- ◆ Divided highway, median strip, with traffic barrier: 5 (20.0%) incidents

Type of Vehicle (25 incidents)

- ◆ Passenger car: 3 (12.0%) incidents
- ◆ Truck/Bus: 11 (44.0%) incidents
- ◆ Small Truck: 1 (4.0%) incident
- ◆ Pickup Truck: 6 (24.0%) incidents
- ◆ Van: 3 (12.0%) incidents
- ◆ Motorcycle: 1 (4.0%) incident

Hazardous Action, Driver is Decedent (22 of 25 known)

- ◆ None: 5 (22.7%) incidents
- ◆ Speed Too Fast: 5 (22.7%) incidents
- ◆ Failed to Yield: 1 (4.5%) incidents
- ◆ Drove Wrong Way: 1 (4.5%) incident
- ◆ Unable to Stop: 3 (13.6%) incidents
- ◆ Other: 2 (9.1%) incidents
- ◆ Careless/Negligent: 4 (18.2%) incidents

Motor Vehicle Crash Terminology

Sequence of Events records step-by-step regarding what happened during the crash. Up to four Sequence of Events may be recorded.

The event that was considered **most harmful** to the human being is identified by the responding police officer. The event that is most harmful is categorized within headings identified as:

- ◆ Non-Collision
- ◆ Collision with Non-Fixed Objects
- ◆ Collision with Fixed Objects

Hazardous Action of Driver, Pedestrian is Decedent (2 incidents)

- ◆ Careless/Negligent: 2 (100.0%) incident

Seat Belt Use was known for 22 individuals. Restraint use was not available for 1 individual (motorcycle), restraint available, but use unknown for 5 incidents.

- ◆ Seat Belt Used: 18 (81.8%) incidents
- ◆ Seat Belt Not Used: 4 (18.2%) incidents

Roadway Area Where Fatal Incident Occurred (25 incidents)

- ◆ Freeway Crash: 11 (44.0%) incidents
 - ◆ Entrance/Exit Ramp: 1 (9.1%) incident
 - ◆ All other freeway areas: 10 (90.9%) incidents
- ◆ Non-Freeway Intersection: 3 (12.0%) incidents
 - ◆ Within Intersection: 2 (66.7%) incidents
 - ◆ Intersection-Other: 1 (33.3%) incident
- ◆ Other Non-Freeway Areas: 11 (44.0%) incidents
 - ◆ Straight Roadway: 8 (72.7%) incidents
 - ◆ Curved Roadway: 1 (9.1%) incident
 - ◆ Transition area: 1 (9.1%) incident
 - ◆ Railroad grade crossing: 1 (9.1%) incident

Most Harmful Event (25 incidents)

- ◆ Non-collision: 7 (28.0%) incidents
 - ◆ Overturn: 6 (85.7%) incidents
 - ◆ Fire/Explosion: 1 (14.3%) incident
- ◆ Collision with non-fixed object: 12 (48.0%) incidents
 - ◆ Motor Vehicle in transport: 11 (91.7%) incidents
 - ◆ Railroad train/engineer: 1 (8.3%) incident
- ◆ Collision with Fixed object: 6 (24.0%)
 - ◆ Median barrier: 1 (16.7%) incident
 - ◆ Ditch: 1 (16.7%) incident
 - ◆ Tree: 4 (66.7%) incidents

Struck-by

Twenty individuals were fatally injured when struck-by an object. Nine (45.0%) incidents involved a motor vehicle: one individual was pinned between two vehicles, one individual was struck by a car while on the side of the road, one individual was struck by a racecar during a race, one individual was struck by a car which fell from a jack, two individuals were struck by a van, one individual was struck by a toolbox which fell from a trailer, one individual was struck by a semi-trailer he was working on when the truck rolled forward, and one individual was struck by a train while walking alongside a railroad track. Seven (35.0%) incidents involved a tree or tree branch. One individual was struck by a patron at his bar/restaurant, one individual was struck by empty fruit boxes which fell from the forks of his tractor, one individual died when the building walls and floor collapsed and one individual died when a house jack failed.



[Case 138](#). Mechanic in his 20s died when the vehicle he was working under fell off two jacks and struck his head.

Suicide

Thirteen individuals died from a fatal self-inflicted injury while at work. Guns were involved in seven (53.8%) of the deaths, while five (38.5%) related to self-asphyxiation and one (7.7%) to jumping from a height.

By industry sector, Wholesale Trade had the highest number of work-related suicides (3), followed by Agriculture, Retail Trade and Public Administration at two work-related suicides each. Eleven (84.6%) of the decedents were male, and the age range across all thirteen decedents was 19 to 92 years of age; the average age of the decedent was 53.6 years old.

Toxic Exposure

Nine individuals died from overexposure to an airborne contaminant. Carbon monoxide was the airborne toxicant resulting in the deaths of four individuals. Overexposure to carbon monoxide was the cause of death for two individual working in Construction (gas-powered generator operating in the basement of a home), one individual working in Real Estate and Rental and Leasing (electric generator in basement of home), and one individual working in Transportation and Warehousing (owner of a towing/tire



[Case 158](#). Laborer in his 20s was overcome and drowned when he entered a 10,500-gallon molasses tank to reposition a drain pipe.

shop sitting in front of wood burning stove and portable gas heater). One individual who worked in Agriculture lost consciousness and ultimately drowned while working in a manure pit. An individual who worked in Construction died while clearing a manhole sewer drain on his business property. One individual working in Wholesale Trade died when he was overcome and drowned in a molasses tank. Two additional individuals working in Transportation died: one truck driver died of hydrocarbon toxicity when the tanker he was driving overturned and leaked on the ground and one truck driver was overcome by hydrogen sulfide when rinsing his tanker.

MIOSHA Fatality Investigations

The 162 individuals who died from of a work-related injury in 2016 worked for 94 employers. In 2016, MIOSHA personnel conducted a work-related fatality program-related compliance investigation at 43 (45.7%) of the 94 employers but for only 26.5% of all the deaths. A fatality was recorded as a MIOSHA “Program-Related” fatality if the deceased party was employed in an occupation included in MIOSHA jurisdiction as defined in Public Act 154 of 1974, as amended, and the fatality appeared to be related to one or more of the following conditions:

- The incident was found to have resulted from violations of MIOSHA safety and health standards or the “general duty” clause.
- The incident was considered the result of a failure to follow a good safety and health practice that would be the subject of a safety and health recommendation.
- The information describing the incident is insufficient to make a clear distinction between a "Program-Related" and "non-Program-Related" incident, but the type and nature of the injury indicated that there was a high probability that the injury was the result of a failure to adhere to one or more MIOSHA standards, the “general duty” clause, or good safety and health practice.

Table 8 shows the number of work-related fatalities in Michigan in 2016 by industry sector and the number of MIOSHA work-related fatality compliance inspections for each industry sector.

Table 8. Work-Related Fatalities and Number of MIOSHA Work-Related Fatality Compliance Inspections, Michigan 2016		
Industry	Number of Work-Related Fatalities	Number of Work-Related Fatality MIOSHA Compliance Inspections (%)
Agriculture, Forestry, Fishing & Hunting (11)	19	3 (15.8%)
Mining	1	0
Construction (23)	40	18 (45.0%)
Manufacturing (31-33)	15	6 (40.0%)
Wholesale Trade (42)	10	1 (10.0%)
Retail Trade (44-45)	9	1 (11.1%)
Transportation & Warehousing (48-49)	17	3 (17.6%)
Real Estate & Rental & Leasing (53)	5	2 (40.0%)
Professional, Scientific, & Technical Services (54)	1	0
Administrative & Support & Waste Management & Remediation Services (56)	12	8 (66.7%)
Educational Services (61)	1	0
Health Care & Social Assistance (62)	5	0
Arts, Entertainment, & Recreation (71)	3	1 (33.3)
Accommodation & Food Services (72)	6	0
Other Services (ex. Public Administration) (81)	8	0
Public Administration (92)	10	0
Total	162	43

For each company that had a work-related fatality, MIFACE accessed the Federal OSHA Integrated Management Information System (IMIS) to determine any previous MIOSHA compliance activity at the company. Eleven of the 43 (25.6%) employers having a MIOSHA work-related fatality compliance inspection in 2016 were identified as having a MIOSHA work-related compliance inspection prior to 2016. Of the 11 companies, which had a work-related fatality in 2016 and were previously inspected by MIOSHA, four were in Construction, three were in Manufacturing, two were in Transportation and Warehousing and two were in Administrative & Support & Waste Management & Remediation Services.

MIOSHA issued a violation citation to the firm at the conclusion of the fatality investigation in 35 of the 43 (81.4%) investigations. Citation penalties assessed at the conclusion of the compliance inspection (not the penalties decided after appeal) ranged from a low of \$500 to a high of \$64,000.

MIFACE Contact with Companies

MIFACE sent recruitment letters to 37 companies/families that had a work-related fatality in 2016. MIFACE then contacted the company/family by phone. Thirty (81.1%) declined and seven (18.9%) accepted the invitation to participate. One company who initially expressed interest in participating did not show up at the scene of the incident on the scheduled day. MIFACE did not contact 125 employers due to the nature of the fatality (for example, work-related suicide, incident happened years ago, motor vehicle crash, heeding the MIOSHA compliance officer recommendation, self-employed worker/company owner, etc).

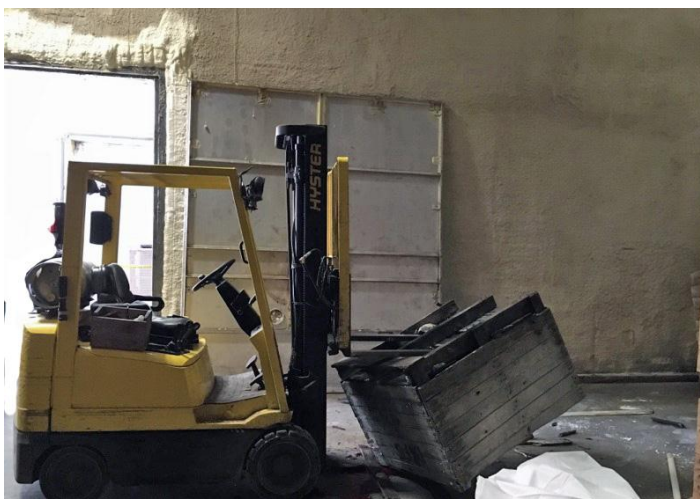
Health and Safety Initiatives

Hispanic Initiative

The US Department of Labor Bureau of Labor Statistics (BLS) has analyzed the National Census of Fatal Occupational Injury (CFOI) data and reported a higher rate of fatal work-related injuries for Hispanic workers in the United States than for other racial/ethnic groups. As a result, Federal OSHA collects additional information during all investigations that includes the primary language and country of origin of the victim. OSHA has also developed several Hispanic safety and health outreach materials that include a compliance assistance web page and information about workplace rights.

In partnership with Federal OSHA, NIOSH has added Hispanic worker fatalities to the list of the current targets for the Federal in-house FACE program. Information gathered is available to the OSHA Hispanic Worker Task Force. The Michigan FACE program supports the initiative and has utilized an Immigrant Workers/Limited English-Speaking Workers investigation guide during appropriate on-site investigations.

There were seven deaths of workers of Hispanic/Latino ethnicity in Michigan in 2016. BLS Table 14, [Michigan Employment Status of the Civilian Non-institutional Population by Sex, Race, Hispanic or Latino ethnicity, and Detailed Age, 2016 annual averages - Michigan](#) was utilized to calculate work-related fatality rates for Michigan Hispanic/Latino, Caucasian and African-American workers 16 years of age and older. In 2016, the Hispanic/Latino fatality rate in Michigan was 3.1 per 100,000 Hispanic/Latino individuals; for males, the fatality rate was 5.2/100,000. For Caucasians, the rate was 3.2/100,000 (males excluding Caucasian men of Hispanic ethnicity (5.5/100,000) and females (0.60/100,000)), for African-Americans, the rate was 4.3/100,000 (males (9.5/100,000)).



Case 36. Hispanic male laborer in his 60s died when he fell approximately 18-20 feet from a fruit storage crate raised by a forklift.

Four of the seven Hispanic/Latino individuals were in their 50s. One individual was in their 30s, one was in his 40s and one was in his 60s. The country of origin for four Hispanic/Latino individuals was the United States, while two were born in Mexico and one was born in El Salvador. One individual worked in Agriculture, two worked in Construction, one worked in Retail Trade, one worked in Transportation and Warehousing, one worked in Administrative and Support and Waste Management and Remediation Services, and one worked in Accommodation and Food Service. .

Sensitivity of “Injury at Work” Box on Death Certificate

If the manner of death (Box 39) on the death certificate indicated accident, suicide, homicide, indeterminate or pending, the “injury at work” box (41d) is completed by the Medical Examiner with “Yes”, “No”, or “Unknown”. “Yes” signifies that the fatal injury occurred at work, “No” signifies it did not occur at work, and “Unknown” signifies that the Medical Examiner did not know if the injury occurred at work. As described in the Methods Section, MIFACE determined a death to be work-related by compiling multiple source documents, including: Workers’ Compensation forms; Police/Fire/EMT Department reports; MIOSHA 24-hour fatality log; hospital records; newspaper reports; family interviews; and Federal agencies (OSHA, NTSB, MSHA, etc.).

Table 9 shows that from 2001-2016, 13.1%-44.8% of the work-related deaths would have been missed if MIFACE had solely relied on the “Injury at Work” box being completed with “Yes”.

Table 9. Sensitivity of Death Certificate “Injury at Work” Box Predicting Fatal Injury at Work, Michigan 2016		
Year (# Deaths)	DC Coded as at work (%)	DC Coded as not at work (%)
2001 (174)*	133 (79.6%)	34 (20.4%)
2002 (151)	126 (86.9%)	19 (13.1%)
2003 (152)	110 (74.3%)	38 (25.7%)
2004 (131)	93 (74.4%)	32 (25.6%)
2005 (110)	88 (83.0%)	18 (17.0%)
2006 (157)	122 (79.2%)	32 (20.8%)
2007 (121)	99 (85.3%)	17 (14.7%)
2008 (121)	100 (84.0%)	19 (16.0%)
2009 (96)	72 (75.8%)	23 (24.2%)
2010 (147)	102 (70.3%)	43 (29.7%)
2011 (141)	95 (69.3%)	42 (30.7%)
2012 (135)	74 (55.2%)	60 (44.8%)
2013 (134)	82 (62.6%)	49 (37.4%)
2014 (143)	89 (62.7%)	53 (37.3%)
2015 (136)	89 (67.9%)	42 (32.1%)
2016 (158)	99 (62.7%)	59 (37.3%)

*All death certificates were not obtained/reviewed each year. Percentages based on number of death certificates received for that year.

Table 10. Industry and Number of Deaths and Number and Percent of Misidentified Deaths, Michigan 2016		
Industry (NAICS Code)	Number of Deaths	Number of Misidentified Deaths (%)
Agriculture, Forestry, Fishing & Hunting (11)	19	11 (57.9%)
Mining (21)	1	0
Construction (23)	40	13 (32.5%)
Manufacturing (31-33)	15	4 (26.7%)
Wholesale Trade (42)	10	2 (20.0%)
Retail Trade (44-45)	9	6 (66.7%)
Transportation & Warehousing (48-49)	16	8 (50.0%)
Information (51)	1	0
Real Estate & Rental & Leasing (53)	5	1 (20.0%)
Professional, Scientific & Technical Services (54)	1	1 (100%)
Administrative & Support & Waste Management & Remediation Services (56)	12	0
Educational Services (61)	1	1 (100%)
Health Care & Social Assistance (62)	5	2 (40.0%)
Arts, Entertainment & Recreation (71)	3	1 (33.3%)
Accommodation & Food Service (72)	6	2 (33.3%)
Other Services (ex. Public Administration) (81)	8	3 (37.5%)
Public Administration (92)	10	4 (40.0%)

Table 10 shows that in 2016, the “Injury at Work” box was misidentified most frequently in the designation of an injury at work in the Retail Trade (6 of 9 deaths) and then Agriculture (11 of the 19 deaths). Work-related deaths involving motor vehicle incidents (15 of 28 deaths), homicides (11 of 22 deaths), struck by (9 of 20 deaths) and then suicides (8 of 13 deaths) were the causes of death most misidentified as “No” in the “Injury at Work” box.

Number of 2016 Deaths Compared to Michigan CFOI

The Census of Fatal Occupational Injuries (CFOI) is the surveillance system funded in most states by the US Department of Labor, Bureau of Labor Statistics. The Michigan CFOI program reported 162 work-related deaths in 2016 per the BLS website viewed on June 2, 2017.

Case Narratives

Based on the information collected during MIFACE on-site investigations and/or from source documents, a brief narrative summary organized alphabetically by means of death of each of the 136 acute traumatic work-related deaths in 2016 is included in [Appendix I](#).

Table 11 provides the narrative case number and cause of death by NAICS code found in the Appendix. Each combination of industry and cause of death is hyperlinked to the beginning of the

corresponding narratives. Additionally, each cause of death label is hyperlinked to its corresponding heading in the Appendix.

When the brand name of equipment was known, MIFACE included this information in the narrative. Unless noted, the inclusion of the brand does not signify that there was a defect or other problem with the equipment. Each case narrative that was a work-related fatality that had a MIOSHA work-related fatality compliance investigation is noted by a specific MIFACE case number and hyperlinked to its MIFACE Summary of MIOSHA Investigation (MIFACE Summary) on the MSU OEM/MIFACE webpage. If a MIFACE Investigation Report was written, the MIFACE Investigation number is hyperlinked to its corresponding report on the MSU OEM/MIFACE website.

