June 2nd, 2015

2013 Annual Report

Tracking work-related deaths in Michigan

2013 Annual Report
Tracking Work-Related Fatalities in Michigan

A Joint Report
Of the
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Table of Contents

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 13th annual Michigan Fatality Assessment and Control Evaluation (MIFACE) report on acute traumatic work-related (WR) deaths in Michigan. There were **134 work-related deaths in 2013**, representing 131 employers and 131 separate incidents. 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 Department of Occupational & Environmental Medicine (MSU OEM) website. Key findings for 2013:

- The number of work-related deaths (134) and the fatal injury rate (3.1 deaths/100,000 workers) were down compared to 2012 (135 work-related fatalities, 3.2/100,000 workers, respectively).
- Transportation & Warehousing (26, 19.4%) had both the largest *number* of work-related deaths and the highest *risk* of death (24.6 deaths/100,000). Construction was second in both number and risk (25, 18.7%; 18.9 deaths/100,000), and Agriculture was third in number and risk (13, 9.7%; 16.0 deaths/100,000) of a work-related death. Manufacturing, although 4th in the number of deaths (10, 7.4%) had one of the lowest risks of death (1.8 deaths/100,000). Arts, Entertainment & Recreation had 6 (4.5%) deaths, but were fourth in the risk of death (12.7 deaths/100,000).
- The most common cause of death was from a motor vehicle (27, 20.5%), followed by struck by (24, 18.2%) and then suicide (22, 16.7%). Falls were the fourth leading cause (19, 14.4%) and then homicide (16, 12.1%). The cause of death could not be determined for two individuals.
- The number of work-related suicides in 2013 nearly doubled compared to 2012 (22 suicides in 2013 compared to 12 suicides in 2012).
- Individuals who died were most likely to be men (90.3%) and White (78.4%). The average age was 46.4 years old and ranged from 19 to 85 years of age.
- Foreign-born workers accounted for 9.0% of all work-related deaths in Michigan in 2013.
- Illegal drugs, alcohol or side effects of prescribed medication was a potential factor in approximately 21% of the deaths.
- The Transportation & Material Moving occupation which had the largest number of work-related deaths (31) followed by Construction & Extraction and Management (20 each).
- Forty-three (43, 51.8%) of Michigan's 83 counties had a fatal work-related incident. Wayne County had the highest number of work-related fatal incidents (30, 22.7%), followed by Oakland County (14, 10.6%). The county of incident was unknown for two fatal incidents.
- Of the 134 work-related fatalities, 27 (20.1%) 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 there to work; or
(2) OFF the employer's premises and person 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 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 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 as well as that of the Bureau of Labor Statistics (BLS), which collects the official statistics of work-related deaths in all states.

Who is Not Included? Individuals who die while "at work" from natural causes, 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 the Michigan work-related fatalities: 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 WR death is: 1-800-866-4674

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, ensuring identifiers are removed**

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
- Review process

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.

Case 105. Male roll off driver crushed while reaching under raised dump box.

For the remaining work-related fatalities including agricultural fatalities, MIFACE initiated contact with employers or farm family members 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 with employer agreement, accompanied the MIOSHA compliance officer. Also, MIFACE interviewed the compliance officers about their investigation.

Results

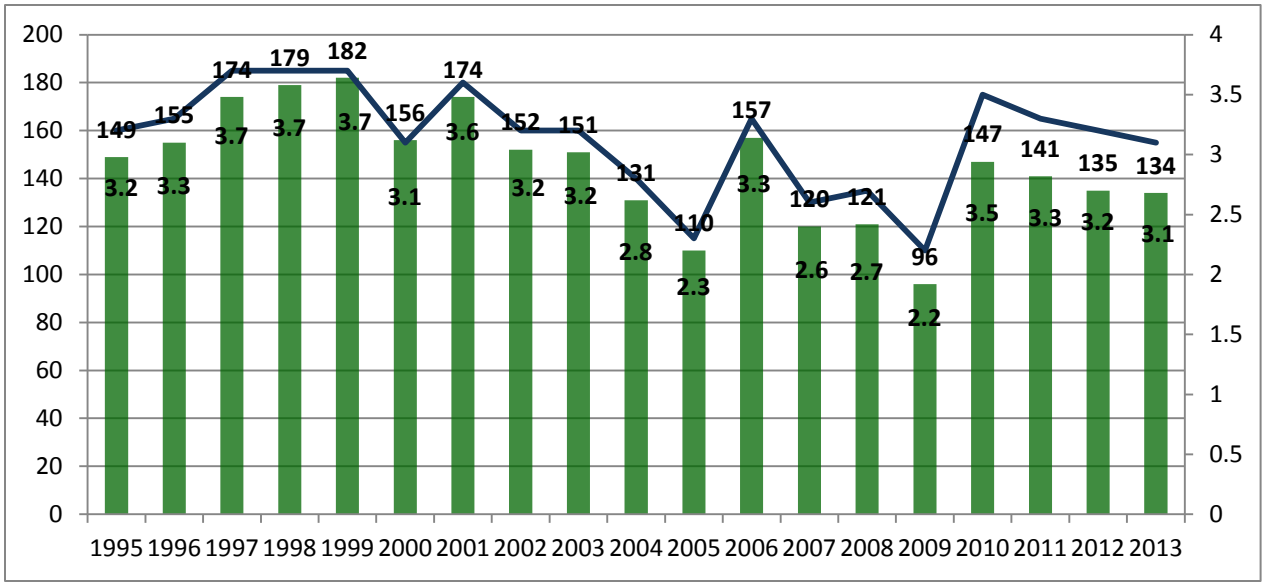
There were 134 acute traumatic work-related fatalities in 2013. One hundred twenty eight (95.5%) of the 134 work-related traumatic incidents occurred in 2013; six individuals died in 2013 due to complications from a work-related injury sustained in a previous year (as noted by the medical examiner on the death certificate):

- 1972: A male electrician sustained a closed head injury at work and died from complications of the injury.
- 1976: A male general laborer was crushed while working in the transportation industry. He had traumatic brain injury, crushing injuries to his chest and left lower extremity which required an above the knee amputation. He died 37 years later from hepatitis acquired from the transfusions he received to treat his injuries. .
- 1989: A male independent contractor for a home remodeling firm died from medical complications of a fall from a ladder.
- 1990: A female assembler at a manufacturing facility was injured when crates of heavy metal car parts fell on her, severing her spinal cord. She died from complications of this injury.
- 2011: A male truck driver was found unresponsive next to a truck. Hospital records indicate that vehicle malfunctions causing the decedent to fall and strike his head and back.
- 2012: A male postal carrier died when the car he was driving was struck by a tow truck in a road intersection. The decedent's vehicle had the right of way on a damp, two-lane roadway with a posted speed limit of 55 mph. The decedent was traveling eastbound. The tow truck driver was traveling north at approximately 45-55 mph on a north-south road, which had Stop signs at the intersection with the east-west roadway. The driver of the tow truck stated to police he was unfamiliar with the area. As he was driving, the tow truck operator stated that his cell phone rang and he dropped it onto the floor between the driver and passenger side of the truck. He reached down to pick up his cell phone and stated he did not see the Stop sign. The tow truck entered the intersection and struck the decedent's vehicle on the driver's side. The decedent was not wearing a seatbelt/shoulder harness. The vehicle's airbag deployed. He died in 2013 due to complications of head injuries sustained at the time of the crash.

The 134 individuals who died had 131 different employers; three employers had a fatal incident where more than one person died. A construction company had two laborers die when the work van they were passengers in slid on an icy roadway, then off the road into a ditch and overturned; a retail store had two store clerks killed by a disgruntled employee; and an insurance company had two insurance agents die when their vehicle was struck by a pickup truck while stopped in a road construction traffic backup.

The number of traumatic work-related deaths per year in Michigan since 1995 is shown in **Figure 1.**

Figure 1. Number and Incidence Rate of Work-Related Fatalities In Michigan, 1995-2013



Incidence rates (per 100,000 workers) are shown by the **blue** line. The number of work-related deaths per year is shown by the **green** columns. Incidence rates shown from 1995-2000 were obtained from the BLS website. Rates shown for 2001-2013 were determined from MIFACE statistics.

Demographics

Table 1 shows the selected demographic characteristics of the 134 traumatic work-related fatalities in Michigan in 2013. Demographic characteristics were gathered from the individual's death certificate.

Gender

One hundred twenty one (90.3%) of the individuals who died were men and 13 (9.7%) were women.

Race

One hundred five (78.4%) of the individuals who died were Caucasian (94 men (89.5%), 11 women (10.5%)), 20 (14.9%) were African American (18 (90.0%) men, 2 (10.0%) women), two men (1.5%) were of Asian/Pacific descent, two men (1.5%) were of American Indian/Alaskan Native descent. Three (2.2%) men had race identified as Hispanic, one (0.8%) man was identified as Arab, and one (0.8%) man was identified as Black/American Indian.

Ethnicity

Three (2.2%) men were identified as being of Hispanic *race* and *ethnicity* on their death certificate.

Age

The age distribution of the individuals who died from a work-related injury is shown in **Table 1, Figure 2**, and **Table 2**.

The ages ranged from 19 to 85. The average age was 46.4, down from 48.3 years of age in 2012. For men, the ages ranged from 19-85, and for women, the ages ranged from 20-64. The average age for men at the time of death was 47.2 years and for women the average age was 39.6 years.

Table 2 shows the distribution of traumatic work-related fatalities by age of the victim and industry sector.

Five of the nineteen (26.3%) individuals who were 66 years of age or older who died from an acute work-related event worked in Agriculture; one individual was 68 years of age, two 70-year-olds and one 73 year old. One individual was 80 years of age.

In Construction, one individual was 66 years of age and one individual was 78 years of age.

In Transportation and Warehousing, one individual was 66 years of age and one individual was 82 years of age.

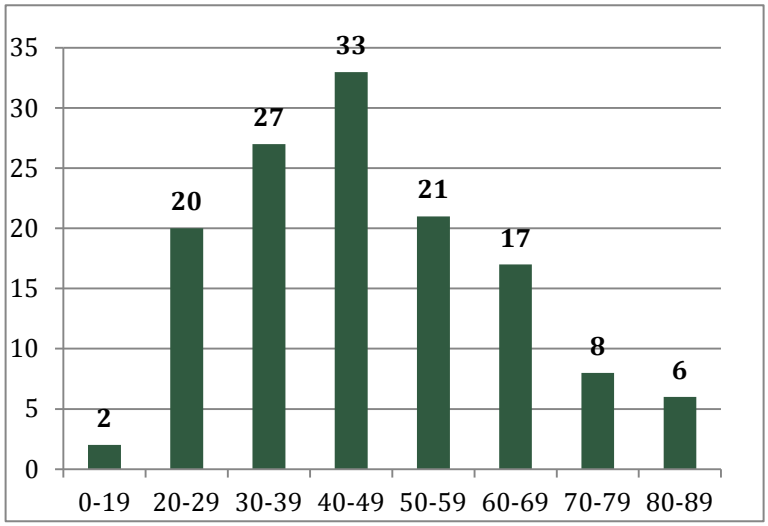
In Administrative & Support & Waste Management & Remediation Services, one individual was 66 and one was 67. In Other Services, both individuals were in their 80s (80 years old and 82 years old). The following industries had one individual each more than 66 years old (Manufacturing (71

Table 1. Demographic Characteristics of 134 Work-Related Fatalities, Michigan 2013

Demographic Characteristics	Number	Percent
Gender		
Male	121	90.3
Female	13	9.7
Race		
White	105	78.4
Black	20	14.9
Asian/Pacific Islander	2	1.5
American Indian/Alaskan Native	2	1.5
Hispanic (as identified on DC)	3	2.2
Arab (as identified on DC)	1	0.7
Black/American Indian	1	0.7
Age		
<20	2	1.5
20-29	20	14.9
30-39	27	20.1
40-49	33	24.6
50-59	21	15.7
60-69	17	12.7
70-79	8	6.0
80-89	6	4.5
Education		
Less than High School	15	11.6
High School Graduate	60	46.5
GED	1	0.8
Specialized Training	1	0.8
Some College (1-4 years)	46	35.7
Post College (5+ years)	6	4.7
Unknown	5	--
Country of Origin		
United States	121	91.0
Mexico	3	2.3
China	1	0.8
Iraq	1	08
India	1	0.8
Bosnia-Herzegovina	1	0.8
Great Britain & Northern Ireland	1	0.8
Kosovo	1	0.8
Nigeria	1	0.8
Poland	1	0.8
Rwanda	1	0.8
Unknown	1	--
Totals	**134**	

years), Finance and Insurance (73 years), Professional, Scientific, & Technical Services (70 years), Arts, Entertainment, & Recreation (76 years, and Real Estate & Rental & Leasing had one individual who was 80 years old when he died. Accommodation & Food Service had the oldest (85 years of age) die as a result of a work-related traumatic incident.

Figure 2. Age Distribution of Work Related Fatalities, Michigan 2013



Six (31.6%) of the 19 individuals aged 66 years or older died from being struck by an object (tree/tree branch in 4 cases, a homemade drag used to level soil in one case and the vehicle he was trying to fix in one case). Four (21.1%) individuals died due to self-inflicted injuries. Three (15.8%) individuals died due to a fall and two (10.5%) individuals died due to gunshot wounds. The following causes of death were involved in one (5.3%) death each: tractor overturn, motor vehicle crash, complications of heat exposure, and airplane crash.

Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2013

Industry Sector (NAICS Code)	0-17	18-65	66+	Total
	Number	Number	Number	
Agriculture, Forestry, Fishing & Hunting (11)	--	8	5	**13**
Mining (21)	--	1	--	**1**
Construction (23)	--	23	2	**25**
Manufacturing (31-33)	--	9	1	**10**
Wholesale Trade (42)	--	2	--	**2**
Retail Trade (44-45)	--	8	--	**8**
Transportation & Warehousing (48-49)	--	24	2	**26**
Finance & Insurance (52)	--	4	1	**5**
Real Estate & Rental & Leasing (53)	--	1	1	**2**
Professional, Scientific, & Technical Services (54)	--	2	1	**3**
Administrative & Support & Waste Management & Remediation Services (56)	--	7	2	**9**
Education (61)	--	3	--	**3**
Health Care & Social Assistance (62)	--	6	--	**6**
Arts, Entertainment & Recreation (71)	--	5	1	**6**
Accommodation & Food Services (72)	--	3	1	**4**
Other Services (except Public Administration) (81)	--	3	2	**5**
Public Administration (92)	--	6	--	**6**
Totals	**0**	**115**	**19**	**134**

Geographic Distribution

Figure 3 and **Table 3** show the county in which the victim worked where he/she was fatally injured. The county was known for 132 of the 134 (98.5%) work-related deaths in Michigan in 2013.

Forty-three (51.8%) of the 83 Michigan counties had at least one work-related injury that led to the death of the worker.

Collectively, the southeast Michigan Counties of Macomb, Oakland, Washtenaw, and Wayne had 56 (42.1%) of all work-related deaths in Michigan in 2013. Wayne County had the largest number of deaths (30, (22.7%), followed by followed by Oakland County (14, 10.6%), and then Jackson and Kent Counties (7 each, 5.3%). Macomb and Washtenaw Counties had 6 each (4.5%).

Figure 3. County of Fatal Work-Related Injury, Michigan 2013

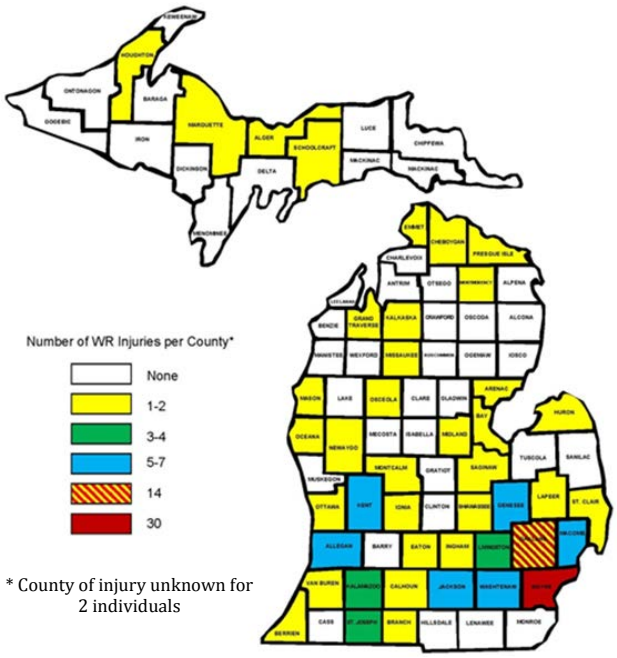


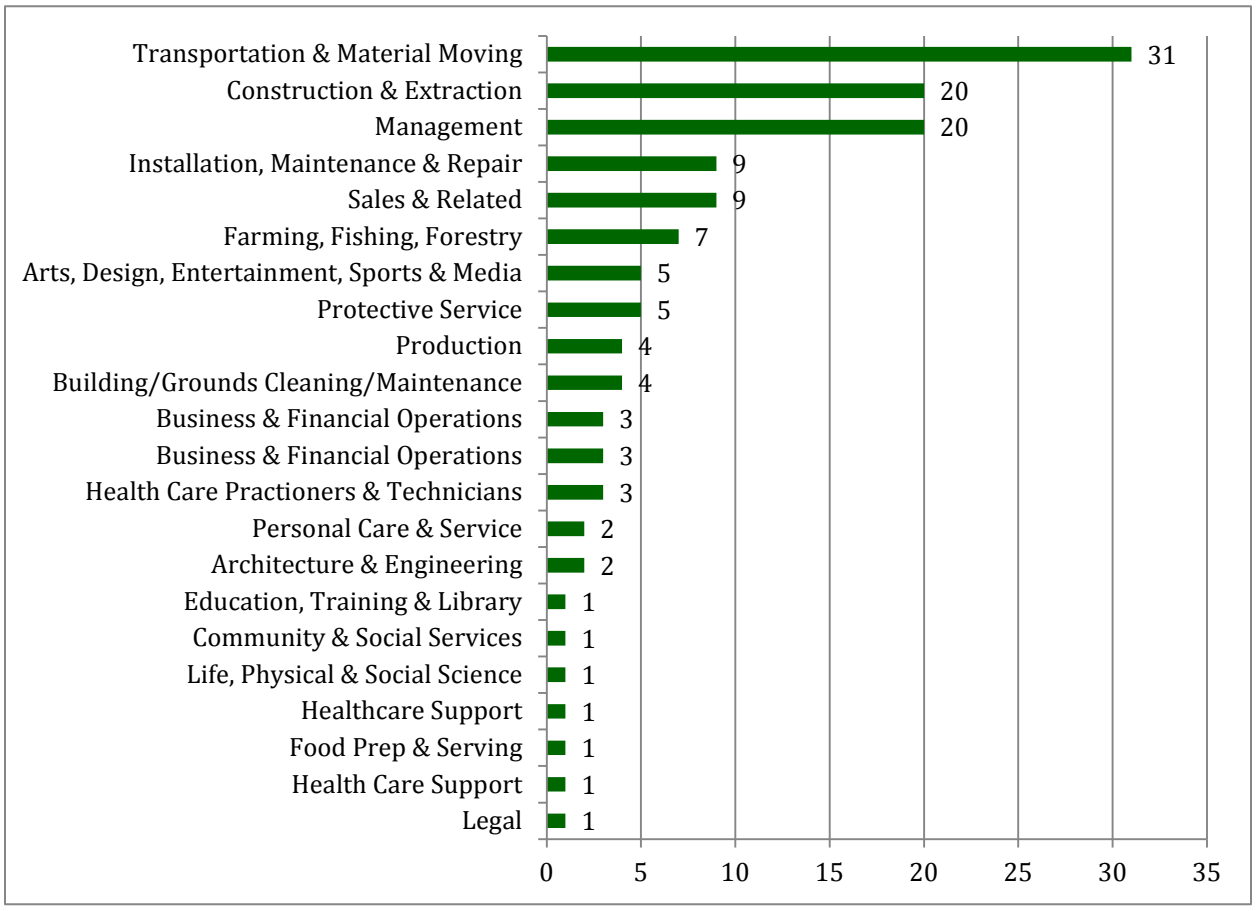
Table 3. County of Fatal Work-Related Injury, Michigan 2013

County	Number	Percent	County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	--	--	Dickinson	--	--	Lake	--	--	Oceana	2	1.5
Alger	1	0.8	Eaton	1	0.8	Lapeer	2	1.5	Ogemaw	--	--
Allegan	5	3.8	Emmet	2	1.5	Leelanau	--	--	Ontonagon	--	--
Alpena	--	--	Genesee	5	3.8	Lenawee	--	--	Osceola	1	0.8
Antrim	--	--	Gladwin	--	--	Livingston	3	2.3	Oscoda	--	--
Arenac	1	0.8	Gogebic	--	--	Luce	--	--	Otsego	--	--
Baraga	--	--	Grand Traverse	2	1.5	Mackinac	--	--	Ottawa	1	0.8
Barry	--	--	Gratiot	--	--	Macomb	6	4.5	Presque Isle	1	0.8
Bay	1	0.8	Hillsdale	--	--	Manistee	--	--	Roscommon	--	--
Benzie	--	--	Houghton	1	0.8	Marquette	1	0.8	Saginaw	2	1.5
Berrien	1	0.8	Huron	1	0.8	Mason	2	1.5	St. Clair	2	1.5
Branch	2	1.5	Ingham	1	0.8	Mecosta	--	--	St. Joseph	3	2.3
Calhoun	2	1.5	Ionia	1	0.8	Menominee	--	--	Sanilac	--	--
Cass	--	--	Iosco	--	--	Midland	2	1.5	Schoolcraft	1	0.8
Charlevoix	--	--	Iron	--	--	Missaukee	1	0.8	Shiawassee	2	1.5
Cheboygan	1	0.8	Isabella	--	--	Monroe	--	--	Tuscola	--	--
Chippewa	--	--	Jackson	7	5.3	Montcalm	1	0.8	Van Buren	1	0.8
Clare	--	--	Kalamazoo	3	2.3	Montmorency	1	0.8	Washtenaw	6	4.5
Clinton	--	--	Kalkaska	1	0.8	Muskegon	--	--	Wayne	30	22.7
Crawford	--	--	Kent	7	5.3	Newaygo	1	0.8	Wexford	--	--
Delta	--	--	Keweenaw	--	--	Oakland	14	10.6	Unknown	2	--

Occupation

Figure 4 shows the distribution of the 134 work-related deaths where the Standard Occupational Classification (SOC) category could be determined from the reporting source data. MIFACE used the 2000 Standard Occupational Classification (SOC) system to categorize occupations of the individuals who died. The 2000 SOC is divided into 23 major groups, which are 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. The 23 "job families" are further subdivided using a six-digit structure into 821 detailed occupations.

