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2021 ANNUAL REPORT

Tracking Work-Related Deaths in Michigan

MICHIGAN
State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824
1-517-353-1846 • https://oem.msu.edu

FACE

2021 Annual Report

Tracking Work-Related Deaths in Michigan

A Joint Report
of
Michigan State University
Department of Medicine
909 Wilson Road, Room 117 West Fee
East Lansing, Michigan 48824-1315
(517) 353-1846

Laurel Harduar Morano, PhD, MPH

Kenneth D. Rosenman, MD

Adrianna Baker, DHSc, MPH (Contributor)

and

Michigan Department of Labor and Economic Opportunity
(LEO)
Michigan Occupational Safety and Health Administration
(MIOSHA)
P.O Box 30643
Lansing MI 48909
Barton G. Pickelman, Director

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Executive Summary

The Division of Occupational and Environmental Medicine (OEM) at Michigan State University (MSU) began tracking work-related fatalities in the state of Michigan in January 2001. This is the 21st annual Michigan Fatality Assessment and Control Evaluation (MIFACE) report on acute traumatic work-related deaths in Michigan. There were **140 work-related deaths in 2021**, an increase of 9 deaths compared to 2020. There were 138 separate incidents representing 138 separate employers. A narrative summary of each work-related fatality is in Appendix I. MIFACE educational material, including on-site Investigation Reports, Summaries of MIOSHA Investigations, and Hazard Alerts are located on the MIFACE webpage on the Michigan State University Division of Occupational & Environmental Medicine (MSU OEM) website. Key findings for 2021:

- The number of work-related deaths (140) in 2021 was increased compared to 2020 (131 work-related deaths). The 2021 fatal injury rate of 3.1 deaths per 100,000 workers increased from 3.0 deaths per 100,000 workers in 2020.

- Although not directly comparable, the *overall* rate of work-related deaths in Michigan is lower than the rate in the United States (3.6 deaths/100,000 full-time equivalent [FTE]s).

- The industry sector with the highest employment-based industry rate was Mining (40.8 deaths/100,000 workers), followed by Agriculture, Forestry, Fishing & Hunting (23.1 deaths/100,000 workers) and then Construction (16.5/100,000 workers). Construction had the largest number of work-related deaths (29 deaths, 20.7% of all fatalities).

- Motor vehicle crashes by incidents were the leading cause of work-related death (24 deaths, 17.3%), followed by struck by (22 deaths, 15.8%), and falls (21 deaths, 15.1%).

- By occupational group, Transportation and Material Moving had the largest number of work-related deaths (29 deaths, 20.7%) followed by Construction & Extraction (25, 17.9%) and Management (25, 17.9%).

- Forty-five of Michigan's 83 counties (54%) had a work-related death. Wayne County had the highest number of deaths at 21 (15.0%), followed by Kent with 12 deaths (8.6%), Washtenaw with 7 deaths (5.0%), and 6 deaths each in Calhoun, Ingham, and Oakland (4.3%).

- Of the 140 work-related fatalities, 34 (24.3%) were MIOSHA program-related and were investigated by a MIOSHA compliance officer.

Definitions

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

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

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

(1) ON the employer's premises and person is there to work; or

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

Incidence means the number of new cases of an illness, injury, or other health-related event that commence during a specified 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 the Department of Licensing and Regulatory Affairs (LARA) (now LEO) and then from the National Institute for Occupational Safety and Health (NIOSH). This is a joint project of LEO/MIOSHA and MSU OEM.

The purpose of the MIFACE tracking project is three-fold:

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

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

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

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

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

Methods

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

IDENTIFY INDIVIDUALS

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

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

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

GATHER INFORMATION

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

CONTACT EMPLOYER/FARM FAMILY

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

MIFACE SITE VISIT

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

MIFACE FOLLOW-UP ACTIVITIES

◊ **Identify Stakeholders**
- Internet search for similar companies and/or trade groups

◊ **Update Database**
- Information collected from each site visit and statewide tracking entered into a database

◊ **Analyze Data**
- Annual Report developed analyzing and discussing data

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

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

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

For many of 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 Administration (MIOSHA) rules and regulations and did not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE accompanied the MIOSHA compliance officer with employer agreement. In addition, MIFACE interviewed the compliance officers about their investigation.

Results

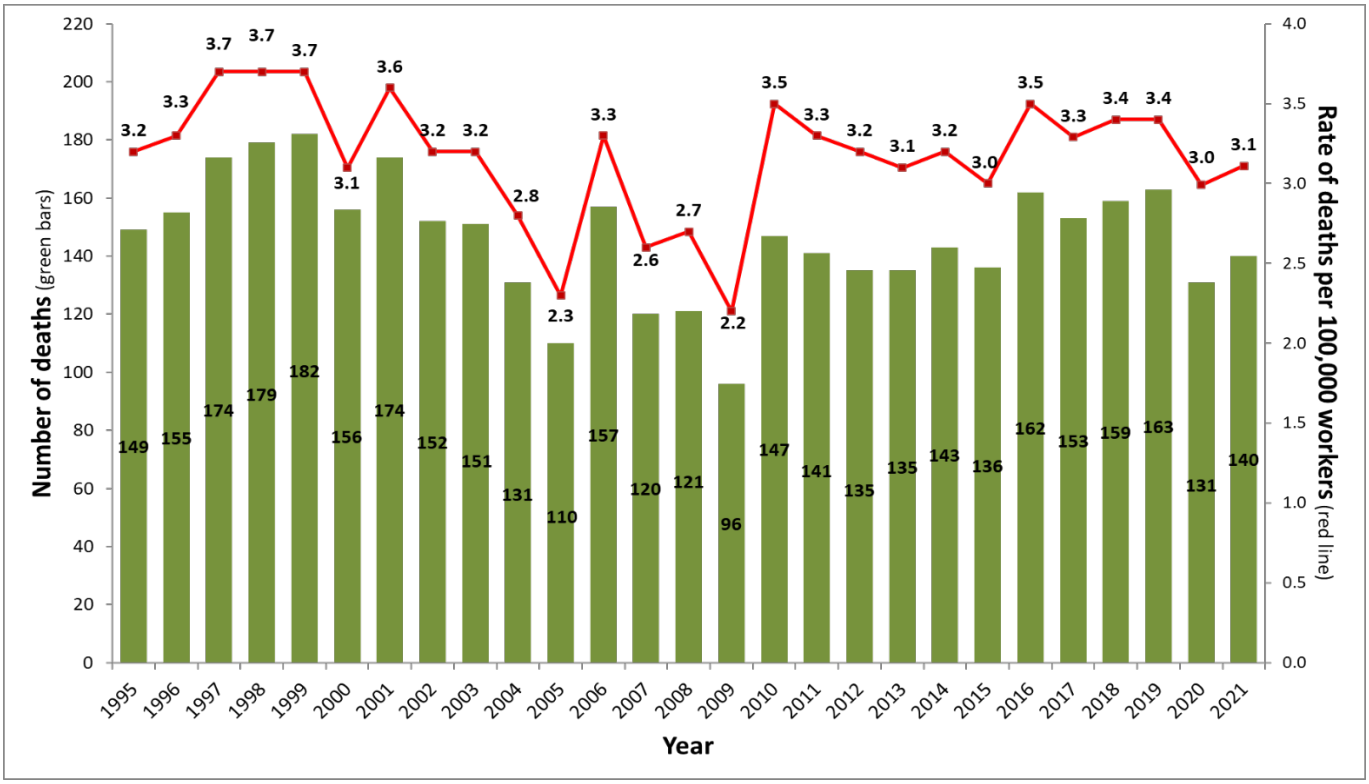
There were 140 acute traumatic work-related fatalities in 2021. One hundred thirty-six (97.1%) of the 140 work-related traumatic incidents occurred in 2021. Below is a description of the four individuals who died in 2021 due to complications from a work-related injury sustained in a previous year:

- A male in his early 60's died due to complications related to a closed head injury sustained 35 years prior.
- A male manufacturing line worker in his mid-70's fell at his workplace in 1987. He died from complications of the injuries he sustained in 1987.
- A male in his late 20's died from complications related to being kicked in the head by a horse several years prior.
- A male farmer in his mid-70's died due to complications from an injury he sustained the winter of 2020. A sheriff responding to a call of cows running loose found the decedent lying in his field, near the gate of the pasture. The decedent showed signs of a traumatic head injury consistent with being kicked by a bull. The incident was not witnessed.

The 140 individuals who died had 138 different employers and comprised 138 separate incidents. A pilot and pilot in training died in an aircraft crash and two contractors died during the same incident.

Figure 1 shows the number of acute traumatic work-related deaths and incidence rate per year in Michigan since 1995. Incidence rates shown from 1995 to 2000 were obtained from the BLS website. Rates since 2001 were determined from MIFACE statistics.

Figure 1. Number and Incidence Rate of Work-Related Fatalities in Michigan, 1995–2021



Demographics

Table 1 shows the demographic characteristics of the 140 traumatic work-related fatalities in Michigan in 2021. Demographic characteristics were obtained from the individual's death certificate.

Race

Of the 127 males who died, 101 were White, 17 were Black, five were Hispanic, two were Arab, one American Indian/Alaskan Native, and one listed their race/ethnicity as other. Eleven White women and two Black women died in a work-related incident.

Age

The age at time of death ranged from 10 to 85 years. The average age was 48.8 years, a slight decrease from 50.3 years of age in 2020. For men, the ages ranged from 10 to 85 years, and for women, the ages ranged from 19 to 75 years. The average age for men at the time of death was 49.5 years; for women, it was 41.6 years.

Twenty-one individuals were 66 years of age or older when they died in 2021 compared to the 26 individuals who died in 2020. The average age at time of death for these individuals was 74.0 years and included 20 men and one woman. Seven (33.3%) of the 21 individuals aged 66 years or older died due to a fall, 6 (28.6%) due to a machine-related incident, 3 (14.3%) were stuck by an object, 3 (14.3%) due to asphyxiation, 1 (4.8%) due to suicide, and 1 (4.8%) due to an animal incident.

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

Nationally, the hours-based fatal work injury rate per 100,000 full-time-equivalent (FTE) workers for individuals aged 65 and over was 8.4. Although not directly comparable, Michigan's employment-based fatality rate for workers aged 65 and over was 8.2 deaths

Table 1. Demographic Characteristics of 140 Work-Related Fatalities, Michigan 2021

Demographic Characteristic*	Number	Percent
Sex		
Male	127	90.7
Female	13	9.3
Race/Ethnicity		
White	115	82.1
Black	19	13.6
Hispanic	2	1.4
Arab	2	1.4
Other	1	0.7
American Indian / Alaska Native	1	0.7
Multi-racial	0	0
Education		
Less than High School	32	22.9
High School Graduate	52	37.1
GED	43	30.7
Some College (1-4 years)	3	2.1
Post College (5+ years)	4	2.9
Vocational School	2	1.4
Specialized Training	2	1.4
Not Provided	2	1.4
Age		
<20	6	4.3
20-29	10	7.1
30-39	29	20.7
40-49	29	20.7
50-59	25	17.9
60-69	27	19.3
70-79	9	6.4
80-89	5	3.6
≤90	0	0
Country of Origin		
United States	136	97.1
Honduras	1	0.7
Iraq	1	0.7
Romania	1	0.7
Yemen	1	0.7
Totals	**140**	100

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

per 100,000 workers in 2021. While the percentage of individuals 65 years of age and older who were employed (16.5%) was smaller than other age categories, this age group had the highest fatality rate of all age groups (**Table 3**).

Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2021

Industry Sector (NAICS Code)	**0-17**	**18-65**	**65+**	**Total**
	Number (%)	**Number (%)**	**Number (%)**	
Agriculture, Forestry, Fishing & Hunting (11)	1 (5)	7 (35)	12 (60)	**20**
Mining (21)	--	1 (50)	1 (50)	**2**
Utilities (22)	--	2 (100)	--	**2**
Construction (23)	1 (3)	28 (97)	--	**29**
Manufacturing (31-33)	--	14 (82)	3 (18)	**17**
Wholesale Trade (42)	--	1 (50)	1 (50)	**2**
Retail Trade (44-45)	--	5 (100)	--	**5**
Transportation & Warehousing (48-49)	--	20 (91)	2 (9)	**22**
Information (51)	--	--	--	**0**
Real Estate & Rental & Leasing (53)	--	1 (100)	--	**1**
Professional/Science/Technology (54)	--	2 (67)	1 (33)	**3**
Administrative & Support & Waste Management & Remediation Services (56)	--	13 (93)	1 (7)	**14**
Educational Services (61)	--	2 (67)	1 (33)	**3**
Health Care & Social Assistance (62)	--	3 (100)	--	**3**
Arts, Entertainment & Recreation (71)	--	2 (50)	2 (50)	**4**
Accommodation & Food Services (72)	--	5 (100)	--	**5**
Other Services (except Public Administration) (81)	--	6 (86)	1 (14)	**7**
Public Administration (92)	--	1 (100)	--	**1**
Totals	**2 (1.4)**	**113 (80.7)**	**25 (17.9)**	**140**

Table 3. Employment Number, Percent of the Civilian Non-institutional Population Employed and Fatality Rate by Age Group, Michigan 2021

Age Range (in years)	Employment		Number of Deaths	Fatality Rate (per 100,000 workers)
	Number employed	Percent of the civilian non-institutionalized population that is employed		
15	*	*	1	--
16-19	173,000	33.8	5	2.9
20-24	408,000	65.4	6	1.5
25-34	993,000	75.0	17	1.7
35-44	910,000	76.6	29	3.2
45-54	961,000	76.2	24	2.5
55-64	721,000	55.1	33	4.6
65 and older	306,000	16.5	25	8.2