Table 11. Traumatic Work-Related Fatality Narratives by Means of Death and Industry Sector, Michigan 2016

Industry Sector (NAICS Code)	Aircraft (0.6%)	Animal (0.6%)	Asphyxiation (0.6%)	Drowning (1.9%)	Drug Overdose (3.1%)	Electrocution (3.1%)	Fall (19.8%)	Fire/Explosion (1.2%)	Heat/Cold (0.6%)	Homicide (13.6%)	Machine (11.7%)	Motor Vehicle (17.3%)	Struck-by (12.3%)	Suicide (8.0%)	Toxic Exposure (5.6%)
Agriculture, Forestry, Fishing & Hunting (11)		2					17			52	74-81		121-125	141-142	154
Mining (21)											82				
Construction (23)						12-15	18-32		51	53	83-85	93-102	126-127	143	155-157
Manufacturing (31-33)					7.8		33-35			54	86-89	103-105	128-129		
Wholesale Trade (42)											90	106-110		144-146	158
Retail Trade (44-45)					9					55-57		111	130-131	147-148	
Transportation & Warehousing (48-49)							36			58-59		112-118	132-134		159-161
Information (51)							37								
Finance & Insurance (52)															
Real Estate & Rental & Leasing (53)						16				60-61	91				162
Professional, Scientific, & Technical Services (54)														149	
Administrative & Support & Waste Management & Remediation Services (56)			3	4.5			38-44						135	150	
Education (61)	1														
Health Care & Social Assistance (62)					10			49		62-63		119			
Arts, Entertainment, & Recreation (71)							45			64			136		
Accommodation & Food Services (72)				6	11		46	50		65			137		
Other Services (ex. Public Administration) (81)										66-69	92	120	138-139	151	
Public Administration (92)							47-48			70-73			140	152-153	

Discussion

In 2016, there were 162 fatal work injuries in Michigan. Construction (40 deaths, 24.7% of all fatalities) had the largest number of work-related deaths and the highest risk of death (25.7 deaths/100,000 workers) and agriculture was second in the number of work-related deaths (19 deaths, 11.7%) and risk of death (22.3 deaths/100,000). Transportation and Warehousing was third in number and risk (16 deaths, 9.9%; 11.6 deaths/100,000 workers) of a work-related death. Manufacturing, although fourth in the number of deaths (15 deaths, 9.3%) had a relatively low risk of death (2.5 deaths/100,000 workers).

There were 5,190 fatal work injuries recorded in the United States in 2016, a 7-percent increase from the 4,836 fatal injuries reported in 2015. Michigan was one of thirty-six states that had a higher number of work-related fatal injuries in 2016 compared to 2015. In 2016, Michigan had an increase of 26 fatalities (26%) compared to 2015. The 2016 work-related fatality rate in Michigan was 3.5 per 100,000 workers.

Since MIFACE began surveillance of all traumatic work-related fatalities the number and rate of work-related acute traumatic fatalities were generally down from 174 (3.6/100,000) in 2001 to 136 (3.0/100,000 workers) in 2015. The lowest number of deaths and rates occurred in 2005 (110, 2.3/100,000 workers) and 2009 (96, 2.2/100,000 workers) ([Figure 1](#)). An increase in the number of deaths in Construction, Wholesale Trade and Other Services contributed to the increased acute traumatic work-related deaths in 2016.

Part of the increase in 2016 in Michigan was from an increase in multi-death incidents; two motor vehicle crashes killed five individuals who worked in Construction and two individuals working in Construction died from overexposure to carbon monoxide, two individuals died in a drowning incident (Administrative & Support & Waste Management & Remediation), two individuals each died in two homicide incidents (Real Estate & Rental & Leasing, Public Administration). These six separate incidents involved the deaths of 13 individuals.

The number of deaths in Construction increased by 12 (28 deaths in 2015 compared to 40 deaths in 2016). While two of the three Construction industry subsectors had a decreased number of deaths, the increase in the number of deaths overall in Construction was due to the increase in the number of deaths of the specialty trade group subsector, which encompasses roofers, painters, drywall installers, carpenters, etc. This subsector had the largest increase in the number of deaths (+15) from 2015 (18 deaths) to 2016 (33 deaths). Twelve of the 15 fatal falls in Construction occurred in the specialty trade group subsector, of which seven were roofers.

The number of deaths in Wholesale Trade increased by six (four in 2015 compared to 10 in 2016). Five of the 10 fatalities were motor vehicle crashes, three were suicides, one was a drowning and one individual died in 2016 from complications of a 2007 injury.

The number of deaths in Other Services increased by 5 (3 in 2015 compared to 8 in 2016). The increase was driven by an increase in the number of homicides (+3 deaths) and struck-by incidents (+2 deaths). The struck by incidents included an elevated vehicle falling from support jacks and a tool chest falling from a truck.

Administrative & Support & Waste Management & Remediation had an increase of two deaths compared to 2015. Eight (66.7%) of the 12 deaths in this industry were individuals trimming/cutting trees. Four of the eight individuals were the owner of the company; none of the owners had a written health and safety plan.

The lack of a written and implemented health and safety program may be a factor in the increase in number of fatalities. In 2016, only 17 (39.5%) of the 43 deaths investigated by MIOSHA had a written health and safety program. Of these, only eight in Construction (40 deaths), three in Manufacturing (15 deaths) two in Transportation & Warehousing (16 deaths), one in Real Estate & Rental & Leasing (5 deaths), and three in Administrative & Support & Waste Management & Remediation Services (12 deaths) had a written health and safety program. The MIOSHA data show that few of the employers had systematically identified the safety and health hazards to which their employees were exposed. As the economy improves with longer working hours and more workers added to the employment rolls, new workers or workers doing new tasks will be at increased risk of injury and death if hazard identification and safety training has not been performed. Employers need to maintain a strong safety culture to ensure that there are not adverse health consequences to the improved economic benefits.



[Case 21](#). Owner/roofer in his 30s fell approximately 30 feet from a pallet elevated by a rough terrain forklift while installing an ice guard on the cone of a roof.

Self-employed individuals, roughly 33% of all work-related deaths in Michigan in 2016, are not often members of trade groups and may not have access to or learn about safety and health issues and are not regulated by MIOSHA and are less likely to consult the MIOSHA website for guidance.

The cause(s) of the increase in the number and incidence rate of work-related fatalities, both nationally and in Michigan, is likely a result of many factors and continued investigation of the causal factors of work-related injuries and fatalities is necessary to both understand and reverse this increase.

In 2016, the number of work-related deaths averaged 3.1 fatalities per week, 13.5 per month, although the deaths were not evenly distributed throughout the year. The month of the fatal incident was known in all of the 162 work-related fatalities; the last six months of 2016 had 102 (63.0%) of all of the work-related deaths. September was the most common month (23 deaths) followed by July (19 deaths), then August (18 deaths), and then October and November (16 fatal incidents each). March, April and June had 12 deaths each, and January and December had 10 deaths each.

MIOSHA staff investigated 43 of the 162 (26.5%) deaths. The Mine Safety and Health Administration (MSHA) investigated one death (0.6%) and the Federal Aviation Administration investigated one death (0.06%). The remaining 117 (72.2%) work-related deaths were not investigated by any regulatory agency other than the police.

As stated previously, Agriculture had the second largest number of work-related deaths (19 deaths, 11.7%) and the second highest incidence rate of 22.3/100,000 workers. The incidence rate was based on the total number of *operators* as identified in the 2012 USDA Agricultural Census, as discussed above. The Agricultural Census does not gather data regarding the Forestry & Logging subsector.

The [USDA Farm Labor Report, Released November 17, 2016 by the National Agricultural Statistics Service \(NASS\), Agricultural Statistics Board, United States Department of Agriculture \(USDA\)](#) indicated that hired workers worked an average of 38.1 hours per week in the region. The data included field crops, other crops including nursery or greenhouse crops and livestock or poultry. The data excluded logging, fishing, forestry and hunting and agricultural service workers, contract labor and custom labor (such as hay baling, combining, corn picking, spraying, fertilizing, etc.). In 2016, four fatalities among hired laborers working in field crops, other crops or livestock/poultry were identified. Utilizing USDA Farm Labor Report's 38.1 hours per week average, the 2016 hours-based fatality incidence rate for hired workers in Michigan was 5.0 fatal injuries/100,000 full-time equivalent workers.

The decrease in the number of deaths in Agriculture from 2015 was due to a drop in fatalities in Animal Production (four fewer deaths), a decrease in the number of deaths which could not be assigned an industry sector (two fewer deaths) and no deaths in Agricultural Support Activities; although the overall decrease in Agriculture was countered by an increase in fatalities in Crop Production (two more deaths), and Forestry and Logging (three more deaths). The average age of those who died working in Agriculture (61.0 years, with a range of 32-92 years) was younger in 2016 than in previous years. **Table 12** shows the average age at the time of death for the past 16 years for those employed in Agriculture. In 12 of the 16 previous years, the average age of the individual was in their 50s or 60s.

Table 12. Average Age at Time of Death, Agriculture, Michigan 2001-2016			
Year	Age (in years)	Year	Age (in years)
2001	47.4	2009	51.5
2002	48.0	2010	53.0
2003	58.1	2011	56.6
2004	59.7	2012	52.2
2005	54.9	2013	56.6
2006	49.9	2014	46.8
2007	54.2	2015	55.3
2008	67.9	2016	61.0

Nationally, in 2016, workers age 55 and older incurred 36% of all fatal work-related injuries. Michigan had a slightly higher lower work-related injury percentage in this age group, at 32.1% of decedents being 55 or older. The two industry sectors comprising the most 55+ year old fatal injuries were Agriculture (12 deaths) and Construction (11 deaths).

In providing funding for Occupational Safety and Health Administration (OSHA) and hence the MIOSHA program, the U.S. Congress placed restrictions on use of federal funds for program activities regarding two categories of employers: small farming operations and small employers in low-hazard industries. This is solely a restriction on expending federal funds; it does not prohibit state-funded MIOSHA activities at these worksites.

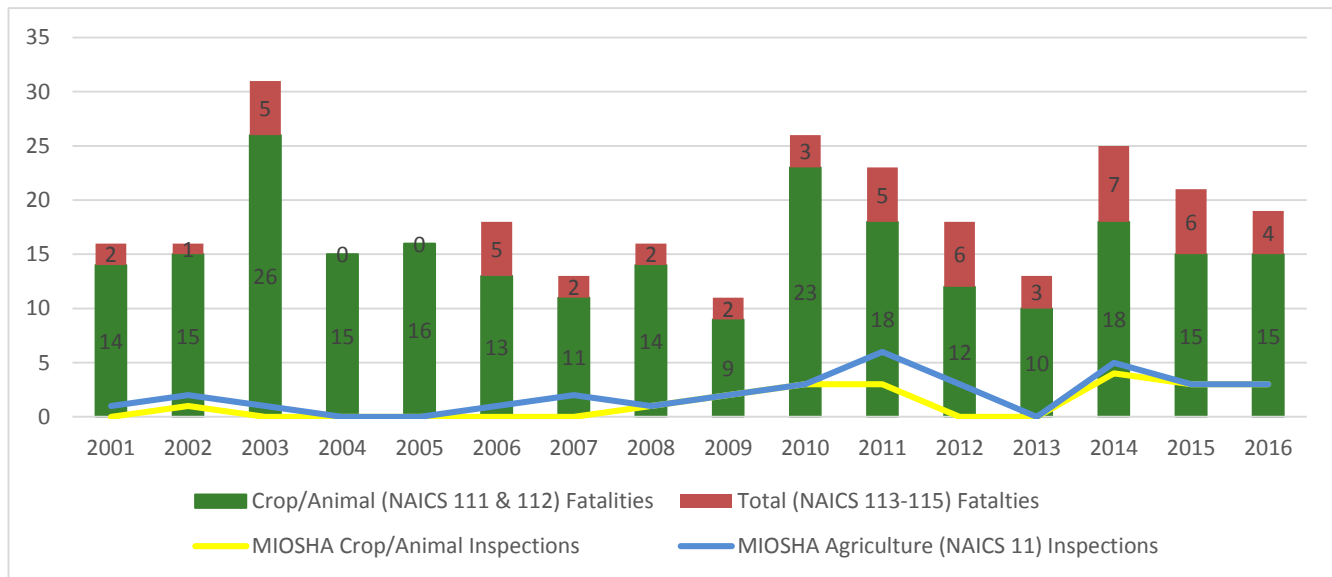
The MIOSHA Act defines Agriculture as “agricultural operations as the work activity designated in major groups 01 and 02 of the Standard Industrial Classification (SIC) manual, United States Bureau of the Budget, 1972 edition. Agricultural operations include any practices performed by a farmer or on a farm as an incident to or in conjunction with farming operations including preparation for market delivery to storage or market or to carriers for transportation to market (MCL 408.10004(1))”.

The federal Appropriations Act exempts small farming operations from federally-funded activities. Only State funds can be used by MIOSHA for interventions at farming operations when a farm operation:

- Employs 10 or fewer employees currently and at all times during the preceding 12 months; and
- Has not had an active temporary labor camp during the preceding 12 months.

It is important to note that immediate family members of farm employers are not counted when determining the number of employees. The majority of agricultural work-related deaths in Michigan have occurred on family farms with fewer than 10 employees and who did not have an active temporary labor camp. Therefore, few MIOSHA work-related fatality inspections on family farm operations have been performed. **Figure 6** shows the total number of Agricultural fatalities with the Crop/Animal fatalities and the number of MIOSHA Agricultural work-related compliance inspections for all Agricultural fatalities and for Crop/Animal work-related fatalities. From 2001 to 2016, MIOSHA has conducted 33 Agricultural (NAICS 11) work-related fatality inspections; 20 of the inspections were in Crop Production and Animal Production and thirteen MIOSHA fatality inspections occurred in the Forestry & Logging subsector.

Figure 6. Number of Agriculture Work-Related Fatalities and MIOSHA Inspections, Michigan 2001-2016



Family farm owners are reluctant to utilize MIOSHA Consultation, Education and Training Division services to initiate “formalized” safety and health practices on their farms. In response, MIOSHA CET has initiated an Agricultural Educational Outreach program. The goal of the consultative and educational outreach to the crop, animal and logging subsectors is to reduce the rate of injuries, illnesses and fatalities by 15% over five years. This educational outreach will address the gap in knowledge about MIOSHA in general, including pertinent Agricultural health and safety regulations, and best safety practices for these small agricultural businesses.

With the exception of 2003 and 2016, motor vehicles have been the leading cause of a work-related death in Michigan. **Table 13** shows the cause of death by year for all of the known work-related deaths in Michigan between the years of 2001-2016. The number of motor vehicle-related deaths remained stable during the 16 years of data collection, as did the number of work-related fatal falls (with the exception of 2016) and struck-by incidents (with the exception of the past four years). Machine-related deaths have largely trended downward since 2001.

Table 14 shows the number of motor vehicle-related work-related deaths by industry sector occurring between the years of 2001-2016. Not surprisingly, motor vehicle-related deaths are prominent in the Transportation industry. What was unexpected was the percentage of the deaths caused by motor vehicles in other industry sectors. Information had at least half of their deaths caused by a motor vehicle. Finance and Insurance, Wholesale Trade, Professional and Scientific and Technical Services, Education and Public Administration also had a marked percentage of work-related deaths involving a motor vehicle. While safety initiatives addressing other issues, such as violence prevention, are of continued importance, employers in these industry sectors should create and maintain safe driving policies and offer driver safety training (including defensive driving) as part of their safety program and training.

Table 13. Cause of Death by Year, Michigan 2001-2016

Year (# deaths)	Electrocution	Fall	Machine	Other/unknown	Motor Vehicle	Homicide	Drowning	Suicide	Toxic Exposure	Struck-by	Fire/Explosion	Heat/Cold	Animal	Aircraft	Asphyxiation	Drug Overdose	Infectious Disease
2001 (174)	4	26	32	4	39	24	2	12	4	13	6	2	1	1	3	1	
2002 (151)	8	21	20		31	22	2	11	4	18	4	2	2	5	1		
2003 (152)	10	19	36		31	15	1	5	3	16	4	1	2	2	4	3	
2004 (131)	7	16	26		29	22		4	4	13	3		1	4	1	1	
2005 (110)	4	20	18		24	16	1	2	2	10	4			6		3	
2006 (157)	10	24	14		35	11	2	8	6	31	4		2	8	1	1	
2007 (121)	4	17	16	2	28	21		6	4	17	1	1	2			2	
2008 (121)	5	26	12		30	14	1	9	2	15	3		1		1	2	
2009 (96)	5	14	7		20	11		12		17			2	2	1	4	
2010 (147)	7	24	16	2	28	26	2	11	6	15	3	1		4		2	
2011 (142)	7	21	20	2	25	15	1	16	4	13	3	2	2	7	2	1	1
2012 (135)	3	18	14	5	36	28	3	12		14						2	
2013 (135)	2	19	10	3	27	16		22	1	24	3	1		2	1	3	
2014 (143)	5	24	11		28	19	3	9		28	1		3	5	3	4	
2015 (136)	5	18	15	1	27	22	2	12	4	21	3		1	3	2	3	
2016 (162)	5	32	19		28	22	3	13	9	20	2	1	1	1	1	5	
TOTALS	91	339	286	19	466	304	23	164	53	285	44	11	20	50	21	37	1

Table 14. Number and Percent of Motor Vehicle-Related Work-Related Deaths by Industry Sector, Michigan 2001-2016		
Industry (total # deaths)	# Motor Vehicle-related deaths	% of total # of deaths
Agriculture (298)	24	8.0
Mining (17)	3	17.6
Utilities (17)	5	29.4
Construction (456)	69	15.1
Manufacturing (229)	20	8.7
Wholesale Trade (70)	27	38.6
Retail Trade (157)	26	16.6
Transportation/Warehousing (269)	117	43.5
Information (29)	16	55.2
Finance/Insurance (13)	6	46.2
Real Estate/Rental/Leasing (32)	2	6.3
Professional/Scientific/Technical Services (35)	14	40.0
Administrative/Support/Waste Management/Remediation (139)	30	21.6
Education (34)	11	32.4
Health Care/Social Assistance (74)	21	28.4
Arts/Entertainment/Recreation (61)	9	14.8
Accommodation/Food Service (74)	4	5.4
Other Services (110)	23	20.9
Public Administration (109)	39	35.8

Both nationally and in Michigan, falls continue to be a top cause of death, particularly in Construction. The national Campaign to Prevent Falls in Construction is a joint effort by government, labor, and management to address this leading cause of construction industry fatalities. **Table 15** shows the number of fatal falls in Construction by year and the percentage of construction work-related deaths the fatal falls represent.