Figure 4. Number of Deaths by Standard Occupational Classification, Michigan 2013



Overall, in 2013, the Transportation & Material Moving job family classification had the largest number of death (31, 23.1%). Of the 31 individuals identified as conducting a work activity in the Transportation & Material Moving job family, the Transportation & Warehousing industry sector accounted for 21 (67.7%) of the deaths. Thirteen (13, 61.9%) individuals were identified as truck drivers and 2 (9.5%) individuals were cab drivers. Other professions included: a bus driver, medical transport van driver, spotter/cargo checker, laborer, airplane pilot, and a pharmaceutical distribution representative. Other industry sectors represented in the Transportation & Material Moving job family were

Manufacturing (tractor operator, remote rail car operator), Administrative & Support & Waste Management & Remediation (2 truck drivers), Other Services (laborer and flight instructor), Wholesale Trade (crane operator), Retail Trade (gas station attendant), Public Administration (tow truck driver), Professions, Scientific & Technical Services (truck driver).

Within the Construction & Extraction job family, the Construction industry sector accounted for 20 (87.0%) of the deaths. Seven (7, 35.0%) carpenters died, 7 (35.0%) construction laborers died, and 2 (10.0%) roofers died. Other construction industry professions included painter, paver operator, equipment operator, and plumber/pipefitter.

Case 50. Male laborer for an excavation company crushed when a Takeuchi TL 130 skid steer backed over him.

Within the Management job family, 9 (45.0%) individuals owned/co-owned the business or were self-employed, 8 (40.0%) individuals were farm owners, 1 (5.0%) individual was the president of the company, 1 (5.0%) was a director of strategic accounts and 1 (5.0%) was a property manager.

Working Status of the Decedent

One hundred thirty one employers were associated with the 134 individuals who died in 131 separate incidents.

Case 14. Male carpenter/roofer was working alone while installing shingles on a dormer on a 2-story house with a 10/12 roof pitch when he fell 9-15 feet.

The employer/employee status was known for 131 (97.8%) of the 134 work-related deaths in 2013. Ninety one individuals (69.5%) were identified as employees. Thirty four (26.0%) were identified as self-employed or the owner/co-owner of the business. If the individual owned the business or was self-employed and was performing work related to the business (excluding farmers), the individual was coded as self-employed; their occupation was coded to the work being performed. For example, a roofing contractor owned the business but was killed while performing roofing work; this individual was coded as an owner/co-owner of the business, but for occupation, the individual was coded as a roofer. Four (3.1%) individuals were identified as volunteers and 2 (1.5%) individuals were temporary/contract workers.

The decedent was working alone in 81 (65.8%) incidents and with a coworker in 41 (33.3%) incidents. The work status was unknown in 11 incidents. For homicides, the decedent was working alone in 9 (60.0%) incidents and with a coworker in 6 (40.0%) incidents. For homicides, the work status was unknown for one incident.

The location of injury for the fatal incident was identified for 130 (97.0%) of the 134 deaths. For years 2001-2011, if the individual was injured in a motor vehicle accident or injured when struck by a motor vehicle, the decedent's location was a street/roadway. Beginning in 2012, MIFACE further refined the location of injury as instructed in the CDC Death Certificate Section 4 – Main Elements. Coding changes include: a) Designations of specific buildings (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 store and stabbed a second time), the location at which the victim was first injured was coded; 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. Those 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". If an incident occurred in a garage at a private home, "house, apartment" was coded. 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; d) 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".

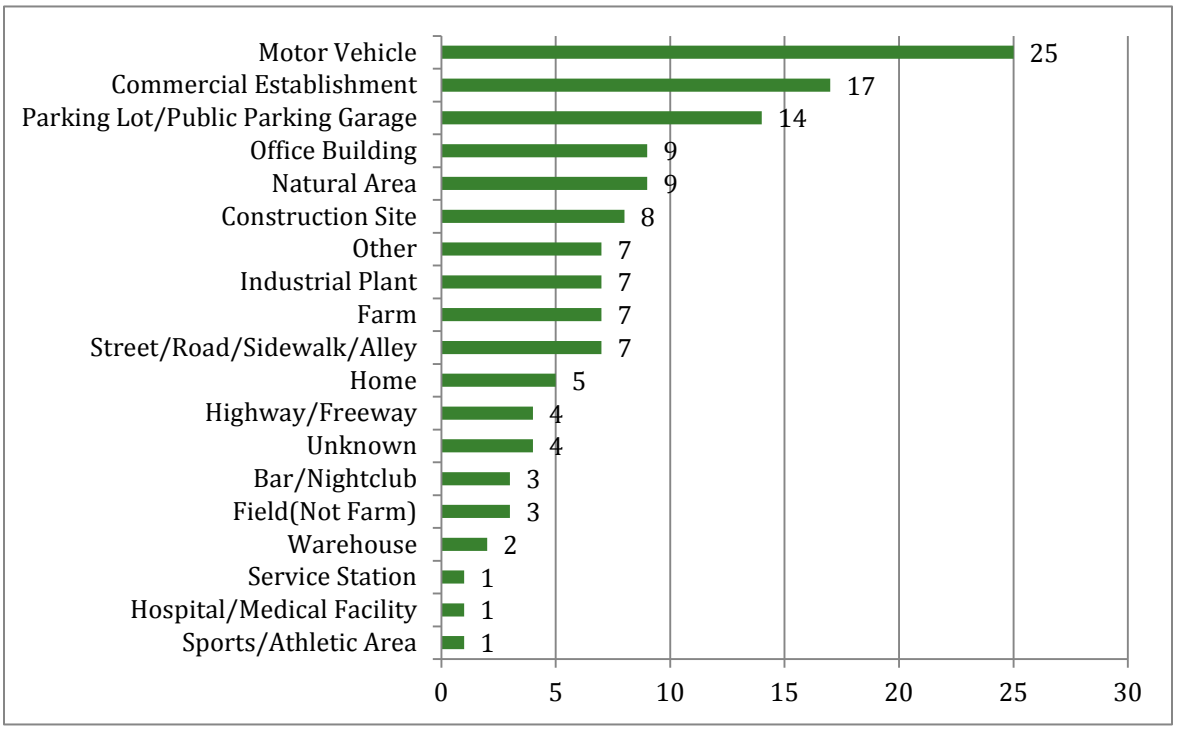
Case 19. Male painter died when the tire of the elevated Skyjack 3220 scissor lift in which he was working entered a depression in a parking lot caused by a recessed storm drain and tipped to its side.

Figure 5 shows the place and number of injuries for the 2013 traumatic deaths.

Motor vehicles were the place where the most fatal injuries occurred (25, 19.2%). Seventeen (13.1%) died at a commercial establishment (retail store, garage at the business, etc.). Fourteen (10.8%) individuals died while on a street/road/alley. Natural areas and office buildings (which included the sidewalk and building driveway) had 9 (6.9%) fatal injuries each. Eight (6.2%) fatal injuries occurred on a construction site and 7 (5.4%) fatal injuries each occurred at an industrial plant, farm, and street/road/sidewalk/alley. The deaths in "Other" include a tug boat, bunkhouse for a carnival, port-a-john at a festival,

airport runway, mine unloading area, vehicle test grounds, and a ship yard dock. The location of injury for four deaths was unknown.

Figure 5. Location and Number of Fatal Work-Related Injuries, Michigan 2013



Location of Death

For 74 (56.1%) individuals, the place of death was at the scene of the traumatic incident. For 55 (41.7%) individuals, the death certificate indicated the death occurred in the hospital. Three (2.3%) individuals were identified as dying at a residential home. The location where the individual died was unknown for two deaths; one individual was found dead in a wooded area and one the individual was injured in Michigan but died in another state.

Illegal Drug/Alcohol/Medication Use

Of the 109 individuals whose death was not a suicide (22 deaths) or a drug overdose (3 deaths), a toxicology screen for alcohol, illegal drugs, prescription or non-prescription medications was known to have been performed on 73 (67.0%) individuals; 49 (67.1%) individuals had detectable levels of at least one of these substances. Twenty eight (57.1%) of the 49 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**). It was unknown if the presence of opiates, hydrocodone and marijuana was from the use of a prescribed medication or from illegal use.

Table 4. Type of Work-related Fatal Incident and Drug Found in Toxicological Analysis, Michigan 2013						
Incident Type	**Alcohol (blood level %)**	**Opiates**	**Prescription**	**Marijuana &/or marijuana metabolite**	**Cocaine, Heroin, metabolites**	**Unknown Prescription /Non Prescription**
Homicide	0.11					
Motor vehicle	0.203					
Machine	0.233					
Homicide	0.337			√		
Struck by				√		Morphine
Motor Vehicle				√		Quinine
Fall						Methadone
Motor Vehicle				√	√	
Homicide				√		
Other Medical				√		
Homicide				√		
Struck By				√		
Homicide					√	
Motor vehicle				√	√	
Struck By				√	√	
Electrocution				√		Hydrocodone
Struck By			Etomidate	√		
Struck By			Midazolam, Fentanyl, Lorazepam			
Fall			Tramadol			Diphenhydrazine
Motor Vehicle				√		Quinine
Struck By		√				
Homicide		√				
Motor Vehicle			Midazolam			
Fall			Midazolam			
Struck By			Metoprolol, Warfarin			Hydrocodone
Struck By			Butalbital, Alapraxolam			Hydrocodone
Fall			Benzodiazepine			
Struck By			Amphetamine			Pseudoephedrine

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 groups of workers who tend to work full-time. However, differences will be observed for worker groups who tend to have a high percentage of part-time workers, such as younger workers.

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 2013

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 for 2013.

Highlights from Table 5:

Seven industry sectors had fewer work-related deaths and a lower employment-based incidence rate in 2013 compared to 2012:

Industry	Decrease in Number of Deaths from 2012	Number of 2013 WR Deaths	2013 Incidence Rate	Number of 2012 WR Deaths	2012 Incidence Rate
Agriculture	5	13	16.0	18	20.7
Manufacturing	1	10	1.8	11	2.0
Wholesale Trade	3	2	1.2	5	3.1
Retail Trade	4	8	1.8	12	2.5
Administrative & Support & Waste Management & Remediation Services	2	9	3.2	11	4.0
Health Care & Social Assistance	1	6	1.0	7	1.2
Other Services (Exc. Public Administration)	6	5	12.9	11	6.5

Six industry sectors had a higher number of work-related deaths and a higher employment-based incidence rate in 2013 compared to 2012:

Industry	Increase in Number of Deaths from 2012	Number of 2013 WR Deaths	2013 Incidence Rate	Number of 2012 WR Deaths	2012 Incidence Rate
Construction	5	25	18.9	20	15.7
Transportation & Warehousing	7	26	24.6	19	18.6
Real Estate & Rental & Leasing	1	2	4.0	1	2.0
Professional, Scientific, & Technical Services	2	3	1.2	1	0.4
Education	1	3	0.8	2	0.7
Arts, Entertainment & Recreation	4	6	12.7	2	4.4

One industry sector had the same number of work-related deaths and but a higher employment-based incidence rate in 2013 compared to 2012.

Industry	Number 2013 & 2012 WR Deaths	Incidence Rate 2013	Incidence Rate 2012
Public Administration	6	2.9	2.5

One industry sector had the same number of work-related deaths and a lower employment-based incidence rate in 2013 compared to 2012 and 2013.

Industry	Number 2013 & 2012 WR Deaths	Incidence Rate 2013	Incidence Rate 2012
Accommodation & Food Service	4	1.1	1.2

Two industry sectors had work-related deaths in 2013 but did not have a death in 2012:

Industry	Number of 2013 WR Deaths	Incidence Rate 2013
Mining	1	15.4
Finance & Insurance	5	3.3

Two industry sectors that had a work-related death in 2012 did not have a death in 2013: Utilities and Information.

The industry sector with the highest employment-based industry rate was Construction (18.9 deaths/100,000 workers). The Heavy & Civil Engineering Construction Subsector had the highest rate (26.8 deaths/100,000 workers).

The industry subsector with the highest work-related fatality incidence rate occurred in Agriculture. Due to the relatively few workers in the Forestry & Logging industry, the 3 deaths resulted in an incidence rate of 258.6 deaths/100,000 workers, far exceeding the incidence rates for all industries and their subsectors.

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Rates by Number of Employees and by Hours Worked, Michigan 2013						
Industry Sector (NAICS Code)	**Number**	**Percent**	**Employment-Based**		**Hours-Based**	
			Number Employees[a]	**Rate[b]**	**Number Hours[a]**	**Rate[c]**
Agriculture, Forestry, Fishing & Hunting (11)	**13**	**9.7**	**81,464[ad]**	**16.0**	**	**
Crop Production (111)	6	4.5	34,538[f]	17.4	**	**
Animal Production (112)	2	1.5	17,656[f]	11.3	**	**
Forestry & Logging (113)	3	2.2	1,160	258.6	**	**
Unknown	2	1.5	**	**	**	**
Mining (21)	**1**	**0.7**	**6,500**	**15.4**	**	**
Mining (except oil & gas)	1	0.7	**	**	**	**
Construction (23)	**25**	**18.7**	**132,400**	**18.9**	**40**	**18.9**
Construction of Buildings (236)	6	4.5	29,500	20.3	38.6	21.1
Heavy & Civil Engineering Construction (237)	4	3.0	14,900	26.8	**	**
Specialty Trade Contractors (238)	15	11.2	87,900	17.1	39.1	17.5
Manufacturing (31-33)	**10**	**7.4**	**555,100**	**1.8**	**43.7**	**1.6**
Paper (322)	1	0.7	**	**	**	**
Chemical (325)	3	2.2	28,900	10.4	**	**
Plastics & Rubber Products (326)	1	0.7	36,200	2.8	**	**
Primary Metal (331)	1	0.7	21,500	4.7	**	**
Fabricated Metal Product (332)	1	0.7	77,500	1.3	41.5	1.2
Machinery Manufacturing (333)	1	0.7	68,400	1.5	45.3	1.3
Computer & Electronic Product (334)	1	0.7	18,000	5.6	**	**
Transportation Equipment (336)	1	0.7	167,200	0.6	46.3	0.5
Wholesale Trade (42)	**2**	**1.5**	**163,600**	**1.2**	**38.1**	**1.3**
Merchant Wholesalers, Durable Goods (423)	2	1.5	91,600	2.2	38.6	2.3
Retail Trade (44-45)	**8**	**6.0**	**455,200**	**1.8**	**29.8**	**2.4**
Motor Vehicle & Parts Dealers (441)	1	0.7	56,400	1.8	39.4	1.8
Food & Beverage Stores (445)	2	1.5	75,800	2.6	**	**
Gasoline Stations (447)	1	0.7	24,500	4.1	**	**
Sporting Goods, Hobby, Book & Musical Instruments (451)	1	0.7	20,200	5.0	**	**
General Merchandise Stores (452)	2	1.5	111,400	1.8	**	**
Miscellaneous Store Retailers (453)	1	0.7	24,700	4.0	**	**
Transportation & Warehousing (48-49)	**26**	**19.4**	**105,700**	**24.6**	**	**
Air Transportation (481)	1	0.7	13,600	7.4	**	**
Truck Transportation (484)	14	10.4	40,800	34.3	**	**
Transit & Ground Passenger Transportation (485)	4	3.0	**	**	**	**
Support Activities for Transportation (488)	3	3.0	**	**	**	**
Postal Service (491)	1	0.7	20,500	4.9	**	**
Warehousing & Storage (493)	2	1.5	14,900	13.4	**	**
Unknown	1	0.7	**	**	**	**

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Rates by Number of Employees and by Hours Worked, Michigan 2012, cont.						
Industry Sector (NAICS Code)	**Number**	**Percent**	**Employment-Based**		**Hours-Based**	
			Number Employees[a]	**Rate[b]**	**Number Hours[a]**	**Rate[c]**
Finance & Insurance (52)	**5**	**3.7**	**152,400**	**3.3**	**35.4**	**3.7**
Credit Intermediation & Related Activities (522)	1	0.7	73,800	1.4	**	**
Securities, Commodity Contracts, and Other Financial Investments & Related Activities (523)	1	0.7	**	**	**	**
Insurance Carriers & Related Activities (524)	2	1.5	65,800	3.0	**	**
Real Estate & Rental & Leasing (53)	**2**	**1.5**	**49,600**	**4.0**	**	**
Real Estate (531)	2	1.5	35,600	5.6	**	**
Professional, Scientific, & Technical Services (54)	**3**	**2.2**	**260,200**	**1.2**	**37.2**	**1.2**
Professional, Scientific, & Technical Services (541)	3	2.2	260,200	1.2	**	**
Administrative & Support & Waste Management & Remediation Services (56)	**9**	**6.7**	**284,000**	**3.2**	**	**
Administrative & Support Services (561)	5	3.7	**	**	**	**
Waste Management & Remediation Services (562)	4	3.0	**	**	**	**
Education (61)	**3**	**2.2**	**384,800**	**0.8**	**	**
Education (611)	3	2.2	384,400	0.8	**	**
Health Care & Social Assistance (62)	**6**	**4.5**	**595,600**	**1.0**	**32.2**	**1.3**
Ambulatory Health Care Services (621)	3	2.2	195,200	1.5	**	**
Hospitals (622)	1	0.7	228,900	0.4	36.3	0.5
Social Assistance (624)	1	0.7	68,200	1.5	**	**
Unknown	1	0.7	**	**	**	**
Arts, Entertainment, & Recreation (71)	**6**	**4.5**	**47,100**	**12.7**	**22.6**	**22.5**
Performing Arts, Spectator Sports, & Related Industries (711)	5	3.7	8,800	56.8	**	**
Amusement, Gambling & Recreation Industries (713)	1	0.7	34,700	2.9	**	**
Accommodation & Food Services (72)	**4**	**3.0**	**350,300**	**1.1**	**22.7**	**2.0**
Food Services & Drinking Places (722)	4	3.0	309,900	1.3	**	**
Other Services (except Public Administration) (81)	**5**	**3.7**	**171,500**	**2.9**	**	**
Repair & Maintenance (811)	3	2.2	36,800	8.2	**	**
Religious, Grantmaking, Civic, Professional & Similar Organizations (813)	2	1.5	97,100	2.1	**	**
Public Administration (92)	**6**	**4.5**	**204,900**	**2.9**	**	**
Justice, Public Order, & Safety Activities (922)	3	2.2	**	**	**	**
Administration of Human Resource Programs(923)	1	0.7	**	**	**	**
Administration of Economic Programs (926)	2	1.5	**	**	**	**
Totals	**134**		**4,317,000[e]**	**3.1**		

[a] Source: Michigan Department of Technology, Management and Budget, Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2013. November 13, 2014. www.milmi.org/cgi/dataAnalysis/

[b] Incidence rates calculated per 100,000 workers.

[c] Rate represents the number of fatal occupational injuries per 100,000 full time equivalent workers and was calculated as: (N/EH) x 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)

[d] Source: USDA, National Agricultural Statistics Service. 2012 Census of Agriculture, AC-12-A-22, Released May 2014. Accessed March 8, 2015, Table 23, Summary by Farm Typology Measured by Gross Cash Farm Income, Primary Occupation of Small Family Farm Operators, and Non-Family Farms - Michigan: 2012 Pg 315 http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Typology/typology13_mi.pdf

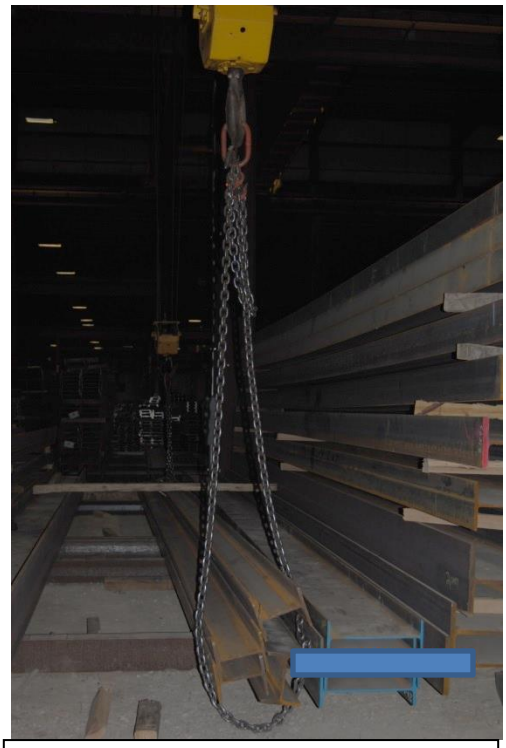
[e] Source: Employment status of the civilian noninstitutional population by sex, race, Hispanic or Latino ethnicity, and detailed age, 2013 annual averages – Michigan. Bureau of Labor Statistics, Local Area Unemployment Statistics http://www.bls.gov/lau/table14full13.pdf Accessed November 13, 2014.