[a] Employment by age from the BLS Local Area Unemployment state specific report.
*No data available

Geographic Distribution

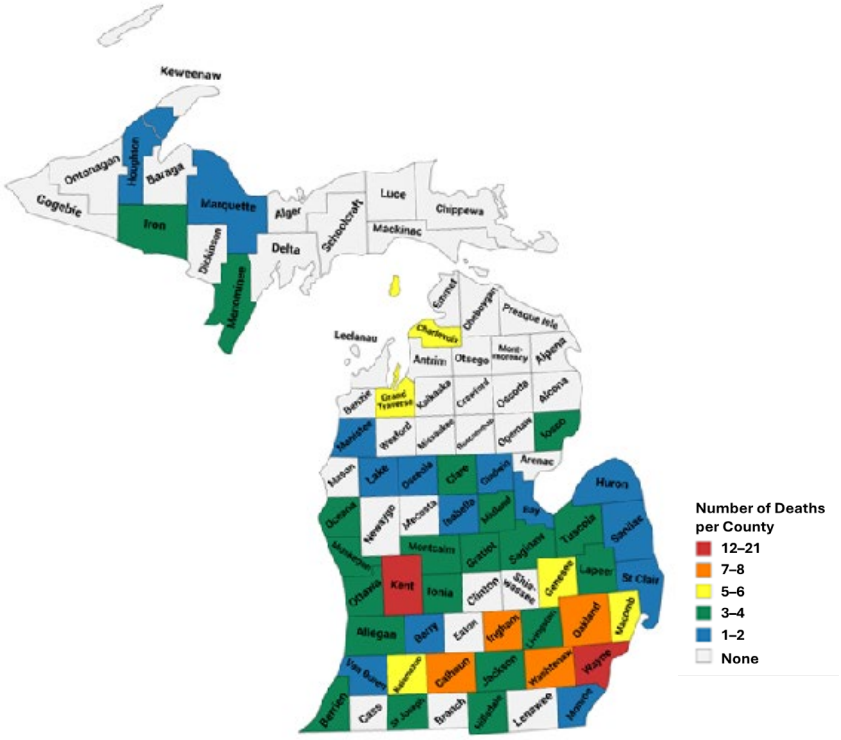
Forty-five (54%) of the 83 Michigan counties had at least one work-related injury that led to the death of the worker **(Figure 2** and **Table 4)**.

Table 4. County of Fatal Work-Related Injury, Michigan 2021

County	Number	(%)	County	Number	(%)	County	Number	(%)	County	Number	(%)
Alcona	--	--	Dickinson	--	--	Lake	1	0.7	Oceana	2	1.4
Alger	--	--	Eaton	--	--	Lapeer	2	1.4	Ogemaw	--	--
Allegan	3	2.1	Emmet	--	--	Leelanau	--	--	Ontonagon	--	--
Alpena	--	-	Genesee	4	2.9	Lenawee	--	--	Osceola	1	0.7
Antrim	--	--	Gladwin	1	0.7	Livingston	2	1.4	Oscoda	--	--
Arenac	--	--	Gogebic	--	--	Luce	--	--	Otsego	--	--
Baraga	--	--	Grand Traverse	5	3.6	Mackinac	--	--	Ottawa	3	2.1
Barry	1	0.7	Gratiot	2	1.4	Macomb	4	2.9	Presque Isle	--	--
Bay	1	0.7	Hillsdale	3	2.1	Manistee	1	0.7	Roscommon	--	--
Benzie	--	--	Houghton	1	0.7	Marquette	1	0.7	Saginaw	2	1.4
Berrien	2	1.4	Huron	1	0.7	Mason	--	--	St. Clair	1	0.7
Branch	--	--	Ingham	6	4.3	Mecosta	--	--	St. Joseph	2	1.4
Calhoun	6	4.3	Ionia	3	2.1	Menominee	2	1.4	Sanilac	1	0.7
Cass	--	--	Iosco	2	1.4	Midland	2	1.4	Schoolcraft	--	--
Charlevoix	4	2.9	Iron	2	1.4	Missaukee	--	--	Shiawassee	--	--
Cheboygan	--	--	Isabella	1	0.7	Monroe	1	0.7	Tuscola	3	2.1
Chippewa	--	--	Jackson	3	2.1	Montcalm	3	2.1	Van Buren	1	0.7
Clare	2	1.4	Kalamazoo	4	2.9	Montmorency	--	--	Washtenaw	7	5
Clinton	--	--	Kalkaska	--	--	Muskegon	2	1.4	Wayne	21	15
Crawford	--	--	Kent	12	8.6	Newaygo	--	--	Wexford	--	--
Delta	--	--	Keweenaw	--	--	Oakland	6	4.3	Unknown	--	--

Collectively, the three southeast Michigan counties of Macomb, Oakland, and Wayne, comprising the Detroit Tri-County area, had 31 (22.1%) of all work-related deaths. Wayne County had the highest number of deaths (21 deaths, 15%), followed by Kent (12 deaths, 8.6%), Washtenaw (7 deaths, 5%), and Calhoun, Ingham, and Oakland (6 deaths each, 4.3%).

Figure 2. County of Fatal Work-Related Injury, Michigan



Occupation

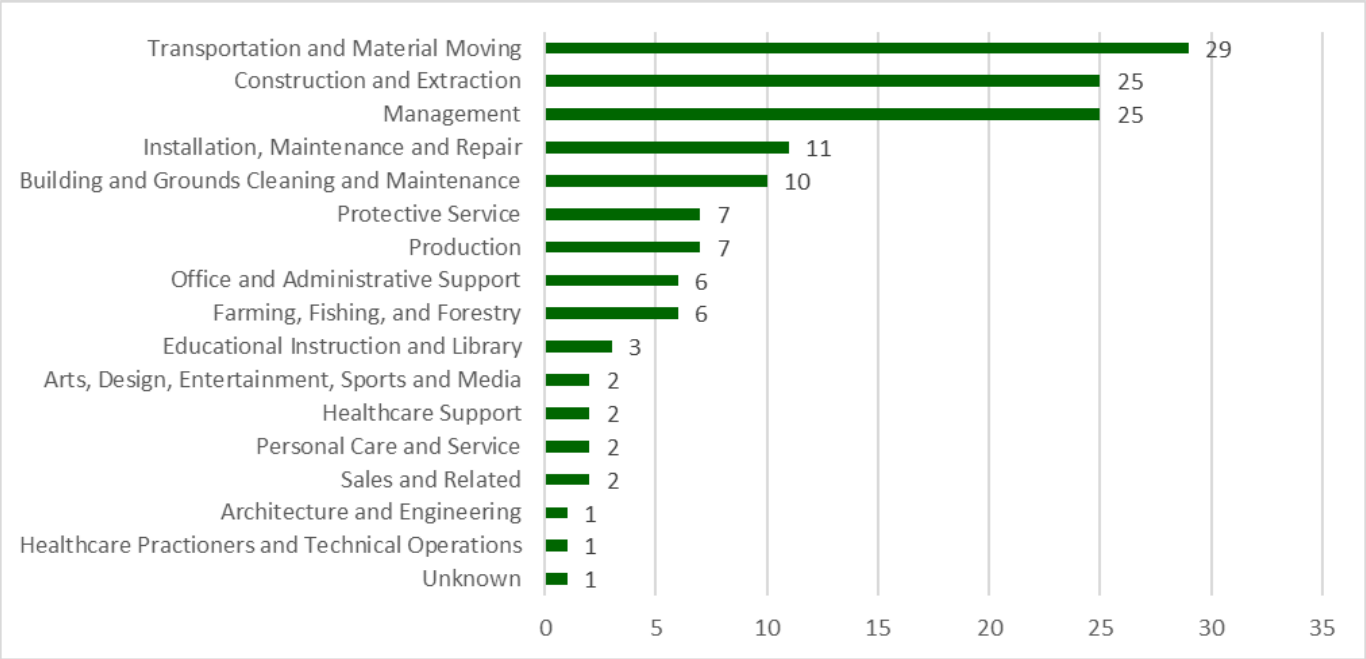
Among the 140 deaths, **Figure 3** shows the occupation distribution of the 139 work-related deaths with known occupation utilizing the 2018 Standard Occupational Classification (SOC) categories. Occupation was determined from the reporting source data. The SOC categories are divided into 23 major groups. These major groups 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 Transportation and Material Moving group had the largest number of deaths at 29 (20.7%). Transportation and Material Moving occupations are varied, such as air traffic controllers, airline and commercial pilots, bus drivers, delivery truck drivers and driver/sales workers, flight attendants, hand laborers and material movers, heavy and tractor-trailer truck drivers, material moving machine operators, railroad workers, taxi drivers, shuttle drivers, and chauffeurs and water transportation workers.

Two occupations had the second highest number of deaths; the Construction & Extraction occupations at 25 (25, 17.9%) and Management occupations (25 deaths, 17.9%). Installation, Maintenance and Repair occupations (11 deaths, 7.9%) had the third highest number of deaths.

Seven of the 23 SOC major groups did not have a death in 2021: Business & Financial Operations, Computer & Mathematical, Food Preparation & Service, Life, Physical, & Social Science, Legal, Community & Social Services, and Military Specific Occupations.

Figure 2. Number of Deaths by Standard Occupational Classification (SOC), Michigan 2021



Working Status of the Decedent

The 140 individuals who died had 138 different employers. The employer/employee status was known for 132 of the 140 (94.3%) work-related deaths. Ninety-nine (70.7%) individuals were employees with three of those individuals known to be a temporary/contract worker. Twenty-nine (20.7%) were self-employed or the owner/co-owner of the business and four (2.9%) individuals were volunteer workers. Eight individuals (5.7%) were listed as unknown.

The decedent was working alone in 73 (52.1%) incidents, with a co-worker in 59 (42.1%) incidents and the work status was unknown in 8 (5.7%) incidents. For the 11 homicides, the decedent was working alone in seven (63.6%) incidents and with a co-worker in three (27.3%) incidents. For one homicide, it was unknown if the decedent was working alone or with a co-worker at the time of the incident.

Illegal Drug/Alcohol/Medication Use

Of the 118 individuals whose death was not a suicide (8 deaths) or a drug overdose (14 deaths), 37 (31.4%) individuals had detectable levels of alcohol, marijuana, illegal drugs or medications in their system. Twenty-four (64.9%, 20.3% of total non-suicide/drug overdose deaths) of these in turn had levels that were considered on review to possibly have contributed to the fatal incident (**Table 5**).

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

Table 5. Type of Work-Related Fatal Incident and Drug Found in Toxicological Analysis Among 24 Individuals Where the Substance Detected was Considered a Possible Contributor to the Individual's Death, Michigan 2021

Incident Type	Blood Alcohol Content (%)	Prescription	Marijuana, Cocaine, Heroin &/or metabolites	Other Illegal	Unknown Prescription/ Non- Prescription
Asphyxiation		Amlodipine	Marijuana		Naloxone
Asphyxiation		Amphetamine, Alprazolam			
Electrocution		Venlafaxine, O-Desmethylvenlafaxine	Marijuana		
Fall		Hydromorphone, Dihydrocodeine, Cyclobenzaprine			
Fall		Lorazepam			Methadone
Fire / Explosion	0.233	Cotinine, Pseudoephedrine, Amphetamine			
Homicide / Assault			Cocaine		
Machine			Marijuana		
Machine					Fentanyl
Machine		Opiates			
Motor Vehicle			Cocaine	MDMA	
Motor Vehicle			Heroin		
Motor Vehicle			Marijuana	Methamphetamine	Amphetamine, Hydrocdone-Free
Motor Vehicle		Lorazepam, Buprenorphine-Free, Norbuprenorphine-Free			
Motor Vehicle	0.104		Marijuana		
Motor Vehicle					Opiates, Fentanyl
Struck-By	0.21		Marijuana		
Struck-By			Marijuana		
Struck-By	0.244	Desmethylsertraline		Methamphetamine	Amphetamine
Struck-By			Marijuana		
Struck-By			Marijuana		
Struck-By			Marijuana		
Unknown		Lidocaine, Propofol, Etomidate			Fentanyl

Work-Related Fatality Incidence Rates by Industry

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

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

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

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

The number of hours worked was not available for several industry sectors. When provided, MIFACE calculated the hours-based work-related fatality incidence rate (See **Table 6**).

Michigan data shows that in industry sectors with many 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 or lower than the employment-based incidence rate, such as in Construction and Manufacturing.

Industry Highlights, Michigan 2021

Table 6 shows the number of traumatic work-related fatalities and Michigan's annual incidence rate by industry sector for number of employees and hours worked.