Table 15. Number of Construction Deaths and Number and Percent of Fatal Falls by Year, Michigan 2001-2016

Year	Number of Construction Deaths	Number of Fatal Falls (%)	Year	Number of Construction Deaths	Number of Fatal Falls (%)
2001	37	15 (40.5%)	2009	19	5 (26.3%)
2002	37	12 (32.4%)	2010	22	7 (31.8%)
2003	35	9 (25.7%)	2011	26	11 (42.3%)
2004	32	12 (37.5%)	2012	20	4 (20.0%)
2005	24	14 (58.3%)	2013	25	10 (40.0%)
2006	42	13 (31.0%)	2014	23	9 (39.1%)
2007	18	7 (38.9%)	2015	28	7 (25.0%)
2008	28	11 (39.3%)	2016	40	15 (37.5%)

Between 2001 and 2016, the number of fatal falls in Construction ranged from a low of four falls in 2012 to a high of 15 falls in 2001 and 2016. The percentage of fatalities in construction secondary to a fall ranged from 20.0% in 2012 to 58.3% in 2005. In 2016, four (26.7%) of the 15 Construction fatal falls occurred during roofing activities.

More information regarding the National Construction Fall Prevention Campaign can be found [here](#). The campaign's goal is to prevent fatal falls from roofs, ladders, and scaffolds by encouraging construction contractors to:

- PLAN ahead to get the job done safely.
- PROVIDE the right equipment.
- TRAIN everyone to use the equipment safely.

Nationally, work-related homicides rose to a record high of 500, the highest homicide figure since 2010. In Michigan, the number of work-related homicides was stable (22 in 2016 compared to 22 in 2015). The overall work-related homicide trend is upward (16 in 2013, 19 in 2014, 22 in 2015 and 2016). Unlike national trends, in which a majority of work-related homicide victims are women, 19 of the 22 (86.4%) victims of homicide in Michigan in 2016 were male. In Michigan, as in national data, death by a gunshot was the most frequent manner of death (95.5%) in the 22 homicides.

Nationally, the hours-based fatal work injury rate (per 100,000 FTE workers) for individuals aged 65 and over was 9.6. All of the individuals aged 65 years and older were males. The number of



Case 20. Carpenter in his 50s died from a 44-foot fall from a parapet on the roof.

individuals aged 65 years of age or more who died in 2016 was lower than in 2015 (18 deaths in 2016 compared to 26 deaths in 2015). Although not directly comparable, Michigan's employment-based fatality rate for males aged 65 and over was 12.2/100,000 in 2016; for all 65 years of age and older, the rate was 7.0/100,000, lower (-27%) than the national hours-based fatal injury rate. While the number of employed individuals 65 years of age and older was the second smallest employed population (ages 16-19 years was the smallest) at only 16.4% of Michigan's civilian non-institutional population of that age, this age group had the highest fatality rate of all age groups by far (See **Table 16**. In 2016, one youth, aged 15 died during a farming activity and due to age, is not included in the calculations in Table 16.

Table 16. Fatality Rate by Age Group and Employment Number and Percent of Civilian Non-institutional Population, Michigan 2016				
Age Range (in years)	Employment		Number of Deaths	Fatality Rate (per 100,000)
	Number (in thousands)	% of Civilian non- institutional Population		
16-19	171	36.4	3	1.8
20-24	498	70.1	6	1.2
25-34	964	76.2	23	2.4
35-44	884	77.8	32	3.6
45-54	1,056	76.4	45	4.3
55-64	781	57.6	34	4.4
65 and older	258	16.4	18	7.0

The age group with the highest number of deaths and the largest fatality rate increase were those individuals in the 45- to 54-year old range. In 2016, there were 17 more deaths than in 2015 and the rate increased from 2.7/100,000 in 2015 to 4.3/100,000. In Michigan, from 2010-2016, the number of individuals 65+ years of age who are employed rose from 164,000 in 2010 to 258,000 in 2016, an increase of 36%. The workforce age 65 and older continues to grow as individuals put off retirement and part-time workers enter the workforce due to economic or other reasons. Older workers have unique health and safety challenges, including resistance to change, medical issues, strength issues, as well a wide range of other concerns, all likely contributing to the higher work-related fatality rate in this age group. Federal [OSHA](#) and [NIOSH](#), among other agencies, have developed resources which can help employers address the challenges faced by older workers and provide a safe working environment for this population group.



Case 34. Maintenance technician in his 60s died from an 18-20 foot fall from a 2-inch-by-2-inch square utility beam.

BLS uses the number of hours worked in an industry and profession to calculate an hours-based fatality incidence rate. The 2016 annual national hours-based fatality rate was the same at 3.6/100,000 FTE. Michigan's employment-based rate was 3.5/100,000 per total workforce.

The number and rate of acute traumatic fatalities peaked in the years 1997-2001, were at their lowest from 2004-2005 and during the economic depression in the years 2007-2009, but have otherwise fluctuated from 134-162 deaths per year with a rate 3.0- 3.5/100,000 workers. **Table 17** shows the deaths per year by industry sector for the six industry sectors with the largest number of deaths per year. Prior to 2016, there was the suggestion of a decrease in the number of deaths in construction and manufacturing from peaks in 2001 but no such suggestion in the other sectors.

Table 17. Number of Deaths per Year by Industry Sector for the Six Industry Sectors With the Largest Number of Deaths per Year, Michigan 2001-2016

	Agriculture	Construction	Manufacturing	Transportation	Retail Trade	Administrative Support/Waste Mgt
2001	16	37	27	20	6	11
2002	17	37	20	7	13	10
2003	31	35	10	18	11	3
2004	15	32	19	17	4	5
2005	16	24	14	14	9	6
2006	18	42	19	19	9	12
2007	13	18	14	11	10	10
2008	16	28	14	11	8	5
2009	11	19	11	6	9	13
2010	26	22	6	20	16	7
2011	24	26	15	14	10	7
2012	18	20	11	19	12	11
2013	13	25	10	26	8	9
2014	25	23	8	19	13	8
2015	21	28	16	18	9	10
2016	19	40	15	16	9	12

Importance of Using Multiple Data Sources

MIFACE used many data sources to ascertain if a fatal injury occurred “on the job”. Reliance on just the information in the “Injury at Work” box on the individual’s death certificate would have missed 59 (37.3%) of the work-related deaths in 2016, particularly with causes of death such as motor vehicle crashes, homicides, struck-by incidents and work-related suicides. That MIFACE is able to capture these work-related fatalities that would otherwise be missed when relying solely on the “Injury at Work” box supports the utility, and need, for surveillance programs that collate fatality information from multiple sources.

Prevention Material Dissemination

On the MSU OEM website (<http://www.oem.msu.edu/>) are copies of the completed MIFACE Investigation Reports, Hazard Alerts, and MIFACE Summaries of MIOSHA Investigations (work-related fatality compliance inspection) conducted by MIOSHA personnel.

In 2016, 4 Investigation Reports, 30 MIFACE Summaries of MIOSHA Investigations, 1 Hazard Alert, and the MIFACE 2016 Data Fact sheet were posted on the MSU OEM website and distributed to stakeholders. MIFACE Summaries of MIOSHA Investigations included a summary of the work-related fatality and the citations issued to the employer by MIOSHA compliance personnel at the conclusion of the fatality investigation. Hazard Alerts are 1-page documents that review work-related fatalities and provide prevention recommendations that target specific industrial sectors or repeated work-related fatality incidents. The MIFACE Data Fact Sheet summarizes information received regarding the state's work-related deaths and was updated periodically when new information was received. The most current 2016 MIFACE Data Fact Sheet can be found [here](#).

For each MIFACE Investigation Report, MIFACE Summary of a MIOSHA Investigation, and Hazard Alert there was a dissemination plan to maximize awareness of the Report and Alert. Investigation Reports and Hazard Alerts were sent via email to appropriate trade associations, unions, trade journals, employers who did the same type of work, and to employers who have expressed interest in receiving the reports.

In 2016, twenty MIFACE presentations were given to trade groups ranging from health and safety professionals in construction, agriculture and general industry. A special effort in conjunction with the Michigan Farm Bureau to provide educational safety sessions to farmers rural emergency responders was ongoing. In 2016, 11 agricultural health and safety presentations were given; more than 700 individuals attended the training sessions.

Summary

Traumatic occupational fatalities are an important public health issue in Michigan and throughout the United States. These deaths are not random events, and information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future. There were 26 more deaths occurring in Michigan in 2016 compared to 2015. The numbers and rates of these acute traumatic fatalities have fluctuated from year to year, and there has not been a clear downward trend over multiple years. Further efforts are needed to have a meaningful reduction of the occurrence of these tragedies.

Understanding the root cause(s) of these tragic events and sharing this information with stakeholders, from individuals to groups, employees to employers, makes these information-gathering efforts worthwhile. If what we learn from any of these deaths can help prevent further tragedies, then the surveillance program has been successful in its goal. An awareness of the hazards of one's job and an attitude of safety-mindfulness on the part of labor and management is critical to prevent future fatal events.

Each of the 162 deaths in this report could have been prevented, whether through installation of engineering controls, development and implementation of health and safety plans, changes to work practice, or the identification and assistance of individuals seeking and receiving mental health counseling so they can better cope with both work and personal stressors. Efforts to prevent future work-related deaths will also be useful to prevent the much larger number of work-related injuries (~335,000) that are estimated to occur each year in Michigan (330,000 is based on previous studies that the BLS estimate of 111,700 represents about 33% of the actual number of nonfatal injuries in Michigan in 2016).

The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to take action to prevent them. Further efforts to investigate the circumstances leading to these deaths and disseminate information from what we learn are necessary to educate and, whenever possible, recommend change in practices and regulations to prevent similar deaths from occurring in the future.

Acknowledgement

We are extremely appreciative of the support of the Michigan Department of Licensing and Regulatory Affairs MIOSHA Safety and Health personnel, the employers, the families and the experts who have worked with us to improve work conditions in Michigan.

We are also appreciative of our Advisory Board who provided constructive comments on each MIFACE Report and Hazard Alert, who assisted us by providing thoughts on developing MIFACE policies and educational outreach activities, and their promotion of the MIFACE program to their employees and constituents.

MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2020 and look forward to identifying ways to prevent work-related traumatic deaths and sharing what we have learned with those who may benefit from this knowledge.

APPENDIX I

Aircraft (1)

Case 1. A male certified flight instructor in his 40s died when the single engine plane in which he was a passenger crashed. The National Transportation Safety Board final report: The private pilot made a low pass in the airplane over the runway and turned left to enter the traffic pattern for landing. A witness stated that the airplane "looked mushy" when it made its left crosswind turn. Another witness reported that the airplane appeared to enter a "close-in" traffic pattern at an estimated altitude of 100-150 feet above ground level and the airplane's airspeed seemed slower than normal. The witness stopped watching the airplane until he heard a change in its engine noise. When he looked back, the airplane was in a left bank turning from the base leg to final approach and the engine stopped producing power. The airplane immediately went into a left spiral and turned about 360-degrees before impacting the ground. The crash site was located about 1,200 feet from the approach-end of the runway near the runway centerline. A post-crash examination of the airframe and engine did not reveal any evidence of a mechanical malfunction or failure that would have precluded normal operation. Although the airplanes calculated weight at the time of the crash was about 6 pounds over its maximum gross weight, this likely was not a factor in the crash, as it would not have significantly increased the airplane's stall speed. A carburetor icing probability chart indicated a probability of serious icing at glide power at the temperature and dew point reported at the time of the crash. Given that no mechanical reason for the loss of engine power was identified, it is likely that the loss of engine power was due to carburetor icing. Following the loss of engine power, the pilot likely failed to maintain adequate airspeed, resulting in the airplane's wing exceeding its critical angle-of-attack and a subsequent aerodynamic stall.

Animal (1)

Case 2. A male farm laborer in his 70s died when an agitated bull that had been loose on the farm property gored him. Earlier in the day, a neighbor at the farm noticed the bull was loose and called another individual to let him know. This individual and another individual went to the farm to tie up the bull. At that time, the bull was not violent. The two individuals walked the bull to a tree, tied him up, put out oats for him, and called the decedent. The decedent then came over to the farm to place the bull into a pen. While attempting to herd it to another location on the farm, the bull gored the decedent.

Asphyxiation (1)

Case 3. A female travel consultant in her 50s died when she choked on food.

Drowning (3)

Cases 4 & 5. A male owner of a landscaping firm who was in his 30s and his male coworker who was in his 20s drowned when they attempted to assist coworkers in a boat which was taking on water and beginning to sink. There were two work crews on site. One work crew, consisting of the owner and two coworkers, was installing a waterfall feature at a home on the lake and the other work crew, two workers, was working in a 2006 aluminum 10-foot Tracker boat gathering buoys

delineating the swimming area in the lake. While gathering the buoys, the boat began to take on water and sink. The workers called the waterfall installation crew for help. The three workers ran down to the lake. By the time the crew arrived at the lake, both of the boaters were in the water. They attempted to swim to shore; one worker made it to shore, the other worker decided to swim back to the boat. The top of the boat was at water level. The owner of the firm and one of his coworkers entered the 51°F water to assist their coworkers. There was a steep drop off on the lake floor approximately 10-15 feet from shore as the two individuals waded out. The County Dive team found the two individuals, who were attempting to assist their co-workers, in 10-foot deep water. The boat that sank may have been overloaded; the boat had a maximum weight of 354 pounds. None of the individuals involved in this incident had access to a personal flotation device at the time of the incident. MIFACE Summary of MIOSHA Investigation [Case 421](#).

Case 6. A male laborer in his 20s worked at a campground maintaining boats. He had been fishing and while fishing, he noticed a two-person paddleboat in the water and attempted to retrieve it. For reasons unknown, he drowned in the attempt. The decedent was known to have medical conditions, which had previously caused him to faint. He was not wearing a life preserver.

Drug Overdose (5)

Case 7. A male automotive manufacturing worker in his 50s died from fentanyl and heroin toxicity.

Case 8. A male automotive millwright in his 40s died of fentanyl and heroin toxicity.

Case 9. A male forklift driver in his 40s died from a drug overdose.

Case 10. A female registered nurse in her 40s died from multiple drug intoxication.

Case 11. A male bartender/catering chef in his 20s died from multiple drug intoxication.

Electrocution (5)

Case 12. A male concrete finisher in his 30s was electrocuted when the handle of the 29-foot-long metal bull float he was using contacted an energized 7,200-volt power line. The decedent and his coworkers were performing concrete finishing work for a residential driveway. The utility company measured the height of the two overhead lines after the incident. The bottom neutral line was 17 feet high and the 7,200-volt primary line was 23-feet high vertically and 24 feet from the edge of the concrete forms. There were two visible impact burn points on the wire. One was a 1.5-2-inch width of the bull float pole and the second contact was approximately 2.3-3.0 feet long where the pole may have slid along the



Case 12.

wire. The decedent was facing south, finishing the concrete driveway and the power lines were at his back (north) when the incident occurred. A line of brush was approximately 8 feet behind him under the power lines, which may have required him to elevate the bull float handle rather than pull it in a more horizontal position. The decedent was wearing non-electrical rated rubber boots, leather work boots, vinyl work gloves, hardhat and safety glasses. When the bull float handle contacted the overhead line, the decedent fell forward, letting go of the pole. Coworkers called emergency response and transported the decedent to a local hospital where he died. MIFACE Summary of MIOSHA Investigation [Case 424](#).

Case 13. A male welder in his 30s was electrocuted while lying on his back on a floating platform while welding the underside of a dock. The decedent and two crewmembers were performing welding activities on the dock and nearby boat slips. The heat index at the time of the incident was approximately 94°F. There were two gas-powered welding machines onsite, one on the pontoon from which the decedent was working and one on a barge. The welding machine on the pontoon ran out of gas, so the decedent asked his coworkers to “throw him the leads” of the welder on the barge. The welder on the barge was an older model and had damaged generator terminal ends, cable leads, ground clamps and stinger ends; wiring into the ground clamp was not completely enclosed and not fully connected and had exposed wiring in several areas along the length of the cable leads. The decedent was lying on his back with the welding lead across his body while welding on the dock above him. His coworkers working on the nearby barge witnessed the decedent, “shaking.” His co-workers jumped from the barge onto the pontoon, removed the cable from the decedent and began CPR while awaiting emergency response. Emergency response transported the decedent to a local hospital where he was declared dead. MIFACE Summary of MIOSHA Investigation [Case 412](#).

Case 14. A male gutter installer in his 30s died when he was electrocuted by an ungrounded 7000/8750-watt portable generator located inside the back of his box truck. The company for whom he worked was subcontracted to install gutter and trim work at a residential home. The decedent and a coworker had finished installing the gutters and trim. Inside of the back of the decedent’s box truck was a 7000/8750-watt portable generator. The generator was sitting on tires, and the tires were lying on the wood floor of the truck. The generator provided power to the gutter machine to cut the gutters. The decedent’s coworker had not seen him for at least 30 minutes, so went to look for him. The coworker saw white smoke emanating from the back of the box truck. Looking inside, he found the decedent slumped over the generator, which was “on”. The coworker entered the truck and felt a “shock” when he touched the decedent. The coworker turned off the generator and then called for emergency response. Due to ladders on the floor, the emergency responders were initially unable to remove the decedent from the generator. Following the removal of the ladders, emergency responders moved the decedent away from the generator and initiated emergency measures. The decedent was declared dead at the scene. It was unclear to the decedent’s coworker why the generator was on, as all the gutters and trim were in place and there were no more gutter cuts to be made with the gutter machine. It was found that the generator did not have an earth ground. Third party testing identified no unusual findings for the generator. MIFACE Summary of MIOSHA Investigation [Case 435](#).