[f] Source: USDA, National Agricultural Statistics Service. 2012 Census of Agriculture, AC-12-A-22, Released May 2014. Accessed March 8, 2015, **Table** 51. Selected Characteristics of Farms by North American Industry Classification System: 2012 http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Michigan/st26_1_051_052.pdf

** No Data provided on DTMB IES 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 2013 as computed by 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. Hours-based rates measure fatal injury risk per standardized length of exposure, and are generally considered more accurate than employment-based rates. Hours-based rates use the average number of employees at work and the average hours each employee works.

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 2013 (3.1/100,000 workers) was lower than the United States hours-based fatality incidence rate (3.2/100,000 workers).** BLS cautions that hours-based fatal injury rates should not be directly compared to employment-based rates because of the differences in the numerators and denominators used.



Case 98. Male temporary worker/crane operator crushed when steel beams fell from a stack.

Table 6. Traumatic Work-Related Fatalities by Industry Sector, Michigan Incidence Rates Compared to US Incidence Rates, 2013				
Industry Sector[a] (NAICS Code)	**Number of Fatalities**	**2013 MI Employment-based Rate[b]**	**2013 MI Hours-Based Rate[a]**	**2013 US Hours-Based Rate[c]**
Agriculture, Forestry, Fishing and Hunting (11)	13	16.2	**	22.2
Mining (21)	1	15.4	**	12.3
Construction (23)	25	18.9	18.9	9.4
Manufacturing (31-33)	10	1.8	1.6	2.0
Wholesale Trade (42)	2	1.2	1.3	5.1
Retail Trade (44-45)	8	1.8	2.4	1.8
Transportation & Warehousing (48-49)	26	24.6	**	13.1
Financial Activities (52)	5	3.3	3.7	0.9
Real Estate and Rental and Leasing (53)	2	4.0	**	**
Professional & Business Services[d] (54, 56)	12	2.2	2.5[e]	2.6
Educational & Health Services[d] (61, 62)	9	0.9	**	0.7
Leisure & Hospitality[d] (71, 72)	10	2.5	4.4	1.8
Other Services (except Public Administration) (81)	5	2.9	**	2.6
Public Administration (92)	6	2.9	**	2.0
Total	**134**	**3.1**	**	**3.2**

[a] Sources: USDA, National Agricultural Statistics Service. 2012 Census of Agriculture, AC-12-A-22, Released May 2014. Table 23, Summary by Farm Typology Measured by Gross Cash Farm Income, Primary Occupation of Small Family Farm Operators, and Non-Family Farms - Michigan: 2012 Pg 315 http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Typology/typology13_mi.pdf Accessed March 8, 2015, Michigan Department of Technology, Management and Budget (DTMB), Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2012. Accessed November 25, 2013. www.milmi.org/cgi/dataAnalysis/.

[b] Incidence rates calculated per 100,000 full-time equivalent (FTE) workers.

[c] Bureau of Labor Statistics News, United States Department of Labor, USDL 10-1142, Release Date: Revised Data April 2014. Accessed May 15, 2014. http://www.bls.gov/iif/home.htm

[d] Employment-based rate calculated as (N+N)/(E+E) x 100,000 FTE workers (from Table 9): N=Number fatalities (NAICS+NAICS), E=Number Employees (NAICS+NAICS).

[e] Hours-based rate calculated as (N+N)/(E+E) x (IES # hours) x 50 x 200,000,000

** No data reported on DTMB IES report.

Of the seven Michigan industry groupings with a calculated hours-based incidence rate, four had higher hours-based incidence rates compared to the US hours-based incidence rate for that industry group: Construction (18.9 compared to 9.4, 100% higher), Retail Trade (2.4 compared to 1.8, 33% higher), Financial Activities (3.7 compared to 0.9, 400% higher), and Leisure and Hospitality (4.4 compared to 1.8, 24.0% higher).

Wholesale Trade's hours-based rate was approximately 4000% lower than the US hours-based incidence rate for industry sector (1.3 compared to 5.1). Manufacturing's hours-based rate was slightly lower than the US hours-based rate (1.6 compared to 2.0). Professional and Business Services hours-based rate was similar to the US hours-based rate (2.5 compared to 2.6).

Agriculture

Six of the eight known Crop and Animal Production deaths in 2013 were known to be farm operators. It was unknown if one individual who died on a dairy farm was an operator,

hired farm labor or an unpaid worker (new item now tracked on the 2012 USDA Agricultural Census). Unpaid workers include agricultural workers not on the payroll who performed activities or work on a farm or ranch. One individual was determined to be an employee (hired labor) per information noted in the police report. 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 2012 Agricultural Census found that there were 81,900 individuals identified as hired farm labor (excluding operators identified as a hired manager). It is unknown if the decedent worked 150 days or more or less than 150 days in a calendar year. The work-related fatality incidence rate for hired farm labor was 1.2 deaths/100,000.

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 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 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 farmworkers 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. The number of farm operators who indicated that they hired labor was 13,620 and 3,906 farm operators indicated they hired contract labor (Table 64, 2012 Agricultural Census, Michigan).

If the total number of Crop and Animal Production workers (operators, hired hands, and unpaid workers) identified in the 2012 Agriculture Census and migrant and seasonal farm laborers are utilized in the denominator, the number of workers in Agriculture was 265,136. Adding fallers, logging equipment operators, log graders and scalers and all other logging workers (1,160 individuals), the denominator for total number of workers "employed" in Agriculture (NAICS 11) was 266,296 workers, which would lower the operator-only incidence rate from 16.0/100,000 to 4.9 deaths/100,000 workers.

There are a number of issues associated with utilizing 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 their hired or contract workers were migrant workers in 2012. Ninety four farms reported on the 2012 Agricultural Census that they did not have hired farm workers but that they did have migrant contract workers on their operation.

The transient nature of crop production 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 significant 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. The same is true for hired hands working 150 days or more – did they work 150 days or 359 days?

Means of Work-Related Death

Table 7 shows the means of death by industry sector. Additional information regarding each means of death follows the summary information.

The means of death was known for 132 (98.5%) of the 134 work-related deaths in 2013. For one individual, the death certificate indicated "accident" with a description of how the injury occurred as "industrial accident" which occurred in 1976. For one individual, the description of how the accident occurred was "closed head injury at work" with the date of incident as "unknown".

Motor vehicles were the leading cause of a work-related death (27, 20.5%) in Michigan in 2013 and the leading cause of death in Transportation & Warehousing (10 of 26 deaths, 38.5%), Public Administration (3 of 6 deaths, 50.0%), Accommodation and Food Services (2 of 4 deaths, 50.0%), and Professional, Scientific & Technical Services (2 of 3 deaths, 66.7%).

Struck by incidents were the second leading cause of death (24, 18.2%) in Michigan in 2013 followed by suicides (22, 16.7%), and then falls (19, 14.4%) and then homicides (16, 12.1%). Machine related incidents (10) accounted for 7.6% of the fatal work-related deaths. Three deaths each (3, 2.3%) were a result of a drug overdose and a fire/explosion. Aircraft crashes and electrocutions accounted for 2 (1.5%) each. One individual each died from asphyxiation, heat exposure, other (accidental gun discharge) and toxic exposure.

Struck by incidents were the primary cause of death in Agriculture (5 of 13, 38.5%) and Administrative & Support & Waste Management & Remediation Services Retail Trade (4 of 9, 44.4%). Struck by incidents were one of the leading causes of death in Transportation & Warehousing (4 of 26, 15.4%) and Arts, Entertainment & Recreation (2 of 6, 33.3%).

Both deaths in Real Estate & Rental & Leasing were due to a work-related suicide. Other industry sectors where work-related suicide was a leading or high percentage of the work related deaths were Manufacturing (2 of 10, 20.0%), Wholesale Trade (1 of 2, 50.0%), Retail Trade (4 of 8, 50.0%), and Health Care & Social Assistance (2 of 6, 33.3%).

Falls in Construction accounted for 10 of the 19 (52.6%) fatal falls in Michigan in 2013 and was the leading cause of death in Construction (10 of 25 deaths, 40.0%). A struck by incident was the second leading cause of death in Construction (5 of 25 deaths, 20.0%).

Table 7. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2013																
Industry Sector (NAICS Code)	**Aircraft (1.5%)**	**Asphyxiation (0.8%)**	**Drug Abuse (2.3%)**	**Electrocution (1.5%)**	**Fall (14.4%)**	**Fire/Explosion (2.3%)**	**Heat/Cold (0.8%)**	**Homicide (12.1%)**	**Machine (7.6%)**	**Motor Vehicle (20.5%)**	**Other (0.8%)**	**Struck By (18.2%)**	**Suicide (16.7%)**	**Toxic Exposure (0.8%)**	**Unknown**	**Total**
Agriculture, Forestry, Fishing & Hunting (11)	--	1	--	--	1	--	--	1	2	1	--	5	2	--	--	13
Mining (21)	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	1
Construction (23)	--	--	--	1	10	1	--	--	1	4	--	5	3	--	--	25
Manufacturing (31-33)	--	--	--	--	1	1	--	--	2	2	--	2	2	--	--	10
Wholesale Trade (42)	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	2
Retail Trade (44-45)	--	--	--	--	--	--	--	3	--	--	1	--	4	--	--	8
Transportation & Warehousing (48-49)	1	--	--	--	2	1	1	2	2	10	--	4	2	--	1	26
Finance & Insurance (52)	--	--	--	--	1	--	--	1	--	2	--	--	1	--	--	5
Real Estate & Rental & Leasing (53)	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	2
Professional, Scientific, & Technical Services (54)	--	--	--	--	--	--	--	1	--	2	--	--	--	--	--	3
Administrative & Support & Waste Management & Remediation Services (56)	--	--	--	1	--	--	--	1	3	--	--	4	--	--	--	9
Education (61)	--	--	--	--	--	--	--	--	--	1	--	--	1	1	--	3
Health Care & Social Assistance (62)	--	--	1	--	--	--	--	1	--	1	--	1	2	--	--	6
Arts, Entertainment, & Recreation (71)	--	--	2	--	--	--	--	1	--	1	--	2	--	--	--	6
Accommodation & Food Services (72)	--	--	--	--	1	--	--	2	--	--	--	--	1	--	--	4
Other Services (ex. Public Administration) (81)	1	--	--	--	1	--	--	--	--	2	--	--	1	--	--	5
Public Administration (92)	--	--	--	--	1	--	--	3	--	1	--	--	--	--	1	6
Totals	2	1	3	2	19	3	1	16	10	27	1	24	22	1	2	134

Means of Death by Cause

Aircraft

Two individuals died as a result of a plane crash. One individual was a pilot with an air freight company. The National Safety Transportation Board concluded, based on the findings from the aircraft performance GPS and simulation study, the degraded visual reference conditions present about the time of the accident, and the forces felt by the pilot, it is likely that he experienced spatial disorientation, which led to his crash. The second individual was a flight instructor who was the passenger with a student pilot at the controls. During the landing approach, the plane was in a nose-high left turn at a moderate bank angle. As the turn progressed, the airplane appeared to pitch down and the left bank steepened. The plane crashed approximately one-half mile from the approach end of the runway.

Case 3. Male farmer was engulfed by soybeans in a silo while attempting to clear a clogged auger.

Asphyxiation

A farmer, who was working with a coworker, was engulfed by soybeans in a silo while he was attempting to clear a clogged auger. The coworker did not turn off the auger while the decedent was in the bin. When the beans broke free, the decedent was sucked down into the soybeans.

Drug Abuse

Three individuals, all in their 20s, died due to an overdose; a registered nurse from a prescription drug overdose, a carnival worker and a music festival worker from multiple drug intoxication.

Case 7. Male volunteer elecrocuted when he contacted an energized 7,200-volt power line while renovating a home.

Electrocution

Two individuals died as a result of coming into contact with electrical current. One individual who was a volunteer renovating a house was electrocuted while erecting a scaffold; either he directly contacted an energized 7,200-volt overhead power line or the safety rail he was holding contacted the overhead power line. A tree trimmer was positioned approximately 17 feet above the ground in a tree when his upper back contacted an energized 7,980-volt overhead power line. There had been heavy rain the night before the incident and the morning of the incident.

Fall

Falls accounted for 19 of the work-related fatalities. The height of the fall was known for 14 (73.7) of the 19 incidents. The heights ranged from ground level to 35 feet. There were 3 (21.4%) fatal falls of 5 feet or less (2 falls were ground level falls), 5 (35.7%) individuals fell 10-24 feet, and 6 (42.9%) individuals fell 25-35 feet.

Case 15. Male roofer fell approximately 26 feet when the cantilevered 2" rigid roof insulation he stepped on broke away.

The reason for the fall was identified in 17 (89.5%) of the 19 incidents. The individual slipped/tripped/lost balance in 6 (35.3%) incidents, a medical condition initiated the fatal fall in 4 (23.5%) incidents, and the structure gave way in 3 (17.6%) incidents. One individual was blown off a rough terrain forklift platform by a gust of wind, one individual was knocked off a ladder by a tree branch, one individual died from an unspecified vehicle malfunction and one individual fell from an elevated hydraulic lift that tipped over when its tire entered a recessed drain area in a parking lot.

The location of the fall was identified for 17 (89.5%) of the 19 fall-related deaths; from a roof in 7 (41.2%) incidents, from a vehicle/machine/equipment in 4 (23.5%) incidents, while standing on the ground in 2 (11.8%) incidents, and from a ladder/scaffold in 2 (11.8%) incidents. A fall through a skylight occurred in one incident and a fall down a flight of stairs in one incident. The work being performed in the seven falls from roofs included: a claims adjuster fell as he was attempting to access the ladder after inspecting the roof, three individuals were performing work with shingles (two installing and one removing the shingles), and three individuals were performing decking work on the roof. The individual who fell through a skylight was on the roof as part of preparing to install a dust collection system. The four falls from a vehicle/machine/equipment included a fall from a tractor, scissor lift, forklift, and railroad tanker.

The condition of the working surface was known in only 12 (63.2%) of the 19 cases. The working surface was dry in 9 (75.0%) incidents; other factors were contributory in 4 of these dry fall surfaces. In one incident, the depression in the ground was covered by opaque plastic and unseen by the workers in the elevated scissor lift. In one incident, the metal roof decking showed significant rust and erosion, with holes in the area where the decedent fell. In the third incident, the skylight was not adequately protected. In the fourth incident, the working platform did not have appropriate guardrails and a gusty wind blew the decedent off the platform. The surface was frost/ice snow-covered in 3 (25.0%) incidents.

The worksite of one fatal fall is unknown. Of the 18 falls where the site of the fall is known, 7 (38.9%) occurred at the place of business where the individual worked, 5 (27.8%) occurred at a residential home construction sites, 3 (16.7%) occurred at a commercial construction sites, 2 (11.1%) occurred at manufacturing facilities, and 1 (5.6%) occurred during work on a pole barn on a residential property.

Fire/Explosion

Three individuals died in a fire/explosion; when methane gas emitted from an active sewage digester tank being disassembled was ignited by another contractor's cutting torch while conducting demolition work in a digester tank; when molten iron spilled from a ladle and exploded when it contacted snow; and one when a driver of a 53-foot long semi-tractor trailer struck associated piping at a well site and attempted to contain an ensuing national gas leak.

Case 30. Truck driver was burned following an attempt to contain a natural gas leak which occurred when his 53-foot long semi-tractor trailer struck associated piping at a well site.

Heat/Cold

One individual died due to complications of heat exposure when he was conducting groundskeeping work on a hot day. He was found unresponsive in the seat of an enclosed, non-air-conditioned backhoe.

Homicide

MIFACE identified 16 work-related homicides. Thirteen (81.3%) were men and three (18.8%) victims were women.

Ten (62.5%) work-related homicide victims were Caucasian and 6 (37.5%) were African American. Eight (61.5%) of the 13 men were Caucasian and 5 (38.5%) men were African American. Two (67.7%) of the three women were Caucasian and one woman was African American.

Thirteen of the 16 (81.3%) homicides occurred among individuals born in the United States. The country of origin for three homicides was Iraq, Kosovo, and Nigeria.

Work-related homicides occurred primarily in Wayne County (13 of 16, 81.3%). Kalamazoo, Mason and Oakland County had 1 (6.3%) homicide each. The

Case 47. Male career probationary fire fighter died while fighting an intentionally-set fire in a commercial building.

decedent was working alone in 9 (60.0%) homicides and with coworkers in 6 (40.0%) homicides. For one homicide, it is unknown if coworkers were present when the homicide occurred.

The average age of a homicide victim was 39.4 years. Ages ranged from 20 years of age to 70 years of age. Tuesdays were the day most homicides occurred 4 (26.7%), followed by Wednesday and Saturday (3 each, 20.0%) and then Monday and Thursday (2 each, 13.3%). Thursday had one homicide and the day of one homicide is unknown.

For nearly half of the work-related homicides, the time of the incident was unknown (7 of 16, 43.8%). When the time of incident could be determined/estimated, three occurred between 4 a.m. and 8 a.m., four occurred between 8 a.m. and 12 p.m., and two occurred between 8 p.m. and midnight.

A gun was the cause of death in 15 (93.8%) incidents and an intentionally set fire caused the death of a firefighter.

Machine

There were 10 non-vehicular machine-related fatalities.

Three (30.0%) individuals were run over by the machine (tractor in Agriculture, skid steer in Construction, forklift in Transportation & Warehousing).

Two (20.0%) individuals were pinned; one was crushed by a pick and place conveyor between the leading edge of the transfer cart and a concrete curb at the bottom of a pit (Manufacturing), and one was pinned by the arms of a skid steer loader against the skid steer frame (Administrative & Support &Waste Management & Remediation).

Case 55. Male landscaping business owner crushed between the lift bucket arms connecting the cross member and the front frame of a Gehl Model 7800 skid steer loader.

Two (20.0%) individuals were entangled; one had his clothing wrapped around the driveshaft that lifted the bed of the Ford LTL900 dump truck (Construction), and one had his clothing entangled in a machine conveyor used for loading/unloading product on a barge (Transportation & Warehousing).

Two (20.0%) individuals were pinned under an overturned tractor; one worked in Agriculture and one worked in Manufacturing.

One individual in Administrative & Support & Waste Management & Remediation was struck by a bulldozer blade at a waste site.

Motor Vehicle

There were 27 motor vehicle related fatalities in 25 crashes. Two crashes had multiple fatalities; in one crash, two passengers were killed and in the second crash, both the driver and the passenger died.

In total, there were 5 passengers killed in a motor vehicle crash. There were 3 pedestrians who died as a result of by being struck by a motor vehicle on an active roadway (if struck by a vehicle in a parking lot, the incident was coded as a struck by not a motor vehicle related death). Pedestrians included a college student who was struck by an oncoming vehicle after exiting his car; a truck driver who was struck by a passenger vehicle as he ran across the road, presumably after checking a road sign, and a truck driver for a mail delivery service who was struck by a semi-truck while changing his van's flat tire.

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.

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.
- **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 same direction, one behind the other and no turn is involved.
- **Sideswipe - Opposite**: vehicles were traveling in opposite directions and made side contact.
- **Other**: crash does not fit in one of the categories.