Highlights from Table 6

Six industry sectors had fewer work-related deaths and a lower employment-based incidence rate in 2021 compared to 2020:

Industry	Decrease in Number of Deaths from 2020	Number of 2021 WR Deaths	2021 Incidence Rate	Number of 2020 WR Deaths	2020 Incidence Rate
Agriculture	5	20	23.1	25	29.1
Other Services	2	7	5.7	9	7.9
Public Administration	9	1	0.4	10	3.9
Retail Trade	3	5	1.1	8	1.9
Real Estate & Rental & Leasing	2	1	1.9	3	5.9
Wholesale Trade	3	2	1.2	5	3.1

Eight industry sectors had a higher number of work-related deaths and a higher employment-based incidence rate in 2021 compared to 2020:

Industry	Increase in Number of Deaths from 2020	Number of 2021 WR Deaths	2021 Incidence Rate	Number of 2020 WR Deaths	2020 Incidence Rate
Accommodation & Food Services	4	5	1.6	1	0.3
Admin & Support & Waste & Remediation	6	14	5.4	8	3.3
Construction	4	29	16.5	25	15.2
Manufacturing	4	17	2.9	13	2.3
Mining	1	2	40.8	1	20.5
Professional, Scientific, & Technical Services	3	3	1.0	--	--
Transportation & Warehousing	9	22	13.5	13	8.3
Utilities	2	2	9.7	--	--

Three industry sectors had the same number of work-related deaths in 2021 compared to 2020 (although the Incidence Rate varies due to fluctuating levels of employment):

Industry	Number 2020 & 2021 WR Deaths	Incidence Rate 2021	Incidence Rate 2020
Arts, Entertainment & Recreation	4	9.4	11.2
Educational Services	3	0.9	0.9
Healthcare & Social Assistance	3	0.5	0.5

The industry sector with the highest employment-based industry rate was Mining (40.8 deaths/100,000 workers), followed by Agriculture (23.1 deaths/100,000 workers) and then Construction (16.5/100,000 workers). The Mining and Agriculture, Forestry & Hunting industry sectors had the highest overall subsector incidence rates—Mining (NAICS 211) and Forestry & Logging (NAICS 113) had an incidence rate of 215.1 and 105.9 deaths per 100,000 workers, respectively.

Table 7 compares the employment-based and hours-based work-related fatality incidence rates by industry in Michigan to national hours-based rates for 2021 as computed by the Bureau of Labor Statistics (BLS). When calculating the fatal injury rates for the United States, BLS excludes workers under the age of 16 years, volunteers, and the resident military.

In 2021, the overall employment-based fatality rate of 3.1 per 100,000 workers, calculated by the MIFACE program, was lower than the BLS-calculated hours-based fatality incidence rate (3.6/100,000 FTEs) in the United States.

However, caution should be used when comparing hours-based and employment-based fatal injury rates because of the differences in the denominators used. When available, MIFACE used Michigan-specific hourly rates from Michigan DTMB CES; when unavailable, MIFACE used the BLS CFOI State-based hourly rate for Michigan.

Table 6. Number of Traumatic Work-Related Fatalities by Industry and Incidence Rates by Number of Employees and by Hours Worked, Michigan 2021						
Industry Sector (NAICS Code)	**Number**	**Percent**	**Employment-Based**		**Hours-Based**	
			Number Employees[a]	**Rate**[d]	**Number Hours**[e]	**Rate**[g]
Agriculture, Forestry, Fishing & Hunting (11)	**20**	**14.3**	**86,396**	**23.1**	**	**
Crop Production (111) (Owners/Operators)	5	3.6	51,156 [b]	9.8	**	**
Crop Production (111) (Hired Workers)	3	2.1	59,903 [b]	5.0	40.9f	6.3
Animal Production (112) (Hired Workers)	2	1.4	17,572 [b]	11.4		
Animal Production (112) (Owners/Operators)	5	3.6	29,276 [b]	17.1	**	**
Forestry & Logging (113)	2	1.4	1,888	105.9	**	**
Farm – Crop/Animal Production Unknown (Owner/Operators)	2	1.4	**	**	**	**
Farm – Crop/Animal Production Unknown (Hired Workers)	1	0.7	**	**	**	**
Mining (21)	**2**	**1.4**	**4,901**	**40.8**	**	**
Oil and Gas Extraction (211)	1	0.7	465	215.1	**	**
Support Activities for Mining (213)	1	0.7	1,277	78.3		
Utilities (22)	**2**	**1.4**	**20,699**	**9.7**	**	**
Construction (23)	**29**	**20.7**	**176,051**	**16.5**	**39.8**	**16.6**
Construction of Buildings (236)	6	4.3	43,908	13.7	36.9	14.8
Heavy & Civil Engineering Construction (237)	8	5.7	19,490	41.0	**	**
Specialty Trade Contractors (238)	15	10.7	112,653	13.3	40.2	13.2
Manufacturing (31-33)	**17**	**12.1**	**585,885**	**2.9**	**40.8**	**2.8**
Food Processing (311)	1	0.7	38,591	2.6	**	**
Wood Product Manufacturing (321)	2	1.4	9,927	20.1	**	**
Plastics and Rubber Products Manufacturing (326)	2	1.4	38,605	5.2	**	**
Nonmetallic Mineral Product Manufacturing (327)	2	1.4	10,267	19.5	**	**
Primary Metal Manufacturing (331)	1	0.7	18,073	5.5	**	**
Fabricated Metal Products (332)	4	2.9	70,060	5.7	39.0	5.9
Machinery Manufacturing (333)	1	0.7	67,921	1.5	43.9	1.3
Electrical Equipment, Appliance, and Component Manufacturing (335)	1	0.7	13,441	7.4	**	**
Transportation Equipment (336)	3	2.1	183,248	1.6	43.6	1.5
Wholesale Trade (42)	**2**	**1.4**	**164,709**	**1.2**	**39.3**	**1.2**
Merchant Wholesalers, Durable Goods (423)	1	0.7	101,421	1.0	40.5	1.0
Merchant Wholesalers, Non-durable Goods (424)	1	0.7	49,377	2.0	**	**
Retail Trade (44-45)	**5**	**3.6**	**448,429**	**1.1**	**29.1**	**1.5**
Motor Vehicle & Parts Dealers (441)	1	0.7	61,090	1.6	37.9	1.7
Building Material and Garden Equipment and Supplies Dealers (444)	2	1.4	47,420	4.2	**	**
Food & Beverage Stores (445)	1	0.7	74,051	1.4	**	**
General Merchandise Stores (452)	1	0.7	105,379	0.9	**	**

Table 6. Number of Traumatic Work-Related Fatalities by Industry and Incidence Rates by Number of Employees and by Hours Worked, Michigan 2021, Cont.						
Industry Sector (NAICS Code)	**Number**	**Percent**	**Employment-Based**		**Hours-Based**	
			Number Employees[a]	**Rate[d]**	**Number Hours[e]**	**Rate[g]**
Transportation & Warehousing (48-49)	**22**	**15.7**	**163,263 [c]**	**13.5**	**	**
Air Transportation (481)	4	2.9	13,085	30.6		
Truck Transportation (484)	10	7.1	46,784	21.4	**	**
Transit and Ground Passenger Transportation (485)	2	1.4	8,090	24.7	**	**
Support Activities for Transportation (488)	2	1.4	15,143	13.2	**	**
Postal Service (491)	1	0.7	20,761	4.8	**	**
Couriers and Messengers (492)	1	0.7	21,180	4.7	**	**
Warehousing and Storage (493)	2	1.4	35,711	5.6	**	**
Real Estate & Rental & Leasing (53)	**1**	**0.7**	**53,046**	**1.9**	**	**
Professional, Scientific, and Technical Services (54)	**3**	**2.1**	**300,489**	**1.0**	**	**
Administrative & Support & Waste Management & Remediation Services (56)	**14**	**10.0**	**259,219**	**5.4**	**	**
Administrative & Support Services (561)	12	8.6	246,045	4.9	**	**
Waste Management & Remediation Services (562)	2	1.4	13,174	15.2	**	**
Educational Services (61)	**3**	**2.1**	**343,374 [c]**	**0.9**	**	**
Educational Services (611)	3	2.1	343,374 [c]	0.9	**	**
Health Care & Social Assistance (62)	**3**	**2.1**	**630,479 [c]**	**0.5**	**31.1**	**0.6**
Nursing and Residential Care Facilities (623)	2	1.4	91,035	2.2	**	**
Social Assistance (624)	1	0.7	7,257	13.8		
Arts, Entertainment, & Recreation (71)	**4**	**2.9**	**42,694**	**9.4**	**19.2**	**19.5**
Performing Arts and Spectator Sports (711)	1	0.7	6,772	14.8	**	**
Amusement, Gambling, and Recreation Industries (713)	3	2.1	32,484	9.2	**	**
Accommodation & Food Services (72)	**5**	**3.6**	**313,178**	**1.6**	**23.6**	**2.7**
Accommodation (721)	4	2.9	32,021	12.5	**	**
Food Services & Drinking Places (722)	1	0.7	281,157	0.4	**	**
Other Services (except Public Administration) (81)	**7**	**5.0**	**121,922**	**5.7**	**	**5.4j**
Repair & Maintenance (811)	4	2.9	41,899	9.5	**	**
Personal and Laundry Services (812)	1	0.7	36,734	2.7	**	**
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	2	1.4	37,276	5.4	**	**
Public Administration (92)	**1**	**0.7**	**236,500 [h]**	**0.4**	**	**
Justice, Public Order, & Safety Activities (922)	1	0.7	**	**	**	**
Totals	**140**	**100**	**4,502,000[i]**	**3.1**	**	**3.3j**

[a] Employment numbers from Michigan Department of Technology, Management and Budget (DTMB), Bureau of Labor Market Information and Strategic Initiatives, QCEW Industry Employment and Wages unless otherwise noted.

[b] 2017 United States Department of Agriculture Census of Agriculture, Michigan-level data, Table 75. Summary by North American Industry Classification System. Number of owners/operators are defined as the number of "producers" in Table 75 summed by industry group (crop or animal). Hired workers are defined as the number of "hired farm labor" in Table 75 by industry group. Total number of employees in NAICS Sector 11 defined as total number of producers (owner/operators) for crop and animal production added to the number of employees in sectors 113 to 115 from Michigan DTMB QCEW data, excluding the count of "hired workers". See the Agriculture section for discussion.

[c] Includes federal, state, or local workers obtained from Michigan DTMB, Bureau of Labor Market Information and Strategic

Initiatives, Current Employment Statistics (CES) found under the classification Public Administration NAICS 92.
[d] Employment-based incidence rates calculated per 100,000 workers.
[e] Average number of hours worked per week by industry taken from Michigan DTMB CES estimates unless otherwise noted.
[f] Number of hours worked per week by hired farm workers in the Lake Region for 2021 as reported in the Quick Stats Search Option from the USDA National Agricultural Statistics Service. Corresponding hours-based rate is calculated using the number of hired farm worker fatalities from the Crop and Animal production sectors combined.
[g] Hours-based incidence rates calculated as (N/EH)*200,000,000, where N is the number of fatalities, EH is the total employee-hours (number of employees * average number of hours worked per week * 50 weeks), and 200,000,000 is the benchmark number of hours worked by 100,000 FTE (40 hour/week) employees in one year.
[h] The number of workers in the Public Administration sector was calculated as the sum of Federal, State, and Local government employees in Michigan, minus the number of U.S. Postal Service workers, state and local hospital workers, and state and local education workers. All numbers from Michigan DTMB CES estimates.
[I] Total 2021 state employment taken from Michigan DTMB LAUS report.
[J] Michigan CFOI 2021 hours-based incidence rate. Note for the Other Services (except Public Administration) NAICS 81, the CFOI rate was based on 9 deaths instead of the 7 deaths reported by the MIFACE program.
** No data available from corresponding sources.

Overall, Michigan's CFOI calculated hours-based work-related fatality rate of 3.3 deaths per 100,000 FTEs was lower than the United States national rate of 3.6 deaths per 100,000 FTEs. For the industries for which MIFACE or BLS calculated a Michigan-specific hours-based rate and for which BLS also calculated a nationwide hours-based rate, most Michigan industry groups had a higher hours-based rate than the United States rate for that industry. The exception to this was in the Wholesale Trade sector (1.2 vs 5.1), Retail Trade sector (1.5 vs 1.9), and Health Care & Social Assistance sector (0.6 vs 0.7). (**Table 7**).

Table 7. Traumatic Work-Related Fatalities by Industry Sector, Michigan Incidence Rates Compared to US Incidence Rates, 2021

Industry Sector (NAICS Code)	Number of Fatalities	2021 MI Employment-based Rate[a]	2021 MI Hours-Based Rate[a]	2021 US Hours-Based Rate[b]
Agriculture, Forestry, Fishing and Hunting (11)	20	23.1	37.7[c]	19.5
Mining (21)	2	40.8	**	14.2
Utilities (22)	2	9.7	**	3.4
Construction (23)	29	16.5	16.6	9.4
Manufacturing (31-33)	17	2.9	2.8	2.6
Wholesale Trade (42)	2	1.2	1.2	5.1
Retail Trade (44-45)	5	1.1	1.5	1.9
Transportation & Warehousing (48-49)	22	13.5	**	14.5
Real Estate and Rental and Leasing (53)	1	1.9	**	2.8
Professional & Business Services (54)	3	1.0	**	0.7
Administrative & Support & Waste Management & Remediation Services (56)	14	5.4	**	**
Educational Services (61)	3	0.9	**	0.7
Health Care & Social Assistance (62)	3	0.5	0.6	0.7
Arts, Entertainment, & Recreation (71)	4	9.4	19.5	2.6
Accommodation & Food Services (72)	5	1.6	2.7	2.3
Other Services (except Public Administration) (81)	7	5.7	5.4[c]	3.8
Public Administration (92)	1	0.4	**	**
Total	**140**	**3.1**	**3.3** [c]	**3.6**

[a] From Table 5 unless otherwise noted
[b] From U.S. BLS CFOI, National hours-based fatal injury rates by industry, occupation, and selected demographic characteristics, 2021.
[c] Michigan Hours-based rate taken from BLS state CFOI data
** No rate available from either MIFACE or CFOI

Means of Work-Related Death

In 2021, the means of death was known for 139 work-related Michigan deaths with one unknown means of death **(Table 8)**. Motor vehicle crashes were the leading cause of a work-related death (24 deaths, 17.1%). The second leading cause of work-related death were struck by incidents (22 deaths, 15.7%), followed by falls (21 deaths, 15%), and drug overdoses (14 deaths, 10%).