Case 15. A male heating and cooling laborer in his 40s was found lying on his stomach in a crawl space on a dirt floor under a home under renovation. The decedent crawled into the space on his

hands and knees carrying a pair of tin snips and a flashlight. Neighbors noticed his work van, with its windows/doors open and heard his cell phone ringing. The neighbors called the police department. It appeared the decedent stood up to perform some work when he contacted the energized line. The police found the decedent lying face down on a dirt floor approximately 10 feet inside the east-side crawl space opening near some heating and cooling duct work with an electrical wire laying across the back of his neck, the tin snips in his left hand and the flashlight in his right hand, and capped electrical wires above him. The decedent had removed a piece of plywood cut to the size of a basement window. After shutting off power to the home and removing the decedent from the crawl space, it was found that the decedent had a large burn mark located on the back of his neck.

Case 16. A female college student in her 20s working as a summer hire lifeguard died from a lightning strike. The decedent observed an incoming storm, and as trained, cleared all people from the beach, secured boats and locked out buildings. Presumably to watch the storm, she walked to a 6-foot-wide by 6-foot-long wood bench swing suspended from metal chains approximately 3-feet long. The swing was located approximately 20 feet from shore. She was wearing building keys around her neck. While sitting on the swing, she began to smoke. A group of people who relocated to a nearby pavilion indicated to responding police they



Case 16.

saw the decedent sit on the swing in the rain as the storm approached. The storm grew strong; one of the group members considered moving the group from the pavilion into the beach house building itself for better protection. Group members indicated there were several lightning flashes followed by loud cracks of thunder as the storm moved over them. The group relayed to the police that there was one particularly bright flash. After the bright flash, the group looked toward the decedent and saw her on the swing but not moving. When they checked on her, she was unresponsive. Because they could not use their cell phones, they went to the beach house and called for help. A family member arrived and immediately started CPR; another coworker assisted. Emergency response responded to the call, assumed care and transported the decedent to a local hospital. She died three days later following transfer to another hospital. A burn mark was located where the keys had hung around her neck. Subsequent investigation found a metal well pump casing with flowers planted around it located approximately 40 feet from the wood swing; some of the flower petals were brown, possible singed. MIIFACE Summary of MIOSHA Investigation [Case 416](#).

Fall (32)

Case 17. A male farm worker in his 70s died when he fell approximately 20 feet to concrete from an unsecured manlift basket. The decedent had asked another coworker to get a manlift so he could place a screen over an exhaust vent to keep out the birds. The coworker retrieved a JBC material handler, which had a basket positioned on the forks. The basket was lying across the forks; the forks were pushed together (not in the basket sleeves). The coworker raised the decedent and the basket approximately 20 feet above the floor. When the decedent was elevated, the coworker noted that the forks were not in the basket sleeves and began to yell a warning to the decedent. As his coworker was yelling to the decedent, the decedent stepped to the side of the unsecured basket, causing both he and the basket to fall to the ground. The decedent died four months later from complications of the injuries sustained at the time of the fall. MIFACE Summary of MIOSHA Investigation [Case 444](#).

Case 18. A male ironworker in his 50s fell 22 feet while working from and relocating a 24-foot fiberglass extension ladder positioned across a 6-foot-wide by 8-foot-deep open shaft way. The unsecured extension ladder was set at the immediate edge of the elevator shaft way on the second floor of the building. To operate a chain fall to hoist a section of equipment, the ladder was positioned across the shaft way and extended to approximately 18 feet 4 inches. A new 18-inch by 18-inch hole had been cut into the ceiling to allow the rigging to be better positioned over the top of the next equipment section to be placed. The decedent, while wearing his fall harness/retractable lifeline tied off to an



Case 18.

overhead attachment point, stepped over a mid-rail that had been left in position across the shaft way opening and ascended the ladder to move the chain fall. After moving the rigging, the decedent descended the ladder, unhooked his retractable lifeline, and hooked it to nearby attachment point on the wall. To remove the ladder, the decedent still in his harness but not tied off, stepped over the mid-rail and ascended a few rungs on the ladder. While compressing the ladder to get it out of the opening, the ladder base slipped into the opening and the decedent and ladder fell 22 feet to the concrete first floor. MIFACE Summary of MIOSHA Investigation [Case 442](#).

Case 19. A Hispanic male carpenter in his 50s died from a 20-foot fall when the window jack scaffold collapsed. The decedent and his coworker had built the window jack scaffold. The scaffold consisted of several different types of on-site building material such as, but not limited to, OSB plywood, 2-inch by 4-inch and larger 2-by boards in various lengths and 16d size nails. The scaffold was approximately 39 inches in width and 42 feet 5 inches in length. The north side of the scaffold was supported by 2x4s extending through the window openings and nailed, using four 16d nails, to the roughed in 2nd story window casings. Two 16d nails secured the 2x6 boards on the south

side of the scaffold directly to the house frame. The two workers were framing the overhang, fascia and soffit working north to south. The employees traveled to the far south end of the scaffold to receive material being handed to them through the window opening. The 2x6s broke away from the home and the 18-foot section of scaffold they were standing on collapsed. Both the decedent and his coworker fell with the scaffold section; his coworker suffered non-fatal injuries. Emergency response transported the decedent to a local hospital where he died. MIFACE Summary of MIOSHA Investigation [Case 425](#).

Case 20. A male carpenter in his 50s died from a 44-foot fall from a parapet on the roof. The decedent was a member of a 4-person work crew erecting parapet structural members with associated bracing on the roof. The parapet framing was braced with a 2x6, positioned from high on the parapet framing angled down to the roof; the base of the 2x6 was located approximately 8 feet away from the parapet structure. A coworker handed the top of the 2x6 brace to the decedent and a coworker nailed the bottom of the brace to the roof. At the time of the incident, the decedent did not use the available stepladder. For reasons unknown, he climbed over a 37-1/2" high portion of the parapet structure and onto the small piece of OSB horizontal overhang. The nails failed to hold the decedent's weight and the piece of OSB dislodged, causing the decedent to fall to the packed dirt below. The decedent was not wearing fall protection. Installed on the roof deck in the area of the incident were three anchorage brackets for fall protection. MIFACE Summary of MIOSHA Investigation [Case 413](#).

Case 21. A male owner/roofer in his 30s fell approximately 30 feet from a pallet elevated by a rough terrain forklift while installing an ice guard on the cone of a roof. The forklift forks were in the pallet forklift pockets. The ground was uneven. One of his coworkers elevated the decedent, who was standing on the pallet, to the work area on the roof. The forklift began to tip to the operator's left, throwing the forklift operator from the seat. A witness indicated the decedent jumped to the roof cone but was unable to secure himself and slipped off the roof, falling 30 feet to the dirt below. He landed on his stomach. As the rough terrain forklift was balancing on two wheels, another worker utilized a front-end loader to stabilize the rough terrain forklift so it would not tip completely. The front-end loader operator assisted the rough terrain forklift driver to stabilize the vehicle and place it back on all wheels so the loader could be moved for emergency responders. Emergency responders transported the decedent to a local hospital where he died. He was not utilizing fall protection or an appropriate lift platform. MIFACE Summary of MIOSHA Investigation [Case 408](#).

Case 22. A male roofer in his 50s, who was the foreman of a 4-person crew on site, died when he fell approximately 27 feet through a deteriorated 2-foot-wide by 5-foot-long concrete roof deck section to the concrete floor of an industrial plant. The low-slope roof deck was approximately 23 feet wide and 180 feet long. The building owner contracted the decedent's employer to perform repairs; the job being performed when the incident occurred was a roof tear-off and re-roof. The firm assessed the roof's condition by looking up at the roof from below. When the roof decking was removed, a 2-foot-wide by 5-foot-long section of 3-inch concrete roof deck was found to be damaged (broken in half) so a re-roof could not occur until it was fixed. The decedent contacted his management about the damaged roof deck panel. The decedent instructed his coworkers to keep

away from the damaged area. The crew placed equipment and hand tools at the damaged area to identify the damaged deck section. Management was enroute to place barricades below. The decedent and a coworker were on top of the roof cleaning up roofing tear-off debris and two coworkers were on a lower roof receiving debris. His coworker used a broom to sweep the debris to the decedent's shovel, and the decedent emptied the shovel into a wheelbarrow. When the wheelbarrow was full, he walked the wheelbarrow to the area where he would dump it to the coworkers working on the deck below him. While walking to this area, he fell 27 feet 6 inches through an unidentified damaged concrete roof section to the concrete floor below. It was unknown if the concrete section failed or if the supporting structural steel failed, causing the fatal fall. The decedent was not wearing fall protection. MIFACE Summary of MIOSHA Investigation [Case 398](#).



Case 22.

Case 23. A male roofer in his 40s died from a 17-foot 6-inch fall from the edge of a 100-foot by 48-foot low-slope roof. The decedent was the project foreman. The guardrails and base plates that were part of the construction project had been taken down and placed in the work truck. A warning line was present, but no safety monitor. In the area of the incident, the insulation board was running at an angle to the roof edge; a saddle/taper from 3-feet to ½-inch was being constructed to funnel water from the roof. A coworker, who was installing insulation screws, witnessed the incident. The decedent was using a battery-powered reciprocating saw to cut insulation board at the edge of the roof



Case 23.

outside of the warning line with no other means of fall protection (personal fall arrest system, safety monitor). It appeared that the decedent either stepped backwards or to the side and fell from the roof. It is unclear if the decedent struck other equipment prior to striking cobblestones on the ground. Coworkers called emergency response; emergency response transported the decedent to the hospital where he died later that day. Unconfirmed reports indicated the decedent had felt dizzy that day. The heat index at the time of the incident was approximately 87°F. Subsequent investigation noted a roof anchor installed approximately 25 feet from the incident site and that a harness was available on site. MIFACE Summary of MIOSHA Investigation [Case 415](#).

Case 24. A male family member in his 50s was assisting his son, the owner of a home improvement company, in placing and securing a ladder on the roof of a van. The decedent climbed onto the roof of a van to assist in securing the ladder when he stepped backwards and fell from the van roof to the concrete below. His son transported him to a local hospital where he died the next day.

Case 25. A male self-employed roofer in his 30s died from injuries sustained in a 10-12-foot fall from a roof. The decedent and a coworker were working on a residential garage roof. The coworker was at the “back half” of the roof and the decedent was working on the front. The coworker could not see the decedent, but heard him yell out to him just prior to or as he fell. The coworker descended from the roof, went to the front of the garage, and saw the decedent lying on his back on the concrete driveway. The coworker called for emergency response. Emergency responders transported him to a nearby hospital where he died the next day. MIFACE Summary of MIOSHA Investigation [Case 422](#).

Case 26. A male carpenter in his 20s died when he fell approximately 22 feet to the concrete floor of a residential home under construction. The decedent was one of a five-person crew setting trusses. One worker was using a CAT TL1055 telehandler to raise the trusses. Three trusses remained to be positioned. Four individuals were involved in positioning the truss: the telehandler operator, an individual on the ground used the tag line to assist in truss positioning, and two workers placed opposite of each other on the top plate of the 2nd story walls. Because of telehandler reach issues, the truss was rigged differently, which made it more difficult for the truss to reach one of the two workers on the top plate. The decedent was working near a 7½- by 14-foot oddly shaped stairway hole partially covered by plywood on the second floor. Three 2x6s supported the plywood. He used a 2x4 to push on the bottom cord of the truss to help move it toward one of the workers on the top plate. This worker told the decedent to get a longer stick. While pushing the truss, the decedent stepped off the edge of the plywood or lost his balance. He fell through the stairway hole to the concrete basement floor and died eight weeks later from complications of the injuries sustained in the fall. MIFACE Summary of MIOSHA Investigation [Case 440](#).

Case 27. A male journeyman roofing contractor in his 30s died from head injuries after falling 15 feet from a residential roof to the concrete driveway below. The cause of the fall was unknown, although a preexisting medical condition may have contributed to the fall.

Case 28. A male self-employed construction worker in his 50s was replacing floodlights on a home when he fell approximately 13 feet to a concrete surface. At the time of the incident, the decedent was working for another company. The incident was unwitnessed. The homeowner heard a noise and investigated. The homeowner found the decedent lying on his back on the cement. The homeowner notified the decedent’s coworkers, who were working on the opposite side of the home. The decedent was working from an Alum-A-Pole pump jack scaffold system, which had been erected by the firm’s owner. To access the scaffold, the decedent used the top section of an extension ladder, which had damaged rungs. It is unknown if the decedent fell while from the scaffold platform or if he fell from the ladder while climbing up to the scaffold platform. The ladder was lying on the ground. Weather data indicated wind speeds between 19-20 knots (20-23 mph) and wind gusts between 21-22.9 knots (24-26mph). He died from head injuries sustained at the time of the fall. MIFACE Summary of MIOSHA Investigation [Case 401](#).

Case 29. A male electrician in his 70s died when he fell 24 feet to a cement pad. The decedent, the owner of an electrical contracting company, and a coworker were installing an exterior light fixture positioned 24 feet above the ground on a pole barn. Based on the position of the exterior light, the 2-jack, 10-foot-high tubular welded mobile scaffold could not be completely placed on the cement pad. The crew placed a couple of pallets on the sand next to the concrete pad and covered them with a sheet of 4-foot by 8-foot by ½-inch OSB sheathing. The scaffold had four locking wheels and cross-bracing. The platform consisted of three 2-inch by 10-inch by 10-foot 1-inch planks (not scaffold grade). The planks had a 2x4 board screwed to the top to act as a ladder block, preventing the extension ladders from slipping off the scaffold. Another ladder positioned on an angle from the ground to the “front” of the scaffold braced the scaffold and prevented it from tipping; the base of the ladder was in the sand and secured in position by a crowbar. The workers worked for approximately one hour. The decedent, in an effort to make access to the platform easier, wanted the ladder bracing in the front of the scaffold moved to the side of the scaffold. After moving the ladder to the side, the crew ascended the ladder to the scaffold to finish the work and the scaffold tipped over. The decedent fell to the concrete pad and his coworker fell to the sand, sustaining a non-fatal injury. MIFACE Summary of MIOSHA Investigation [Case 426](#).

Case 30. A male painter in his 20s died from injuries sustained in a 30-40 foot fall from a two-point suspended swing stage scaffold, when one of the two anchor points appears to have failed. The decedent and a coworker were members of a 5-person crew sandblasting the interior of a 2,000,000-gallon water tank. On the day of the incident, there was limited lighting within the bowl when the decedent and his coworker relocated the scaffold after the lunch break. To relocate the scaffold, the crew attached to a cable, one of many, which the company had previously installed so employees could move from one cable drop to the next. A third party investigation found, among other things that: a) the scaffold was attached at one end and the other end was completely hanging 9 feet from the ground of the bowl, b) the pulley system was intact and free from any visual damage, and c) the swing stage connector was intact. Additionally, shackles and a screw was found on the ground in the bowl in debris (3-5 feet apart), a shackle with screw in it was found 9 feet under the scaffold in the debris, and the anchorage hole had no visible markings and/or damage. One hypothesis: the clevis pin pulled through the anchoring shackle causing the scaffold to fail. Coworkers on scene heard a loud noise/boom. Finding the two workers on the floor of the bowl, they called emergency response. The decedent was airlifted to a nearby hospital where he died several days later. MIFACE Summary of MIOSHA Investigation [Case 439](#).

Case 31. A male independent contractor in his 50s, who worked in construction, died when he fell approximately 15 feet from an unknown type of ladder while prepping/painting the eaves/trim of a residential home. The incident was unwitnessed. The homeowner found the decedent lying on the ground and called emergency response. The decedent was airlifted to a nearby hospital where he died several days later.

Case 32. A male painter in his 70s died from head injuries sustained when he fell down 13-14 wood stairs at a home under construction. Coworkers heard his fall and called for emergency response. He died in the hospital from complications of the injury several days later.

Case 33. A male pallet repairer in his 30s died from complications of a fall injury he sustained in a production area that was free from holes and slip/trip hazards. The incident occurred in a 10-foot wide aisle way. The decedent was carrying a roll of banding through the shop. He set it down, turned around, tripped and caught his foot on a stack of pallets near him. A week after the injury and after several days off work, the decedent contacted his employer and requested to see a doctor to have the ankle evaluated. The doctor referred him to an orthopedic doctor who diagnosed a possible torn Achilles tendon. The doctor placed him in a foot brace and scheduled further medical evaluation. Three days after seeing the orthopedic doctor, the decedent died from a medical issue caused by the injury. One of the decedent's coworkers informed the employer of his death. MIFACE Summary of MIOSHA Investigation [Case 432](#).



Case 33.

Case 34. A male maintenance technician in his 60s died from an 18-20 foot fall from a 2-inch-by-2-inch square utility beam. The decedent was welding on a support beam for a rail on a pick and place conveyor while his coworker acted as the ground man. The decedent could not reach an area on the support beam, so he stepped from the 3-foot by 6-foot basket of the Condor Manlift he was working from onto the utility beam. The decedent finished his welding. His coworker noted that the decedent hung the welding lead on the rail, grabbed the top of the rail with both hands, and put his head down on hands. Seconds later, the decedent's knees buckled and he fell, first striking the top of an exhaust system and then to the concrete floor. The decedent was not wearing a fall protection harness during the welding activity or when he left the basket. Emergency response responded and transported the decedent to a local hospital where he was declared dead. MIFACE Summary of MIOSHA Investigation [Case 441](#).

Case 35. A male information technology technician in his 50s died of complications of a fall. The decedent was reaching for an object in his chair when the chair fell backwards causing neck injuries. He died four days later from complications of the injury.

Case 36. A Hispanic male laborer in his 60s died when he fell approximately 18-20 feet from a fruit storage crate raised by a forklift. The decedent had noted light bulbs needing replacement in a fruit cooling room. He had informed maintenance personnel, but they were busy with another task. The decedent then asked a coworker to lift him up in an old apple fruit crate using a Hyster powered industrial truck, Model #S35XM. Responding police found that the crate bottom was rotted. The crate bottom gave way causing the forks to penetrate through the crate. This caused the crate to flip forward ejecting the decedent from the crate. The decedent fell to the concrete floor sustaining fatal injuries. MIFACE Summary of MIOSHA Investigation [Case 436](#).