Highlights of Motor Vehicle Incidents

Driver/Passenger/Pedestrian
- Drivers: 19 (70.4%) individuals
- Passengers: 5 (18.5%) individuals
- Pedestrians: 3 (11.1%) individuals

Number of Units (25 incidents)
- 1 unit: 6 (24.0%) incidents
- 2 units: 15 (60.0%) incidents
- 3 units: 2 (8.0%) incidents
- 4 units: 1 (4.0%) incident
- 7 units: 1 (4.0%) incident

Crash Type (25 incidents)
- Single motor vehicle: 7 (28.0%) incidents (1 pedestrian, 2 passengers)
- Head On: 3 (12.0%) incidents
- Angle: 5 (20.0%) incidents
- Rear End: 7 (28.0%) incidents (1 driver and his passenger)
- Sideswipe-Opposite: 1 (4.0%) incident
- Other: 2 (8.0%) incidents (1 driver, 1 pedestrian)

Number of Roadway Lanes (25 incidents)
- 2 lanes: 18 (72.0%) incidents
- 3 lanes: 3 (12.0%) incidents
- 4 lanes: 2 (8.0%) incidents
- 5 lanes: 1 (4.0%) incident
- 7 lanes: 1(4.0) incident

Amount of Light (25 incidents)
- Daylight: 16 (64.0%) incidents
- Dawn/Dusk: 2 (8.0%) incidents
- Dark – Lighted: 2 (8.0%) incidents
- Dark – Unlit: 5 (20.0%) incidents

Speed Limit (25 incidents)
- 30 mph: 1 (4.0%) incident
- 45 mph: 1 (4.0%) incident
- 55 mph: 11 (44.0%) incidents
- 60 mph: 2 (8.0%) incident
- 70 mph: 10 (40.0%) incident

Weather (25 incidents)
- Clear: 15 (60.0%) incidents
- Cloudy: 5 (20.0%) incidents
- Fog: 1 (4.0%) incident
- Rain: 1 (4.0%) incident
- Snow/Blowing Snow: 2 (8.0%) incidents
- Severe Wind: 1 (4.0%) incidents

Surface Conditions (25 incidents)
- Dry: 17 (68.0%) incidents
- Wet: 4 (16.0%) incidents
- Icy: 2 (8.0%) incidents
- Snowy: 1 (4.0%) incident
- Slushy: 1 (4.0%) incident

Type of Trafficway (25 incidents)
- Not physically divided (2-way traffic): 13 (52.0%) incidents
- Divided highway, median strip, without traffic barrier: 3 (12.0%) incidents
- Divided highway, median strip, with traffic barrier: 9 (36.0%) incidents

Type of Vehicle (25 incidents)
- Passenger car: 9 (36.0%) incidents
- Truck/Bus: 6 (24.0%) incidents
- Pickup Truck: 2 (8.0%) incidents
- Van: 7 (28.0%) incidents
- Small truck (<10,000#): 1 (4.0%) incident

Seat Belt Use was known for 18 (81.8%) of the 22 individuals for whom seat belt use was applicable (not applicable for 3 pedestrians, unknown for 6 incidents)
- Seat Belt Used: 12 (66.7%) incidents
- Seat Belt Not Used: 6 (33.3%) incidents

Hazardous Action, Driver is Decedent (17 of 19 known)
- None: 5 (29.4%) incidents
- Speed Too Fast: 3 (17.6%) incidents
- Disregard Traffic Control: 3 (17.6%) incidents
- Unable To Stop: 2 (11.8%) incidents
- Drove Left of Center: 2 (11.8%) incident
- Careless: 2 (11.8%) incident

Hazardous Action of Driver, Passenger is Decedent (4 of 5 known)

- None: 2 (50.0%) incidents
- Speed Too Fast: 2 (50.0%) incidents

Hazardous Action of Driver, Pedestrian is Decedent (3 incidents)

- None: 2 (66.7%) incident
- Speed Too Fast: 1 (33.3%) incident

Roadway Area Where Fatal Incident Occurred (25 incidents)

- Freeway: 12 (50.7%) incidents
  - Entrance/exit ramp: 1 (8.3%) incident
  - All other freeway areas: 11 (91.7%) incidents
- Non-Freeway Intersection: 6 (24.0%) incidents
  - Within Intersection: 5 (83.3%) incidents
  - Intersection-Other: 1 (16.7%) incident
- Other Non-Freeway Areas**:** 7 (28.0%) incidents
  - Straight Roadway: 6 (85.7%) incidents
  - Curved Roadway: 1 (14.3%) incidents

Most Harmful Event (25 incidents)

- Non-collision: 3 (12.0%) incidents
  - Overturn: 2 (66.7%) incidents
  - Fire/Explosion: 1 (33.3%) incident
- Collision with non-fixed object: 19 (76.0%) incidents
  - Pedestrians: 3 (15.8%) incidents
  - Motor vehicle in transport: 16 (84.2%) incidents
- Collision with Fixed object: 3 (12.0%)
  - Tree: 3 (100.0%) 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

Other

One individual died due to a discharge of a weapon. The police department report indicated that the decedent, who was unaware that the gun was loaded, was playing "Russian roulette" when the gun discharged.

Struck By

Twenty four individuals were fatally injured when struck by an object. Eight (33.3%) of the incidents involved a motor vehicle; four (50.0%) individuals were run over by the vehicle (van in junkyard, bus in parking lot, two semi tractors in lots), two involved cars (one was pinned under a car during repair, and the second was pinned by driver's side door against another vehicle's passenger door while pushing car that had run out of gas), one individual was working on a dump truck when the raised dump box fell onto him and one individual was pinned under the tire of a pickup truck while making repairs. Five (20.8%) individuals

Case 95. Re-enactment of decedent's position while using Paslode nail gun.

were killed by falling trees and/or tree branches. Two (8.3%) individuals were killed when struck by steel beams. One (4.2%) individual each died as a result of being struck by a: trench wall cave-in, a bobcat bucket that fell from a raised position supported by a wall, a homemade tractor drag, heavy crates, a nail from a nail gun, a roll-off trash dumpster box, a mold suspended by a crane, a tractor wheel while pulling a tree out of a wooded area, and a motorcycle during a race.

Suicide

Twenty two individuals died from a fatal self-inflicted injury at work. Guns were involved in 13 (59.1%) of the deaths. Seven individuals died from asphyxiation: five individuals died from hanging and two individuals died due to carbon monoxide poisoning. One individual set himself on fire and one individual jumped from a parking structure.

By industry sector, Retail Trade had the largest number of suicides (4), followed by Construction (3) and then Agriculture, Manufacturing, Transportation & Warehousing, Real Estate & Rental & Leasing, and Health Care & Social Assistance (2 each). Wholesale Trade, Finance & Insurance, Education, Food Service & Accommodation and Other Services each had one suicide.

Nineteen (86.4%) of the decedents were men and three (13.6%) were women. The average age of the victims was 50.6 years of age and ranged from 21 years of age to 80 years of age.

Toxic Exposure

One individual died due to cyanide poisoning.

Unknown

One individual sustained a closed head injury at work in 1972; he died from complications of that injury in 2013. One individual was crushed in an industrial incident in 1976; he died from complications of that injury in 2013.

MIOSHA Fatality Investigations

The 134 individuals who died as a result of a work-related injury in 2013 worked for 131 employers. In 2013, MIOSHA personnel conducted a work-related fatality program-related compliance investigation at 27 (20.6%) of the 131 employers. A fatality is 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 appears to be related to one or more of the following conditions:

1. The incident was found to have resulted from violations of MIOSHA safety and health standards or the "general duty" clause.
2. The incident was considered to be the result of a failure to follow a good safety and health practice that would be the subject of a safety and health recommendation.

3. 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 indicates that there is 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 2013 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 2013

Industry	Number of Work-Related Fatalities	Number of Work-Related MIOSHA Compliance Inspections (%)
Agriculture, Forestry, Fishing & Hunting (11)	13	0
Mining (21)	1	0
Construction (23)	25	13 (52.0%)
Manufacturing (31-33)	10	5 (50.0%)
Wholesale Trade (42)	2	1 (50.0%)
Retail Trade (44-45)	8	0
Transportation & Warehousing (48-49)	26	3 (11.5%)
Finance & Insurance (52)	5	1 (20.0%)
Real Estate & Rental & Leasing (53)	2	0
Professional, Scientific, & Technical Services (54)	3	0
Administrative & Support & Waste Management & Remediation Services (56)	9	3 (33.3%)
Education (61)	3	0
Health Care & Social Assistance (62)	6	0
Arts, Entertainment, & Recreation (71)	6	0
Accommodation & Food Services (72)	4	0
Other Services (ex. Public Administration) (81)	5	0
Public Administration (92)	6	1 (16.7%)
Total	134	27

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. Thirteen of the 27 (48.1%) employers having a MIOSHA work-related fatality compliance inspection in 2013 were identified as having a MIOSHA work-related compliance inspection prior to 2013.

Of the 13 companies which had a work-related fatality in 2013 and were previously inspected by MIOSHA, 5 were in Construction, 3 were in Manufacturing, 1 was in Wholesale Trade, 2 were in Transportation & Warehousing, 1 was in Finance & Insurance and 1 was in Administrative & Support & Waste Management & Remediation. MIOSHA issued a violation citation to the firm at the conclusion of the fatality investigation in 26 of its 27 (96.3%) investigations. Citation penalties assessed at the conclusion of the compliance inspection (not the penalties decided upon appeal) ranged from a low of $1,000 to a high of $84,000.

MIFACE Contact with Companies

MIFACE contacted 41 employers via a recruitment letter to request their participation in the MIFACE program. Phone call follow-up was made to 39 firms/families. Twenty-seven (69.2%) declined and 10 (25.6%) accepted the invitation to participate. We could not find a phone number for two companies/families and asked in the recruitment letter for the individual to contact MIFACE. As of May 23, 2014, neither of the two had contacted us. MIFACE did not contact 93 employers due to the nature of the fatality (for example, work-related suicide, incident happened years ago) or was unable to contact (no valid address -invitation letter returned). A copy of eight of the ten 2013 MIFACE investigation reports (in addition to all MIFACE educational outreach materials) are on the MSU OEM web site. Click on the Traumatic Fatalities link to view the reports and other educational materials.

Health and Safety Initiatives

Hispanic Initiative

The US Department of Labor, Bureau of Labor Statistics (BLS) has analyzed the Census of Fatal Occupational Injury (CFOI) data and reported a higher fatal work injury rate for Hispanic workers than for other racial/ethnic groups. As a result, Federal OSHA is currently collecting 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 will be made available to the OSHA Hispanic Worker Task Force. The Michigan FACE program supports the concept and rational of this initiative. As a result, we have utilized a draft Immigrant Workers/Limited English Speakers Workers investigation guide during on-site investigations to gather information when it is appropriate.

There were three deaths of Hispanic workers in Michigan in 2013. The BLS Table 14, Michigan Employment Status of the Civilian Non-institutional Population by Sex, Race, Hispanic or Latino ethnicity, and Detailed Age, 2013 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. As only males of Hispanic/Latino descent died in 2013, only the male population of Caucasian and African American was utilized. In 2013, the Hispanic/Latino males

fatality rate in Michigan was 3.0 per 100,000 Hispanics, compared to a rate of 4.9 per 100,000 for Caucasians and 7.7 per 100,000 for African-Americans.

Two Hispanics, aged 36 and 43, died in Construction-related incidents (both falls from a roof). One individual, 67 years of age, worked in Administrative & Support & Waste Management & Remediation (struck by pickup truck). The country of origin for all 3 Hispanic individuals was Mexico.

Temporary Staffing Agency Initiative

The percentage of the Michigan workforce that was temporary workers has gone from 1.8% in 2009 to 2.8% in 2013 (Michigan Labor Market Information). To assist host companies and temporary staffing agencies understand their respective responsibilities in health and safety, the following documents were developed, disseminated to all the temporary staffing agencies in Michigan and posted on the MSU OEM website (Resources):

- Temporary Employee Safety & Health: Responsibilities of the Temporary Staffing Agency & the Host Employer: Document provides an overview of the shared responsibilities of temporary worker safety and health.
- Safety and Health Resources for Temporary Staffing Agencies in Michigan
- Hazard Alert: **Temporary Worker Safety - A Shared Responsibility.** Highlights staffing agency and host employer's minimum safety and health training requirements.
- Recommended Practices, Protecting Temporary Workers: OSHA and NIOSH recommended practices for staffing agencies and host employers so that they may better protect temporary workers through mutual cooperation and collaboration. Includes safety and health practices.

While there is a shared responsibility between the two parties, the hosting company typically has the primary responsibility for the safety and health of temporary workers since it is the typically the entity which creates and controls the hazards of the worksite and exercises day-to-day supervision of the temporary worker, not only including daily work direction, but also the methods, means and processes of how their work is accomplished.

Bathtub Refinisher Initiative

Between 2006 and 2010, four bathtub refinishers died in Michigan, three of whom were using a paint stripping product containing a high percentage of methylene chloride and one using an acid to strip the bathtub. MIFACE informed NIOSH of these deaths, and in a cooperative effort with federal OSHA and NIOSH highlighted the health and safety hazards of using methylene chloride as a bathtub finish stripping agent. OSHA identified another 10 methylene chloride deaths in bathtub refinishers nationwide. Several publications including a MIFACE Hazard Alert, You Tube video, a Morbidity and Mortality Weekly Report (MMWR) publication, MIOSHA outreach publications to bathtub refinishers, and an OSHA/NIOSH Hazard Alert (January 2013) were disseminated.

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 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. 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 a review of the past 13 years of the sensitivity of the Injury at Work box. Data identified that on average nearly 25% (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 2013

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 (120)	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%)

*All death certificates were not obtained/reviewed each year

In 2013, the injury at work box was misidentified most frequently in the designation of an injury at work in the Agricultural industry (10 of the 13 deaths) followed by Transportation & Warehousing (7 of 26 deaths). Work-related deaths involving motor vehicle incidents (12 deaths) and suicides (11 deaths) were the causes of death most misidentified as No in the injury at work box.

Number of 2013 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

135 work-related deaths in 2013 per the BLS website viewed on May 8, 2015. MIFACE had identified one fewer death compared to the published CFOI number of deaths.

The difference between the two systems in the number of work-related deaths was because the following death was not included in the MIFACE total:

- A salesman killed in an automobile crash that occurred on a Saturday while driving a family member's car.

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 134 acute traumatic work-related deaths in 2013 is included in Appendix I.

Table 10 gives the narrative case number and cause of death by NAICS code found 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.

In Table 10, the Cause of Death is hyperlinked to its corresponding heading in the Appendix. 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 10. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2013															
Industry Sector (NAICS Code)	**Aircraft (1.5%)**	**Asphyxiation (0.8%)**	**Drug Abuse (2.3%)**	**Electrocution (1.5%)**	**Fall (14.4%)**	**Fire/Explosion (2.3%)**	**Heat/Cold (0.8%)**	**Homicide (12.1%)**	**Machine (7.6%)**	**Motor Vehicle (20.5%)**	**Other (0.8%)**	**Struck By (18.2%)**	**Suicide (16.7%)**	**Toxic Exposure (0.8%)**	**Unknown**
Agriculture, Forestry, Fishing & Hunting (11)		3			9			32	48,49	58		86-90	110, 111		
Mining (21)					10										
Construction (23)				7	11-20	28			50	59-62		91-95	112-114		
Manufacturing (31-33)					21	29			51,52	63,64		96,97	115, 116		
Wholesale Trade (42)												98	117		
Retail Trade (44-45)								33-35			85		118-121		
Transportation & Warehousing (48-49)	1				22,23	30	31	36,37	53,54	65-74		99-102	122, 123		133
Finance & Insurance (52)					24			38		75,76			124		
Real Estate & Rental & Leasing (53)													125, 126		
Professional, Scientific, & Technical Services (54)								39		77,78			127		
Administrative & Support & Waste Management & Remediation Services (56)				8				40	55-57			103-106	128, 129		
Education (61)										79				132	
Health Care & Social Assistance (62)			4					41		80		107			
Arts, Entertainment, & Recreation (71)			5,6					42		81		108, 109			
Accommodation & Food Services (72)					25			43,44					130		
Other Services (ex. Public Administration) (81)	2				26					82,83			131		
Public Administration (92)					27			45-47		84					134

Discussion

There were 134 traumatic work-related fatalities in Michigan in 2013, a decrease of one fatality compared to 2012. The 2013 work-related fatality rate in Michigan was 3.1/100,000. The major sources for identifying a work-related death were death certificates, the 24-hour MIOSHA hotline, internet notifications, and the Michigan State Police vehicular crash data reporting system. We coordinated our surveillance with the Census of Fatal Occupational Injuries (CFOI). CFOI is the surveillance system funded in most states by the United States Department of Labor Bureau of Labor Statistics (BLS). CFOI reported 135 deaths in 2013. The reason the number of work-related fatalities differed between the two systems was because of differing conclusions on whether a motor vehicle crash was work-related.

Since MIFACE began surveillance of all traumatic work-related fatalities the number and rate of work related acute traumatic fatalities are generally down from 174 (3.6/100,000) in 2001 to 134 (3.1/100,000) in 2013. However, the lowest number of deaths and rates occurred in 2005 (110, 2.3/100,000) and 2009 (96, 2.2/100,000) and then increased in 2006 (157, 3.3/100/000) and 2010 (147, 3.5/100,000) (Figure 1).

In 2013, the number of work-related deaths averaged 2.6 fatalities per week although the deaths were not evenly distributed throughout the year. The month of the fatal incident was known in 130 of the 134 work-related fatalities in 2013. Of the known month of incident, January was the most common month (16 fatal incident) followed by April (13 fatal incidents) and then November (12 fatal incidents).

Transportation & Warehousing had both the largest number of acute traumatic work-related deaths (26, 19.4%) and the highest employment-based incidence rate (24.6/100,000). Construction had the second largest number of work-related deaths (25, 18.9%) and the second highest employment-based incidence rate (18.9/100,000).

Among the non-suicide/non-overdose deaths, 28 (25.7%) of the individuals had detectable levels of alcohol, illegal drugs, prescription and nonprescription medication on autopsy that were considered to possibly have contributed to the occurrence of the traumatic injury (i.e. the presence of marijuana metabolite in 13 of the 28 of these individuals an indication of recent use but not that it effected their judgment or response time prior to their fatal incident).

MIOSHA staff investigated 27 of the 134 (20.1%) deaths. Federal OSHA investigated 2 deaths and the National Transportation Safety Board investigated two deaths. The U.S. Coast Guard investigated one death. The remaining 102 (76.1%) of work-related deaths were not investigated by any regulatory agency other than by the police to exclude a homicide or suicide.

Seven industry sectors had a decrease in the number of work-related deaths and incidence rate (The three industry sectors with the largest reduction in the number of work-related deaths were Other Services (-6 deaths), Agriculture (-5 deaths) and Retail Trade (-4 deaths)), six had an increase in the number of work-related deaths and incidence rate (The two industry sectors with the largest increase in the number of deaths compared to 2012 were Transportation & Warehousing (+7 deaths) and Construction (+5 deaths)), one had the same number of work-

related deaths but a higher employment-based incidence rate, one had the same number of work-related deaths but a lower employment-based incidence rate, and two industry sectors had work-related deaths in 2013 compared to 2012. Two industry sectors did not have a work-related death in 2013 but did in 2012: Utilities and Information.

Agriculture had the third largest number of work-related deaths (13, 9.7%) and the third highest incidence rate of 16.0/100,000. The incidence rate was based on the number of *operators* as identified in the 2012 USDA Agricultural Census. The Agricultural Census does not gather data regarding the Forestry & Logging subsector.

MIFACE statistics show that 76.0% of the work-related fatalities that occur in Agriculture occur to the owner/operator. Of the known work status (i.e. owner, employee, etc.) of crop and animal production operations (operators completing the USDA Agricultural Census), 78.7% of the work-related fatalities have occurred to the farm owner. Due to the above percentages and the transient nature of hired hands, since 2001, MIFACE has used the operator incidence rate.

In future years of the MIFACE program, when hired workers and migrant/seasonal workers are represented in the number of deaths in Agriculture, a separate calculation will be made to determine the work-related fatality employment-based fatality rate for their segment of the work force. Additionally, utilizing the most recent USDA National Agricultural Statistics Service Farm Labor Report, the Lake States Region (encompasses Minnesota, Wisconsin and Michigan) hours-worked (hours/week) will be used to determine an hours-based fatality rate.

Although the number of Agricultural fatalities decreased from the previous year (decreases in the number of deaths in Animal Production, Forestry & Logging and Fishing, Hunting & Trapping), the number of work-related deaths in Crop Production stayed the same, but was an increased percentage of the total number of Agricultural work-related deaths (6 of 13 deaths (46.2%) in 20013 compared to 6 of 18 deaths (33.3%) in 2012).

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)".

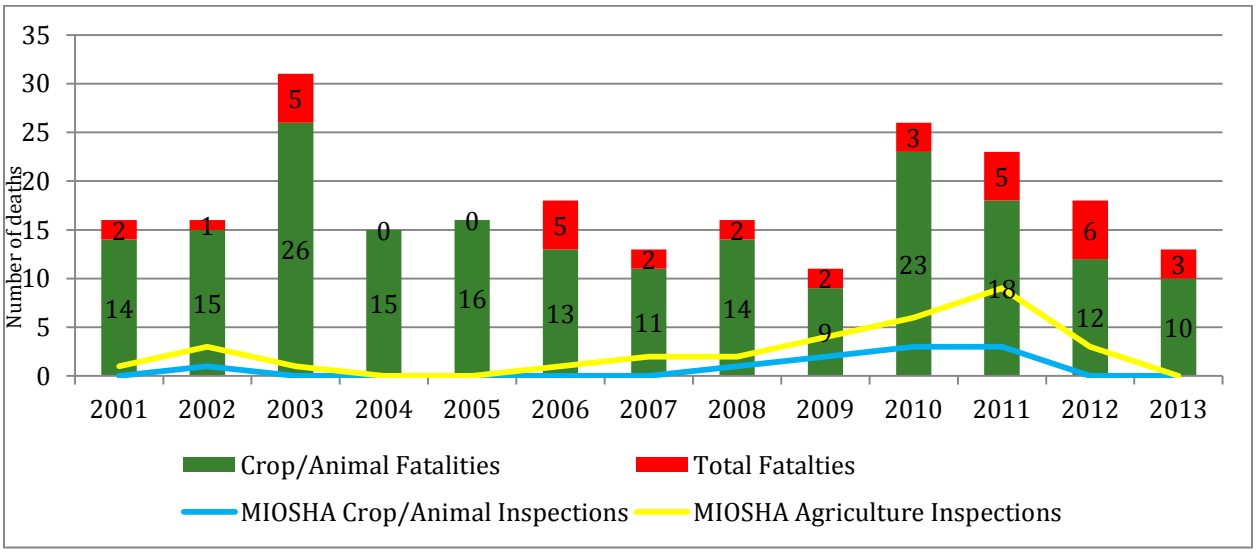
The federal Appropriations Act exempts small farming operations from federally funded activities. 100% State funds must be used by MIOSHA for interventions at farming operations when a farm operation:

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

Note: 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 2013, MIOSHA has conducted 22 Agricultural work-related fatality inspections; 10 of the inspections were in Crop Production and Animal Production. Twelve MIOSHA fatality inspections occurred in the Forestry & Logging subsector.