Motor vehicle crashes were the, or one of the, leading means of death in 5 of 15 industry sectors (33.3%), including Transportation and Warehousing (5 of 24 deaths, 20.8%), Wholesale Trade (1 of 1 death, 100%), Professional, Scientific, and Technical Services (1 of 3 deaths, 33.3%), Administrative & Support & Waste Management & Remediation Services (4 of 14 deaths, 28.6%), and Health Care & Social Assistance (2 of 4 deaths, 50.0%).

Fatal falls were the, or one of the leading means of death in 4 of 15 industry sectors (26.7%), including Construction (7 of 29 deaths, 24.1%), Manufacturing (4 of 17 deaths, 23.5%), Professional, Scientific, and Technical Services (1 of 3 deaths, 33.3%), and Arts, Entertainment, & Recreation (2 of 4 deaths, 50%).

Struck by incidents were the, or one of the leading means of death in 3 of 15 industry sectors (20%), including Construction (7 of 29 deaths, 24.1%), Mining (2 of 2 deaths, 100%), and Educational Services (1 of 3 deaths, 33.3%).

Suicides were the, or one of the leading means of deaths in 3 of 15 industry sectors (20.0%), including Retail Trade (2 of 6 deaths, 33.3%), Real Estate, Rental, & Leasing (1 of 1 death, 100%), and Educational Services (1 of 3 deaths, 33.3%).

Machines were one of the leading means of death in 1 of the 15 industry sectors—the Agriculture, Forestry, Fishing & Hunting industry (5 of 19 deaths, 26.3%).

Table 9 displays the number of fatalities across leading means of death by year from 2001-2021. There are variations in the means of death each year and because of small numbers in any given means of death, it is difficult to identify any temporal trends.

In 2018, a review of the MIFACE database was performed to standardize the categorization of death by motor vehicle. All motor vehicle entries were reviewed. If the death was a result of the deceased being a driver or passenger in a motor vehicle crash, the death was categorized as a motor vehicle crash. If the death was caused by a motor vehicle striking a pedestrian or a worker on a machine, then the categorization of the death was changed from motor vehicle to struck by.

Between 2001 and 2021, 2021 had the highest number of fatal drug overdoses at Michigan workplaces with 14 overdose deaths. Overdose deaths increased 50% from 7 cases in 2020 to 14 cases with 2021. 2018 to 2021 accounts for 49% of all drug overdoses in the workplace from 2001-2021 (39 of 80 deaths). This increase mirrors national trends during this time period of increasing opioid (e.g., fentanyl, heroin, hydrocodone), stimulant (e.g., cocaine, methamphetamine) and alcohol use both at home and at work.

Table 8. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2021

Industry Sector (NAICS)	Aircraft	Asphyxiation	Drowning	Drug Overdose	Electrocution	Explosion/ Fire	Fall	Medical	Homicide/ Assault	Machine	Motor Vehicle	Struck by	Suicide	Toxic Exposure	Animal	Unknown	Total
Agriculture, Forestry, Fishing & Hunting (11)	--	1	--	1	--	--	3	--	--	5	4	3	1	--	2	--	**20**
Mining (21)	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	**2**
Utilities (22)	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	**2**
Construction (23)	--	--	1	1	2	--	7	--	2	1	5	7	2	1	--	--	**29**
Manufacturing (31-33)	--	1	--	4	1	1	4	--	--	2	1	2	--	--	--	1	**17**
Wholesale Trade (42)	--	1	--	--	--	--	--	--	--	--	1	--	--	--	--	--	**2**
Retail Trade (44-45)	--	--	--	1	--	--	1	--	--	--	1	1	1	--	--	--	**5**
Transportation & Warehousing (48-49)	4	--	--	2	--	1	1	1	2	1	5	5	--	--	--	--	**22**
Real Estate, Rental, & Leasing (53)	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	**1**
Professional, Scientific, and Technical Services (54)	--	--	--	1	--	--	1	--	--	--	1	--	--	--	--	--	**3**
Administrative & Support & Waste Management & Remediation Services (56)	--	2	--	--	--	2	1	--	--	3	4	2	--	--	--	--	**14**
Educational Services (61)	--	--	1	--	--	--	--	--	--	--	--	1	1	--	--	--	**3**
Health Care & Social Assistance (62)	--	--	--	--	--	--	1	--	--	--	1	--	1	--	--	--	**3**
Arts, Entertainment, & Recreation (71)	--	1	--	1	--	--	2	--	--	--	--	--	--	--	--	--	**4**
Accommodation & Food Services (72)	--	--	--	3	--	--	--	--	2	--	--	--	--	--	--	--	**5**
Other Services (except Public Administration) (81)	--	2	--	--	--	1	--	--	--	--	1	--	1	1	1	--	**7**
Public Administration (92)	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	**1**
Total	**4**	**8**	**2**	**14**	**5**	**5**	**21**	**1**	**7**	**12**	**24**	**23**	**8**	**2**	**3**	**1**	**140**

Table 9. Leading Means of Death by Year, 2001–2021[a]

Year	Motor Vehicle	Struck by	Fall	Homicide/ Assault	Machine	Suicide	Electrocution	Aircraft	Toxic Exposure	Fire/Explosion	Drug Overdose	Drowning	Asphyxiation	Animal	Heat/Cold
2001	29	19	26	24	31	12	4	6	4	6	1	2	3	1	2
2002	28	21	21	22	20	11	8	5	4	4	--	2	1	2	2
2003	27	20	19	15	36	5	10	2	3	4	3	1	4	2	1
2004	26	16	16	22	26	4	7	4	4	3	1	--	1	1	--
2005	23	11	20	16	18	2	4	6	2	4	3	1	--	--	--
2006	32	34	24	11	14	8	10	8	6	4	1	2	1	2	--
2007	26	19	17	21	16	6	4	--	4	1	2	--	--	2	1
2008	22	23	26	14	12	9	5	--	2	3	2	1	1	1	--
2009	18	19	14	11	7	12	5	2	--	1	4	--	1	2	--
2010	23	20	24	26	16	11	7	4	6	3	2	2	--	--	1
2011	22	16	21	15	20	16	7	7	4	3	1	1	2	2	2
2012	31	19	18	28	14	12	3	--	--	--	2	3	--	--	--
2013	24	27	19	17	10	22	2	2	1	3	3	--	1	--	1
2014	26	30	24	19	11	9	5	5	--	1	4	3	3	3	--
2015	25	23	18	22	15	12	2	3	4	3	3	2	2	1	--
2016	28	19	32	22	19	13	5	1	9	2	5	3	1	1	1
2017	28	27	26	25	9	17	5	--	--	4	4	6	1	--	--
2018	24	36	21	22	10	15	5	3	2	4	10	2	4	1	--
2019	31	21	19	11	19	23	5	9	6	4	8	1	2	3	1
2020	21	27	21	11	10	14	3	2	--	2	7	2	7	0	3
2021	24	23	21	7	12	8	5	4	2	5	14	2	8	3	--
Total	**538**	**470**	**447**	**381**	**345**	**241**	**111**	**73**	**63**	**64**	**80**	**36**	**43**	**27**	**15**

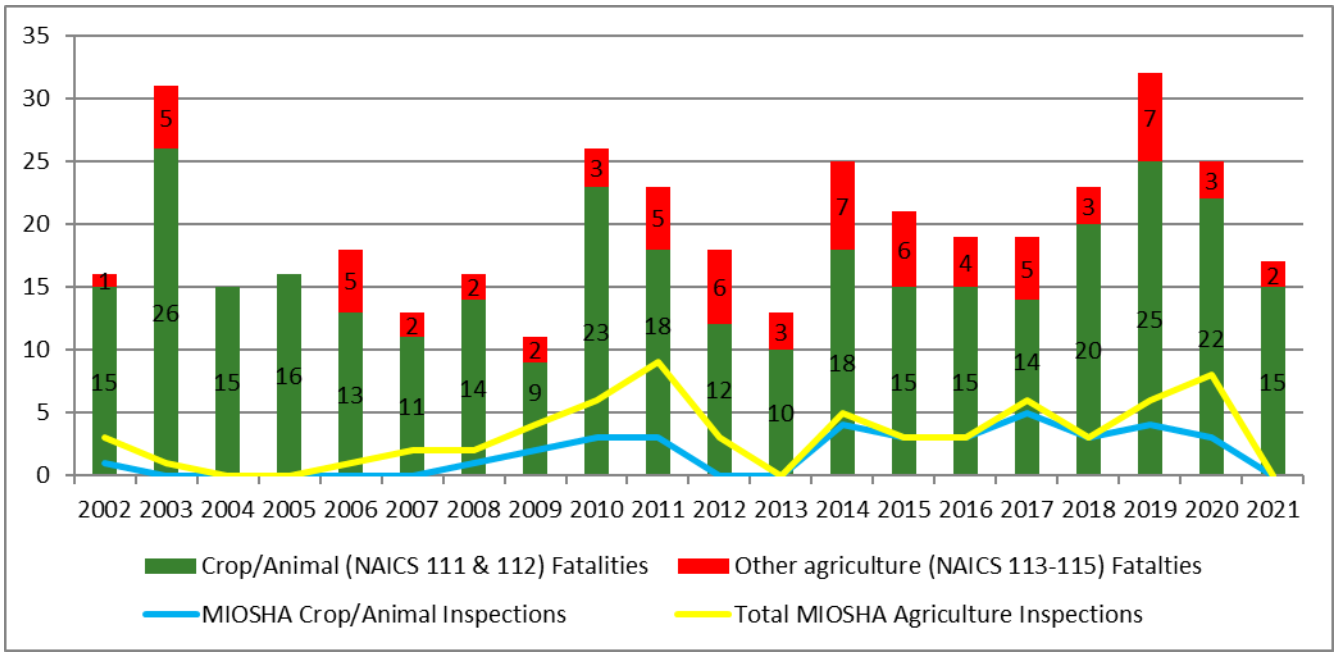
[a] The categories 'Unknown' and 'Other' were excluded from this table, resulting in omission of 2 cases.

Highlights and Discussion by Select Industries and Means of Death

Agriculture, Forestry, Fishing & Hunting (NAICS 11)

Figure 4 shows the number of fatalities in the Agriculture, Forestry, Fishing & Hunting sector, split between crop and animal-raising industries (NAICS 111 and 112, respectively) and other agricultural industries (NAICS 113-115), by year for 2001–2021. The figure also shows the number of fatalities which were investigated through MIOSHA fatality inspections by year.

Figure 3. Number of Agriculture Fatalities and MIOSHA Inspections, 2002–2021



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

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

It is important to note that immediate family members of farm employers are not counted when determining the number of employees. Most 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.

The average age of those who died working in Agriculture in 2021 was 60.2 years, with a range of 10 years old to early 80's. **Table 10** shows the average age at the time of death for the past 20 years for those employed in Agriculture. In 17 of the 20 previous years (85%), the average age of the individual was in their 50's or 60's.

Table 10. Age at Time of Death, Agriculture, Michigan 2002–2021			
Year	Age (in years)	Year	Age (in years)
2002	48.0	2012	52.2
2003	58.1	2013	56.6
2004	59.7	2014	46.8
2005	54.9	2015	55.3
2006	49.9	2016	61.0
2007	54.2	2017	52.5
2008	67.9	2018	58.4
2009	51.5	2019	58.5
2010	53.0	2020	62.4
2011	56.6	2021	60.2

Special Considerations Regarding Employment Estimates in Agriculture

Traditional farm operations (Crop and Animal Production) accounted for 18 of the 20 (90%) deaths in 2021. Twelve of the 20 (60%) known work-related deaths were identified as a farm owner/operator, while six (30%) were identified as hired labor/worker (one individual was a volunteer, two individuals were family members, three were hired).

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. Unpaid workers likely make up a significant portion of the agricultural workforce – the 2017 USDA Census of Agriculture reports 77,475 hired workers and 54,839 unpaid workers. The number of migrant workers was not noted on the 2017 Agricultural Census, only the number of farms utilizing migrant labor. The 2013 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 farm workers include both individuals who met the definition of a migrant but only travel within the state of Michigan (intrastate migrants) and others who come from outside the state to work in Michigan (interstate migrants). The 2017 Agricultural Census reports that 11,907 farms in Michigan reported using hired labor, while only 828 reported using migrant labor.

If the total number of Agricultural operators (80,432), hired farm labor (77,475), and unpaid workers (54,839) identified in the 2017 Agriculture Census are added to the above estimate for migrant and seasonal farm laborers (49,135), as well as to the number of employees working in Forestry & Logging (1,888), Fishing, Hunting & Trapping (206), and Agricultural Support Activities (3,870) estimated by the Michigan DTMB in 2021, the total number of workers in Agriculture was 267,845. The increase in the number of workers would dramatically lower the NAICS 11 Agriculture, Forestry, Fishing & Hunting work-related fatality incidence rate from 23.1 deaths per 100,000 workers to 7.5.

Both rates are appreciably lower than the BLS CFOI hours-based rate for Michigan of 37.7 per 100,000 FTEs, which only includes hired employees. If only employment estimates from the Michigan DTMB Industry Employment and Wages report are used, the number of workers in agriculture totals only 31,693 which would drive the employment-based rate up to 63.1 per 100,000 workers.