Case 37. A 76-year-old male line telephone linesman in his 70s died from complications of a 1971 fall from a ladder.

Case 38. A Hispanic male tree trimmer in his 40s died when he fell approximately 40 feet from a tree. The decedent was working aloft trimming and removing vines from an oak tree at a residential property using a chain saw, pole saw and a hand saw. During the activity, it appears that the decedent inadvertently cut his ½-inch climbing rope in half with his hand saw approximately 12 inches from his saddle harness, causing him to fall approximately 40 feet to the ground. A co-worker found the decedent on the ground with his chainsaw idling and called emergency response. Police investigating the death found: a) blue climbing rope fibers on the hand saw



Case 38.

teeth and no blue rope fibers on the chain saw teeth, b) the decedent was “equipped with a secondary safety harness consisting of a white rope with yellow marking and 3 carabineers”, referred to as a “buck strap”, and c) the decedent did not appear to be using the buck strap at the time of the fall as all carabineers were in a storage position still hooked to a ring on his harness. The decedent was not wearing a helmet at the time of the fall. The incident was unwitnessed. The decedent was declared dead at the scene. MIFACE Summary of MIOSHA Investigation [Case 438](#).

Case 39. A male tree trimmer in his 20s died when he fell approximately 40 feet when his Weaver Cougar Positioning Saddle Model 1075 rope bridge failed while ascending a tree. A homeowner contracted the decedent’s employer to remove dead limbs and cable two oak trees together for support so the tree closest to the house would not fall and damage the home. The decedent was a member of a 3-person crew. After arriving at the site and developing a work plan, the decedent and one of the coworkers were ascending, back to back, the two oak trees to be cabled together to begin installing the cable and remove a chain that the homeowner installed between the two trees. The decedent was wearing a Weaver Cougar Positioning Saddle Model 1075 manufactured in 2009. As he was ascending, the saddle rope bridge, which was the equipment’s original 14.5-inch bridge rope, broke near the middle of the rope; one piece measured 8 inches and the other piece measured 6.5 inches. The decedent fell approximately 20 feet, struck the edge of the house roof, and then fell approximately 20 feet to a wood deck, landing on his back. The ground man witnessed the fall. He ran to his truck to call for emergency response. The coworker repelled down the tree, and with the homeowner, administered CPR until emergency response arrived. The police who came to the scene noted: a) his climbing harness exhibited several areas of wear to both the bridge rope at its attachment points to the saddle rings and to the harness, b) the bridge rope was so worn in the areas which were tied to the metal rings that the black and yellow coloring of the rope was gone and the under gray rope fibers were visible, and, c) the harness’s right black thigh support strap was torn and broken. The decedent was wearing a hard hat during the climb, but based on the lack

of apparent impact damage to the hard hat, responding police hypothesized it most likely came off from his head as he fell. The decedent died several days later from complications of a blunt force head injury. MIFACE Summary of MIOSHA Investigation [Case 396](#).

Case 40. A male owner of a tree trimming service who was in his 60s died from injuries sustained when he fell from the bucket of bucket truck. The decedent was trimming branches from a silver maple tree estimated to be 60 feet tall located in the backyard of a residence. He was operating an articulating boom bucket truck using the boom to “crane” the cut branches to the street, where the chipper was located. The incident involved a 15-foot long, 6-inch diameter branch. The decedent had tied a rope to this branch and the bucket. He was elevated approximately 14-20 feet, moving the branch to the chipper. The work crew indicated they heard a loud popping sound. The bucket tipped forward, causing the decedent to fall headfirst to cement. The decedent was not utilizing fall protection, but was wearing a hard hat, which came off his head during the fall. MIFACE Summary of MIOSHA Investigation [Case 402](#).

Case 41. A male tree trimming company owner in his 60s died when he fell approximately 40 feet from a tree. The decedent was near the top of the tree cutting limbs when he inadvertently cut the limb to which his lifeline was attached. When the limb fell, the decedent fell with it and landed on a pile of branches. He was alert at the scene when emergency response arrived. He died a week later from the injuries sustained at the time of the incident.

Case 42. A male journeyman tree trimmer in his 40s died from a 35-foot fall when the knot used to attach his climbing rope to his climbing saddle untied. The decedent and his coworker (with additional 2-person trimming crews in the area) were performing line clearance tree trimming work in a residential neighborhood. Prior to beginning work in the morning, the decedent discussed waiting for additional individuals to help trim the incident B-4 maple tree because it was so large. The crew trimmed one tree prior to lunch, and then after lunch, decedent



Case 42.

and his coworker held another job briefing about the maple tree. After the job briefing, which documented that all equipment and unique hazards had been assessed, the decedent climbed up to set his rope and trimmed his way down the front side of the tree and around the cross arms of the power pole. The decedent had a chain saw and an insulated pole pruner with him in the tree to trim branches that were near the lines. The ground man was in an adjacent yard throwing brush over the fence when he heard branches snapping and a loud “thud”. Looking toward the sound, he saw the decedent on the ground. The ground man called 911 and ran for help to a nearby company crew. The homeowner arrived at that moment and helped at the scene. It is hypothesized that the knot the decedent had selected to tie to his saddle, thought to be a Bowline knot, had become untied

because it had not been finished with, or did not have, an adequate stopper knot on the tail end. Subsequent investigation supporting this hypothesis found that the ends of all the other ropes attached to the saddle had black electrical tape wrapped around the end. The end of the rope that had been tied to the saddle was frayed and had only remnants of electrical tape on the rope fibers. MIFACE Summary of MIOSHA Investigation [Case 429](#).

Case 43. A male tree trimmer in his 70s died when he fell approximately 20 feet after the branch he was sitting on broke at the crotch while he was readjusting his lifeline. The decedent was wearing his harness sitting on a 4-inch diameter dwarf maple limb. The lifeline was tied to a branch opposite of where he was sitting. He was in the process of transferring his lifeline up to the next crotch. He had unhooked his lifeline so he could move to a different part of the tree when the branch he was sitting upon broke at the crotch. The decedent and the branch fell to the ground; the branch landed on him. Emergency response was called and the decedent was transported to a local hospital where he was declared dead. MIFACE Summary of MIOSHA Investigation [Case 430](#).

Case 44. A male tree removal company owner in his 40s died when a limb split and fell onto the bucket of the bucket truck positioned 55 feet in the air causing him to be catapulted from the bucket. The decedent was trimming a large oak tree at a private residence. The decedent tied a rope around the front rack of his bucket truck, laid the rope through a limb crotch of a nearby tree, and then around the 6-inch diameter, 15-foot long vertical limb that he was planning to cut. While cutting the limb with a chainsaw, the limb split and broke off, falling onto the bucket and dropping over the right side of the truck boom, pulling down on the bucket and catapulting the decedent, who



Case 44.

was not wearing fall protection, to the ground. The decedent landed on his back on a pile of previously cut limbs. Emergency response was called. The decedent was declared dead at the scene. MIFACE Summary of MIOSHA Investigation [Case 419](#).

Case 45. A male ice hockey referee in his 40s died when he fell while skating on the ice rink during warmup. He struck his head on the ice. He was not wearing a helmet.

Case 46. A female restaurant hostess/cashier in her 60s died from complications of a head injury sustained when she had a witnessed collapsed at work. The decedent had a past medical history. She died several weeks later in the hospital.

Case 47. A male posse deputy sheriff in his 30s died when the horse he was riding in a parade bucked, causing him to fall and hit his head on the pavement. The decedent was holding a flag, leading the posse when a World War II vintage motorcycle and sidecar came up next to his horse.

The horse began to jump around. The decedent dropped the flag so he could try to control the horse. The horse began to buck. As the decedent began to dismount, his foot caught in the stirrup, and he fell backwards striking his head on the pavement. The decedent was in uniform and not wearing a riding helmet.

Case 48. A male fire fighter/paramedic in his 40s died from a medical complication after surgery for a shoulder injury due to a fall. He had injured his shoulder when he slipped on ice and fell backwards on a dirt road while walking back to his vehicle following a response call.

Fire/Explosion (2)

Case 49. A female hospice worker in her 50s died when her client's home was involved in a fast-moving fire caused by a natural gas explosion. The decedent was found in a room with a gas range, hot water heater and furnace.

Case 50. A male restaurant owner in his 50s died from smoke inhalation when he attempted to extinguish a fire. The decedent and his brother closed the store for the night. They both lived in an apartment below the store. Discovering a fire in the store, the decedent went up to the store to put out the fire and was overcome by the smoke. A heater unit was the suspected cause of the fire.

Heat/Cold (1)

Case 51. A male roofer in his 50s died from environmental hyperthermia. The decedent was a member of a four-person crew tearing off and replacing a roof on a three-story apartment building. The employer provided water and an electrolyte replacement drink both at ground level and on the roof, and encouraged the crew to take breaks when necessary and to drink fluids. The crew took a break for lunch. The owner of the roofing company left to pick up some supplies. While the crew was on break, the decedent ascended the ladder to the roof. A coworker noticed him fall to the roof after ascending the ladder. The coworker ascended the ladder to check on him. The coworker found the decedent sitting on a bucket breathing heavily and asked if he was “okay”. The decedent did not respond to that question, but responded with a statement indicating it was difficult to climb the ladder. The coworker descended to the ground and continued his break. After the break was over, he climbed the ladder to the roof and found the decedent lying on the roof next to the bucket, non-responsive. His coworker returned to his car to retrieve his cell phone and called for emergency response and then returned to the roof and provided aid per instructions from dispatch. The decedent was transported to a local hospital where he was declared dead. The medical examiner report states that the environmental temperature was 91°F at noon on the day of the incident and the humidity was 71% resulting in a heat index of 109°F. The decedent’s body core temperature was elevated to an unsafe level. MIFACE Summary of MIOSHA Investigation [Case 423](#).

Homicide (22)

Case 52. A male licensed marijuana grower in his 60s died from blunt force injuries sustained during an assault.

Case 53. A male construction laborer in his 30s died from multiple gunshot wounds after being shot while standing on the porch of the home he was renovating.

Case 54. A male temporary worker in his 20s at a paper manufacturer died from a gunshot wound.

Case 55. A male party store clerk in his 30s died from a gunshot wound that occurred during a robbery.

Case 56. A male automotive engineer in his 50s died from multiple gunshot wounds. The decedent had a side business buying and selling cell phones. He was shot was during a cell phone transaction.

Case 57. A male in his 40s selling CDs in the parking lot of a business died from gunshot wounds sustained during an altercation.

Case 58. A male Uber driver in his 50s died from multiple gunshot wounds.

Case 59. A male taxi driver in his 30s died from a gunshot wound.

Cases 60 & 61. A female assistant manager in her 40s and a female leasing agent in her 20s, both of whom worked in an apartment complex office, died of gunshot wounds sustained when an apartment complex tenant shot them.

Case 62. A female caregiver in her 50s died from multiple gunshot wounds.

Case 63. A male supervisor in his 50s, who worked at a transitional sobriety home, died from a gunshot wound. The decedent was involved in a confrontation with an individual at the home.

Case 64. A male mixed martial arts athlete in his 20s was selling CDs of his fights. He was involved in an altercation and died from multiple gunshot wounds.

Case 65. A male fast-food restaurant owner in his 50s died from a gunshot wound.

Case 66. A male auto garage owner in his 50s died from gunshot wounds.

Case 67. A car wash laborer in his 20s died from multiple gunshot wounds.

Case 68. A male self-employed contractor in his 40s died from a gunshot wound.

Case 69. A male barber in his 40s died from a gunshot wound.

Cases 70 & 71. Two male court bailiffs, both in their 60s, died from gunshot wounds when the individual they were escorting to court obtained a gun and shot them during an escape attempt.

Case 72. A male police officer in his 40s died from medical complications of a gunshot wound he sustained during a foot chase.

Case 73. A male police officer in his 20s died from a gunshot wound while on patrol.

Machine (19)

Case 74. A male farmer in his 50s died when he was pinned under a Ford 1600 tractor that overturned rearward as the decedent was using the tractor equipped with a bucket to clear trees and brush from the property. The tractor overturned while he was attempting to push over a 6-inch diameter tree and the tractor "walked up the tree" while the bucket was in the air. The tractor was not equipped with a roll-over protection structure (ROPS).

Case 75. A male farmer in his 60s died when it appeared he fell from his 1972 Massey Ferguson tractor while mowing his property. The decedent was operating the tractor equipped with a front-end loader and pulling a brush hog. The right side rear wheel of the tractor and brush hog were stuck in soft sand. The decedent was located under the left side of the brush hog; the tractor was running and in gear. The mower was also active. The tractor was not equipped with a ROPS therefore a seat belt was not present.

Case 76. A male farmer in his 50s died when the 2013 Polaris Sportsman 500 AWD four-wheeler he was driving collided with a pickup truck as the decedent and pickup truck driver were racing home on a dirt path between two dark, unlit farm fields. The path did not have vegetation growing on it and was dry, hard and furrowed. The pickup driver drove the decedent to the Polaris, which the decedent had left in the field for several days. The decedent told the pickup driver that he would race him home. The pickup driver turned the truck around, and drove down the path at his stated speed of 20-25 mph. The Polaris collided with the pickup while both were making right turns, heading towards the decedent's home. Investigating police identified the following factors, which may have contributed to the crash: the path surface was uneven and rocky and the decedent was not wearing a helmet. Immediately after the pickup driver felt something hit his vehicle, he stopped and turned his vehicle around. He saw the decedent on the ground on his back with the Polaris on top of him. The pickup driver pushed the Polaris off the decedent and called 911.

Case 77. A male farmer in his 50s died when he was pinned under a Kubota Model L295DT tractor tire, which had rolled into a 12-foot deep ditch. The decedent had been cutting grass at the ditch edge that abutted a cornfield. The tractor had a brush hog mower attached. He had been operating the tractor along the cornfield edge; the edge was within approximately 8 feet of the ditch. It appeared that he had been mowing the ditch bank weeds. The tractor rolled, causing the decedent to be thrown from the tractor. The right side drive tire of the tractor came to rest on the decedent. It is unknown whether the tractor was equipped with a ROPS and seatbelt.

Case 78. A male farm laborer in his 50s died when he was pinned underneath a 6,000-pound Farmall Model M that rolled rearward on him while unloading it from a trailer. The decedent was in the process of unloading the tractor from a trailer connected to a pickup truck. The trailer was on a hill, and the decedent was allowing the tractor (set in reverse) to roll off the trailer when he attempted to disengage the clutch to start the tractor. The friction from the tractor tires and the tractor's high center of gravity resulted in the tractor overturning to the rear, pinning the decedent under the tractor with the steering shaft across his pelvis. The tractor was not equipped with rollover protection.

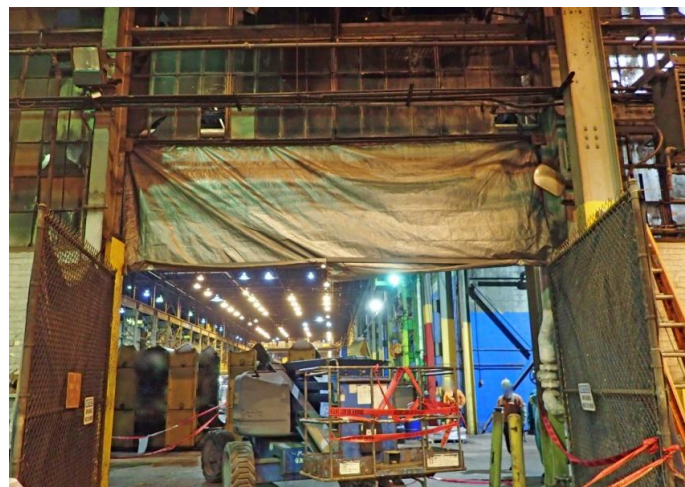
Case 79. A female farmer/farm hand in her 50s died when her clothing became entangled in the unguarded rotating power take off (PTO) shaft of a tractor she was using to power a corn elevator. The decedent was the live-in partner of the farm owner, and she and the owner were using a PTO driveline to power a corn elevator, which in turn was used to transfer corn from a wagon into a corncrib. Once the elevator was running and the decedent had begun to unload the corn from the wagon onto the elevator, she suggested to the owner that he go harvest more corn while she continued by herself. About 20 minutes after the owner returned to the field to continue harvesting corn, the owner was alerted by his brother, who had been hunting on the owner's property, that he had discovered the body of the decedent. The decedent's clothing had become caught in the gear of the rotating power shaft where it connected to the corn elevator, leading to further entanglement of the decedent and extensive trauma. No part of the PTO driveline was guarded or shielded. Emergency response was called and the decedent was declared dead at the scene.

Case 80. A male dairy farm owner in his 30s died when he was caught between the lowering arm and frame of a skid steer loader. The decedent and a coworker were in the process of finding a hydraulic leak. The decedent had lifted the caged area forward to expose the engine and hydraulic system. The skid steer engine was running and the bucket arms raised when the decedent moved the left side forward lever. The skid steer jumped and started spinning to the left as the bucket arm lowered. The decedent was unable to avoid the lowering arm of the skid steer.

Case 81. A male logger in his 70s died when the skidder he was driving down a snow-covered hill overturned. The decedent was hauling a load of logs on a crib. The crib began to slide and as the crib lost control, it overtook the cab part of the skidder. The skidder had an overhead guard but no windows or window nets. As it overturned, the decedent's head became pinned under the skidder's roof support.

Case 82. A male equipment operator in his 60s was pinned while using a steel cable to hook a screen plate to a Komatsu Model WA420 front-end loader at a sand surface mine. The decedent was discovered injured and leaning against the loader bucket. Emergency response was called and the decedent was transported to a local hospital where he died the following day from his injuries.