Figure 6. Number of Agriculture Work-related Fatalities and MIOSHA Inspection, Michigan



Family farm owners are reluctant to utilize MIOSHA Consultation, Education and Training Division services 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 5 years. This educational outreach will be beneficial to 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.

Both nationally and in Michigan, falls were the leading cause of death in Construction. The national Campaign to Prevent Falls in Construction is a joint effort by government-labor-

management to address the top cause of construction industry fatalities. **Table 11** shows the number of fatal falls in Construction by year and the percentage of work-related deaths the fatal falls represented.

Table 11. Number of Construction Deaths and Number and Percent of Fatal Falls by Year, Michigan

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

Between 2001 and 2013, the number of fatal falls in Construction ranged from a low of 4 falls in 2012 to a high of 15 falls in 2001. The percentage of fatalities in construction secondary to a fall ranged from 20.0% in 2012 to 58.3% in 2005. 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.

In 2013, nationally, work-related homicides declined by 16%. Michigan also had a reduction (43%) in the number of work-related homicides. The number of work-related homicides in Michigan decreased by 12 deaths (16 in 2013 compared to 28 in 2012 compared to 15 in 2011). Similar to national data, death by a gun shot was the most frequent manner of death in the 16 homicides.

Work-related suicides in Michigan increased, mirroring the national trend; nationally, work-related suicides rose by 8%, but in Michigan, work-related suicides rose nearly doubled (12 in 2012 to 22 in 2013). In both work-related homicides and work-related suicides, firearms were most often used as the means of death (15 of 16 homicides and 13 of 22 suicides).

The reasons for the significant increase of work-related suicides in Michigan in 2013 are complex. Research has shown that usually many factors are at play such as economic downturns, pre-existing mental-health conditions, physical health, occupation, and access to the means (e.g. guns, prescription medication, etc.). It is possible that the increased number of work-related suicides may be due to the decedent's desire to have someone other than a family member make the discovery of death. Regardless of this possibility, a multi-pronged approach encompassing employers, mental health provides, and occupational safety and health professionals to address the whole worker, both on-the-job and off-the-job should be initiated. Employers should provide

resources for employees (such as employee assistance programs) and training for supervisors to learn the warning signs of a violent act such as a suicide. In addition to the "off-the-job" factors, the individual's occupation and workplace stress should be addressed by mental health providers. Occupational safety and health professionals strive to assist employers in providing a safe workplace; this includes the necessity to recognize that non-work factors may affect the individual's safety and health and his/her coworker's safety and health on the job.

Contrary to national data, the rate of fatal injuries among Hispanic or Latino workers in Michigan is not greater than Caucasian and/or African-American and did not increase from 2012 to 2013 (4 deaths in 2012 to 3 deaths in 2013 in Michigan). All Hispanic work-related deaths that occurred in Michigan in 2013 were foreign-born. Similar to national data, most of the Michigan Hispanic work-related deaths occurred in Construction (two of three).

BLS uses the number of hours worked in an industry and profession to calculate an hours-based fatality incidence rate. The 2013 annual national hours-based fatality rate was 3.2/100,000 FTE. MIFACE could not calculate an hours-based rate for Michigan for 2013 due to insufficient data from the Michigan Office of Labor Market Information but Michigan's rate was lower per total workforce (3.1/100,000).

Importance of Using Multiple Data Sources

MIFACE uses many data sources to ascertain if a fatal injury occurs "on the job". Accurate reporting of work-related deaths in Michigan depends upon the completeness of the data. Reliance on just the information in the Injury at Work box on the individual's death certificate would have missed 49 (37.4%) in 2013.

Prevention Material Dissemination

On the MSU OEM website (www.msu.oem.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 2013, 8 Investigation Reports, 32 MIFACE Summaries of MIOSHA Investigations and 4 Hazard Alerts, and a MIFACE 2013 Data Fact sheet were posted on the MSU OEM website and distributed to stakeholders. MIFACE Summaries of MIOSHA Investigations include 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 is updated periodically when new information is received. The most current 2013 MIFACE Data Fact Sheet can be found here.

For each MIFACE Investigation Report and Hazard Alert there was a dissemination plan to maximize awareness of the Report and Alert. Investigation Reports and Hazard Alerts were sent 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 2013, seven MIFACE presentations were given to trade groups ranging from construction to state agriculture departments. A special effort in conjunction with the Michigan Farm Bureau to provide educational safety sessions to farmers was ongoing. In 2013, 12 agricultural health and safety presentations were given; more than 800 individuals attended the training sessions.

Prevention Through Design (PtD) is a national outreach program by NIOSH to promote the philosophy and highlighting the importance of "designing out" hazards and risks to prevent and control occupational injuries, illnesses, and fatalities. In the ASSE By Design Newsletter (Volume 13, Number 3) the authors used the MIFACE Investigation Report (#05MI077) *Race Car Fuel Dispenser Operator Killed when Methanol Tank Exploded* to emphasize the importance of the "design out" concept.

A digital story, *Methylene Chloride and Bathtubs: A Dangerous Combination* about the death of a bathtub refinisher who was using a methylene chloride-based aircraft paint stripper to strip a bathtub in a small apartment bathroom with limited ventilation was developed and posted on You Tube. MIFACE worked with the decedent's spouse to tell the story of his death so others might learn from this tragedy.

Summary

Traumatic occupational fatalities are an important public health issue in Michigan as they are throughout the United States. There was a decrease in the number of deaths in 2013 by one death. Traumatic occupational deaths are not random events. Information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future.

Understanding the root cause(s) of these tragic events and then sharing that information with stakeholders - from individuals to groups, is what makes these efforts worthwhile. If what we learn from any of these deaths can help prevent another death, 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 134 deaths in this report could have been prevented, whether through installation of engineering changes, development and implementation of health and safety plans, work practice changes and identifying and assisting individuals in 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 (~243,000) that are estimated to occur each year in Michigan.

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 where applicable, recommend change in 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 provide constructive comments on each MIFACE Report and Hazard Alert, who assist us by providing thoughts on developing MIFACE policies and educational outreach activities, and their promotion of the MIFACE program to their employees/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

Case 1. A male pilot in his 20s died when his Cessna 208B crashed in the woods shortly after take-off. The pilot had flown from Airport 1 and landed at Airport 2 to refuel the airplane and pick up 570 pounds of cargo. After the airplane was refueled and the cargo loaded, he taxied to a runway and departed. The NTSB summary: "The pilot spoke with three employees of the airport who stated that 1he seemed alert and awake but wanted to make a "quick turn" After the airplane was fueled and the cargo was loaded, the pilot departed; the airplane crashed one minute later. Night visual meteorological conditions prevailed at the time. An aircraft performance GPS and simulation study indicated that the airplane entered a right bank almost immediately after takeoff and then made a 42 degree right turn. The plane was accelerating throughout the flight, from about 75 knots groundspeed shortly after liftoff to about 145 knots groundspeed at impact. The airplane was climbing about 500 to 700 feet per minute to a peak altitude of about 260 feet above the ground before descending. The simulation showed a gas generator speed of about 93 percent throughout the flight. The study indicated that the load factor vectors, which were the forces felt by the pilot could have produced a somatogravic illusion of a climb, even while the airplane was descending. The post-accident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Based on the findings from the aircraft performance GPS and simulation study, the degraded visual reference conditions present about the time of the accident, and the forces felt by the pilot, it is likely that he experienced spatial disorientation, which led to his inadvertent controlled descent into terrain. The NTSB determines the probable cause(s) of this accident to be: The pilot's inadvertent controlled descent into terrain due to spatial disorientation. Contributing to the accident was lack of visual reference due to night conditions."

Case 2. A male flight instructor in his 80s died when the Taylorcraft model BC12-65 airplane piloted by a student pilot crashed during landing. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The plane was a two-place, high wing, single engine airplane, with a conventional (taildragger) landing gear configuration. During the landing approach, the plane was in a nose-high left turn at a moderate bank angle. As the turn progressed, the airplane appeared to pitch down and the left bank steepened. The airplane impacted a wooded area about one-half mile east-southeast of the approach end of the runway. The airplane came to rest with the tail in a near vertical position. Both the flight instructor and student pilot were declared dead at the scene.

Asphyxiation

Case 3. A male farmer in his 60s died when he was engulfed by soybeans in a silo while attempting to clear a clogged auger. The decedent entered the bin through the top and was poking at the soybeans while a coworker was hitting the side of the grain bin to loosen them and break them free. The coworker did not turn off the auger that took the soybeans from the bin and into the truck. Once the beans broke free, the decedent was sucked down into the soybeans. The coworker could hear the decedent scream for help. The coworker called a friend and told him

that his coworker was trapped in the grain bin and he needed his help. The friend immediately responded to the farm. The friend entered the grain bin and dug through the soybeans in an attempt to locate the decedent. Once the fire department arrived, the side door to the bin was opened and the soybeans rushed out through the door. His friend continued to attempt to locate the decedent in the soybeans until the decedent was located and removed from the grain bin. Approximately 30 minutes passed before the decedent was removed from the bin/silo alive by emergency responders and transported to a local hospital where he died.

Drug Overdose

Case 4. A female registered nurse in her 20s died due to an accidental prescription drug overdose.

Case 5. A male carnival worker in his 20s died due to drug overdose.

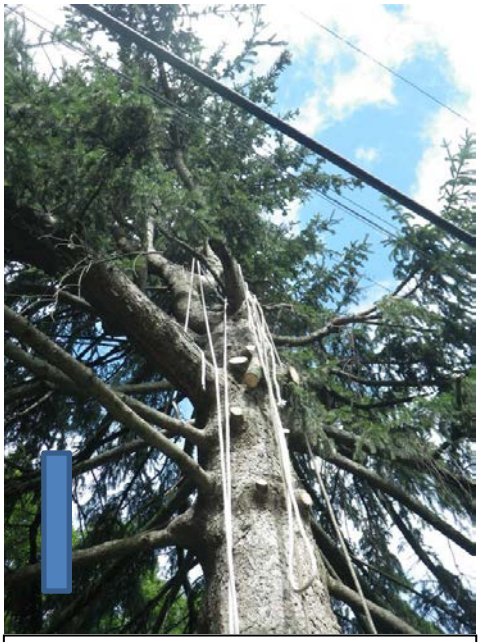
Case 6. A male temporary worker in his 20s died due to a drug overdose at a music festival.

Electrocution

Case 7. A male volunteer in his 30s died when he was electrocuted after contacting an energized 7,200-volt power line while renovating a home. The decedent was employed by the owner of a construction company. The owner was also vice president of a ministry that, among other outreach, renovated homes. The construction company owner and the decedent had volunteered at the ministry for many years and had worked on multiple ministry-related renovation projects. Three individuals were at the construction site: the construction company owner, the decedent, and another ministry volunteer who had traveled to the site from another state. The crew was in the process of erecting a company-owned construction scaffold to enable workers to install new fascia and soffits on the home. The company owner indicated to the MIOSHA compliance officer that power lines were located approximately 7 feet from the home. The company owner warned the decedent and his coworker of the presence of the power lines, instructing them to be careful because the top line was energized (the bottom line was the ground (neutral) line). The scaffold was erected, and at the time of the incident, was positioned approximately 9 inches from the neutral and 34.5 inches away from the energized 7,200-volt line. The construction company owner was standing on the ground. The decedent's coworker was on the 2nd section handing the safety guardrails up to the decedent, who was positioned on the 4th section, installing the guardrails. It is believed that the decedent was holding the rail when it or he touched the energized line. The decedent and safety rail fell to the ground. There were four distinct areas of crater-like electrical burns on the safety rail. Coworkers administered CPR while awaiting the arrival of emergency responders. The decedent was declared dead at the scene. (MIFACE Summary 330)

Case 8. A male tree trimmer in his 20s died when his upper back contacted an energized C-phase 7,980-volt overhead power line. The decedent climbed the side of a pine tree that faced the power lines to trim branches located too close to the energized lines. His coworker was the grounds person. The decedent was positioned approximately 17 feet above the ground, tied in, with his back facing the power lines. He double hooked his trim saw and then asked the grounds

person for his insulated pruners. The grounds person bent over to pick up the pruners and then saw a flash of light. There had been heavy rain the night before the incident and the morning of the incident. Additional environmental conditions contributing to this incident were the heavy tree canopy, the power lines were green and oxidized and tree branches were touching the conductors. The decedent's upper back contacted the energized line and the electrical current exited via his right forearm. He died at the scene. (MIFACE Summary 338)



Case 8. Male tree trimmer electrocuted when his back contacted a 7,980-volt energized overhead power line.

Fall

Case 9. A male farmer in his 60s died when he fell between his tractor's wheel fender and tractor frame. The decedent was changing implements on the tractor in a pole barn. Responding police hypothesize that the decedent, who had limited mobility, was trying to climb up onto his tractor and he slipped. There was no evidence that the tractor had been running. When his spouse did not receive an answer when she called his cell phone, she went to the pole barn. She found him on the right side of the tractor with his outer garments caught on the outermost brake pedal, his feet under the tractor, and his torso resting between the rear tire and the framework for the loader. The decedent's cause of death was positional asphyxiation.

Case 10. A male reagent handler in his 60s died when he fell 12 feet from the top of a snow and ice-covered railroad tanker car to the concrete floor. He had climbed via a ladder to the top of the tanker car. He was wearing a hard hat and a high visibility vest, but no fall protection equipment. It appeared that a medical event initiated his fall. He died of head injury complications as a result of the fall.

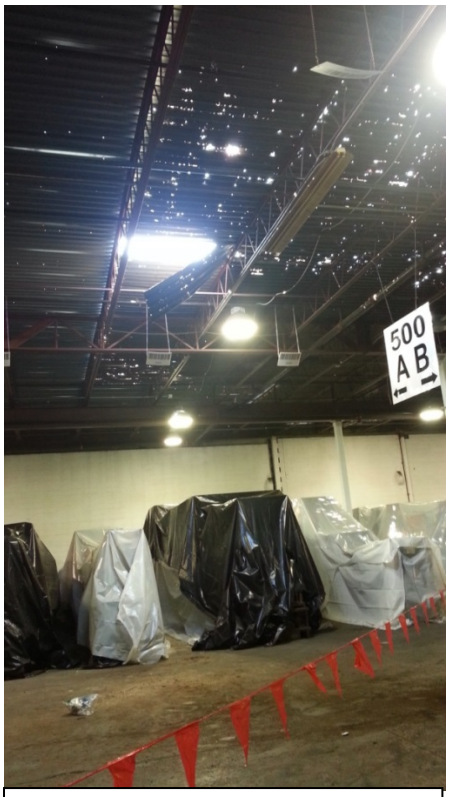
Case 11. Male carpenter fell 30 feet from a roof edge to frozen ground.

Case 11. A male carpenter in his 30s died when he fell 30 feet from a roof edge to the frozen ground below. The decedent was one of five crewmembers working on a home under construction. The decedent and a coworker were on the east side of the home, decking a 10/12 pitched roof. The OSB decking was icy in spots. The decedent was at the peak of the 2-story roof when he lost his footing. His coworker turned when he heard a scream and saw decedent sliding down the roof trying to catch hold of anything on the roof to stop his fall. The crew had not

placed roofing toeboards on the roof deck. Neither the decedent nor his coworker was wearing fall protection. The coworker yelled to get the attention of the general contractor who was working in a different part of the home. Emergency response was called and the decedent was transported to a local hospital where he died. (MIFACE Summary 339)

Case 12. An independent contractor for a home remodeling firm in his 50s died in 2013 from medical complications of a fall from a ladder in 1989. The circumstances of his fall are unknown.

Case 13. A male roofer in his 30s died when he fell through a rusted metal roof deck approximately 22 feet to the concrete floor. The firm was contracted to remove an existing roof on a commercial property and replace the metal decking (where necessary) and then replace the entire roof. The roof had been repaired five years ago. The metal decking was covered with pressed board, insulation and rubber. The firm's safety coordinator, several foremen, and 36 employees were on the roof when the fatality occurred. The section of roof where the decedent was working had been cleared of the rubber and insulation. The metal roof decking showed significant rust and erosion, with holes in the area where the decedent fell and in numerous other areas on the roof. Daylight was observed through the decking before and after the incident. The decedent was wearing a harness without the use of a life line and lanyard attached to an approved anchor point (cobra cart) located 30 feet away. He was in the process of removing the pressed board when he fell approximately 22 feet through the deteriorated metal roof decking to the concrete floor below. There were several means of fall protection available for use on the roof, however employees either did not use the fall protection systems or used them incorrectly. Emergency response was called. He was transported to a local hospital where he was declared dead. (MIFACE Summary 325)



Case 13. Male roofer fell through a rusted metal roof deck approximately 22 feet to the concrete floor.

Case 14. A male carpenter/roofer in his 20s was working alone while installing shingles on a dormer on the northwest side of a 2-story house with a 10/12 roof pitch when he fell 9-15 feet either from the west rake edge of the roof or from the end of the north front eave to the frozen ground below. His coworkers did not witness the events leading to his fall. At the time of the incident, winds were gusting to 24 mph. The decedent was not wearing a personal fall arrest system and no slide guards were installed on the roof. Partially erected scaffolds not meeting MIOSHA Part 12 or Part 21 requirements were erected on the northernmost and southernmost side of the house, only under the eaves. The northernmost single plank scaffold was in place under the north eave but did not extend to the end of the eave. No scaffold was provided on the rake edges of the house or dormers. The distance from the roof eaves to the frozen ground was approximately 9 feet. He was found unresponsive by a coworker near the northwest corner of the house. The company owner stated he had fall protection for his employees but did not make them wear it. He was airlifted to the hospital where he died two days later from the injuries

received. (MIFACE Summary 322)

Case 15. A male roofer in his 40s died when the cantilevered 2" rigid roof insulation he stepped on broke, causing him to fall approximately 26 feet to the frozen ground. The firm had a fall protection program including a safety monitor, warning line, and personal fall arrest system (PFAS). The foreman had dual responsibilities: installing insulation and acting as the warning line's safety monitor. The decedent was not wearing fall protection while working inside of the warning line attaching insulation. A coworker who was wearing a full body harness with retractable lanyard and tied off to an approved anchor point screwed to the metal roof deck was working at the roof edge cutting the insulation flush with the roof. While leaning over the edge, the coworker's cell phone fell out of his pocket to the ground. The foreman had left the roof to obtain more roofing material. When the coworker left the roof to retrieve his cell phone, the decedent left his work area to finish the remaining four feet of insulation work at the roof edge. He did not put on his full body harness and attach to the anchor site. A coworker saw him, stand up and stretch, and then take a step backward onto the insulation extending over the roof edge. The overhanging insulation was unable to support his weight and broke, causing him to fall approximately 26 feet to the frozen ground below. Emergency response was called. The decedent was airlifted to a local hospital where he died several hours later. (MIFACE Investigation Report #13MI020)

Case 16. A male retired social worker in his 60s died from a 12-15 foot fall while assisting a friend in tearing off the shingles of his friend's pole barn roof. While his friend was in the pole barn, the decedent and two other individuals were up on the roof working. The individual in the barn indicated he heard a cracking noise and then a thud. He looked over and saw the decedent on the ground. All individuals present at the site indicated that the hole in the roof was "small". It appears the decedent fell feet first, landing on the ground on his right side. The decedent was transported to a hospital where he was declared dead.

Case 17. A male self-employed carpenter in his 50s fell from a third story residential roof.