The transient nature of crop production complicates the picture of Agricultural employment. A single farm may produce several crops utilizing hired labor to harvest. Workers may come and go (leave the state) to harvest other crops. Given that many of these work stints may be for durations significantly shorter than a year, it is possible that many hired and/or migrant workers will work at multiple farms in a year, each of which may count the worker in their reported number of hired workers, leading to overestimation of total employment in the industry.

Due to uncertainties regarding the true total number of hired, unpaid, and seasonal/migrant workers, and which of these categories may be overlapping or enveloped by others, the employment-based incidence rate of work-related fatalities across Agriculture (23.1/100,000 workers) utilizes only the total number of operators in Crop and Animal Production reported by the 2017 USDA Census of Agriculture combined with employee counts for Forestry & Logging, Fishing, Hunting & Trapping, and Agricultural Support Activities from the Michigan DTMB. It is likely that the most accurate employment-based incidence rate lies somewhere between this number and the rate given when all possible counts of hired, unpaid, and migrant labor are combined (7.5/100,000 workers).

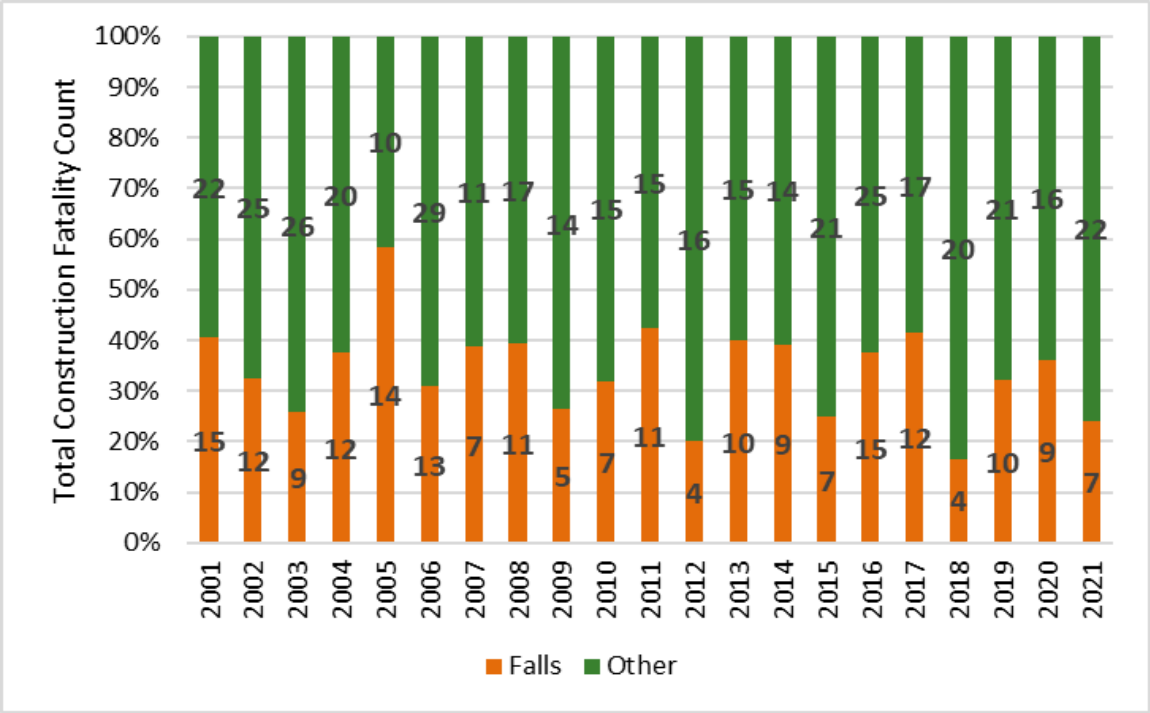
Construction (NAICS 23)

The number of deaths in the Construction industry sector increased by 5 compared to the prior year (24 deaths in 2020 compared to 29 deaths in 2021). Deaths in two subsectors increased from 2020 to 2021, respectively: Specialty trade contractors group subsector (NAICS 238) from 10 to 15 deaths and Construction of buildings (NAICS 236) from 5 to 6 deaths. Heavy and civil engineering construction subsector (NAICS 237) had a decrease from 9 deaths in 2020 to 8 deaths in 2021. Development and general contracting subsector (NAICS 233) had no deaths in 2020 nor in 2021.

Falls were the primary cause of death in the Construction sector (7 of 29 deaths, 24.1%) in 2021. Five of the seven falls occurred in the Specialty trade contractor's subsector (NAICS 238), including one repairman, one roofer, one iron worker, one painter, and one electrical contractor. **Figure 5** shows the number of fatal falls in the Construction sector by year and the percentage of construction work-related deaths the fatal falls represent.

Between 2001 and 2021, the number of fatal falls in the Construction industry sector ranged from a low of four falls in 2012 and 2018 to a high of 15 falls in 2001 and 2016. During the 21 years, falls were the leading means of death for 16 years and the secondary means of death for four years, with a low of 16.7% in 2018 (secondary means of death) to a high of 58.3% in 2005 (leading means of death).

Figure 4. Fatal Falls as Percent of Total Construction Deaths by Year, 2001–2021



Retail Trade (NAICS 44-45)

During the time period 2001 to 2021 the leading means of death in the Retail Trade industry sector (NAICS 44-45) was homicides, accounting for 47.4% (99 deaths) of all 209 fatalities. Furthermore, each year during this time-period, homicides were the leading means of death within Retail Trade, except in 2021 when no homicides occurred in the industry. The Retail Trade industry sector accounts for a quarter (26.0%) of all 381 homicides from 2001–2021, the largest proportion of all industry sectors, followed by Accommodation and Food Services (47 deaths, 12.3%). Within Retail Trade, the next three most common means of death during the 21-year period were motor vehicle collisions (30 deaths, 14.4%), suicides (30, deaths, 14.4%), and falls (26 deaths, 12.4%).

Transportation and Warehousing (NAICS 48–49)

Motor vehicle crashes were the most common means of death in the Transportation and Warehousing industry sector in 2021 (5 of 24 deaths, 20.8%). These reflect overall trends for 2001–2021, in which motor vehicle collisions comprise the most common means of death in the Transportation and Warehousing industry sector (136 of 342 deaths, 39.8%), with struck by incidents being the next highest type of fatality (58 deaths, 17.0%). Furthermore, this industry accounts for a quarter (25.3%) of all 538 motor vehicle crash deaths from 2001–2021, the largest proportion of all industry sectors, followed by Construction (69 deaths, 12.8%) (**Table 11**).

Table 11. Number of Motor Vehicle Crash Work-Related Deaths by Industry Sector, Michigan 2001–2021	
Industry	*Number MV-related deaths (%)*
Agriculture	35 (6.5)
Mining	3 (0.6)
Utilities	3 (0.6)
Construction	69 (12.8)
Manufacturing	27 (5.0)
Wholesale Trade	35 (6.5)
Retail Trade	30 (5.6)
Transportation/Warehousing	136 (25)
Information	18 (3.3)
Finance/Insurance	6 (1.1)
Real Estate/Rental/Leasing	1 (0.2)
Professional/Scientific/Technical Services	15 (2.8)
Administrative/Support/Waste Management/Remediation	38 (7.1)
Education	12 (2.2)
Health Care/Social Assistance	22 (4.1)
Arts/Entertainment/Recreation	16 (3.0)
Accommodation/Food Service	7 (1.3)
Other Services	24 (4.5)
Public Administration	41 (7.6)
Total	538 (100)

Comparisons to MIOSHA and CFOI Fatalities

MIOSHA Fatality Investigations

In 2021, MIOSHA personnel conducted a work-related fatality program-related compliance investigation for 34 (24.3%) of the 140 deaths. A fatality was recorded as a MIOSHA "Program-Related" fatality if the deceased party was employed in an occupation included under MIOSHA jurisdiction as defined in Public Act 154 of 1974, as amended, and the fatality appeared to be related to one or more of the following conditions:

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

Table 12 shows the number of work-related fatalities in Michigan in 2021 by industry sector and the number of MIOSHA work-related fatality compliance inspections for each industry sector. MIOSHA issued a violation citation to the firm at the conclusion of the fatality investigation in 25 of the 34

(73.5%) investigations. Citation penalties assessed at the conclusion of the compliance inspection (not the penalties decided after appeal) ranged from $500 to $33,000. One citation penalty was extremely higher than the rest at $119,000.

Table 12. Work-Related Fatalities and Number of MIOSHA Work-Related Fatality Compliance Inspections, Michigan 2021

Industry	Number of Work- Related Fatalities	Number of Work-Related Fatality MIOSHA Compliance Inspections (%)
Agriculture, Forestry, Fishing & Hunting (11)	20	0
Mining (21)	2	1 (50)
Utilities (22)	2	2 (100)
Construction (23)	29	11 (37.9)
Manufacturing (31-33)	17	7 (41.2)
Wholesale Trade (42)	2	1 (50)
Retail Trade (44-45)	5	1 (20)
Transportation & Warehousing (48-49)	22	3 (13.6)
Real Estate & Rental & Leasing (53)	1	0
Professional, Science, & Technical Services (54)	3	0
Administrative & Support & Waste Management & Remediation Services (56)	14	7 (50)
Educational Services (61)	3	0
Health Care & Social Assistance (62)	3	0
Arts, Entertainment, & Recreation (71)	4	1 (25)
Accommodation & Food Services (72)	5	0
Other Services (ex. Public Administration) (81)	7	0
Public Administration (92)	1	0
Total	**140**	**34 (24.3)**

Number of 2021 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 140 work-related deaths in 2021.

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

Table 13. Sensitivity of Death Certificate "Injury at Work" Box Predicting Fatal Injury at Work, Michigan 2002-2021

Year	Number Deaths	DC Coded as at work (%)	DC not coded at work (%)
2002	151	126 (86.9%)	19 (13.1%)
2003	152	110 (74.3%)	38 (25.7%)
2004	131	93 (74.4%)	32 (25.6%)
2005	110	88 (83.0%)	18 (17.0%)
2006	157	122 (79.2%)	32 (20.8%)
2007	121	99 (85.3%)	17 (14.7%)
2008	121	100 (84.0%)	19 (16.0%)
2009	96	72 (75.8%)	23 (24.2%)
2010	147	102 (70.3%)	43 (29.7%)
2011	141	95 (69.3%)	42 (30.7%)
2012	135	74 (55.2%)	60 (44.8%)
2013	134	82 (62.6%)	49 (37.4%)
2014	143	89 (62.7%)	53 (37.3%)
2015	136	89 (67.9%)	42 (32.1%)
2016	158	99 (62.7%)	59 (37.3%)
2017	153	85 (55.5%)	68 (44.4%)
2018	152	91 (59.9%)	61 (40.1%)
2019	163	95 (58.2%)	68 (41.8%)
2020	131	82 (62.6%)	49 (37.4%)
2021	140	89 (63.6%)	51 (36.4%)

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

Table 13 shows that from 2002–2021 13.1% to 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 14 shows that in 2021, the "Injury at Work" box on the death certificate was misidentified at the highest rate in the designation of an injury at work in for those in the Other Services (ex. Public Administration) industry (71.4% of deaths misidentified; 5 deaths), however the highest number of misidentified work-related deaths was the Agriculture, Forestry, Fishing & Hunting industry (70%; 14 deaths) followed by Transportation & Warehousing industry (40.9%; 9 deaths). There were zero misidentified deaths in the following industries: Mining, Utilities, Wholesale Trade, Retail Trade, Real Estate & Rental & Leasing, Arts, Entertainment & Recreation, and Public Administration.

Table 14. Industry and Number of Deaths and Number and Percent of Misidentified Deaths*, Michigan 2021		
Industry (NAICS Code)	Number of Deaths	Number of Misidentified Deaths (%)
Agriculture, Forestry, Fishing & Hunting (11)	20	14 (70)
Mining (21)	2	0
Utilities (22)	2	0
Construction (23)	29	7 (24.1)
Manufacturing (31-33)	17	5 (29.4)
Wholesale Trade (42)	2	0
Retail Trade (44-45)	5	0
Transportation & Warehousing (48-49)	22	9 (40.9)
Real Estate & Rental & Leasing (53)	1	0
Professional & Business Services (54)	3	1 (33.3)
Administrative & Support & Waste Management & Remediation Services (56)	14	2 (14.3)
Educational Services (61)	3	1 (33.3)
Health Care & Social Assistance (62)	3	2 (66.7)
Arts, Entertainment & Recreation (71)	4	0
Accommodation & Food Service (72)	5	3 (60)
Other Services (ex. Public Administration (81)	7	5 (71.4)
Public Administration (92)	1	0
Total	140	49 (35)
*For 2 deaths the injury at work box on the death certificate was marked "Unknown" (Retail Trade = 1 death; Transportation and Warehousing = 1 death).		

MIFACE Activities

Importance of Using Multiple Data Sources

MIFACE used multiple data sources to ascertain if a fatal injury was work-related. Reliance on just the information in the "Injury at Work" box on the individual's death certificate would have missed 51 (36.4%) of the 140 work-related deaths in 2021, particularly with causes of death from motor vehicle crashes, homicides, struck-by incidents, and work-related suicides. That MIFACE can capture these work-related fatalities that would otherwise be missed when relying solely on the "Injury at Work" box supports the utility, and need, for surveillance programs that collect and combine fatality information from multiple sources.

Prevention Material Dissemination

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

MIFACE Investigation Reports, MIFACE Summaries of MIOSHA Investigations, Hazard Alerts, and the

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

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

MIFACE presentations are regularly given to trade groups ranging from health and safety professionals in construction, agriculture, and general industry.