Case 83. A male foreman in his 30s died when he was crushed between an elevated aerial lift basket and a piece of angle iron. The decedent worked for a mechanical contractor; Company 2, where the death took place, hired the mechanical contractor for whom the decedent worked. Company 2 rented a Genie Model Z45/25 aerial lift and permitted the decedent's employer to use the aerial lift to perform repairs throughout the plant. After he raised the bucket to shut off a steam/water line valve so he could make a repair, the decedent was required to use the lift at another location in the facility to repair a



Case 83.

newly-installed pipe that was leaking. To travel to the new location, the decedent did not lower the boom/basket to a height to be able to safely drive under a 10-foot 8-inch high piece of angle iron covered by a tarp; he operated the still elevated aerial lift basket while facing the controls with his back toward the direction of travel. To operate the lift in this configuration, the decedent engaged the drive-enable switch, which was not the recommended position in which to operate the lift. The decedent's back struck the angle iron and he was crushed between the angle iron and the controls of the aerial lift. MIFACE Summary of MIOSHA Investigation [Case 443](#).

Case 84. A male excavator operator in his 40s died from complications of blunt head trauma. The decedent was operating a Caterpillar Model 320L excavator. His employer was subcontracted to perform underground utility installation. At the time of the incident, the decedent was assigned to assist another contractor with moving/setting pond liner material. The decedent and two other workers (Worker 1 and Worker 2) were in the process of moving 500-pound rolls of pond lining material. The two workers and the decedent had installed a nylon sling on the roll and hooked it to an open hook on the excavator bucket. The decedent rotated the cab to align the cab with the tracks and after driving forward for approximately 10 feet, Worker 1 and Worker 2 observed the bucket slam down to the ground. The two workers were unable to see the decedent at this time. Running to the excavator, Worker 1 saw the decedent slumped forward in the cab over the controls and jumped onto the moving excavator on the driver's side to move the decedent from the controls. Worker 3, who was employed by the same firm as the decedent, jumped onto the passenger side's track but his clothing was caught and he was knocked to the ground, breaking his leg. The excavator continued to move forward as Worker 1 kept getting knocked off of the tracks and getting back on. After moving approximately 100 feet, the excavator encountered sand piles causing it to turn to the right and to enter a pond covered with 4-6-inch ice. Other workers at the site called for emergency assistance. Worker 1 was able to break the cab windshield. Another site worker used a rough terrain forklift with a wooden pallet on the forks to provide access for emergency response personnel to assist Worker 1 and the decedent. After being retrieved from the cab, the decedent was transported to a local hospital where he died several hours later. Worker 3 was also taken to the hospital for surgery to repair his broken leg. MIFACE Summary of MIOSHA Investigation [Case 399](#).

Case 85. A male construction firm owner in his 40s died when he was run over after he fell, jumped or was thrown from a John Deere tractor. The decedent was clearing land with a skid steer loader when the skid steer became stuck in soft dirt. The decedent positioned a tractor a short distance away from the skid steer. A bungee cord was holding the safety bar down. The decedent attached a chain to the rear hitch of the tractor and to the front of the skid steer at the attachment points wrapping the chain around the rear axle on the right side of the skid steer. The sequence of events leading to his death were unknown. The skid steer was running and all four tires spinning. The tractor's key was in the ignition and was in the "on" position when the decedent was found. It appeared that the decedent was using the 2,600-pound tractor to pull a 3,500-3,800 pound skid steer, with the safety bar down when he either fell, jumped or was thrown from the tractor and run over.

Case 86. A male sanitation worker in his 40s died when he was struck by mixing blades in a 500-gallon, 8-foot diameter, and 5-foot-deep scrape surface steam jacketed mixing tank. The decedent walked up a flight of stairs to a metal platform to gain access to the top of the tank, which was 34.5

inches above the platform. The tank had mixing blades running the depth of the tank. The tank was weight activated; when the tank reached 200 pounds, it automatically turned on and began the mixing process. In addition, if the tank itself appeared empty, the piping system below could hold between 50-80 pounds of weight and this weight could affect the activation when an individual leaned over the side or closed the lid and sat on the tank cover. The decedent was assigned to clean and sanitize the incident tank. He used a long-handled brush, and to clean around the rim of the tank, a hand-held green scrubber. It is unknown if the machine was running at the time he was cleaning it or if it started up automatically. At some point, the decedent entered/fell into the tank and was struck by the mixing blades. Another sanitation worker heard the tank making “weird” noises and told another sanitation worker, who investigated. The individual turned off the tank at the control panel, climbed the stairs, looked into the tank and found the decedent inside at the bottom of the tank. Emergency response was called. Emergency responders pulled the decedent out the tank but were unable to resuscitate him. Responders found a plastic bucket and the hand-held green scrubber inside of the tank with the decedent. The brush was leaning against the outside of the tank. MIFACE Summary of MIOSHA Investigation [Case 409](#).

Case 87. A male temporary worker in his 30s was crushed between a mini-dumpster and a compactor. The decedent was emptying a mini-dumpster measuring 36 inches wide by 39 inches high by 51 inches long. The decedent utilized a battery operated Toyota 3-wheeled powered industrial truck Model 7FBEU18 to transport the mini-dumpster from the loading dock, across the facility’s parking lot, to the trash compactor. The incident was unwitnessed. The trash compactor had an 8-inch I-beam welded to it to



Case 87.

protect the electrical system for the compactor. There was an approximate 30-degree downward grade toward the trash compactor. A possible scenario was that the decedent parked the forklift/mini-dumpster, with the forks in a slightly elevated position facing the compactor approximately 24 inches from the trash compactor. The decedent exited the forklift and stood between the front of the forklift and the compactor to manually empty the mini-dumpster. At some point, the forklift rolled forward, pinning the decedent between the mini-dumpster and the trash compactor. The decedent was able to self-extricate and walk approximately three feet from the forklift, where he collapsed. His coworkers found him lying on the ground moaning and summoned emergency response. The decedent was transported to a local hospital where he died the next day. MIFACE Summary of MIOSHA Investigation [Case 431](#).

Case 88. A male quality control employee in his 30s died when he was pinned between a rotary carousel and part of the platen framework of a thermal forming machine. The decedent had been an operator of similar equipment in this facility prior to his job in quality control. The incident area had three stations, a loading/unloading area, an oven, and a press. The loading/unloading station had a lift table where a press operator laid a sheet of plastic. The lift table rose to the carousel, where clamps held the plastic sheet in place. The second station was the oven, where the clamped piece of plastic, still held in the carousel, was heated to make the plastic pliable. The heated

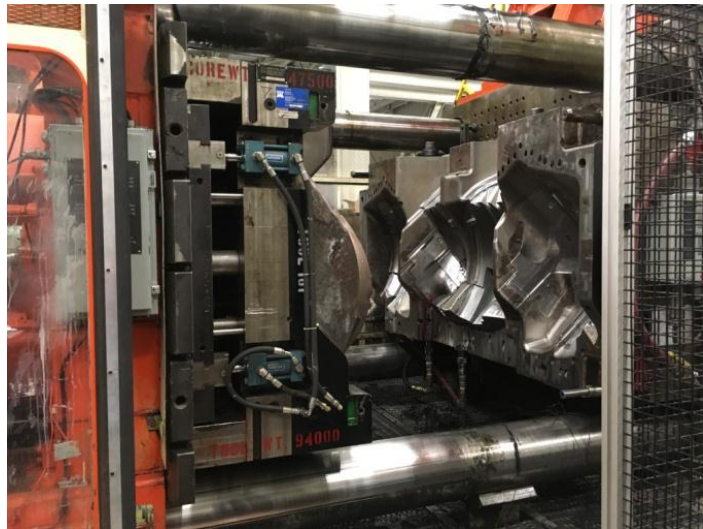


Case 88.

plastic exited the oven and the carousel rotated to the press area. While the sheet of plastic was clamped in the carousel, the bottom platen of the press rose to close the mold and a vacuum was pulled to finish forming the plastic. The bottom platen opened and then lowered to open the mold to its home position. The carousel rotated and the finished piece was unloaded. The whole process took approximately 5 minutes. While the machine/cell was operating, the employees performed necessary trim work of the finished product. The machine/cell had a cage around it with three access points; a 6-foot by 9-foot opening in the loading/unloading area, a 6-foot by 9-foot gate between the oven and the press, and a gate approximately 6 feet by 9 feet in front of the press with a slide bolt. The two gates were not interlocked. The press operator noticed a problem with a part and notified quality control. The decedent agreed there was a problem but was unsure of the cause. The machine was in the automatic mode when he accessed the press area through the unlocked and non-interlocked gate in front of the press. He stepped onto the lower platen of the press and stood up in between the framework of the carousel to exam the upper mold when the carousel cycled. When the carousel turned, he was caught between the framework of the carousel and the top of a stationary corner support post for the lower platen. MIFACE Summary of MIOSHA Investigation [Case 427](#).

Case 89. A male machine operator in his 30s died when he was crushed between the platens of a 3,200-ton horizontal injection mold press. An outside contractor had performed an upgrade on this machine earlier in the year. The outside contractor installed four new sensors, one on each corner on the underside of a presence-sensing floating floor; these were “plunger-type” sensors (like a ballpoint pen), replacing toggle-switch type sensing units at the clamp area of the machine. The sensors were designed to prohibit the press operation if 50 pounds or more of weight was placed on the floor. In addition, the control panel was upgraded to include a message to the operator that the clamp area was not clear. Under normal operation, after forming the parts, a pick and place conveyor removed the finished parts from the press area and placed them on a conveyor for further processing. In this incident, the pick and place conveyor had dropped the parts onto the floating floor of the press area. The press operator stopped the press, which was operating in automatic mode, and the molds retracted (distance between the molds was approximately 5 feet) to permit the decedent to enter the press area to retrieve the parts. The decedent entered the press, picked

up the parts, and then threw them outside of the press. At this point, it appeared the press operator thought the decedent had exited the press. The operator was unaware that the decedent was still in the press area. It was hypothesized that the decedent noticed some un-formed plastic around the molds, which could interfere with press function, and was attempting to clear it when the operator restarted the machine. The decedent was crushed between the closing platens. The operator heard a noise and opened the press. He saw the decedent and then called for emergency response. Subsequent investigation determined that the plunger arms on all four of the recently installed sensors had broken off due to an inferior quality of the product and the design of the floor within the press; thus, the floor did not function as designed, permitting both the press door and the molds to close. The control panel did not indicate to the machine operator that the press area was not clear. MIFACE Summary of MIOSHA Investigation [Case 411](#).



Case 89.

Case 90. A male service technician in his 30s working for a dairy parlor manufacturer died from complications of a head injury sustained in 2007. He and a coworker were repairing a rotary milking parlor. The rotary milking parlor had two rails, a kick rail (lower rail to prevent a cow from kicking workers) and a breach rail (prevented cows from backing over the kick rail). A vertical support bar supported the rails. His coworker heard the decedent say that an airline fell off. The airline was located in a take-off cabinet. When the decedent reached into the takeoff cabinet to reconnect the line, the parlor rotated, crushing his head between the take-off cabinet and a vertical support for the two rails.

Case 91. A male equipment sales owner in his 50s died when the crane he was operating tipped over onto a lowboy trailer gooseneck, crushing the cab. The decedent was operating a 1988 Link Belt Rough Terrain crane, Model HSP-8022. He was in the process of lifting a Hewitt Robius Vibrex gravel shaker, measuring approximately 6 feet by 6 feet by 14 feet from a trailer and moving the shaker to set on another trailer. It appeared that the decedent extended the crane boom approximately 6 feet; the boom was extendable from 27 to 70 feet. He had lowered the four hydraulic outriggers to ground level on the crushed stone/asphalt in the equipment yard, but in a retracted condition. The outriggers were 7 feet 4¾ inches apart when fully retracted and 18 feet 6¾ inches apart when fully extended. It appeared the crane boom angle was approximately 25-30-degrees. The decedent lifted the gravel shaker from the trailer and began to move it. The crane tipped over to its right side onto the gooseneck of a 2002 Load King 55-ton detachable lowboy trailer, crushing the cab. The outrigger pads were damaged and/or sheared off when the crane overturned. Emergency response was called and the decedent was declared dead at the scene. MIFACE Summary of MIOSHA Investigation [Case 437](#).

Case 92. A male church volunteer in his 40s was using a garden tractor to mow the lawn for a church. The decedent was mowing around a flower garden, which used brick pavers to define the edge. While mowing, it appears the decedent drove up onto the pavers and into the garden. While within the garden area, the garden tractor mower tipped to its side trapping the decedent. An individual in a nearby building saw the decedent and the overturned tractor and ran to the scene with another individual, turned off the running tractor and called for emergency response.

Motor Vehicle Collision (28)

Case 93. A male owner of a construction company who was in his 30s died when the pickup truck he was driving left the roadway and struck a tree. The decedent was southbound on a dry, 2-lane roadway with a posted speed of 55 mph. Responding police determined, based on the tire tracks and the pickup's position, that the truck crossed over the centerline and entered the ditch on the east side of the roadway. The pickup truck then traveled several feet outside of the shoulder of the roadway when it struck a tree. The decedent was not wearing a seatbelt/shoulder harness.

Case 94. A male carpenter in his 50s died when a semi entering an intersection struck the pickup truck he was driving. The decedent was northbound on a dry, 2-lane roadway with a posted speed limit of 55 mph. The semi was eastbound and positioned behind another semi at the eastbound road's stop sign. The first semi-tractor/trailer turned right (heading southbound) which, according to the responding police, significantly reduced the sight lines for both the decedent and the semi driver that struck him. As the first semi turned, the semi striking the decedent's pickup never stopped at the stop sign and proceeded into the intersection. Both the semi and the decedent attempted to avoid the collision, but were unsuccessful. The semi struck the decedent's pickup on the driver's side, causing the pickup truck to overturn and land in a ditch filled with water. The decedent was not wearing a seatbelt/shoulder harness. The pickup truck's airbags did not deploy.

Cases 95 & 96 & 97. Three male roofers, ages 42, 35, and 26 died when the pickup truck they were riding in struck a tree. The pickup truck was northbound on a winding, wet 2-lane roadway with a posted speed limit of 55 mph. The pickup had four passengers and the driver. The 26-year-old driver was operating too fast for conditions causing the truck to fishtail. He eventually lost control as he exited the left hand "S" corner entering a "straight" roadway. The pickup truck ran off the roadway to the right and struck a tree on the driver's side. Responding police noted the following: "The momentum and velocity of the vehicle caused it to kick up, forcing the passenger side to roll with the roof of the vehicle into the tree causing the roof to collapse. This roll up and roof collapse caused the b-pillar of the vehicle to collapse, thus leading to those extensive deaths and injuries by all five parties in the accident. It was noted that the initial impact was 42 inches off the ground and that the highest point of impact of the vehicle as it rolled up the tree was 108 inches off the ground". One of the surviving passengers indicated to police that the crew was running late and that the driver had been told to "slow down". All of the decedents were wearing a seatbelt/shoulder harness. The pickup was equipped with front airbags; the airbags did not deploy.

Case 98. A male construction worker in his 30s died when the box truck he was driving rear-ended a semi-trailer. Both trucks were traveling westbound on a dry, 3-lane roadway with a posted speed limit of 70 mph. Traffic ahead was slowing due to a roadway lane closure. The semi was slowing from 55 mph to approximately 15-25 mph. Passing vehicles quickly cut in front of the semi, and as

the driver was downshifting, he felt the semi lurch forward. Unable to move forward, the semi driver looked in the vehicle mirrors and saw that the decedent's box truck had struck the trailer. The decedent was wearing a seatbelt/shoulder harness. The truck's airbags deployed.

Case 99. A HVAC technician in his 30s died when the van he was driving crossed the median of an expressway and struck an oncoming semi-truck. The decedent was westbound on a dry, 2-lane expressway with a posted speed limit of 70 mph. The decedent passed another vehicle traveling westbound in the right lane. For reasons unknown, his vehicle left the roadway, crossed the median, and struck an eastbound semi-truck, which attempted to avoid the collision. The decedent's van struck the semi-truck head on. The decedent was wearing a seatbelt/shoulder harness. The van's airbags deployed.

Case 100. A male vice president of a heating and cooling company in his 20s died when he lost control of his pickup truck after being rear-ended. The decedent's pickup and the car, which struck him, were both traveling westbound on a dry, 2-lane roadway with a posted speed limit of 55 mph. The pickup and the car had both exited one expressway to another; three lanes were converging to two lanes. The car was in the middle lane and the pickup was in the far left lane, the lane that merged. The decedent sped up to move to the middle lane; the car also sped up. The decedent "brake checked" (i.e. tapped his brakes) and the car driver slowed down. The decedent "brake checked" a second time, and then hit his brakes hard. Prior to the impact, the car driver checked his blind spot because he wanted to change lanes. When he looked back, his vehicle rear-ended the decedent's pickup. Responding police indicated the car was traveling at 81 mph at the point of impact. The collision caused the decedent to lose control and run off the roadway to the left. The pickup struck a guardrail and then entered the median and rolled over. The decedent was ejected from the pickup. He was not wearing a seatbelt and shoulder harness. The pickup truck's airbags deployed.

Cases 101 & 102. Two male painters, aged 18 years and 15 years died when their pickup truck rear-ended a semi-trailer. The 18-year-old decedent was driving to a jobsite with his passenger in the front seat. The incident occurred in the left turn lane of a dry, 5-lane roadway with a posted speed limit of 65 mph. The semi-tractor trailer had originally been traveling northbound and had merged into the left turn lane, coming to a near or complete stop while waiting to make a left turn. For reasons unknown, the pickup truck veered into the left turn lane at a high rate of speed and struck the rear of the trailer. Both decedents were wearing their seatbelts/shoulder harnesses. The pickup truck airbags deployed.

Case 103. A male animal food manufacturing firm semi-truck driver in his 40s died when the semi he was driving, crossed the centerline, left the roadway, struck trees and then entered a steep embankment. The decedent was northbound on a dry, 2-lane road with a posted speed limit of 55 mph. For reasons unknown, the decedent crossed the centerline and left the roadway to his left. The tractor struck some trees, and then entered a steep embankment. The tractor and trailer rolled to the driver side of the vehicle. The decedent's restraint use was unknown. The airbags did not deploy.