Case 18. A male sheet metal fabricator in his 40s died when he fell approximately 30 feet through an unguarded/unprotected, plastic dome-type skylight to equipment/concrete floor. The skylight involved in the incident had a plastic convex dome that measured approximately 22 inches wide by 45 inches long. The dome was positioned on top of a 55-inch square, 10-12-inch high metal curb. Ten feet east of the skylight was a ladder/catwalk roof access attached to a ground level dust collector. The decedent used this access point to climb to the roof. The roof surface was dry, and covered with a thin layer of debris consistent with buildup from years of weather. Company A had awarded an industrial dust collector system relocation project to the

Case 18. Sheet metal fabricator fell approximately 30 feet through unprotected skylight.

decedent's employer. The decedent was present at the site to take final measurements, review blueprints and inspect the jobsite in preparation for relocating the dust collector. After meeting with Company A personnel, he indicated he had obtained the needed information. Company A personnel believed he had left the site. The decedent instead proceeded to the location of the soon-to-be relocated dust collector. He accessed the roof via this dust collector's fixed ladder and a catwalk/stairway. On the roof at the east base of the skylight was a metal lid to a five gallon bucket. The lid was placed top side down with the metal tabs used to secure the lid to the bucket sticking up. Scuff marks on the roof indicated that the lid had recently been moved. There was a corresponding scuff mark next to the lid as well as two scuff marks on the vertical portion of the skylight assembly. The sheriff department also noted footprints on the east side of skylight in the dust and finger marks were noted on the south side of skylight curb. The responding sheriff agency hypothesized that the decedent stepped on the lid, slipped/tripped, lost his balance and fell through the skylight, 29'4" to the floor. The decedent was found by a Company A employee who was driving a forklift through the area. The employee called for assistance. Another employee called for emergency response. The decedent was declared dead at the scene. After the decedent was found, an employee from Company A went up on the roof to determine if there were other issues on the roof. While there, he found the decedent's phone west of the skylight. The responding sheriff determined the phone was in camera mode, and no texts or phone messages had been made and/or received. A hard hat, tape measure and notepad were near the decedent on the floor. (MIFACE Summary 328)

Case 19. A male painter in his 30s died when the tire of the elevated Skyjack 3220 scissor lift in which he was working entered a depression in a parking lot caused by a recessed storm drain and tipped to its side. The decedent and his coworker were elevated approximately 15 feet in the scissor lift while they painted a building's eaves/fascia. To protect the ground from paint overspray, the workers laid opaque plastic on the asphalt pavement. The plastic covered a storm drain grate, which was recessed 4½ inches. The workers noticed an area that had been missed during their painting work, so the lift had to be moved back to the missed area on the fascia. Both workers knew the storm drain grate was nearby but thought it was several feet away. While the lift was elevated, the decedent was in charge of the operating the lift. While in the process of backing the lift to the missed area of fascia, the lift's left rear tire entered the 4½-inch storm drain depression, which was located approximately 20 feet away from the building causing the lift to tip to its side toward the building. The decedent's coworker jumped from the lift as it was falling and received non-fatal injuries. The decedent stayed in the lift basket and struck the ground, receiving head injuries. Emergency response was called and the decedent was transported to a local hospital where he died two days later from his head injuries. (MIFACE Investigation Report #13MI091)

Case 20. A male construction laborer in his 40s died when he fell approximately 28 feet from a shop-built 4-foot deep by 16-foot long scaffold platform affixed to the forks of an extendable boom, rough terrain Skytrak 6036 forklift. The scaffold platform was affixed to the Skytrak forks via "C" clamps. The scaffold did not have guard rails. The decedent was a member of a three-person work crew engaged in setting windows in a residential home. The decedent and a coworker loaded a 56-inch by 106-inch window on the platform, standing it up and leaning it against the carriage of the forks. One coworker was inside the home on the second floor awaiting the delivery of the window. The forklift operator lifted the decedent and the window up to the second level. The forklift operator could not see the decedent's movement because the film on the window blocked his view. The forklift operator was getting ready to ask the decedent if it was alright to lower him to the second floor window when there was a 25 mph gust of wind. The wind picked up the window like a sail and knocked it over. The decedent was holding onto the window, and both the window and the decedent fell to the ground. Emergency response was called and CPR was performed. The decedent was transported to a local hospital where died. (MIFACE Summary 327)

Case 20. Construction laborer fell approximately 28 feet from shop-built platform.

Case 21. A male maintenance laborer at a paper manufacturing company in his 60s died when he fell from a ragger spool frame into the bottom of a paper pulper tank which was partially filled with product and in operation. The decedent was welding on the center of a "ragger spool wheel" located three feet from the edge and 24-28 inches above the pulper tank. The pulper was a 25-diameter open (non-covered) vat with a 43-inch-high barrier around it from the cement floor. The tank was 16-20 feet deep with a sloped base. At the center of the tank was a beater blade, approximately 5 feet across, powered by a 500 HP electric motor at 900 rpm and a spinning rotor blade at the bottom which shredded recycled paper and mixed it with water to produce paper pulp. The ragger unit was a coarse cleaning unit, removing all lightweight trash from the spinning waste paper. The ragger material resembled a large woven synthetic rope line and had an arm that held the spool. The arm of the ragger was stationary and was designed to hold the ragger line in the pulper tank so that it could effectively capture the debris in the tank. To access the ragger spool, the decedent used a wood 4-step step ladder. He used the step ladder as a straight ladder and placed it in the corner where the ragger unit frame and the pulper

Case 21. Male maintenance worker fell into paper pulper.

tank barrier met. The decedent was working alone welding flat metal stock bars on the spool's center. Based on his previously observed work practice, it is postulated that he was standing on the second step of the folded 4-step step ladder and was leaning over the open pulper tank to access the ragger spool when he fell into the pulper. The reason(s) for the fall were unknown. The maintenance supervisor walked by the area and found the folded ladder leaning up against the ragger and standard barrier of the pulper machine, the Miller Bobcat 250 welder he was using turned on, and the welder's electrode holder (stinger) draped over the standard barrier edge of the pulper. He could not locate the decedent. After searching the decedent's usual break areas, they concluded he must be located in the pulper and turned the pulper "off". Emergency response was called and he was declared dead at the scene. (MIFACE Summary 326)

Case 22. A male truck driver in his 50s was found unresponsive next to a truck in 2011. Hospital records indicate vehicle malfunctions caused the decedent to fall and strike his head and back. He died from complications of this injury in 2013.

Case 23. A female picker/packer at a pharmaceutical distribution center in her 60s died of medical complication of a fall in a parking lot.

Case 24. A male insurance claim adjuster in his 70s died when he fell 18 feet from a flat, dry, commercial building roof edge during a claim assessment. Upon arriving at the building, the decedent determined the ladder he brought with him was not tall enough. A contractor was performing siding work on a nearby home. The decedent asked him if he could borrow a ladder. The contractor agreed and carried and set up a 24-foot Werner extension ladder equipped with a stabilizer and safety feet. The contractor placed the ladder base against the exterior wall approximately 8-9 feet from the base of the building and below the building's gutters. The stabilizer, attached on the top rung, had large rubber "boots" that helped to keep the ladder from moving. The contractor stated that the ladder was placed in this position to avoid crushing the gutter and to keep the ladder from sliding. The decedent scaled the ladder while the ladder was held by the contractor and performed the assessment. Approximately 20 minutes later, when finished with the claims assessment, the decedent called out to the contractor to come back to the incident site to hold the ladder while he descended from the roof. The contractor walked back to stabilize the ladder. With the contractor stabilizing the ladder, the decedent attempted to exit the roof. He had one hand on the building gutter and the other hand on the stabilizer. He swung his right leg over to the ladder, but his foot missed the top ladder rung. The decedent lost his balance and fell head first 18 feet to the concrete below. The contractor called for emergency response. The decedent was transported to a local hospital where he died. (MIFACE Summary 329)

Case 25. A male restaurant/bar owner in his 80s died as a result of complications of a head injury sustained when he fell while in his office.

Case 26. A male auto technician in his 60s collapsed and fell at work and died due to arteriosclerotic heart disease. Blunt force head and chest trauma were contributory.

Case 27. A male U.S. attorney in his 50s died from medical complications of a fractured ankle after he fell down the last four steps while descending the stairs to the underground parking lot beneath his building.

Fire/Explosion

Case 28. A male plumber/pipefitter in his 40s died when methane gas emitted from an active sewage digester tank was ignited by another contractor's cutting torch while conducting demolition work in a digester tank. The incident occurred at the secondary digester tank that was in the process of being demolished. The 60-foot diameter cylindrical tank had exterior walls measuring 18.5 feet from the ground to the top of the wall. The 450,000 gallon secondary digester had a floating lid made mostly of steel, but had a wood "lid" which permitted gases to escape. This lid was engineered to move up and down according to the level of wastewater in the tank and was used to hold in the methane gas as well as other harmful gases. The lid weighed approximately 100,000 pounds and rode on steel vertical rails attached to the interior of the tank walls. In the center of the lid was a hub located 30 feet from the interior walls. The secondary digester had approximately 150,000-200,000 gallons of wastewater in it at the time of the incident. The decedent and an employee from another demolition firm (Employee #2) were in the process of demolishing the tank, which had an active sewage flow. The lid had two open manholes and other cracks from demolition which allowed gases to escape while hot work was being performed. The decedent had used a cutting lance to remove the floating lid. The guiderails were rigged (hooked) to a 50 ton crane for removal while being torched to cut them free of the digester tank's walls. Employee #2 was cutting the bolts using a torch on the center hub. The decedent was walking on the surface of the tank next to the exit ladder while sparks and slag was sprayed onto the digesters lid. Employee #2's cutting torch ignited the methane gas that had accumulated under the lid and was escaping from cracks and open man holes. The resulting explosion propelled the lid approximately eight to ten feet into the air. The decedent was thrown out of the digester and landed outside of the tank, while Employee #2 was propelled up but stayed inside the digester when the lid dropped back into the digester. Emergency response transported both workers to the hospital, where the decedent died of his injuries approximately one hour after the incident. (MIFACE Summary 336)

Case 28. Male plumber/pipefitter died in methane explosion during sewage digester tank demolition.

Case 29. A male railroad remote control operator for a steel company in his 30s died when molten iron which had spilled from a ladle contacted snow causing an explosion and fire. The work process leading to the incident was as follows: an overhead crane operator placed a ladle of hot metal into a "ladle tilter". The ladle tilter tilted the ladle to a desired angle for removing the

molten slag from the surface of the hot metal. The overhead crane then retrieved the ladle for transport. Incident summary: The area where the ladle was placed into the tilt station was poorly lit. A modified ladle contained approximately 195 tons of molten iron and had been placed on the west tilter unit by the crane operator. The ladle modifications made it difficult to disengage the hooks from the trunnion on the ladle and the operating position for the crane operator made it difficult to observe the west side of the ladle. As the crane operator disengaged the hooks and was trolleying away from the ladle, the ladle tipped and fell to the North off the tilter table spilling molten iron onto the ground. The molten iron breached the building's outer metal wall located 60 feet away and three or four explosions occurred due to the molten metal coming into contact with water from melting snow. The decedent, who was the remote car operator, had brought the bottle cars with the molten iron to the area where they were being offloaded and was either in the warming shanty or walking to the shanty when the explosions occurred. He was found lying face down in the roadway approximately 10 feet from where the shanty had been located. Emergency response was called and he was transported to a local hospital where he was declared dead. Subsequent investigation found that the tilter had only one of two of the required hydraulic cylinders (the east side hydraulic cylinder had fallen off of the unit) and that the stop blocks which prevented the tilt frame from rearward motion had been removed in the past (date unknown). Anchor bolts had also failed, most likely due to faulty welds. (MIFACE Summary 342)

Case 30. A male driver in his 30s died following an attempt to contain a natural gas leak which occurred when his 53-foot long semi-tractor trailer struck associated piping at a well site. Due to the impact the piping broke loose releasing an unspecified volume of natural gas which likely reached the vehicle engine compartment. A fire ensued, and the decedent was engulfed in the flames. The decedent had driven to the well site to pick up a 53-foot low-boy flatbed trailer loaded with well drilling components. The front of the trailer was facing the wellhead. To exit the area, the decedent decided to make a 180-degree left-hand turn around the well rather than back the tractor/trailer unit out of the site. The soil around the wellhead was muddy due to recent rains except for compacted gravel in an approximate 20-foot radius surrounding the wellhead. To avoid getting stuck in the mud, the decedent attempted to stay on the gravel. While making this sharp turn around the wellhead, the very front of the trailer just behind the gooseneck contacted and broke 2-inch gas lift lines and valves. The police report indicated the decedent first tried to back away from the piping he had struck. He then exited the tractor without shutting off the engine and attempted to shut off the flow of gas by closing the valves. It is postulated that vapors from the gas were ignited by the tractor's engine. The resulting explosion engulfed the tractor, trailer and the decedent in flames. Other employees working nearby ran to the site after hearing the explosion and found the decedent walking away from the well. He indicated to his coworkers and first responders he was trying to shut the valves. He died nine days later from injuries sustained during the incident. (MIFACE Summary 334)

Heat/Cold

Case 31. A male general laborer in his 60s died due to hypertensive and arteriosclerotic cardiovascular disease while working outdoors on a hot day. The decedent was conducting grounds keeping work at a machinery moving, warehousing and transportation facility. He worked for several hours in the morning cutting tree limbs. When enough of the cut limbs had been accumulated, he used a backhoe to move the limbs to another area of the facility. At

approximately 10:00 a.m., a coworker noticed that the backhoe was stationary where the limb storage area was located. The employee investigated and found the decedent non-responsive and slumped forward in the seat of a non-air conditioned cabbed backhoe. CPR was initiated by employees while emergency response was called. Emergency responders assumed care upon arrival and transported him to a local hospital where he was pronounced dead. (MIFACE Investigation Report #13MI090)

Homicide

Case 32. A male medical marijuana grower in his 30s died from gunshot wounds sustained during an attempted robbery at his home.

Case 33. A male store owner in his 50s died due to gunshot wounds during a robbery.

Cases 34 & 35. Two retail sales clerks, a male and a female, both in their 20s, died due to gunshot wounds inflicted by a disgruntled employee.

Case 36. A male cab driver in his 40s died due to a shotgun wound when his cab was carjacked.

Case 37. A male cab driver in his 40s died due to multiple gunshot wounds. The decedent was found lying on the ground next to his cab, with the cab door open and the engine running.

Case 38. A female loan office/check cashing clerk in her 30s died due to a gunshot wound sustained during a robbery.

Case 39. A male accountant in his 70s died due to multiple gunshot wounds one day following an emotional argument with an employee.

Case 40. A male security officer in his 60s died due to a gunshot wound. The decedent was sitting in his vehicle outside of an optical office and was in an altercation with an individual. The assailant fired shots into the vehicle, killing the decedent.

Case 41. A female medical assistant in her 30s died due to multiple gunshot wounds. The decedent had taken out a personal protection order against the individual who killed her.

Case 42. A male rapper/musician in his 20s died of a gunshot wound during an altercation with an off-duty transit officer at a gas station. The decedent had been selling CDs at the gas station.

Case 43. A male restaurant owner in his 30s died due to a gunshot wound. He had just closed the business for the night, and was in the alley behind his business near his car when the assailant came out from behind a garbage bin and shot him.

Case 44. A male nightclub security guard in his 40s died due to a gunshot wound while working outside of the bar.

Case 45. A male Michigan State trooper in his 40s died due to a gunshot wound during a traffic stop.

Case 46. A male police officer in his 30s died due to a gunshot wound during a traffic stop.

Case 47. A male career probationary fire fighter in his 20s died while fighting an intentionally-set fire in a commercial building. The decedent was a member of a three-person initial entry team. The team entered a door located on the south side of the building at the east end deploying a 200-foot long, 1½-inch hose. Firefighter #1 controlled the nozzle, the decedent assisted and the acting Captain was the third entrant. Visibility was very limited. The door way access opened to a 60-foot long aisle running between two fixed banisters. While crawling on the floor, upon reaching the end of the banister, Firefighter #1 encountered a wall. He gave the decedent the nozzle and they moved to the right with the decedent now in the lead. At this point they began to encounter additional furniture (chairs, booths, stools) and worked their way around continuing to look for the fire. After approximately 25 minutes inside the building, the Captain observed his SCBA had one solid and one blinking light and determined the team needed to exchange bottles. He communicated with the decedent and Firefighter #1 and believed they all began to exit the building. Visibility was now zero. Firefighter #1 believed he was speaking with the decedent during their exit with the last contact made as he approached the door. Firefighter #1 and the acting Captain exited and then noticed that the decedent was not with them. MAYDAY, which would have ceased all radio traffic, was not made. The decedent responded to a radio inquiry that he was in another part of the building and was asked who he was with. Because radio traffic was not halted, another radio conversation was heard, which led to the belief that the decedent was with another crew. Later it was determined that a different conversation between crews working the fire was heard. Further attempts to contact the decedent met with negative results, however at one point a radio transmission was recorded where the decedent stated he was out of air. An aerial ladder team determined that the roof-mounted air handlers were about to collapse at which time an evacuation order was given. An immediate head count found the decedent unaccounted for, and the MAYDAY call was made. The building then collapsed prior to being able to locate and extricate the decedent. He was declared dead at the scene. (MIFACE Summary 333)

Machine

Case 48. A male farmer in his 80s died due to complications sustained when his tractor rolled over him.

Case 49. A male farmer in his 40s died when he lost control of the tractor with an attached small grain wagon he was driving, causing the tractor to roll to its side and pin him. The dry, 2-lane rural road was a flat blacktop with no curves or hills. The International Harvester Farmall 856D tractor he was driving in 4th gear had badly worn Alliance 6-ply rear tires with approximately one inch of tread. The front tires were Farm King, 12-ply. The front

Case 49. Farmer pinned in tractor overturn on public roadway.

driver/left side tire had approximately one inch of tread and the passenger/right side tire had very little to no tread. The tractor was not equipped with a rollover protection structure (ROPS). The decedent and another tractor operator were traveling northbound. It appears that the decedent drove too close to the tractor in front of him. When he became too close to the other tractor, he lost control of his tractor. Police investigation determined that his tractor crossed the centerline, swerved to the right, swerved back to the left, then swerved to the right again. The tractor rolled over, continued to roll onto the driver's side, and stopped rolling when the axle hit the pavement. The tractor then rolled back onto the top coming to rest in the southbound lane, facing west pinning the decedent underneath the tractor seat. The gravity wagon maintained its attachment during the incident. The driver of the other tractor stated he heard tires squealing as the decedent's tractor approached.

Case 50. A male laborer for an excavation company in his 20s died when a Takeuchi TL 130 skid steer backed over him. The decedent had been working with the driver of the skid steer involved in the incident. The two workers were in the process of leveling stone in preparation for a paving operation. The decedent was responsible for measuring and checking depth of the stone fill. The skid steer did not have an operational back up alarm, and the rear view convex mirrors were missing. The responding police department noted to the MIOSHA compliance officer that the decedent was wearing an earbud type headset when he observed the body at the site, but was unable to determine if the earbuds were in use during incident. The skid steer driver indicated to the responding police that prior to backing he noted the decedent standing out of the way on the paved portion of the road. The skid steer driver backed up and was watching the bucket in front of him when he backed over the decedent. The driver then pulled ahead. The reason the decedent was in the stone area is unknown. Emergency response was called and the decedent was declared dead upon arrival at the hospital. (MIFACE Summary 337)

Case 51. A male fertilizer mixing facility assistant manager in his 30s died when his 1972 Case 580B Construction King tractor with a front end loader overturned after sliding down the walls of a drainage ditch. The tractor was not equipped with a roll over protection structure (ROPS) and seat belt. The decedent had unsuccessfully attempted to remove a 12-foot section of the rail of a railroad on the south side of the facility with the tractor bucket. The facility's General Manager determined that another method should be used to remove the rail. The decedent was in the process of backing the tractor away so he could move it to another area. The tractor length, including the bucket was approximately 15 feet. The decedent backed the tractor approximately 20 feet. The ground was snow covered. The back wheels of the tractor slipped into an approximate 9-foot-deep ravine with an unmarked edge. As the tractor was sliding down the ditch, he attempted to drive the tractor forward, but the tractor continued to slide into the ravine. When the front wheels of the tractor reached the edge of the ravine, the tractor

Case 51. Male fertilizer facility assistant pinned under overturned tractor in ditch.

overturned to the rear. The decedent was pinned against the ravine bank by the tractor seat. (MIFACE Investigation Report #13MI009)

Case 52. A male laborer at a powder coating and e-coat firm in his 30s died when a transfer cart which acted as a pick and place conveyor pinned him between the leading edge of the transfer cart and a concrete curb at the bottom of a pit. The incident occurred in the pit of an automated paint line. A transfer cart placed racks of parts into position for immersion in the e-coat bath which was located below floor level and removed finished parts as the parts exited an oven. During these processes, parts could fall into a pit area. The parts had to be manually removed so they did not interfere with the functioning of the transfer cart. The firm did not have a lockout tagout program for the equipment involved, but had developed a basic work instruction (flowchart). The flow chart indicated that the operator (decedent) was required to shut down (did not mean lock out) the transfer cart prior to entering the pit. The decedent entered the pit without actuating a stop on the system to clear the pit area. The transfer cart cycled and the decedent was pinned between the transfer cart and a concrete curb in the pit. (MIFACE Summary 340)

Case 53. A male checker/stevedore in his 60s died when he was struck by a 62,000-pound-capacity forklift carrying a 40,000-pound steel coil.

Case 54. A male mechanic for a shipping company in his 30s died when he became entangled in a machine conveyor used for loading/unloading product on a barge. The conveyor roller height from the deck was approximately 23 1/2 inches. The roll cross beam directly behind the roller where the decedent was found under the hopper was approximately 26 inches from the roller to the cross beam under the hopper. The incident was not witnessed. The decedent may have been greasing the rollers for the conveyor system or passing under the rollers to reach the other side of the conveyor system. Coworkers indicated to the responding police that it was a common practice for the decedent to go underneath the machinery to gain quicker access to the other side in order to service the equipment. The decedent was found wedged between the conveyor belt and the drums (large rollers located under the belt) at the base of the conveyor boom.