Case Narratives

Based on the information collected during MIFACE on-site investigations and/or from source documents, a brief narrative summary organized by industry of each of the 140 acute traumatic work-related deaths in 2021 is included in Appendix I.

Table 15 provides the narrative case number and cause of death by NAICS code found in the Appendix. Each combination of industry and cause of death is hyperlinked to the beginning of the corresponding narratives. Additionally, each cause of death label is hyperlinked to its corresponding heading in the Appendix.

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

Table 15. Narratives for 2021 Work-Related Fatalities

Industry Sector (NAICS)	Aircraft	Asphyxiation	Drowning	Drug Overdose	Electrocution	Fall	Fire/ Explosion	Homicide/ Assault	Machine	Medical	Motor Vehicle	Struck-By	Suicide	Toxic Exposure	Animal	Unknown
Agriculture (11)		1		2		3-5			6-10		11-14	15-17	18		19-20	
Mining (21)												21-22				
Utilities (22)					23-24											
Construction (23)			25	26	27-28	29-35		36-37	38		39-43	44-50	51-52	53		
Manufacturing (31-33)		54		55-58	59	60-63	64		65-66		67	68-69				70
Wholesale Trade (42)		71									72					
Retail Trade (44-45)				73		74					75	76	77			
Transportation & Warehousing (48-49)	78-81			82-83		84	85	86-87	88	89	90-94	95-99				
Real Estate, Rental, & Leasing (53)													100			
Professional, Scientific, and Technical Services (54)				101		102					103					
Admin. & Support & Waste Management & Remediation Services (56)		104-105				106	107-108		109-111		112-115	116-117				
Educational Services (61)			118									119	120			
Health Care & Social Assistance (62)						121					122		123			
Arts, Entertainment, & Recreation (71)		124		125		126-127										
Accommodation & Food Services (72)				128-130				131-132								
Other Services (81)		133-134					135				136		137	138	139	
Public Administration (92)								140								

Conclusion

Traumatic occupational fatalities are an important public health issue in Michigan and throughout the United States. These deaths are not random events, and information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future. There were 9 more deaths occurring in Michigan in 2021 compared to 2020. The numbers and rates of these acute traumatic fatalities have fluctuated from year to year, and there has not been a clear downward trend over multiple years. The increase in 2021 is probably secondary to resumed work activity from the stay-at-home work order and increased commuting related to the COVID-19 pandemic. The MIFACE program will continue to monitor work-related deaths to determine if there is a return to pre-pandemic levels. However, further efforts are needed to have a meaningful reduction of the occurrence of these tragedies.

The lack of a consistent and lasting decrease in the number and incidence rate of work-related fatalities, both nationally and in Michigan, is likely a result of many factors and continued investigation of the causal factors of work-related fatalities is necessary to understand and effect a meaningful reduction in these deaths. Understanding the root cause(s) of these tragic events and sharing this information with stakeholders, from individuals to groups, employees to employers, makes these information-gathering efforts worthwhile. If what we learn from any of these deaths can help prevent further tragedies, then the surveillance program has been successful in its goal. An awareness of the hazards of one's job and an attitude of safety-mindfulness on the part of labor and management is critical to prevent future fatal events.

Some important points highlighted by the deaths:

- The workforce aged 65 and older continues to grow as individuals put off retirement and part-time workers enter the workforce due to economic or other reasons. Older workers have unique health and safety challenges, including resistance to change long standing work practices that may not be safe, medical issues, or strength issues, all likely contributing to the higher work-related fatality rate in this age group. Federal OSHA and NIOSH, among other agencies, have developed resources which can help employers address the challenges faced by older workers and provide a safe working environment for this population group.

- Fatalities from falls remain a major concern, particularly in construction. 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.

- Homicides in the retail trade and accommodations and food services sectors and workplace violence in the health care sector have been recognized as important workplace risks. OSHA and NIOSH have both developed extensive resources for employers and employees to use to address the risks associated with workplace violence, especially within certain workplaces such hospitals.

- Motor vehicle crashes are a major cause of work-related fatalities. This should not be a surprise

in the Transportation and Warehousing industry sector given the nature of work tasks within this industry sector, but it is also true for many industry sectors. Employers should create and maintain safe driving policies and offer driver safety training (including defensive driving) as part of their safety program and training. MIFACE has created a hazard alert containing recommendations and resources for employers to develop motor vehicle safety policies and programs.

- Drug abuse/overdose in the workplace is a challenging issue for employers. Solutions are not straightforward. Stakeholders, including the medical, legal, insurance, safety, and regulatory community must collaborate to develop state-specific interventions and resources that Michigan's employers and employees can utilize to address this issue. NIOSH Opioids in the Workplace webpage offers resources related to opioid use. Resources to address prescription drug use and misuse in the workplace can be obtained from the Substance Abuse and Mental Health Services Association and National Safety Council.

Each of the 140 deaths in this report could have been prevented, whether through installation of engineering controls, development and implementation of health and safety plans, changes to work practices, or the identification and assistance of individuals seeking and receiving mental health counseling so they can better cope with both work and personal stressors. The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to act to prevent them.

Acknowledgements

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

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

MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2025 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 - Narratives

AGRICULTURE, FORESTRY, FISHING & HUNTING (NAICS 11) (20 deaths)

ASPHYXIATION

1. A male farmer in his mid-70's died when his tractor rolled over. The decedent was mowing his lawn when his tractor struck an outbuilding and tipped over. The decedent was pronounced dead at the scene.

DRUG OVERDOSE

2. A female dairy farm hand in her early 30's died from a multiple drug overdose. She was found unresponsive on the floor by the farm owner. She was declared dead at the scene.

FALL

3. A male fruit farmer in his early 80's died from complications related to a fall. The decedent fell from his stationary tractor. The decedent was transported to a local hospital and later died from his injuries.

4. A male farmer in his early 80's died following complications related to a fall from a ladder. The decedent was using a ladder to place a bale of hay on his truck when he fell. The decedent was transported to a local hospital by EMS and later died under hospice care.

5. A male floriculture production business owner in his late 60's died when he fell from a ladder. The decedent was performing renovations on his greenhouse roof when he fell approximately 12 feet from the ladder. The decedent was transported to a local hospital by EMS where he later died.

MACHINE

6. A male farmer in his early 80's died when he was run over by his tractor. The decedent was run over when he started his tractor in gear. The decedent was transported to a local hospital by EMS where he died.

7. A male farmer in his late 60's died when he was crushed underneath a piece of agricultural equipment that he was performing maintenance on. The decedent was in the process of changing the tire on a combine using wooden blocks to hold the combine up. After the tire was removed the combine slid, causing the wooden blocks to break and the combine's header to land on the decedent. The decedent was pronounced dead at the scene.

8. A male dairy farmer in his mid-70's was found lying in the tracks of his tractor with tire tracks from his tractor/spreader over his body. The tractor was located elsewhere on his property where it had stopped. The decedent was laying in the driveway leading to the barnyard of his farm. The decedent was using a large tractor (case with front and rear dual tires/axles with large manure spreader attached to it). The starter on the tractor had been malfunctioning and required a "jump" by hotwiring the battery directly to the starter, bypassing the relay. The starter was located on the right side of the tractor, proximal to the front axle. It is suspected that the decedent had wired the starter as above and

the tractor had been accidentally left in gear. When the engine started the tractor immediately took off, crushing the decedent as it ran him over. He was declared dead at the scene.

9. A male farmer in his early 70's died when his tractor rolled over and landed on him. The decedent was trimming brush around his horse pasture using the tractor when the rollover occurred. The decedent was transported to a local hospital by EMS where he later died.

10. A male farmer in his mid-70's died when his tractor rolled over and landed on him. The decedent was transported by EMS to a local hospital where he died.

MOTOR VEHICLE CRASH

11. A male dairy cattle and milk production farm driver in his late 40's died when he was involved in a single motor vehicle crash. The decedent was traveling eastbound in his semi-truck pulling a milk tanker when he entered a curve, crossed the centerline, lost control, and the truck overturned, sliding into the ditch. The decedent was pronounced dead at the scene. The decedent was wearing a seatbelt at the time of the crash and the airbag was deployed. The roadway was dry at the time of the crash. The crash occurred in daylight. The posted speed limit was 55 mph.

12. A male logging truck driver in his early 60's died after a motor vehicle crash. The decedent died at home due to complications several weeks after the crash.

13. A male beef cattle ranching farmer in his early 50's died when the tractor he was driving crashed. He was traveling westbound on a public road when he got too close to the soft shoulder and the tractor rolled into the ditch pinning the decedent underneath. The decedent was pronounced dead at the scene.

14. A male farmer in his early 40's died when his tractor was struck by vehicle. The decedent was traveling westbound on a public road when he was struck from behind and ejected from his tractor. The decedent was transported by EMS to a local hospital where he died from his injuries.

STRUCK BY

15. A 10-year-old male farmer died after being struck by a tractor. The decedent was riding on the fender of the tractor being driven by a co-worker when the tractor hit a bump causing the decedent to fall and be run over. The decedent was pronounced dead at the scene.

16. A male wheat farmer in his late 60's died when he was struck by a falling tree. The decedent was using a tractor to dislodge a previously cut tree. In the process of unlodging the previously cut tree a dead standing tree was contacted and fell on the decedent and the tractor. The decedent was pronounced dead at the scene.

17. A male beef cattle ranching farmer in his early 80's died when the tractor he was on was pinned underneath a tree. The farmer was traveling west parallel to the tree line, using a brush hog on the back of the tractor. A tree fell towards the north, striking the farmer and the tractor. The tractor continued west, however the drag from the tree pulled the tractor toward the south, and into the tree line/wetland. The decedent was pronounced dead at the scene.

SUICIDE

18. A male apple orchard laborer in his early 30's died of a self-inflicted hanging.

ANIMAL

19. A male farmer in his mid-70's died due to complications from an injury he sustained three months prior. A sheriff responding to a call of cows running loose found the decedent lying in his field, near the gate of the pasture. The decedent showed signs of a traumatic head injury consistent with being kicked by a bull. The incident was not witnessed.

20. A male farmer in his late 20's died from complications related to being kicked in the head by a horse several years prior.

MINING, QUARRYING, AND OIL AND GAS EXTRACTION (2 deaths)

STRUCK BY

21. A male drilling oil operator in his early 30's died when he was pinned between a drilling rig and an oil rig. The decedent and a co-worker were assisting a third co-worker with the positioning of the drilling rig near an oil rig. The decedent was measuring the distance between the drilling rig and the oil rig when he positioned himself between the two pieces of equipment. The co-worker instructed the drilling rig operator to stop when the drilling rig slipped on the ice and pinned the decedent between the two pieces of equipment. The decedent was pronounced dead at the scene. The ground conditions in the field were icy at the time of the incident.

22. A male oil and gas operations laborer in his mid-60's died when he was struck by a trailer. The decedent was assisting a co-worker move the trailer with a powered industrial truck. The tongue of the trailer slipped out of the chain connected to the powered industrial truck's forks and struck the decedent. The decedent was transported by EMS to a local hospital and died from his injuries three days later.

UTILITIES (2 deaths)

ELECTROCUTION

23. A male electrician in his early 40's died when he was electrocuted. The decedent was in a 7-foot-deep excavated trench, troubleshooting a main power line in response to a customer service call. Believing it to be de-energized, he cut the 13,000-volt cable and was electrocuted when he grabbed the line. As instructed by colleagues, he stood up and put his hands in the air before becoming weak and collapsing on the cable, resulting in a second electrocution. The decedent suffered thermal burns and internal injuries. Emergency responders were called by his co-workers. He was declared dead at the scene. It was determined that the crew leader did not direct the decedent to test the cable to ensure that it was de-energized before performing the work, as required.

24. A male lineman in his early 60's died when he came into contact with a downed live electric service wire. The decedent was in the process of restoring electrical service to a private residence following severe weather. The decedent fell from a ladder and came into contact with the live wire. The decedent

was pronounced dead at the scene.

CONSTRUCTION (29 deaths)

DROWNING

25. A male diver in his late 40's died when he failed to surface during an underwater inspection of a dam apron. The decedent was surveying a downstream section of a hydroelectric dam in full scuba gear but failed to surface after an unknown amount of time. He was not tethered, and his diving partner was not maintaining line of sight. For these and other related infractions, MIOSHA issued citations to the decedent's employer. Initial rescue via a search boat and public safety divers were unsuccessful. Emergency fire response formed a human chain team and were able to successfully recover the decedent's body after a four-hour search. He was pronounced dead at the scene. Emergency response noted a strong surface current as well as several entanglement hazards and boulders along the riverbed, which was between 9 and 13 feet deep. Water conditions at the time of the incident were warm, murky, and very turbulent.

DRUG OVERDOSE

26. A male construction worker in his early 40's died on the job site due to a drug overdose. The decedent was pronounced dead at the scene.

ELECTROCUTION

27. A male structural steel and precast concrete contractor in his mid-20's was electrocuted. He was working with his co-worker in an aerial lift when he contacted an overhead, high voltage power line. He was suspended for 20 minutes before being brought down. He was unconscious and blue and had second and third degree burns on multiple parts of his body. He was taken to a nearby hospital where he died two days later.

28. A male lineman in his late 30s became unresponsive while to performing maintenance on 7200-volt power lines from an elevated bucket. A co-worker attempted to call out to him but received no response. The co-worker lowered the bucket and found the individual unresponsive inside. CPR was initiated by the co-worker and continued by emergency responders. Despite these efforts, the individual was pronounced dead at the scene. An autopsy revealed blistered burns on both hands, and the cause of death was determined to be electrocution. Voltage testing had not been completed to ensure the 7200-volt power line was deenergized prior to his starting the work nor were protective grounds installed.