Case 104. A male bread delivery driver in his teens died when he was ejected from the van he was driving when the van left the road became airborne, flipped and rolled. The decedent was

southbound on a dry, 2-lane roadway with a non-posted speed limit of 55 mph. The responding police noted that the decedent's speed was "too fast". The van left the roadway, entered a ditch, and then struck a large "covert abutment" causing the van to become airborne, flip and roll several times. The van came to rest on its roof in a shallow creek. Responding police noted no apparent signs of braking. The decedent was not wearing a seatbelt/shoulder harness. The airbags did not deploy.

Case 105. A male truck driver in his 40s died when his semi-tractor veered off the road and hit a series of trees. The decedent was driving a semi-tractor with a trailer loaded with 10 yards of sand southbound on a dry, 2-lane roadway with a posted speed limit of 35 mph. The responding police agency indicated that it appeared that part of the semi had drifted over the double yellow centerline and then corrected back into the southbound lane. The decedent did not "straighten out", but continued on the same path of travel. The semi left the roadway onto the shoulder, then a ditch, and then up the ditch embankment on the opposite side. The semi eventually struck a number of small trees before hitting a large tree. The decedent exited the vehicle himself and said he did not remember what happened while talking to witnesses and emergency personnel. He was later declared dead at the hospital. A witness in a trailing vehicle noted that the brakes were not applied throughout the entire incident. The decedent was wearing a seatbelt. The semi-tractor's airbags did not deploy.

Case 106. A male manufacturing salesman in his 50s died when the SUV he was driving rear-ended a semi-truck which had slowed down due to a construction backup. The semi and the decedent's vehicle were both northbound on a dry, 2-lane expressway with a posted speed limit of 70 mph. The decedent had been traveling at a high rate of speed. Traffic had slowed in front of him due to the left lane ending and an upcoming construction zone. The decedent merged from the left lane to the right lane, rear-ending and becoming wedged under the semi-trailer. The decedent was wearing a seatbelt/shoulder harness. The airbags deployed.

Case 107. A wood sales laborer/self-employed "scrapman" in his 50s died when the pickup he was driving left the roadway. The decedent was southbound on a slush/snow-covered (slippery) 2-lane roadway. The posted speed limit was 70 mph. The pickup truck was in the passing lane when the decedent lost control of the vehicle, went off the right side of the roadway and rolled several times. The decedent was not wearing a seatbelt/shoulder harness. The airbags did not deploy. Responding police noted that an underlying medical condition could have contributed to this incident; an oxygen tank was present in the debris as well as a medical bag containing medications.

Case 108. A male delivery driver in his 20s died when the box truck he was driving left the roadway and struck a tree. The decedent was traveling northbound on a dry, 2-lane roadway with a posted speed limit of 55 mph. For reasons unknown, the decedent lost control of the vehicle, left the roadway, struck a car and then a tree. The decedent was wearing a seatbelt/shoulder harness. The truck was not equipped with an airbag.

Case 109. A male semi-truck driver in his 50s died when his semi-tractor struck the passenger side of a SUV attempting a left-hand turn at an intersection. The decedent was driving a semi-tractor towing a tanker loaded with toluene. He was traveling northwest on a wet, 2-lane roadway with an unposted speed limit of 55 mph. The decedent had the right of way. The SUV had stopped at an

intersection. The SUV attempted to turn left (southeast) onto the roadway and pulled out in front of the decedent's semi. The decedent attempted to avoid the collision but was unsuccessful. The semi struck the SUV on its front passenger side corner. The semi then left the roadway and struck a ditch, causing the semi to roll onto the passenger side, and continue to roll coming to rest on the driver's side. The decedent was trapped inside the crushed cab and was pronounced dead at the scene. The decedent was wearing a seatbelt. The semi-tractor was not equipped with airbags.

Case 110. A male petroleum company service technician manager in his 30s died when a truck that crossed the median struck his commercial van head-on. The decedent was southbound on a dry, 4-lane divided roadway without a barrier with a posted speed limit of 70 mph. An oncoming vehicle traveling northbound continued on a generally straight path through a curve in the roadway, crossing the median diagonally and continuing into the southbound lanes, where it struck the decedent's semi head-on. The decedent was declared dead at the scene. The decedent was wearing a seatbelt. The van's airbags did deploy.

Case 111. A male tire company warehouse manager in his 60s died when his company van rear-ended a semi-trailer, which had just entered the travel lane from a ramp. The decedent was eastbound on a dry 2-lane roadway with a posted speed limit of 70 mph. A semi-trailer was merging eastbound into the right lane. As the semi completed its merge with its 4-way lights activated within the right travel lane, the decedent's vehicle struck the rear of the trailer. Witnesses indicated the decedent's vehicle appeared to apply little or no braking. The decedent was wearing a seatbelt/shoulder harness. The semi's airbags did not deploy.

Case 112. A male semi-truck driver in his 50s died when a trailer that had crossed the center line struck his cab. The decedent (Driver 1) was southbound hauling two dump beds of sand on a dry, 2-lane roadway with a posted speed limit of 45 mph. Driver 2 was hauling two empty trailers traveling northbound. Driver 2's pigtail outlet from the lead trailer to his second trailer was damaged; no electrical power was supplied to the second trailer. Because there was no power, the lift axle on the second trailer began to automatically fill with air, causing the empty second trailer to be unstable. As Driver 2 was driving back to the business, the second trailer began to sway (fish tail). Driver 2 was unable to control the trailer and the trailer "swayed violently into the southbound lane" (per the responding police) striking the decedent's cab on the driver's side. The decedent, seeing the oncoming tractor-trailer, unsuccessfully attempted to avoid the collision by veering to the right. The trailer struck the decedent's cab and lead trailer. The decedent was wearing a seatbelt/shoulder harness. The cab was not equipped with an airbag.

Case 113. A male semi-truck driver in his 30s died when his semi rear-ended another semi, which had stopped on the roadway due to congested traffic caused by a roadway construction site located approximately one mile north of the incident site. The incident occurred at approximately 11:30 p.m. The decedent was northbound in the center lane on a dry, unlit, 3-lane expressway with a posted speed limit of 65 mph. The decedent failed to stop, struck the rear of a semi-trailer and then veered off the road to his right (passenger side). The semi ran off the road to the right because of the collision and then caught fire. Restraint use was unknown. The cab was not equipped with an airbag.

Case 114. A male truck driver in his 20s died in a multi-vehicle crash. At the time of the incident, snowfall was heavy with whiteout conditions. Due to the diminished visibility, traffic flow began to slow down. The incident occurred on a westbound 2-lane roadway with a posted speed of 70 mph. Vehicle 1 was traveling too fast for conditions. The driver lost control of the vehicle and crashed into the guardrail. The driver backed the vehicle into the lanes of traffic in an attempt to turn around. The driver blocked both lanes of travel. Additional vehicles traveling too fast for road conditions, in succession, began to lose control as they attempted to swerve to avoid the blocked roadway, causing multiple vehicles to crash into one another. The decedent was operating a semi-tractor/trailer. He swerved into the left lane and was unable to avoid striking the rear of another semi-tractor/trailer. Responding police determined the decedent was traveling too fast for conditions at the time of the crash. The decedent was wearing a seatbelt/shoulder harness. The vehicle's front airbags deployed.

Case 115. A male semi-truck driver in his 50s died when, after exiting a freeway, he did not stop at a stop sign at the end of the exit ramp, traveled across the intersection, struck the concrete end barrier of a bridge, and then went off the road, down an embankment and across a stream. A witness to the incident indicated to responding police that the truck had been traveling westbound at approximately 70 mph. There was a split in the expressway, and the witness indicated that it appeared that the decedent could not decide whether he wanted to remain traveling westbound or to travel northbound. The decedent made a last minute decision to travel northbound and continued traveling at least 70 mph. As the decedent approached another exit, it appeared to the witness that the decedent made another last minute decision to exit the roadway. The witness stated that the decedent did not apply his brakes after he got off the roadway and onto the ramp. The decedent's restraint use was unknown. The cab was not equipped with airbags.

Case 116. A male semi-truck driver in his 40s died when his semi-tractor/trailer left the roadway and rolled into a ditch. The decedent was eastbound on a dry, 4-lane roadway with a posted speed limit of 70 mph. There was a left to right curve leading up to the incident scene. The responding police department noted the roadway had a 1% down grade and sloped downward from left to right. For reasons unknown, the semi, which was traveling in the far right lane, drove onto the right shoulder and struck the tail-end section of guardrail. The tractor-trailer combination continued beyond the end of the guardrail and onto the grassy shoulder/ditch where the loaded semi-trailer "jack-knifed" into the ditch. The decedent tried to correct and come back into the right lane but was unsuccessful. The cab was pulled by the trailer, which barrel-rolled halfway spilling its load into the ditch, flipping onto its roof. The decedent was wearing a seatbelt/shoulder harness. It was unknown if the airbag deployed. Responding police determined possible contributing factors for the crash included, but were not limited to, the driver falling asleep and distracted driving.

Case 117. A male semi-truck driver in his 40s died when he was involved in a collision with another semi. The decedent was eastbound on a dry, 2-lane roadway with a posted speed limit of 60 mph. Three semis were involved in the collision. Semi 1 and Semi 2 had been stopped for a traffic backup and were just starting to drive ahead slowly with the 4-way flashers activated on both of the semis. Semi 2 saw the decedent approaching and steered to the left to avoid the potential collision. The decedent's semi attempted to avoid rear-ending Semi 2's trailer by swerving to the right but was unsuccessful. The decedent's semi-tractor struck the rear of Semi 2's trailer, causing Semi 2 to strike the rear of the Semi 1's trailer. The decedent was wearing a seatbelt/shoulder harness. The

cab was not equipped with an airbag.

Case 118. A self-employed deliveryman in his 40s died when a train struck the van he was driving. The decedent was eastbound on a wet and snow-covered 2-lane roadway with a non-posted speed limit of 55 mph. The train was traveling westbound on the tracks. As the train approached the road/train crossing, the van crossed in front of it. A tree line obstructed the engineer's visual approach to the road. The engineers stated that decedent's van came into the crossing at a fast pace and they were unable to stop the train. The train crossing had stop signs, no crossing barricades. The decedent was wearing a seatbelt/shoulder harness. The van's airbags deployed.

Case 119. A male regional account executive in his 30s died when a semi tractor-trailer struck the passenger car he was driving. The incident occurred within an intersection. The decedent was northbound on the dry, 2-lane roadway with a posted speed of 55 mph. The northbound lane had a stop sign with a flashing red light at the intersection. The semi-truck, which had the right of way, was westbound and had a flashing yellow light. The decedent failed to stop at the intersection. The semi struck the decedent's vehicle on the passenger side, causing it to overturn several times and come to rest in a field. The decedent was wearing a seatbelt/shoulder harness. The car's airbags deployed.

Case 120. A male legislator in his 60s died when he was thrown from his motorcycle after striking an oncoming car that was performing an improper left turn. The decedent was southbound on a dry, 2-lane roadway with a posted speed limit of 55 mph. A vehicle traveling northbound made a left turn, entering the decedent's southbound lane. The decedent's motorcycle struck the passenger side of the turning vehicle causing him to be ejected from the motorcycle. He traveled approximately 25 feet in the air, coming to rest on the roadway. He was declared dead on the scene. The decedent was wearing a motorcycle helmet.

Struck By (20)

Case 121. A male farmer in his 50s died when he was pinned by a tree that was lying on the ground. The tree was felled several weeks prior. The decedent and a coworker had previously removed the smaller limbs and brush from the tree and were in the process of completing the cutting up the bigger limbs and trunk. A tractor hauled the pieces of the tree to another part of the property to be further cut up into firewood. The decedent had wrapped a chain around the piece of tree and was trying to move it with a tractor when it became stuck. The decedent was in the process of cutting a branch from the piece of tree when the tree branch broke causing the tree base to rotate and the tree to roll and knock the decedent to the ground. As he was knocked to the ground, the tree continued to roll over pinning the decedent between the downed tree and a section of log that had been cut from the tree. The decedent's coworker heard both the decedent's chainsaw and tractor idling and walked to the decedent's location. Emergency responders estimated the tree to be 5-6 feet in diameter.

Case 122. A male farmer in his 50s died when unsecured wooden crates fell from the forks of a forklift attachment to the front of a Massey Ferguson 360-2-WD farm tractor and struck him. The Massey Ferguson was converted to a forklift by attaching forklift components to the front of the tractor. The serial plate indicated a height of 108 inches and a capacity of 2500 pounds at 24-inch

load center. The low profile tractor was used in orchard operations and did not have a roll over protection device. The tractor lifted and moved wooden crates to locations around the fields where pickers would fill bags with product and then deposit the bags in the crate and back to a staging area, where the crates were trucked to a processing facility. The decedent was preparing to move a stack of empty crates to the field. The crates measured 4-feet by 3-feet by 27 inches deep to bottom fill area and 32 inches on the outside to include the frame and fork enclosures. A crate unit was constructed by placing one crate upright on the ground, one crate placed on its side inside the upright crate and a third crate flipped over and placed over the other two crates. Each 3-crate unit weighed 480 pounds. Three of these crate units comprised a stack, which measured 15 feet 3 inches tall. At the time of the incident, the decedent was backing a stack away from the crate storage area when the top 3-crate unit and one additional crate fell on top of the tractor he was operating. The decedent and tractor continued in reverse until the tractor struck a truck located approximately 30 feet away. A witness ran over to the decedent, who had pushed the bins off himself. The witness turned off the tractor and called for emergency response. Near the area where the decedent was working was a small curb in the parking lot. Responding police observed tractor tire impressions that showed the tractor to have backed out, away from the crate storage area and partially up onto a 10-inch curb and then back onto the flat area of the parking lot. MIFACE Summary of MIOSHA Investigation [Case 420](#).

Case 123. A male farmer in his 70s died while clearing trees from a wooded area. The decedent was “cleaning up” the property. He was using a John Deere tractor, which was not equipped with a cab or roll over protection device. The tractor had a bulldozer-type blade attached to the rear of the tractor. A chain was attached from the tractor blade to a large tree, which was being pulled by the tractor. The blade caught the front of a 6- to 8-inch tree, pulling it down onto the tractor and the decedent. The tree forced the decedent off the tractor seat. He was pinned by the tree trunk and branches against the right rear fender of the tractor.

Case 124. A male feller in his 60s died when a tree fell onto him. The decedent was working with another individual to cut down a tree. The coworker stated they attached a cable to the tree to assist them in cutting it down. The tree started to lean in the opposite direction of how they wanted the tree to fall so they attached a cable as high as they could on the tree and then attached the other end of the cable to the tractor the decedent was operating. The decedent used the tractor to pull the tree toward him. Apparently, the decedent thought the tree would miss him as it fell, but it did not. The tree struck him on the left side of his head causing him to fall off the tractor to the ground.

Case 125. A male feller in his 50s died when a tree limb being cut struck him. The decedent was a member of a 3-person crew cutting trees and making them into logs for a furniture-making business. Coworker 1 was bucking and decking, and Coworker 2 performed limbing activities. The decedent was cutting down the trees and skidding the trees to Coworker 2. The work practice was for the decedent to cut down three trees and then skid the trees to Coworker 2, then cut down three more trees and skid them to Coworker 2. The decedent would take the limbed trees from Coworker 2 to Coworker 1 to cut them into logs and stack the logs into piles. Coworkers 1 and 2 were sharpening their saws when Coworker 1 decided to go to see if the decedent needed any help. Coworker 1 found the skidder and it was running. Coworker 1 walked up to the skidder and heard the chainsaw running. As he walked toward the sound of the chain saw, he saw the decedent lying on his back. The coworker called the owner of the store/furniture-making business and asked him

what to do. Store personnel called emergency response. The tree, which struck the decedent, was lying beside him.

Case 126. A male Caterpillar Model 320 excavator operator in his 60s died when a 45- to 47-foot long, 25-inch diameter oak tree fell on the cab of the excavator. The excavator was not reinforced (retrofitted with a falling object/roll over protective structure). The site clearing operation occurred in a drainage ditch/ravine with a slope of approximately 10 degrees. A tree service company had topped the incident oak tree one week prior to the fatal incident. The decedent was instructed to push trees away from the excavator to remove them, including the incident oak tree. The oak was located approximately 2/3 of the way down the ravine. The excavator was positioned approximately 1/4-1/3 of the way down the ravine wall. Based on pictures taken by the responding police department, it appeared a scoop of sand was removed near the base of the oak tree (unknown when the sand was removed). At some point, the decedent either contacted the root system with the bucket or the root system lost its integrity and the tree fell uphill, striking the arm of the excavator and then landing on the excavator cab. A coworker at road level was processing trees hauled up to the road by the decedent. When the decedent did not bring up the next tree for processing, his coworker started to walk down the ravine wall. As he was walking, a nearby contractor yelled to him “how long has that tree been on the excavator?” His coworker ran to the excavator and attempted, unsuccessfully, to shut down the machine while the contractor called for emergency response. MIFACE Summary of MIOSHA Investigation [Case 397](#).

Case 127. A male teacher in his 40s was volunteering with his church family to clean and renovate a building. The west wall and the ceiling of the building collapsed while he was near the entrance and several falling pieces struck him.

Case 128. A male sawmill operator in his 60s died when the tree he was felling struck him. The decedent was cutting a 22-inch diameter birch tree on an embankment. The decedent had not notched the tree and was relying on the wedge to direct the fall of the tree. Responding police noted the tree appeared to have broken off above his head, kicked out away from him, and then fell back on top of him. A family member found him with the tree lying on top of him.



Case 128.