Case 55. A male landscaping business owner in his 50s died when he was crushed between the lift bucket arms connecting the cross member and the front frame of a Gehl Model 7800 skid steer loader. The decedent and a coworker were in the process of straightening and staking a newly planted 25-30-foot tall spruce tree that had fallen due to heavy rains and high winds. The ground was muddy. A 2-inch nylon ratchet strap was attached to the bucket and to the trunk of the tree, approximately eight feet above the ground. The decedent backed the skid steer and raised the bucket to provide tension on the strap to straighten the tree. After the tree was straight, the decedent exited the skid steer, leaving it in idle. With his coworker, the decedent pounded two stakes into the ground with guidelines attaching the tree to the stakes. Additional trees were also noted to have loose guidelines, so the work crew tightened these and then returned to the incident tree. The crew determined additional guidelines were required and the decedent repositioned the skid steer, straightened the tree, and added stakes/guidelines. The skid steer was located on the east side of the tree. The sequence of events is unknown after the tree was re-straightened. The coworker stated to the responding police that the decedent said he was going to move the skid steer so they could loosen and remove the nylon strap. The coworker

was positioned west of the tree and could not see the decedent or skid steer. The coworker heard a moan and then investigated. He found the decedent between the cross member and the skid steer frame. The coworker stated that the safety bar was down when he attempted to raise the skid steer bucket. He was unable to raise the bucket. He indicated to the MIOSHA compliance officer that the bucket was located approximately four inches from the ground. The coworker ran to a nearby property and emergency response was called. The decedent was declared dead at the scene. Post fatality, the skid steer was inspected by an outside firm. The skid steer safety bar was functional. The skid steer was equipped with a seat safety switch, but the technician examining the unit could not get the seat to move and subsequently could not test the seat safety switch. (MIFACE Summary 332)

Case 56. A male owner of a trucking company in his 30s died when his clothing wrapped around the driveshaft that lifted the bed of the Ford LTL900 dump truck he had driven to the incident site. The decedent was having a problem with the power take off unit that operated the hydraulic system controlling the movement of the dump bed. The decedent crawled under the truck while the engine was running in what appeared to be an attempt to engage the driveshaft unit. Another contractor arrived at the site and found the truck stalled, and the decedent entangled in the driveshaft.

Case 56. Re-enactment of decedent's position under truck attempting to fix dump box PTO.

Case 57. A male truck driver for a construction company in his 40s died when he was struck by a bulldozer at a garbage dump. The construction company owner and the decedent drove to the dump site. Police investigation found that the decedent exited the truck and walked around the truck to open the trailer doors. At some point, the decedent walked into a "restricted" area and was struck by the bulldozer. The police were informed by workers at the site that individuals bringing items to the dump were to stay with their vehicles. Police observed that the dump building was very loud and full of garbage and there was a lot of heavy machinery traffic. The owner exited the truck and observed the decedent on the ground next to the bulldozer tire. The owner transported the decedent to the decedent's home. On the way, the owner bought alcohol and pain relievers. After arriving home, the decedent and the owner drank the alcohol. It is unknown who called for emergency response. Emergency response arrived at the home and transported the decedent to the hospital where he died.

Motor Vehicle

Case 58. A male swine farm employee in his 50s died when the pickup he was a passenger in was struck by a southbound vehicle which did not stop at a stop sign at an intersection. The pickup truck was traveling westbound on a dry 2-lane roadway with a posted speed limit of 55 mph. Vehicles traveling east/west had the right of way. The incident occurred in an open agricultural area with farm fields on all four corners of the intersection. Responding police noted that the northwest and southwest fields had what appeared to be a bean crop with an approximate height

of one foot. The northeast and southeast fields contained corn which was of a moderate height with some stands reaching approximately four feet in height. The officer noted that based on the change in grade between the roadway surface and farm field surface, the corn partially obstructed traffic coming from the east heading westbound, however the top half of the vehicle would still be visible. The pickup truck was struck in the intersection on the passenger side. The driver of the southbound vehicle indicated to responding police that he was not paying attention and ran the stop sign. As a result of the crash, the pickup rolled, causing damage leading to crush of the roof space and back quarter panels of the bed of the truck. The responding police department did not complete the crash report information concerning seatbelt/shoulder harness use and airbag deployment.

Cases 59 & 60. Two male construction laborers, one in his 50s and one in his 40s died when the work van they were passengers in slid on an icy roadway, then off the road into a ditch and then overturned. The work van was traveling westbound on a 2-lane road with a posted speed limit of 55 mph. As the van driver approached a curve in the roadway, the van began to slide to the right. He slowed down and regained control and then the van again slid to the right. He applied the brakes and corrected to his left causing the van to slide to the left, and then off the road and into the ditch. The van rolled over and came to rest against a stand of trees. Both decedents were not wearing their seat belt/shoulder harness. The van was not equipped with an airbag.

Case 61. A male passenger in his 20s riding in a Ford F-250 pickup truck died when the pickup truck struck the rear of a semi-tractor trailer. The semi-truck had a passenger side rear-tire blowout and the driver had pulled off the southbound freeway to the exit's off-ramp western shoulder on a dry, posted 70 mph expressway. The exit had a dedicated exit lane. A witness stated to the responding police department that it appeared the driver of the pickup, which was hauling a trailer, lost control because the truck suddenly began to swerve back and forth, causing the trailer it was towing to jack-knife. The pickup driver then completely lost control and veered off the right edge of the freeway and struck the driver's side corner of the parked semi-trailer at an angle, causing the passenger side of the pickup to absorb the greatest impact. The pickup truck driver did not apply the brakes prior to impact with the semi-trailer. The driver of the pickup told another witness to the crash that he either fell asleep and/or felt drowsy prior to the crash. The decedent was wearing his seat belt/shoulder harness. The pickup's airbags deployed.

Case 62. A male construction engineer in his 20s died when he did not yield at a stop sign and was struck by an oncoming vehicle. The decedent (driver) and his coworker were eastbound on a dry 2-lane asphalt road with a posted speed limit of 55 mph. The vehicle which struck him (Vehicle 2) was southbound and had the right of way. The decedent did not yield at the stop sign and entered the intersection. Vehicle 2 could not stop in time and struck the decedent's vehicle on the driver's side, causing it to come to rest in a field and burst into flames. A passerby was able to rescue the decedent's coworker but due to the resultant flames, unable to rescue the decedent. The decedent and his coworker were wearing their seatbelts/shoulder harness.

Case 63. A male pharmaceutical sales representative in his 30s died when the passenger car he was driving struck a logging truck. The decedent was travelling westbound on a snowy, 2-lane roadway with a posted speed limit of 55 mph. The decedent's vehicle lost traction and began to slide, crossing the centerline into the eastbound lane. The decedent's vehicle then reentered the

westbound lane, with the driver's side of the vehicle facing eastbound when the oncoming logging truck observed the decedent's vehicle enter the eastbound lane, the driver attempted to avoid the collision by crossing into the westbound lane. When the decedent's vehicle reentered the westbound lane, it was in the path of the logging truck. The logging truck was unable to avoid the collision with the decedent's vehicle. The decedent was not wearing a seat belt. The vehicle's airbag deployed.

Case 64. A male college student in his 20s died when, after getting out of his car after a crash was struck by an oncoming vehicle. The decedent was traveling to the business at which he had an internship in preparation for a presentation. The incident occurred on an unlit 2-lane roadway with a posted speed limit of 70 mph. At the time of the incident, the roadway was slushy and it was snowing. The decedent lost control of his vehicle, and it went into a slide, hit the cable barriers and was kicked back into the traffic roadway. The decedent exited his car. The driver of a second vehicle witnessed the decedent's crash and stopped on the roadway's right shoulder, activated its hazard lights, and then exited his vehicle. The driver of the second vehicle walked over to assist the decedent. The decedent and the Good Samaritan were standing next to the decedent's vehicle near the yellow median line in the roadway. The decedent's vehicle did not have its lights on. Another vehicle approached the crash scene traveling approximately 75 mph and applied the brakes in an attempt to avoid the crash. The driver lost control of his vehicle. The vehicle slid sideways and struck the decedent's vehicle, the decedent, and the Good Samaritan. Responding police identified the contributing factors in the crash sequence as the rate of speed the vehicles were traveling, the weather conditions affecting the road surface at the time of the crash, and the presence of the cable barriers that deflected the decedent's vehicle back onto the roadway.

Case 65. A male semi-truck driver in his 50s died when his semi-truck rear-ended another semi-truck (Truck A), belonging to the same company. The decedent was following Truck A as they traveled in the right lane of a westbound icy and hard-packed snow-covered 2-lane highway, with a posted speed limit of 70 mph. The two men were communicating via Bluetooth cell phone technology. Truck A slowed to approximately 30-35 mph due to a traffic back up, caused by a previous crash in the right lane. The decedent appeared to be unaware Truck A was slowing and failed to stop, rear-ending Truck A. The decedent was trapped in the cab of the semi, with the radiator against his legs and the steering wheel pressed into his chest. The semi then caught fire after a fuel line break. The decedent was pronounced dead at the scene.

Case 66. A male semi-truck driver in his 30s died when his vehicle ran off the roadway, crossed over the median and struck another semi-truck head-on. The decedent's semi was southbound on a dry, 2-lane expressway with a posted speed limit of 60 mph. The expressway was divided by a grassy median with four cable barriers in the median. For unknown reasons, the decedent's semi left the roadway to his left, entered the grassy median, ran over three of the cables, entered the northbound lanes, and struck, nearly head-on, the northbound semi-tractor. The decedent was talking to a coworker on his cell phone at the time of the incident; there was no hands-free device found in the decedent's cab. The decedent was wearing seatbelt/shoulder harness. The semi's airbags deployed.

Case 67. A male truck driver in his 30s died when his semi left the roadway and eventually struck trees in a wooded area. The dry, 2-lane expressway had a posted speed limit of 60 mph. The semi tractor-trailer was traveling eastbound at approximately 60-65 mph. For reasons unknown, the semi drifted from the right lane to the left lane of the expressway, traveled through the cable barriers, crossed the median, crossed the westbound expressway and then struck several large trees in a wooded area. The decedent was declared dead at the scene. The decedent's seatbelt/shoulder harness use was unknown. The tractor cab was not equipped with airbags.

Case 68. A male laborer for a furniture company in his 30s died when the GMC box truck he was driving crossed the centerline and struck a tree. The decedent was traveling southbound on a dry, 2-lane roadway with a posted speed limit of 45 mph. Witnesses indicated the decedent gradually crossed the centerline, entered the northbound lane, and then left the roadway, striking the tree. The decedent was wearing a seatbelt. It is unknown if the vehicle's airbag deployed. The incident occurred at approximately 7:15 a.m. Cell phone records obtained by the police suggested that the decedent had been awake much of the night. Toxicology found alcohol, illegal drugs and marijuana in his blood. The decedent had a medical marijuana card.

Case 69. A male truck driver in his 50s died when the work van he was driving struck a car which had ran a stop sign. The dry, 4 -lane roadway had a posted speed limit of 55 mph. The incident occurred at the road intersection. The decedent, who was traveling eastbound, had the right of way. The decedent's vehicle struck the car within the intersection, causing his van to roll. The decedent was partially ejected from the vehicle. He was not wearing a seatbelt. The work van was not equipped with an airbag.

Case 70. A male semi-truck driver in his 50s died when his tractor rear-ended a slowing semi-tractor trailer and burst into flames. The decedent was traveling westbound on a dry, 2-lane expressway with a posted speed limit of 70 mph. Due to a traffic backup caused by a previous accident the semi-tractor trailer struck by the decedent was slowing down. The responding police report stated that "the decedent approached the traffic backup and failed to stop within a safe distance and struck a tractor trailer in the rear end. When the decedent struck the tractor trailer, his tractor burst into flames." The decedent was unable to exit the tractor. The decedent was wearing his seatbelt/safety harness. The vehicle's airbags deployed.

Case 71. A male semi-truck driver in his 50s died when, for unknown reasons, he veered off of the roadway, struck a guardrail, and continued down an embankment. The driver was carrying a load of apples. The cab struck a light pole and burst into flames. The dry, 2-lane expressway had a posted speed limit of 70mph. The driver unsuccessfully attempted to get out of the cab before being overcome by the fire. The decedent's restraint use was unknown. The semi-tractor cab's airbags did not deploy.

Case 72. A male truck driver in his 50s died when he was struck by a passenger vehicle as he ran across the road to reach his semi-truck. The accident took place during the early evening on an unlit, dry, 2-lane highway with a posted speed limit of 55 mph. The decedent parked his semi-truck 40 feet away from an intersection just left of center in the westbound lane of the road. He left the semi truck’s headlights on in “bright” mode. The decedent left his semi-truck and crossed

the eastbound lane to stand in the ditch; police hypothesized he was reading road signs. As an eastbound passenger vehicle approached the intersection and the parked semi, the driver flashed her headlights multiple times in an attempt to alert the semi driver to turn off the "bright" headlights since it was impairing her ability to see. As the passenger vehicle was passing the semi, the decedent ran into the eastbound lane to get back to his vehicle. The driver of the passenger vehicle did not see the decedent and was unable apply her brakes and avoid striking him. The driver called for emergency response. Emergency responders transported the decedent to a local hospital where he was declared dead.

Case 73. A female driver of a medical transport van in her 50s died when the van was struck head-on by a driver with an elevated blood alcohol (0.31%) that was fleeing police. The police had been pursuing the driver due to erratic driving. It was early morning and was raining. The wet 7-lane roadway was lit by street lights and had a posted speed limit of 30 mph. Due to weather/road conditions and high speeds, police terminated the pursuit. The driver, who was traveling south bound, continued at a high rate of speed and crossed the center into the northbound lanes. Police indicated the decedent's restraint use as unknown and that the transport van's airbags deployed.

Case 74. A male postal carrier in his 40s died when the car he was driving was struck by a tow truck in a road intersection. The decedent's vehicle had the right of way on a damp, 2-lane roadway with a posted speed limit of 55 mph. The decedent was traveling eastbound. The tow truck driver was traveling northbound at approximately 45-55 mph on a north-south road, which had stop signs at the intersection with the east-west roadway. The driver of the tow truck stated to police he was unfamiliar with the area. As he was driving, the tow truck operator stated that his cell phone rang and he dropped it onto the floor between the driver and passenger side of the truck. He reached down to pick up his cell phone and stated he did not see the stop sign. The tow truck entered the intersection and struck the decedent's vehicle on the driver's side. The decedent was not wearing a seatbelt/shoulder harness. The vehicle's airbag deployed.

Cases 75 & 76. Two male insurance agents, the driver in his 40s and his passenger in his 20s died when their vehicle was struck by a pickup truck while stopped in a road construction traffic backup. The incident occurred on a dry, 2-lane expressway with a posted speed limit of 70 mph. The incident involved seven vehicles. The driver of the oncoming pickup truck (#1), was traveling over the speed limit and did not apply the brakes prior to striking the rear of the decedents' vehicle (#2) and then another vehicle (#3). The decedents' vehicle struck vehicle #4, then the median barrier, then vehicles #6 and #7. Both of the decedents were wearing their seatbelts/shoulder harness. The vehicle's airbags did not deploy.

Case 77. A male salesman for an electronics firm in his 30s died when his passenger car was struck on the driver's side by an SUV. The weather was rain/snow mix and fog limited visibility in all directions. The posted speed limit on both 2-lane roadways was 55 mph. The decedent was traveling southbound; his roadway had a stop sign. The SUV, which was traveling westbound at the speed limit, had the right of way. The decedent did not yield at the intersection's stop sign, entered the intersection, and was struck by the SUV. The decedent was wearing his safety belt/shoulder harness. The vehicle airbags did not deploy.

Case 78. A mail delivery service truck driver in his 50s died when he was struck by a semi-truck while changing his van's flat tire. The decedent had been traveling eastbound on a dry, 3-lane highway with a posted speed limit of 70 mph. The driver's side front tire had gone flat. The decedent had pulled the van onto the right shoulder of the highway at the bottom of a decline. He was crouched down very close to the fog line changing the tire when he moved approximately two feet into the active roadway. An oncoming semi-truck was unable to see him or avoid striking him. The investigating police noted that all tires had good tread depth. On the flat tire was an old metal valve stem unlike the other three tires which had newer plastic valve stems. When the valve stem was replaced, the tire was able to maintain constant air pressure once inflated, questioning the integrity of the previous metal valve stem. The metal valve stem could be a possible causation, however not limited to, why the left front tire became flat and ultimately why the decedent pulled to the right shoulder.

Case 79. A male golf coach in his 30s died when did not stop the van he was driving at an intersection stop sign and entered the intersection. The van was struck by an oncoming vehicle. The decedent was traveling northbound and the oncoming vehicle was traveling eastbound. The eastbound roadway had a posted speed limit of 55 mph. The eastbound vehicle had the right of way. The decedent's vehicle was struck the driver's side. The driver of the eastbound vehicle indicated to responding police that she was speeding. Both vehicles overturned after impact and three individuals were ejected from the decedent's vehicle. Three individuals died as a result of the crash: the decedent, a passenger sitting directly behind the decedent, and a passenger in the eastbound vehicle. The decedent was wearing a seatbelt. The van's airbags deployed.

Case 80. A female director of strategic accounts for a medical supply firm in her 40s died when the vehicle she was driving struck the rear of a semi-truck trailer. The two vehicles were traveling westbound on a dry 2-lane highway with a posted speed limit of 70 mph. The semi-truck was stopped in the right lane due to heavy traffic due to a previous accident caused by slowing vehicles in a construction zone. The decedent unsuccessfully attempted to avoid the stopped semi. Her vehicle struck the trailer, and then veered off to the right into a swampy area. The decedent was wearing her seatbelt/shoulder harness.

Case 81. A male rodeo professional in his 20s died when a falling tree struck his car while he was enroute to home from a rodeo event. The incident occurred during a thunderstorm with high winds on a dark, unlit 2-lane roadway with an un-posted speed limit of 55 mph. The large tree fell onto the roof of the decedent's vehicle. After being struck by the tree, the vehicle left the roadway to the right and entered the ditch. The decedent was wearing his seatbelt/shoulder harness. The vehicle's airbag deployed.

Case 82. A male laborer for an auto glass company in his teens died when he was ejected from the van he was driving as it rolled over several times in the roadway median. The decedent was traveling northbound at approximately 97 mph on a dry, 2-lane roadway with a posted speed limit of 70 mph. The decedent drove off of the left side of the roadway while attempting to retrieve a cell phone which had fallen to the floor. He overcorrected in an attempt to reenter the roadway and lost control, causing the vehicle to collide with and roll over the cable barrier alongside the roadway. The decedent was not wearing his seat belt. The van's airbag did not deploy.

Case 83. A male community service volunteer in his 80s died when the vehicle he was driving crossed the centerline and struck two oncoming vehicles. The 5-lane asphalt roadway was dry and had a posted speed limit of 55 mph. The decedent was traveling northbound when the incident occurred. The vehicle he was driving struck the first vehicle, and after colliding with this vehicle, struck a second vehicle. The decedent was wearing a seatbelt/shoulder harness. The vehicle's airbags deployed.

Case 84. A male tow truck driver in his 40s died when the flat bed tow truck with a secured vehicle he was driving struck the rear of a semi -tractor trailer which was slowing due to an accident that had just occurred. Both vehicles were traveling westbound in the far right lane on a dry, 3-lane expressway with a posted speed limit of 70 mph. After rear-ending the slowing semi - trailer, the tow truck left the roadway to the left, crossing the left two traffic lanes and striking the median wall. The tow truck traversed down the side of the median wall to its final resting point. The decedent was wearing his seatbelt/shoulder harness at the time of the incident.

Other

Case 85. A male gas station attendant in his teens was positioned behind bullet proof glass at the gas station. Another individual came into the gas station and they were talking and laughing. He mistakenly thought a real gun was a BB gun while playing "Russian roulette" and unbeknownst to him, the gun was loaded and he accidentally shot himself in the head.

Struck By

Case 86. A male farmer in his 60s died from traumatic asphyxia while using a Ford NNA tractor to haul a felled tree through the woods. Evidence at the scene indicated that a tree that was being moved was caught between two trees, which caused the tractor to stop suddenly. The front end of the tractor went up in the air, causing the decedent to fall backwards from the seat. The tractor did not overturn. The decedent landed behind the rear tires and his leg became caught up in the three point hitch and the fender well of the tractor. When he did not return home, family members searched for him. It appeared that the rear tire rolled over him. He was found with the left rear tire resting up against his chest and that the weight from the tractor caused his death. The tractor was not equipped with a rollover protection structure (ROPS).

Case 87. A male small engine repairer in his 20s died while working with a family member on a dairy farm repairing the hydraulic lines of a bobcat style front end loader. The bucket was placed up on a cement wall as they repaired the line. After the repair, the coworker placed the bobcat in reverse and began backing the bobcat while the decedent was standing between the bobcat and the wall. As the bobcat bucket cleared the wall, it immediately came down on its own, striking the decedent. The bobcat then stalled. After restarting, the coworker was able to raise the bucket up off the decedent. Emergency response was called and the decedent was transported to a nearby hospital where he was declared dead.

Case 88. A male self-employed tree farm/salvage and repair owner in his 70s died when he was struck by a tree branch. The decedent was working alone cutting trees in a wood lot. He was

found beneath a tree branch from a recently cut tree. Police indicated that the tree fell opposite from the intended direction causing a branch to break off and strike and pin the decedent.

Case 89. A male logger in his 40s died when the tree he had felled struck his head. The decedent and his son had a contract to fell and harvest trees from a piece of private property. The police report indicated that the tree was almost all the way down, but was hung up in another tree. The decedent told his son to finish dragging the other finished fallen tree out to the wood pile and told his son that the "tree needs to finish falling". His son pulled the tree out of the area using a tractor. He could see his father trimming small branches from this tree. When the son arrived at the wood pile and unhooked the tree, he could not hear the chain saw. Running back to the area, he found his faller under a large branch. His father was unresponsive as he pulled him from under the branch.