FALL

29. A male construction worker in his early 50's died from injuries sustained from a fall from height. The decedent was working on a construction site when he fell from a roof of 20-25 feet in height. The decedent was transported to a local hospital and later discharged to hospice. The decedent succumbed to his injuries under hospice care 2 weeks after the incident.

30. A male repairman in his early 40's died when he fell off a ladder. The decedent was attending to 2nd story gutters on a residential property when he struck his elbow and fell between 20 and 30 feet. The

decedent sustained multiple blunt force injuries to his head, neck, and chest from falling on the cement driveway. Emergency responders found the decedent lying on his side in the driveway, and bleeding from his head, with a faint pulse. They began to administer CPR and transported him to a location for airlift via helicopter, but lost pulse before its arrival. They were unable to regain his pulse and he was pronounced dead at the location.

31. A male construction worker in his late 50's died from injuries sustained from a fall from height. The decedent was using an extension ladder to access a roof of 15 feet in height to inspect a repair. Once on the roof, the decedent attempted to extend the extension ladder further above the landing but in doing so the decedent did not fully engage the latches that connect the upper and lower halves of the ladder together. When the decedent went to use the ladder to descend from the roof the upper half of the ladder slipped, and the latches engaged down on the next rung. The impact caused the ladder to fall away from the building and the decedent to fall to the ground. The decedent was pronounced dead at the scene.

32. A male roofing contractor in his late 40's died when he fell from a roof. The decedent was working on the roof 10 feet above the ground when he slipped and fell. The decedent was transported to a local hospital by EMS and died from his injuries 10 days later.

33. A male journeyman iron worker in his early 60's died due to complications related to a closed head injury from a fall sustained 35 years prior.

34. A male painter in his early 60's died after he fell approximately 20 feet from a scaffold to the ground. The decedent was working on a scaffold between two ladders when he fell onto his head. He was found unresponsive by his co-worker. He was taken to a nearby hospital where he later died.

35. A male electrical contractor in his mid-60's died after he fell from a ladder. The decedent was trimming branches and fell approximately 15 feet striking his face on the ground. The decedent was transported by EMS to a local hospital where he later died.

HOMICIDE

36. A male contractor in his late 30's died from gunshot wounds to the head along with his co-worker. They were shot while working on a house's roof.

37. A male carpenter in his mid-30's died from gunshot wounds to the head along with his co-worker. They were shot while working on a house's roof.

MACHINE

38. A male poured concrete foundation contractor in his early 50's died when he was run over by a skid steer. To adjust the forks, the decedent started the skid steer from the outside. When the skid steer began to move the decedent fell off and was run over. The decedent was pronounced dead at the scene.

MOTOR VEHICLE CRASH

39. A male truck driver in his early 50's died, who was hauling sand collided with three semi-trucks. The decedent was travelling eastbound in the right lane of the two lanes of travel that were open but

backed up due to construction/lane closure. The decedent's semi-truck (vehicle #1) rear-ended a truck-tractor with a semi-trailer (vehicle #2) at an estimated speed of 55–60 mph. Vehicle #2 was pushed forward into a truck-tractor with a semi-trailer (vehicle #3). The decedent's truck proceeded to side swipe vehicle #3, pushing it into the left lane. The decedent's truck then proceeded to make impact with the rear end of a fourth vehicle, a dump truck (vehicle #4), overturning both vehicles across both lanes of the roadway. Vehicle #3 caught on fire as a result of the crash. The decedent was ejected from his truck and was found lying in the ditch on the right side of the road, approximately 20 feet from the fire. He was proclaimed deceased at the scene. The decedent was not wearing a seat belt. The decedent vehicle's air bag did not deploy. The other three drivers involved in the crash were wearing their seat belts. The roadway was dry at the time of the crash and the weather was clear. The crash occurred in daylight. The posted speed limit was 65 mph.

40. A male driver working in highway, street and bridge construction in his late teens operating a commercial vehicle died when he was involved in a single motor vehicle crash. The decedent and a co-worker were traveling westbound when the vehicle veered onto the right shoulder and then proceeded to roll off the shoulder into a swamp. Both the decedent and the co-worker were ejected from the vehicle. The decedent was transported by EMS to the local hospital and soon after succumbed to his injuries. The co-worker thought the decedent fell asleep behind the wheel. The decedent was not wearing a restraint. The roadway was wet at the time of the crash. The crash occurred at dawn and the weather was cloudy. The posted speed limit was 70 mph.

41. A male water and sewer line contractor in his early 30's died when he was involved in a motor vehicle crash. The decedent was traveling southbound in a work truck when he attempted to pass another vehicle at an intersection. The vehicle being passed made a left hand turn into the decedent's vehicle colliding in the northbound lane. The decedent's vehicle proceeded to roll after the collision. The decedent was pronounced dead at the scene. The roadway was dry at the time of the crash. The crash occurred in daylight. The posted speed limit was 55 mph.

42. A male insulation contractor in his late teens who was a passenger in a box truck died after a motor vehicle crash. The box truck entered an intersection and was struck by a gravel hauler. The decedent was pronounced dead at the scene. Two individuals died in this crash.

43. A male insulation contractor in his early 30's who was driving a box truck died after a motor vehicle crash. The box truck entered an intersection and was struck by a gravel hauler. The decedent was pronounced dead at the scene. Two individuals died in this crash.

STRUCK BY

44. A male structural steel and precast concrete construction worker in his mid-60's died when he was crushed by a crane boom. The decedent was assembling the crane when it tipped, and the boom fell onto the decedent. The decedent was pronounced dead at the scene.

45. A male subcontractor in his late 40's died after he was struck in the head by a crane boom. The decedent and his co-worker were rigging the bulkhead to the crane. When the bulkhead was ready to be lifted, both the decedent and his co-worker started backing up. The boom of the crane was approximately 25 feet in the air and the bulkhead was approximately waist high off the pier. As the bulkhead came off the ground, the crane operator started to swing it to the right while moving the boom in and raising the cable up at the same time. As the crane operator was moving the bulkhead, he heard

a loud crack and observed the boom snap off and fall. The crane boom hit the decedent. He died at the scene. An inspection of the equipment was completed before the work started and no issues were observed with the crane. The crane was rated at 10 tons and the approximate weight of the bulkhead was 4,400 pounds.

46. A male operator in his mid-30's died when he was struck by a motor vehicle. The decedent was operating an aerial work platform and was in the process of moving the equipment from the shoulder to the median of the freeway. The aerial work platform was crossing the freeway with the body of the lift in the left lane and the decedent in the basket of the lift in the right lane when the decedent noticed a semi-truck approaching. The decedent exited the basket when it was apparent the semi-truck was going to strike the basket of the lift. As the basket of the lift was being struck by the first semi-truck, the decedent exited and was attempting to run to the shoulder when a second semi-truck passing on the right struck the decedent. The decedent was pronounced dead at the scene. The roadway was dry at the time of the incident. The incident occurred at night with no lighting other than a single orange lamp on the body of the lift. The posted speed limit was 45 mph in the construction zone.

47. A male construction worker in his late 30s was killed at a construction site. He was run over by the right rear tire of a rough-terrain forklift driving in reverse on a dirt driveway leading to a lower level of a building under construction. Emergency medical services were on the scene quickly, but despite their efforts, the worker was pronounced dead at the hospital. The cause of death was determined to be extensive blunt force injuries to the pelvis and upper thighs.

48. A male highway, street and bridge construction flagman in his late-40's died when he was struck by a vehicle. The decedent was directing traffic flow when an oncoming semi-truck failed to slow. The semi-truck struck two stopped vehicles pushing one of them into the decedent, which became engulfed in flames. The decedent was pronounced dead at the scene.

49. A male construction worker in his mid-30's died when he was struck by a motor vehicle. The decedent and a co-worker were moving construction materials using a pickup truck at a private residence. The materials were being moved from scaffolding in the driveway to a temporary shed. The decedent positioned himself behind the pickup truck when the co-worker pressed the gas pedal, reversing the pickup truck and striking the decedent. The decedent was transported by EMS to a local hospital where he died from his injuries.

50. A male site preparation supervisor in his mid-40's died when he was struck by a falling tree and fell from an elevated platform. The decedent was trimming trees using a bucket truck when a section of the tree fell and struck the decedent and bucket, causing the bucket to fall approximately 30 feet to the ground. The decedent was pronounced dead at the scene.

SUICIDE

51. A male construction laborer in his late teens died from a self-inflicted hanging.

52. A male roofer in his early 30's died due to a self-inflicted gunshot wound. The decedent was pronounced dead at the scene.

TOXIC EXPOSURE

53. A male residential remodeling laborer in his early 20's died from carbon monoxide overexposure. The decedent was using a generator placed indoors to intermittently charge electronics while providing security at a home during non-work hours. The decedent fell asleep with the generator running and was overcome by carbon monoxide. The decedent was pronounced dead at the scene.

MANUFACTURING (17 deaths)

ASPHYXIATION

54. A male architectural metal work manufacturing laborer in his early 60's died when he was pinned between a powered industrial truck and a cement wall. The decedent was utilizing a modified walk-behind powered industrial truck to move a steel I-beam. A co-worker saw the decedent using the powered industrial truck and a short time later returned to find the decedent pinned. The decedent was pronounced dead at the scene.

DRUG OVERDOSE

55. A male die maker in his mi-50's died from a multiple drug overdose. He was found unresponsive in a bathroom by his co-worker.

56. A male metal stamping plant worker in his late 40's died at work due to a drug overdose. The decedent was pronounced dead at the scene.

57. A male motor vehicle parts manufacturing worker in his early 40's died due to a drug overdose. He was found in the breakroom by a co-worker. The decedent was transported to a local hospital by EMS where he died.

58. A male manufacturing worker in his late 40's died at work from the use of methamphetamine. He was found collapsed in a factory aisle by a co-worker and was immediately given CPR. EMS arrived on the scene and took over CPR. Approximately 30 minutes after first being found on the floor, life saving measures were halted. The decedent was pronounced dead at the scene. A white powdery substance in a plastic bag was found in the front pants pocket of the decedent at the time of death. The decedent had been having difficulty breathing for 4-5 days prior to his death but had not sought medical care due to lack of health insurance and a primary care physician. The cause of death was determined to be methamphetamine toxicity complicating a heart condition.

ELECTROCUTION

59. A male artist and wood worker in his early-40's died due to an electrocution while creating wood burning art. The decedent was pronounced dead at the scene.

FALL

60. A male in his 50's died after falling from the second to the first floor while cleaning out garbage from a building. He had volunteered to help a friend, the building's prior owner. Part of the agreement for sale of the building was to clean out the garbage and old equipment/materials. The decedent and

his friend had walked up to a landing on the second floor. This landing had a wooden gate that swung out over the first floor. The gate was only attached to its base via two short screws. The likely order of events was the decedent leaned against the wooden gate while throwing trash over the side, the gate swung open as it was not "locked", the decedent hung onto the gate which ripped off its mounting and fell to the floor with the decedent. The decedent hit the leading edge of the dumpster which caused blunt chest trauma, leading to his death.

61. A male electrician in his early 50's died as a result of injuries suffered from a fall from height. He worked for an iron and steel manufacturer. The decedent was walking on an elevated platform when it collapsed, and the decedent fell approximately 50 feet. The decedent was not utilizing fall protection equipment at the time of incident. The decedent was pronounced dead at the scene.

62. A male manufacturing line worker in his mid-70's fell at his workplace in 1987. He died from complications of the injuries he sustained in 1987.

63. A male ready-mix concrete manufacturing business owner in his mid-80's died when he fell down a set of steps onto a concrete sidewalk. The decedent was transported to a local hospital by EMS where he later died.

FIRE/EXPLOSION

64. A male mill laborer in his late 50's was operating an industrial tub grinder when a fire started on the equipment and spread to the surrounding unprocessed wood. The decedent was not able to get out of the equipment cab and was fatally injured by the fire.

MACHINE

65. A male maintenance technician in his mid-60's was found on top of a large industrial sand blasting machine. A review of a video of the incident showed the decedent working on the machine. At one point a large door moved up and crushed the decedent pulling his body up with the door. He had not put the safeguard into place that would have prevented the door from shutting while he worked on the machine. The decedent was trained yearly on how to safely work on the machine and was trained in ensuring the safeguard was in place while working on that specific machine. The decedent was transported to a nearby hospital where he died.

66. A male plastic product manufacturing mechanical technician in his late 30's died when he was caught in a piece of manufacturing machinery. The decedent was attempting to adjust a sensor on the machine when he reached into the point of operation. The machine cycled, crushing the decedent. The decedent was pronounced dead at the scene.

MOTOR VEHICLE CRASH

67. A male driver in his late 40's working for a retail bakery died when he was involved in a motor vehicle crash. The decedent was traveling northbound when he failed to slow down for traffic that had come to a stop due to traffic congestion caused by an unrelated motor vehicle crash. The decedent's vehicle struck a large box truck from the rear causing the large box truck to strike the vehicle in front of it. It also resulted in the decedent's vehicle being lodged underneath the rear of the larger box truck. The decedent was pronounced dead at the scene. The decedent was wearing a seatbelt, and the airbag

was deployed. The roadway was dry at the time of the incident. The incident occurred at night with no additional lighting. The posted speed limit was 70 mph.