Case 129. A male sign-hanging crew foreman in his 40s was struck by a semi-truck while taking a picture of a finished business mileage sign. The bucket truck hauling the arrow board was completely parked within the exit shoulder of the exit ramp with the outriggers down across the roadway. There was no roll-ahead area between the arrow board/bucket truck and the exit sign the crew was working on. The arrow board was flashing. A flatbed truck equipped with a bucket was parked ahead of the bucket truck/arrow board. The exit ramp curved to the right. The 3-person crew had successfully completed adding mileage plaques and arrows to two exit ramp signs. The incident occurred while the decedent was taking a picture to document the completion of the second of the two exit sign changes. The decedent was standing between the bucket truck

and the arrow board and one of his crew members was standing nearby on the shoulder edge. A semi tractor-trailer, as it was exiting the highway, struck the arrow board. There were no signs of braking by the semi driver. The collision caused the arrow board to move forward, striking the decedent and his coworker. The semi tanker jackknifed and the cab struck the flatbed truck, causing the semi cab to burn. All crew members were wearing their high-visibility vests, but had removed their hard hats and fall protection because they were done for the day. MIFACE Summary of MIOSHA Investigation [Case 400](#).

Case 130. A male vehicle preparation manager in his 50s died when he was pinned between the pickup truck he was moving and a parked pickup truck. The decedent was retrieving new pickup trucks from a dealership across the street. At the time of the incident, the truck he was retrieving was in the front row next to the road and there were two rows of trucks parked behind it. The decedent moved an unrelated truck and then returned and started the truck in the row directly behind the truck he needed. There was an open space to the right and in front of this pickup truck so he backed the truck up and drove the pickup into the open spot out of the way. He opened the driver's side door and the truck moved in reverse. The truck he was driving struck another pickup truck that was parked to the left and next to the truck he was operating. His pickup struck the truck bed of the parked pickup and the opened driver's door caught the parked truck and folded out and forward towards the front fender. The decedent was thrown out of the driver's side door and pinned between the bed of the parked pickup and the open driver door and the B-pillar of the pickup he was driving. He was found unresponsive between the two trucks. When he was found, the truck he was operating was running and the gearshift was in neutral. The individual finding the decedent put the truck in park and then ran for help. The decedent was not wearing a seat belt. MIFACE Summary of MIOSHA Investigation [Case 434](#).



Case 130.

Case 131. A Hispanic male mobile home set up crew leader in his 50s died from complications of an injury in 2016. The injury occurred in 2001 when a house jack failed and a mobile home fell on his back.

Case 132. A male self-employed semi-truck driver in his 40s died when a semi-tractor he was fixing rolled forward onto him. The decedent was working on the air bags and brakes. A family member spoke with him as he was placing the last tire and the decedent indicated he was almost done working. The incident occurred as he was lowering the semi down using a bottle jack, which was located under the truck frame in between the two rear axles. He had partially opened the relief valve and was in the process of lowering the truck, when the truck rolled forward onto him. The decedent did not utilize any wheel chocks. The responding police found the truck was in neutral and the air brakes engaged. The decedent was found pinned partially under the front right rear tires by a family member, who called 911.

Case 133. A male tow truck driver in his 20s died when an oncoming vehicle struck him. The decedent parked his tow truck northbound in the southbound lane of travel with all emergency lighting activated along with 4-way emergency hazard lights and the headlights in the "dim" setting. The decedent was in the process of removing a vehicle lodged in a ditch. He was standing near the tow truck's controls on the driver's side of the tow truck. An oncoming southbound vehicle swerved to the right in an attempt to avoid striking the tow truck but struck the tow truck, the decedent and then struck the tow cable and towed vehicle in the ditch. The decedent was wearing dark clothing with no reflective material. The incident occurred in the early morning in the dark on a 2-lane, wet roadway with a posted speed limit of 55 mph.

Case 134. A male pipeline station operator in his 60s died when a train struck him while he was conducting a visual inspection of the pipeline looking for leaks within the pipeline right of way along a railroad spur. The decedent was standing on the head of a railroad tie when the "snow plow" on the lead locomotive struck him. The train was traveling approximately 44 mph. It appeared to the locomotive engineer that the decedent was looking at his cell phone. The train conductor and the engineer blew the train horn, but the decedent did not move. The area of the incident was noisy due to a nearby factory, construction and airport. The decedent was not wearing a reflective vest. MIFACE Summary of MIOSHA Investigation [Case 433](#).



Case 134.

Case 135. A male tree trimming company owner in his 20s died when a large branch struck him while trimming a tree. The decedent was approximately 30 feet above the ground removing the upper section of a 55-foot poplar tree (topping the tree). He was aloft using climbing gear and tied off with a saddle. Approximately 10 feet above the deceased, one end of a rope was tied to the tree section being cut. The other end of the rope was attached to the rear bumper/hitch of a pickup truck to pull the tree section away from falling on a private residence. The decedent had notched the trunk and was making the back cut on the 19-inch diameter trunk when the saw became pinched approximately 12 inches into the tree. He instructed his ground person to allow some slack in the rope so he could remove the saw. As the vehicle was being backed up to loosen the rope tension, a 25-foot section of the tree above his head kicked back and fell on the opposite side of him, placing him between the falling tree top and the rope attached to the pickup truck. The weight of the falling tree section caused the rope to pull the deceased backward from where his saddle was tied off and continued with massive force across his abdomen, chest and head. Emergency response was called, but neither EMS nor the fire department had any means to gain access to the decedent. The local electrical utility and department of public works were contacted to respond with a bucket truck. The decedent was declared dead at the scene. MIFACE Summary of MIOSHA Investigation [Case 417](#).

Case 136. A male racetrack safety crewmember in his 40s died when he was struck by a racecar while on the track directing traffic under “caution” conditions. During the race, one of the racecars had dropped oil or some other fluid on the track. The “Caution” was issued (via radio communication to all track personnel, racecar drivers and Safety Crew); also caution lights (yellow flashing lights) at the entrance of Turns 1 and 3 were lit. Under a “caution” condition, all racecars are required to line up single file and travel approximately 25 mph around the track until the “caution” is over. The Track Clean Up crew, wearing the required firefighter turnout gear and radio communication, left their station behind the concrete wall near the exit of Turn 2 and drove to the area of the racetrack where the oil/fluid was located to lay down oil-dry and move the disabled racecar off the track. While laying down the oil-dry, the Clean Up crew heard through radio communication that the decedent had been struck. The decedent, who was wearing the required firefighter turnout gear and radio communication, left the station near Turn 2 but did not communicate his intentions to the other safety crewmembers. He stood on the outer/elevated portion of the track to direct the racecars to form the single-file line and drive along the inner lanes of the track. A witness indicated as the racecars came out of Turn 2, one of the cars came out of the single file. The driver attempted to avoid striking the decedent. The decedent attempted to get out of the way. He was struck and was thrown 20-25 feet onto the inner lanes of the track. The decedent did not have protection from a Safety Vehicle to serve as a barrier between him and the oncoming cars on the track. The race was stopped. Emergency responders on site treated the decedent, who was flown to a nearby hospital where he was declared dead in the emergency room. MIFACE Summary of MIOSHA Investigation [Case 418](#).



Case 136.

Case 137. A male bar/restaurant owner in his 70s died from head injuries when he was knocked off a bar stool during an altercation between customers.

Case 138. A male mechanic in his 20s died when the vehicle he was working under fell off two jacks and struck his head. The day prior to the incident, the decedent had used two jacks to lift the vehicle and had left the vehicle on the jacks. At the time of the incident, the decedent was working under the passenger side of the vehicle using an impact wrench on the idler arm trying to remove a nut. The jacks collapsed and the vehicle fell off the jacks and onto the decedent. A coworker who was nearby heard a noise. He saw the decedent under the vehicle and ran to his personal vehicle to obtain a jack, which he used to raise the vehicle up and off the decedent. The coworker pulled the decedent from under the vehicle. The coworker notified another individual to call for emergency response while he began CPR. The decedent was declared dead at the scene.

Case 139. A male in his 40s died while loading a toolbox onto the flatbed of his “flatbed style” tow truck. The tow truck was in a state of disrepair; it visually tilted towards the driver's side due to several broken rear leaf springs and the side rails had been removed. The tool box, filled with tools and auto parts, had two pieces that were stacked (unsecured) on top of each other. The lower tool chest had a set of four wheels affixed to the bottom of the tool chest. Positioned at one end of the lower chest were two castor wheels that could independently pivot 360 degrees in a circle. Police, who investigated the death, weighed the tool chest; it weighed 1,980 pounds. The tow truck had been backed into the garage area. The front of the tow truck was not in a level position and it was cantilevered over the area's threshold with the front wheels parked on downward sloping pavement. His friend, who was helping the decedent, indicated to responding police that the front driver's side caster wheel of the tool chest would not lock and that the decedent had been hitting the brake on the caster wheel with a sledge hammer in an attempt to get the brake to set, but was unsuccessful. The decedent had attached a winch cable to the top of the wheel housing on the passenger side tool chest's rotating castor wheel. The decedent began to pull the tool chest onto the flatbed. When on the flatbed, the decedent raised the flatbed into what should have been a level position with the tool chest on it. Because the flatbed was tilted toward the driver's side and pitched downward, the toolbox began to roll sideways and off the truck bed. The decedent initially stopped winching the tool chest and assisted his friend, who was positioned on the driver's side of the truck to push the tool chest back towards the center of the flatbed. The decedent continued winching to the tool chest. Once they got the tool chest steady on the flatbed, the decedent told his friend to hold onto the tool chest while he went around to the other side of the truck. Once on the other side of the truck, the decedent was planning to use a strap to tie the tool chest down. The tool chest started to roll off the driver's side for a second time. Unable to hold the tool chest and keep it on the flatbed, the friend yelled to the decedent. The decedent ran back around the tow truck and attempted to push the tool chest back onto the flat bed. The tool chest fell off from the tow truck and onto him. The winch cable was still connected to the top of one of the rotating castor wheel housings at the time of the responding police arrival. The friend yelled for help and workers from another business responded, lifting the tool chest from the decedent. Emergency response was called. Awaiting arrival, chest compressions were given by a bystander. Emergency responders assumed care upon arrival. The decedent was declared dead at the scene.

Case 140. A male police officer in his 40s died when a van struck him while he was assisting with a traffic stop. The decedent was standing on the street, next to his patrol car when the van struck him and another police officer who survived.

Suicide (13)

Case 141. A male farmer in his 60s died from a self-inflicted hanging.

Case 142. A male farmer in his 90s died from a self-inflicted gunshot wound.

Case 143. A Hispanic male painter in his 30s died from a self-inflicted hanging.

Case 144. A male auto/truck salesman in his 40s died from a self-inflicted hanging.

Case 145. A male storeowner in his 70s died from a self-inflicted hanging.

Case 146. A male salesman in his 50s died from a self-inflicted gunshot wound.

Case 147. A male master mechanic in his 50s died from a self-inflicted gunshot wound.

Case 148. A male service station attendant in his teens died from a self-inflicted gunshot wound.

Case 149. A male interior designer in his 50s died from a self-inflicted drowning.

Case 150. A female housekeeper in her 20s died from a self-inflicted gunshot wound.

Case 151. A male auto repair business owner in his 50s died from a self-inflicted hanging.

Case 152. A male police officer in his 50s died from a self-inflicted gunshot wound.

Case 153. A male police officer in his 50s died from a self-inflicted gunshot wound.

Toxic Exposure (9)

Case 154. A male dairy farmer in his 50s died when he lost consciousness and drowned in liquid manure in a pit housing the manure pump. Heat exhaustion was identified as an “other significant condition contributing to the death but not resulting in the underlying cause of death”. The 6-foot long by 6-foot wide by 12-foot deep pit had two “sections”; the top section was constructed of treated plywood with the top of the plywood approximately 4 feet above grade and the bottom section was a concrete pit 8 feet deep. Across the opening of the pit was a partial wood cover. The pit was located inside a barn. The decedent began working between 8:00pm and 9:00pm to repair a pump that had been malfunctioning for a few days. The pump was located along the east and south walls and a ladder constructed of 2x4s was built into the west side wall. An extension cord was plugged into a flood light that was positioned to illuminate the pit. Wearing a Tyvek® suit and rubber boots, the decedent descended to the bottom of the pit by the ladder. It is unknown if he performed any work on the equipment. When he did not return home, a family member went to look for him in the early morning hours of the next day. When the family member arrived at the location, the family member moved the partial wooden cover from the pit opening and found him deceased. When emergency responders arrived, they found a 20-inch axial house fan on the ground near the pit. The fan was not plugged in when emergency responders arrived on scene; it was unknown if the family member moved and/or unplugged the fan upon discovering the decedent or if it had not been plugged in while the decedent was working. The heat indexes reached 95 to 105 degrees on the day of the incident, with high temperatures and humidity sustained during the evening hours/early morning hours the next day. Emergency responders found the decedent lying on his back lodged partially under the pump and tightly against the pit wall in approximately 12 inches of manure. MIFACE Summary of MIOSHA Investigation [Case 428](#).

Cases 155 & 156. Two male construction laborers aged 47 and 37 died from carbon monoxide poisoning. A gas-powered generator was operating in the basement of the home they were renovating.

Case 157. A male business owner in his 60s was overcome and drowned while attempting to clear a manhole sewer drain on his business property. The decedent removed the manhole cover and placed it nearby. It was hypothesized he had a cardiac event. A family member found him with his head, torso and upper legs in the drain; his shins and toes were facing upward. Found nearby were a shovel, submersible pump and water hoses from his building. Following his removal from the drain responders determined the water depth at approximately 20 inches.



Case 157.

Case 158. A male laborer in his 20s was overcome and drowned when he entered a 10,500-gallon molasses tank to reposition a drainpipe. The molasses tank was 11.8-foot wide by 13.9-foot high. The decedent and a coworker were in the process of draining the tank holding a mixture of molasses and water. Near the bottom of the tank was a pipe to drain the contents. The drainpipe had been turned “up” rather than “down”. The workers hooked up a gasoline-fueled pump to the bottom valve to pump the molasses/water mixture from the tank. When no more of the mixture could be removed, his coworker indicated that a sufficient quantity of the molasses/water mixture had been pumped from the tank. The coworker stepped away, and several minutes later, noticed the decedent preparing to enter the tank. At the top of the tank was a 15-inch hatch opening. After some discussion, the coworker agreed to “spot” the decedent while he entered the tank to rotate the drain pipe to the “down” position. To enter the tank, the decedent placed a lift truck in front of the tank and raised the forks to a position so the forks were straddling the 15-inch opening. Suspended from the mast and the forks were two cargo tie-down straps. The decedent donned a pair of full-length waders and a full-face respirator equipped with ammonia cartridges and rappelled to the base of the tank to reposition the drainpipe in an effort to further drain down the molasses/water mixture. He pushed the drainpipe into position, and then attempted to climb out of the tank by holding the straps and placing his feet on the side of the tank and pulling/walking up. The decedent twice attempted to climb out of the tank. The coworker observed the decedent become unresponsive and attempted to pull him out of the tank, but was unsuccessful. The spotter then ran to the firm’s office and summoned emergency response. Firm personnel used a circular saw to cut a 4-foot by 4-foot hole in the tank. Two employees entered the tank and found the decedent submerged in the mixture. They pulled the decedent from the tank and began CPR. Emergency response personnel arrived transported him to a local hospital where he was declared dead. MIFACE Summary of MIOSHA Investigation [Case 414](#).

Case 159. A male semi-truck driver in his 60s died of hydrocarbon toxicity when his tanker hauling approximately 13,500 gallons of gasoline overturned and leaked onto the ground. The decedent was traveling northeast on a wet, dark, unlit, 2-lane roadway with a posted speed of 55 mph. Near

an intersection, the decedent left the roadway on the passenger side of the vehicle and went off onto the shoulder. The right side tires appear to have contacted the soft dirt where the vehicle then rolled. It rolled onto the passenger side first, and continued to roll all the way over until landing on the driver's side. There was extensive gasoline spillage preventing extrication of the decedent for hours. Responding police could not determine the decedent's speed nor the cause of the vehicle leaving the roadway. The decedent was wearing his seatbelt /safety harness. The semi cab was not equipped with an airbag.

Case 160. A male semi-truck driver in his 50s transporting waste sodium sulfide and water died when he was overcome by hydrogen sulfide while rinsing his tanker car. The decedent had unloaded the approximately 7,350 gallons of the waste liquid into an underground treatment pit at the treatment site; the unloading site was inside a building with overhead doors on each end for ventilation. The treatment site required respiratory protection while working in the building. The decedent wore a full-facepiece respirator equipped with organic vapor cartridges. Per company procedure, the decedent was preparing the tanker for his next load. He climbed to the top of the tanker and opened the center dome lid. A waste treatment site witness indicated that the decedent looked down near the open hatch and when he raised his head, the witness thought the facepiece looked foggy. The decedent removed the respirator and placed it on top of the tanker near the walkway. He was not wearing fall protection; the fall protection was located in the cab of his truck. Positioned near the open dome hatch, the decedent intended to use a hose from a water truck to rinse the walls of the tanker. The witness indicated his head was close to the hatch opening, perhaps to look inside the tanker. He took a couple of breaths and then the decedent lost consciousness and fell from the top of the tanker 10-15 feet to the ground. The witness tried to catch him but was unsuccessful. Waste treatment site personnel moved the decedent to fresh air outside of the building. They performed CPR until medical response personnel arrived. The decedent died the next day at the hospital. Waste treatment site personnel conducted air monitoring at the hatch opening using a 4-gas monitor approximately 30 minutes after the incident. The equipment's maximum level of detection for hydrogen sulfide was 100 ppm, which is the "immediately dangerous to life and health (IDLH)" level for hydrogen sulfide; the monitor spiked quickly to 100 ppm. MIFACE Summary of MIOSHA Investigation [Case 410](#).

Case 161. A male towing/tire shop owner in his 40s died due to overexposure to carbon monoxide. The decedent and three friends were overcome while sitting in front of a wood burning stove and a portable gas heater.

Case 162. A male real estate professional in his 30s died due to overexposure to carbon monoxide. The responding police report indicated he was found dead with an electric generator in the basement of a house he was renovating for sale. There was a high level of carbon monoxide found by emergency responders. The decedent had a lethal level of blood carbon monoxide (53% saturation).