Case 89. Male logger struck by falling tree.

Case 90. A male construction worker in his 70s died when was struck by a tree branch from the tree he had felled. Police investigation at the scene indicated the tree that was being cut had fallen to the east and there was an extremely large branch that had possibly struck another tree, broken off, and fallen onto the decedent.

Case 91. A male truck mechanic in his 40s died when a pickup truck fell on him. The decedent was in the process of checking the truck for an oil leak. The truck had been driven up a slight incline and parked with the front wheels on a cement apron surrounding a building. The front wheels were positioned several inches east of a 5-inch deep trench and the back wheels on dirt in a concave-shaped 3-inch trench. There was a consistent elevation decline from the building to the west to allow for water drainage. The decedent started the truck, placed it in neutral, and partially depressed the parking brake. No wheel chocks were used to prevent truck movement. At some point while lying on his back working under the truck, the truck moved backward, with the front wheels entering a 5-inch deep dirt trench. The truck's sway bar and link to the rear of the front axle fell on the decedent's chest, pinning him against the cement. A building employee had left approximately one hour earlier and had noted the truck running. When he returned, the truck was still running, so he looked under the truck. Seeing the decedent, he screamed for help. Emergency response was summoned. A jack was used to raise the truck. The decedent was transported to a local hospital and declared dead. (MIFACE Investigation Report #13MI149)

Case 91. Truck mechanic pinned under pickup truck sway bar.

Case 92. A male township public works laborer in his 50s when one of the walls of an excavation collapsed while he was working on a leaking water main. The township contracted an outside excavation contractor to perform the digging of the excavation. The 6-inch water main had been leaking for approximately 18 hours and was located approximately three feet from and parallel to the north/south roadway edge. The water main remained pressurized and continued to leak water because the crew could not locate a gate valve. A pump was used to control the water entering the excavation. The township-designated competent person, who was also the site foreman, directed the excavator operator to dig the excavation. After the incident, MIOSHA measurements of the excavation found it to be 17-feet long by 5-feet wide (at the top) by 8-feet deep and cut parallel to the roadway. The east side of the excavation (4-inches from the roadway edge) was cut vertically to 8.5 feet in height. The west side of the excavation was cut to 7 feet and was sloped to a 78-degree angle because the township's competent person noted the west side wall slough. The base of the excavation was approximately 4 feet wide. The soil type was backfill/clay and was water saturated because of the leak. The decedent and a coworker (Coworker 1) entered the excavation to clean the leaking water main and found that they needed a larger clamp than what was brought to the site. Both workers exited the excavation and, after discussion with the site foreman, it was decided that the foreman would procure the larger clamp. The decedent re-entered the excavation to continue the cleaning of the main. The foreman directed Coworker 1 and another township worker who was onsite to monitor the sides of the excavation. The decedent was facing west when a 13-foot long by 8.5-foot high by 3-foot thick section of the vertical east wall (including soil from under the roadway) collapsed into the excavation. The soil completely covered the decedent. One of the coworkers called for emergency response and the site foreman. Both coworkers entered the excavation to try to locate and dig out the decedent. The coworkers were able to find him and clear the area around his head. The excavator operator excavated soil from the north side of the trench to allow the water to drain to the north in an attempt to limit the rise of water in the trench. The foreman arrived and the three workers were able to uncover his upper body. Emergency workers were on scene. The decedent was removed from the excavation and transported to a local hospital. He died several days after the incident. A trench box was available but was not used at the time of the incident. (MIFACE Summary 323)

Case 92. Male public works laborer struck by excavation wall collapse.

Case 93. A male general construction laborer in his 50s died when he was struck by a structural steel I-beam/guardrail assembly that fell from a flatbed trailer. The decedent and a coworker from another contractor were in the process of removing the 7-8 tie down straps used to secure a load of five powder-coated steel I-beams, three of which had attached guardrails. The trailer was parked at a bridge project the previous night. The steel had been loaded "standing up" to protect the powder coat. While standing on the ground, the decedent's coworker started to loosen the tie down straps on one side of the flatbed trailer and decedent loosened the straps on the opposite

side. The coworker decided to get on the trailer bed to throw the straps to the other (decedent's) side. The steel beam/guardrail assembly that struck the decedent weighed approximately 1,500 pounds. The I-beam was approximately 21 feet long, 14 inches tall with a flange that was 6-7/8 inches wide and 7/16 inches thick. Welded to the I-beam was a 6-inch by 6-inch piece of angle steel approximately 14 feet 4 inches long off the side of the flange. A steel guardrail was welded onto the angle steel and was approximately 4 feet tall. It consisted of a variety of 3-inch by 6-inch tube steel, 3-inch by 4-inch tube steel and 2-inch by 2-inch tube steel. The decedent was picking up the tie down straps that had just been removed from the load when the I-beam/guardrail assembly became unsteady and fell, striking him on his head and then pinning him at his midsection. The decedent was transported to a local hospital where he later died from his injuries. The decedent's coworker fell off the truck. He was also struck by an I-beam which resulted in a fractured ankle. (MIFACE Summary 346)

Case 94. A male paver/construction laborer in his 40s died due to compressional asphyxia when the raised truck bed on a 1986 Chevrolet utility dump truck he was working under came down and pinned him between the truck bed and truck chassis. The decedent was in the process of installing a new exhaust system prior to installing a remanufactured engine. It appears at the time of the incident, the decedent was installing a muffler. The decedent finished lunch and started to install the muffler. The decedent's coworker, who was in the lunchroom, arrived approximately two minutes later and found the decedent pinned by the dump box. The coworker did not hear any sounds indicating the dump box fell suddenly. The coworker attempted to call for emergency response, but could not do so because of a weak signal. With no engine in the truck and no power to the hydraulics, the coworker attempted to raise the bed using a skid steer, but was unsuccessful. The coworker ran to a nearby business and asked for help with the 911 call, and then returned to the decedent. The coworker tried using a floor jack and 2x4 boards to raise the dump box, but was unable to do so. The decedent was extricated by rescue personnel and transported to a local hospital where he was declared dead. The employer stated that he always required employees to use wood blocks to support the bed when working under it, but at the time the blocks had either been displaced or removed by the deceased. (MIFACE Summary 341)

Case 94. Male paver/construction laborer when the raised 1986 Chevrolet utility dump truck bed he was working under came down and pinned him between the truck bed and truck chassis.

Case 95. A male carpenter/laborer in his 30s died from injuries sustained when a C Pak, 33-degree clipped-head paper-taped, 3-inch by 0.131 smooth nail from a Paslode nail gun, Model F350S entered his eye socket and lodged in his head. The Paslode Model F350S nail gun used by the decedent had been shipped with a sequential trigger, but the trigger had been swapped out with a contact trigger. The decedent was reattaching the entry wall to the garage wall because the entry wall was not square. To do so, he was reaching around the entry wall hanging around the corner using his right hand to hold the wall and his left hand (non-dominant) to hold the nail

gun to nail inside of the wall joists back toward his body. He was not wearing any eye protection. His coworkers heard the nail gun being used. Suddenly, the decedent was observed on the ground. The decedent got up and walked a few feet to his coworkers, told them to call for emergency response, and then collapsed. The decedent was transported to a local hospital where he died several days later. After the incident, a nail was found to be partially embedded in one of the entry wall studs. This could have been the result of a "double tap" or a nail that had not been removed from the stud as the wall was being repositioned. Either scenario may have caused the decedent to lose control of the gun. There was a mark on the stud directly next to the decedent's left hand from the base of the 13.5-inch-long nail gun. When the gun struck the stud, the decedent may have pressed the trigger, and since his head was directly in the line of fire, and because he was not wearing appropriate eye protection, the nail entered his eye socket and lodged in his head. (MIFACE Summary 324)

Case 96. A male die setter in his 40s died when he was struck by a falling 6,800 pound die. The decedent utilized a 12-ton capacity overhead bridge crane to perform a straight lift using one leg of a four legged sling. The die being transported had standard 1-inch tap holes. The hook of the single leg was hooked to a single M24 eyebolt that was set in the 1-inch hole. The sling, which was in good condition, was rated at 90 degrees for a lift up to 18,100 pounds. The decedent, who was working alone, had lifted the die and moved it across five dies to a narrow aisle way between dies. The decedent was positioned between the suspended load and a die located on the floor when the M24 eyebolt stripped out of the hole causing the die to fall and strike the decedent's head and chest. The fall of the die was attributed to insufficient thread contact between the M24 eyebolt and the 1-inch hole. Employees working in adjacent areas heard the crash and ran to the incident site. Emergency response was called. The decedent was declared dead at the scene. (MIFACE Summary 331)

Case 97. A female assembler at a manufacturing facility in her 50s was injured in 1990 when crates of heavy metal car parts were dropped on her, severing her spinal cord. She died from complications of this injury in 2013.

Case 98. A male temporary worker in his 40s, who was assigned crane operator duties, died when steel beams fell from a stack and crushed his pelvis. He had been "in training" for 2-3 weeks working under the direction of an experienced employee. The decedent was in the process of "picking an order" when the incident occurred. The decedent did not have a crane operator permit. The incident area was a bay with several aisles separated by stacks of steel I-beams that measured 35 feet long by 8 inches wide by 7 inches tall. Each beam weighed approximately 980 pounds. The decedent was working alone. The decedent was wearing a radio pendant, which operated one of the two cranes in the area. The sequence of events was unknown. Based on his coworkers' interview statements, it appeared the decedent walked on the stack of beams instead of the floor. An employee walking by the bay heard a noise, and looked over to the location of the sound. He saw the decedent grabbing at a beam, perhaps to regain his balance. It appeared that this action caused four beams to fall. The I-beams landed on his back and legs, pinning him against the stack. The sling chains for the crane which had been operated by the decedent's remote pendant were not moving, which indicated that a sling or rigging failure did not cause the beams to fall onto him. The employee activated the facility's emergency procedure. Because the crane used by the decedent was located above him and the remote pendant was unable to be

accessed due to the decedent's position against the I-beam stack, a second crane in the area was used to push the crane away and lift the I-beams from the decedent. Emergency response transported the decedent to a local hospital where he was declared dead. (MIFACE Summary 321)

Case 99. A male truck mechanic in his 60s died when he was run over by a semi-tractor in a truck parking area. The decedent had been operating a yard switcher, a vehicle used to move trailers in the lot. With the decedent inside of the switcher, Driver 1 was conducting safety checks of his semi tractor-trailer. Driver 2 backed his tractor trailer to the east of Driver 1's trailer. There were only a few feet between the two trailers. Driver 2 exited his cab with the engine running, unlocked his semi's 5th wheel, and returned to his cab. Driver 2 saw the decedent in the driver's seat of the switcher. At some point, the decedent exited the switcher by the rear stairs. Driver 2 pulled forward away from the parked trailer and started turning left. After driving forward approximately five feet he saw through his window the decedent lying on the ground, waving for help. Driver 2 immediately stopped his truck and exited the cab to provide aid. Driver 1 ran to the trucking office to request emergency response. The decedent was found with a claw hammer nearby. The police report indicated the semi's second axle, passenger side, inside tire ran over the decedent.

Case 100. A male truck driver in his 40s died when he was struck by a semi-tractor while in the parking lot of the shipping terminal. The decedent had been working on the dock and then reassigned to the grounds job to placard trailers. He was instructed to meet another employee. When he went to the yard he did not have his high-visibility vest or truck keys because he was new and did not have a locker in the facility to store his gear. His supervisor gave him permission to get his gear from his vehicle, which was parked in an employee parking lot. A coworker observed him walking across incoming/outgoing lanes of the main entrance to the terminal/ terminal truck parking lot to get to his vehicle rather than using the designated walkway, which was not conveniently located, to the employee parking lot. It was dark and raining at the time of the incident. The decedent was wearing dark-colored clothing. He may have had his head down and his hands over his face due to lighting a cigarette. The driver that struck him had hooked up a trailer located on the east side of the main building and did not know if it needed to be placarded. The driver drove the truck around the facility looking for a grounds person to ask about placarding the truck. Normally the driver would radio the grounds personnel for placarding information, but he did not have a functioning radio. As he was driving, he struck the decedent with the right front bumper of the truck. The decedent was found by a coworker lying in the incoming lane to the terminal. Emergency response was called and the decedent was declared dead at the scene. (MIFACE Summary 335)

Case 101. A female bus driver in her 40s died when she was run over by her bus while attempting to re-enter the bus as it moved forward in a parking lot. The decedent arrived at her last stop on the north end of her bus run and drove her bus into the parking lot. The bus faced east and was positioned near the top of a slight downward slope in the parking lot. The bus wheels were turned to the right. The decedent opened the front bus door and the only passenger on the bus de-boarded. The back door of the bus was closed when the decedent de-boarded after the passenger. The bus transmission was in Drive. The decedent did not set the parking brake. The back door was closed - if the back door was open, the bus would not move. After she de-

boarded, the bus began to move forward and the front door closed. In an attempt to stop the moving bus, she ran alongside it and tried to place her hands between the front door flaps to push the doors apart so she could re-board the bus. The front wheels of the bus ran over her foot and up her leg, causing her to fall down. A bystander attempted to move her away from the path of the bus, but was unsuccessful. As the bus continued to move forward, the rear wheels ran over her. Witnesses called for emergency response. The bus stopped after colliding with two parked, unoccupied vehicles. The decedent was transported to a local hospital by ambulance and was declared dead at the hospital. (MIFACE Investigation Report #13MI019)

Case 101. Female bus driver struck by her bus as she was attempting to stop it from moving.

Case 102. A male private airport manager in his 80s died when the homemade drag he was using to level the ground "flipped up" and struck him in the head. The decedent was operating an older model, narrow front Allis-Chalmers tractor. The tractor was not equipped with a rollover protection structure (ROPS). Attached to the rear of the tractor was a home-made drag. The decedent had constructed the drag using two 4-inch by 6-inch by 14-foot treated wood posts attached to four 8-foot channel-style steel beams and one shorter middle channel-style steel beam. The drag was attached to the lift arms of the tractor's three-point hitch. At the second steel beam, the decedent had attached a screw-in bolt in the wood, attached the chain to the bolt, and the chain to each lift arm. At some point during the leveling of the soil, the drag caught on something on the ground and "flipped" up, coming to rest upright against the back of the tractor. One of the drag's steel beams struck the decedent's head. Police indicate it appeared the tractor stopped immediately. When the decedent was found, the tractor was still running. Emergency response was called and he was declared dead at the scene. (MIFACE Investigation Report #13MI102)

Case 103. A male transport driver for an oil company in his 40s died while conducting contracted tree cutting activities. The decedent had been contracted by a farmer to clear brush around the ditch line of a field. He had indicated to a friend that he was not going to be using the chainsaw that day, simply clearing brush. The decedent was pinned under the tree he had had felled with a chainsaw. When he did not return home, family members contacted the decedent's friends who went looking for him. They found him pinned under the tree. Using the decedent's chain saw, they cut the tree and lifted if off of him prior to emergency responders arriving. There was no brush in the decedent's truck, which was parked nearby.

Case 104. A male church volunteer in his 60s died while clearing snow from a parking lot. The decedent was using a Ford Bronco equipped with a plow blade. Witnesses observed him plowing the snow, and after approximately a half hour, saw the decedent working under the raised hood of the truck. Approximately twenty minutes later, the witness saw the decedent under the truck

and the truck running. When he arrived at the incident scene, he could see that the individual was deceased. Emergency responders found the truck running and in reverse. The decedent was partially under the passenger side front tire and had a red handle screwdriver near his right hand. The tire on the truck was up against the left side of the decedent's head. It appeared that the tire had pulled on the decedent's coat and the coat asphyxiated him. When the truck was being removed from the incident scene, it was found that the plow would not move up or down.

Case 105. A male truck driver in his 30s died when he was crushed by an empty 40 yard, 5 ton scrap metal box from a Benlee Dunright tilt frame semi-trailer he was unloading from his truck. The wire rope used to load and unload the box was not attached to the box and was rewound on the winch spool and attached to the securing C hook on the trailer. This was an unwitnessed incident. The decedent's sunglasses were found under the box. It is hypothesized that his sunglasses fell under the box and that he may have been reaching under the box to retrieve his sunglasses while it was still sitting on the tilt frame end (stinger). While reaching under the box, the box came off the stinger and landed on top of him. The decedent was found by a fellow employee operating a front end loader. After getting help, the loader operator attached chains to the bucket and lifted the box from the decedent as his coworkers moved the decedent from under the container. Emergency response arrived and he was declared dead at the scene.

Case 106. A male scraper in the construction business in his 30s died when he was at a junkyard. The decedent was a pedestrian in the junk yard. A witness observed him attempt to stop a rolling van by standing behind it. The vehicle continued to move and ran over him.

Case 107. A female babysitter in her 40s died while attempting to steer/stop her stalled vehicle. The decedent's vehicle ran out of gas just after entering a parking garage. The parking garage gate had closed behind her. She exited her vehicle and started pushing the vehicle out of the entrance area so other vehicles could enter. She attempted to restart the vehicle; the vehicle did not start. While on the driver's side, with the driver's side door open, and with her right hand on the steering wheel, she stood outside of the vehicle between the open door and the driver's door jamb, and began to push the vehicle toward a marked open parking space. There was a slight downhill grade toward the open parking space. It appears the vehicle began accelerating down the grade more quickly than she believed it would. The driver's side of her vehicle came into contact with the passenger side of a parked vehicle, causing the vehicle's driver's side door to shut, pinning her between the closed door and the door jam. A passerby called for emergency response. The decedent was transported to a local hospital where she was declared dead.

Case 108. A male motocross racer in his 30s died as a result of a collision that occurred during the race. Witnesses indicate as the decedent started up a hill, he was traveling at a high rate of speed. He hit the tire of a motorcycle in front of him causing him to go over the handlebars. The decedent was wearing a helmet and other protective gear. He died several weeks later in the hospital.

Case 109. A male hunt club member in his 70s died when the top portion of a tree he had felled broke off and came back toward him, striking his head/face. The tree diameter was estimated at six to eight inches. The height of the tree was unknown. The decedent was not wearing any personal protective equipment. The decedent started up his generator in the back of his pickup

parked approximately six feet from a two-track road to power his Craftsman 16-inch, 3.5 HP electric chainsaw. Police pictures show that the tree fell directly toward another tree. As it was falling, the top portion of the tree broke away, presumably when the top of the tree struck a tree in its path, and came back toward him and struck his head. The actions of the decedent just prior to being struck by the top of the tree were unknown. After placing a deer camera, a hunt club member who had spoken with the decedent approximately 10 minutes earlier, came back down the two-track but did not see him. He went to look for him and saw the decedent lying on his back near the stump of the tree he had just felled. He called for emergency response. He was declared dead at the scene. (MIFACE Investigation Report #13MI197)

Suicide

Case 110. A male farmer in his 70s died from a self-inflicted gunshot wound.

Case 111. A male farmer in his 40s died from a self-inflicted hanging.

Case 112. A male designer at an engineering firm in his 50s died from a self-inflicted gunshot wound.

Case 113. A male electrician in his 50s died from a self-inflicted gunshot wound.

Case 114. A male co-owner of a garage door and repair company in his 70s died from a self-inflicted gunshot wound.

Case 115. A female plastics manufacturing scheduler in her 40s died from a self-inflicted hanging.

Case 116. A male company president in his 70s died from a self-inflicted gunshot wound.

Case 117. A male export specialist in his 40s died from a self-inflicted gunshot wound.

Case 118. A male glass cutter and auto parts laborer in his 30s died from a self-inflicted hanging.

Case 119. A male carpet layer in his 40s died from a self-inflicted hanging.

Case 120. A male bike mechanic in his 30s died from a self-inflicted hanging.

Case 121. A female co-owner of an auction firm in her 20s died from a self-inflicted gunshot wound.

Case 122. A male truck driver in his 50s died from self-inflicted thermal burns.

Case 123. A male truck driver in his 40s died from a self-inflicted gunshot wound.

Case 124. A male owner of a security firm in his 60s died from a self-inflicted gunshot wound.

Case 125. A male rental property owner in his 80s died from a self-inflicted gunshot wound.

Case 126. A male storage rental unit manager in his 40s died from a self-inflicted overexposure to carbon monoxide.

Case 127. A male pathology assistant in his 60s died from a self-inflicted jump from a building.

Case 128. A male manager of a physical therapy outpatient facility in his 30s died from a self-inflicted gunshot wound.

Case 129. A male ophthalmologist in his 50s died from a self-inflicted gunshot wound.

Case 130. A female barmaid in her 20s died from a self-inflicted gunshot wound.

Case 131. A male certified auto mechanic/owner of an auto service store in his 40s died from a self-inflicted overexposure to carbon monoxide.

Toxic Exposure

Case 132. A male graduate student in his 20s died due to cyanide poisoning.

Unknown

Case 133. A male general laborer was crushed in an industrial accident in 1976 while working in the transportation industry. He received traumatic brain injury, crushing injuries to the chest and left lower extremity which required above the knee amputation. He was treated for these injuries and became disabled at the time of the injuries. He died in 2013 in his 60s from transfusion acquired hepatitis as a complication of the injuries received in the industrial accident.

Case 134. A male electrician sustained a closed head injury at work in 1972. He died from complications of that injury in 2013 in his 60s.