STRUCK BY

68. A male metal stamping plant worker in his mid-50's died when he was struck by a large press die. The decedent was using an overhead crane to adjust the die when it swung and crushed him between the die and the press. The decedent was pronounced dead at the scene.

69. A male concrete product manufacturing employee in his early 60's died from blunt force trauma to the chest. The decedent was using an air compressor to inflate a semi-truck tire when the tire exploded. The explosion knocked the decedent to the ground. The decedent was transported by EMS to a local hospital where he died from his injuries.

UNKNOWN

70. A male robotic engineer at a plastic fabrication company in his late 40's died after collapsing while using a dry ice blaster to clean a plastic injection mold. The decedent's collapse was witnessed by two co-workers who stated they saw a large flash of light and heard a loud thunder at the same time the decedent collapsed. CPR was performed by these co-workers until EMS arrived. The decedent was unconscious and unresponsive, and he was transported to a local hospital where he was pronounced dead. A definite cause of death could not be determined by autopsy or toxicology. It is believed that the decedent may have been electrocuted, although no source was identified.

WHOLESALE TRADE (2 deaths)

ASPHYXIATION

71. A male transportation equipment and supplies merchant wholesalers truck driver in his early 70's died when he was caught between two semi-truck trailers. The decedent was preparing to unhitch his trailer by raising the jacks when the truck and trailer rolled and pinned him against another stationary trailer. The brakes were not engaged on the decedent's truck. The decedent was pronounced dead at the scene.

MOTOR VEHICLE CRASH

72. A male tobacco and tobacco product merchant wholesaler truck driver in his mid-50's died when he was involved in a single motor vehicle crash. The decedent was traveling northbound when his semi-truck veered into the median and struck a concrete barrier near an overpass. The decedent was transported by EMS to a local hospital where he was later pronounced dead. The posted speed limit was 75 mph.

RETAIL TRADE (5 deaths)

DRUG OVERDOSE

73. A female retail supermarket worker in her mid-30's died as the result of a drug overdose. She was found in her car in the parking lot of her workplace approximately six hours after she had clocked out.

A family member stated that earlier in the day she had expressed suicidal intent. The decedent was pronounced dead at the scene.

FALL

74. A male nursery, garden center and farm supplies retail worker in his lates 50's died after he fell from a ladder. The decedent fell approximately 8 feet from a ladder striking the back of his head. The decedent was transported to a local hospital by EMS where he later died.

MOTOR VEHICLE CRASH

75. A female motor vehicle supplies and new parts retail delivery driver in her early 50's died when she was involved in a motor vehicle crash. The decedent was stopped at a stop light when her vehicle was rear-ended by another vehicle. The decedent was transported by EMS to a local hospital where she died from her injuries.

STRUCK BY

76. A male building materials dealer truck driver in his early 30's died when he was struck by a vehicle while unloading materials. The decedent was next to the trailer in the roadway unstrapping his load when he was struck by a passing vehicle. The decedent was pronounced dead at the scene.

SUICIDE

77. A male store clerk in his late 40's died from a self-inflicted hanging.

TRANSPORTATION AND WAREHOUSING (22 deaths)

AIRCRAFT

78. A male charter pilot in his mid-50's died when he was involved in an aircraft crash. The decedent was piloting an aircraft transporting several passengers when the aircraft struck the ground short of the runway. The decedent was pronounced dead at the scene.

79. A male pilot in his early 60's died when his aircraft crashed prior to landing. The pilot and his pilot in training were enroute to an airport in a private twin-propeller aircraft. Approximately 3 miles from the runway threshold, the airplane suddenly and rapidly descended at a steep incline, crashing into a swamp and wooded area. When police located the downed aircraft, they observed both the pilot and pilot in training to be deceased. There was very heavy sleet with low visibility conditions for about 10 minutes before and after the crash. No abnormalities were noted with the airplane's flight controls that would have precluded normal operation. There were two deaths from this crash.

80. A male charter pilot in training in his early 20's died when his aircraft crashed prior to landing. The pilot and his pilot in training were enroute to an airport in a private twin-propeller aircraft. Approximately 3 miles from the runway threshold, the airplane suddenly and rapidly descended at a steep incline, crashing into a swamp and wooded area. When police located the downed aircraft, they observed both the pilot and pilot in training to be deceased. There was very heavy sleet with low visibility conditions for about 10 minutes before and after the crash. No abnormalities were noted with

the airplane's flight controls that would have precluded normal operation. There were two deaths from this crash.

81. A male commercial photography pilot in his early 30's died after his aircraft crashed. The decedent was piloting a single engine aircraft performing a visual survey when the aircraft contacted the support cables for a radio tower. The decedent was pronounced dead at the scene.

DRUG OVERDOSE

82. A male truck driver in his early 30's died due to a drug overdose. The decedent was pronounced dead at the scene.

83. A male long distance general freight semi-truck driver in his mid-50's died as the result of a heart attack with cocaine as a contributing factor. The decedent was witnessed driving erratically before hitting a parked car. The decedent was found unresponsive in his vehicle. Emergency medical services arrived on scene and began CPR after extricating him from his vehicle. After roughly 25 minutes of attempting to resuscitate the decedent, he was pronounced dead at the scene.

FALL

84. A male warehouse employee in his mid-60's died as the result of complications from a head injury related to a presumed fall from an unknown height he suffered while at work. He was found unresponsive on the ground and clinging to a railing. The event which led him to this position was not witnessed. The decedent was transported by EMS to a hospital where he was evaluated and found to have multiple skull base and temporal bone fractures, multifocal intracranial hemorrhage, and respiratory failure. The decedent passed away four days after being admitted to the hospital.

FIRE/EXPLOSION

85. A male truck driver in his late 40's was driving a tractor trailer westbound when he lost control of his vehicle. His tractor-trailer started towards the south shoulder of the road and the decedent tried correcting it to the north when the tractor-trailer tipped over striking the north wall of a bridge over a creek and blocking the entire roadway. The tractor trailer was hauling liquid tar and once it overturned, it caught fire, and the decedent became entrapped in the vehicle. A passenger vehicle driving behind the tractor trailer struck the overturned tractor trailer and became engulfed in flames also. The decedent was proclaimed dead at the scene. A postmortem examination of the decedent revealed fourth degree burns over 100% of body with thermal injury to most internal organs. The crash occurred on two westbound travel lanes. The weather was cloudy and dry.

HOMICIDE/ASSAULT

86. A male rideshare driver in his early 60's died from multiple stab wounds. The decedent was transported to a local hospital by police where he later died.

87. A male Uber driver in his mid-40's died from multiple gunshot wounds. He was found after his vehicle struck the front porch of a home after he was shot.

MACHINE

88. A male local specialized freight trucking driver in his mid-40's died when he was run over by a bulldozer. The decedent had started his bulldozer when he exited the cab, and the bulldozer began to move forward. The decedent attempted to climb back onto the bulldozer but was pulled under the right track. The decedent was pronounced dead at the scene.

MEDICAL COMPLICATION FROM SUBSTANCE ABUSE

89. A male general freight trucker in his late 30's died in the cab of his truck due to medical complications related to substance abuse. The decedent was pronounced dead at the scene.

MOTOR VEHICLE CRASH

90. A male truck driver in his mid-60's died after being involved in a single motor vehicle crash. The decedent was travelling westbound when he lost control of the semi-truck hitting several signs on the right shoulder causing the semi-truck to flip onto its side. The semi-truck slid across the roadway into the median and hit the guardrail and a concrete overpass support. Upon hitting the concrete overpass support, the semi-truck caught fire. The decedent was pronounced dead at the scene. No other vehicles were involved in the crash. The crash occurred at night. The posted speed limit was 70 mph.

91. A male tow truck driver in his mid-50's died when he was involved in a motor vehicle crash. The decedent was traveling eastbound when he entered the intersection at the end of the expressway exit ramp and struck a semi-truck. The decedent was pronounced dead at the scene. The decedent was not wearing a seatbelt. The roadway was dry at the time of the crash and the weather was clear. The posted speed limit was 35 mph.

92. A female postal service worker in her mid-50's died when her vehicle was struck by a semi-truck. The decedent was making a left-hand U-turn from the shoulder traveling southeast when her vehicle pulled out in front of a semi-truck also traveling southeast and was struck. The decedent was ejected from the vehicle and both vehicles caught fire as a result of the crash. The decedent was not wearing a restraint. The roadway was dry at the time of the crash. The crash occurred in the daylight and the weather was clear. The posted speed limit was 55 mph.

93. A male truck driver in his mid-30's died after being involved in a single motor vehicle crash. The decedent was traveling southbound when he entered an elevated ramp at a high rate of speed and lost control of the semi-truck. The semi-truck began to tip and hit the concrete wall on the right side of the ramp. The semi-truck then veered left and tipped over hitting the concrete wall on the left side of the ramp while sliding and eventually falling off the overpass to the ground 85 feet below. The decedent was ejected from the semi-truck during the crash. The roadway was dry at the time of the crash. The roadway where the crash occurred is well lit. The posted speed limit was 70 mph on the roadway and 30 mph on the ramp.

94. A male truck driver in his late 40's died when he was involved in a single motor vehicle crash. The decedent was traveling eastbound in a box truck when he entered the median and struck a bridge pillar. The decedent was pronounced dead at the scene. The crash occurred at night and the vehicles air bags were deployed. The posted speed limit was 70 mph.

STRUCK BY

95. A male road transportation flagman in his mid-50's died when he was struck by a vehicle. The decedent was directing traffic flow using a slow/stop sign when an oncoming vehicle failed to slow. The decedent was pinned between the oncoming vehicle and a stationary work truck. The decedent was pronounced dead at the scene.

96. A male local general freight truck driver in his late 30's died when he was struck by a mobile crane. The decedent had prepared his truck and was awaiting the placement of a shipping container on his truck when he was run over by a mobile crane being operated in reverse. The decedent was pronounced dead at the scene.

97. A male specialized local freight truck driver in his late 50's died when he was crushed while unloading his trailer. The decedent was unloading steel bars from his trailer when, upon loosening a strap, the load shifted and knocked him off the trailer. The load subsequently fell on top of the decedent. The decedent was pronounced dead at the scene.

98. A male truck driver in his early 60's died when he was struck by a semi-truck in a truck stop parking lot. The decedent was pronounced dead at the scene. The weather was clear, and the area of the parking lot was unlit at the time of the incident.

99. A male local general freight truck driver in his mid-60's died when his trailer was hit by a pick-up truck. The decedent was on the side of the roadway inspecting his semi-truck between the cab and the trailer when a pick-up truck struck his trailer. The impact caused the trailer to roll over the decedent. The decedent was pronounced dead at the scene.

REAL ESTATE, RENTAL AND LEASING (1 death)

SUICIDE

100. A male realtor in his early 60's died from self-inflicted hanging at his business. The decedent was transported by EMS to a local hospital where he was pronounced dead.

PROFESSIONAL, SCIENTIFIC, AND TECHNICAL SERVICES (3 deaths)

DRUG OVERDOSE

101. A male supervisor in a production occupation in his mid-30's died from acute fentanyl toxicity. The decedent was found unresponsive on the floor of the facility after falling out of a non-running powered industrial truck and onto the floor.

FALL

102. A male portrait photography studio photographer in his late 60's died due to complications related to a fall. The decedent collapsed and hit their head. The decedent was transported to a local hospital by EMS where he later died due to his injuries.

MOTOR VEHICLE CRASH

103. A male marketing consulting services employee in his late 20's died after being involved in a motor vehicle crash. The decedent was travelling southbound when his company vehicle rolled and came to a rest against the concrete median barrier. The decedent's vehicle was subsequently struck by another vehicle. The decedent was pronounced dead at the scene. The road conditions were wet at the time of the crash. The posted speed limit was 70 mph.

ADMINISTRATIVE AND SUPPORT AND WASTE MANAGEMENT AND REMEDIATION SERVICES (14 deaths)

ASPHYXIATION

104. A male landscaping business owner in his early 40's was cutting brush and running the brush through a tree chipper with his three co-workers. The decedent was working alone on a dump truck. When they finished their work and it was time to leave, the decedent's co-workers got into their trucks and were waiting for the decedent to leave first. After the owner did not pull out, one of his co-workers walked over to where the decedent was working on the dump truck. He found the decedent pinned under the wheel of the truck and not breathing. The front tire on the passenger side was on his left arm and shoulder and his head was pressed against his chest by the front axle. The vehicle was in reverse and running when the decedent was found. He had gone under the truck to start the truck using a screwdriver to connect starter terminals. The truck backed over him when he connected the starter terminals. The decedent was pronounced dead at the scene. The truck was impounded and taken for mechanical inspection. Per a certified mechanic's opinion, the truck's entire steering column/shift linkage was worn out and the keyed ignition would not start the vehicle as designed. The vehicle's starter and starter solenoid were located inside the frame near the front passenger tire and best accessed from underneath the truck. This would be consistent with where the deceased was observed to be laying. The mechanic stated that the truck could successfully be jump-started with a flat-bladed screwdriver going across two poles/studs of the starter solenoid. There was no way to manually jump-start this model truck from under the hood. When starting the vehicle in this manner it would not matter what gear the transmission was in, the vehicle would start and if left in gear would immediately begin moving. With the vehicle left in reverse, upon starting it would have immediately begun moving in that direction. This is consistent with the on-scene observations and injuries observed to the deceased.

105. A male landscaper in his late 60's died after he was pinned underneath a lawn mower. The decedent was operating a commercial mower on a front lawn in reverse on a hill that had a slope of 27.5 degrees. He backed off a rock retaining wall that was 47 inches tall. The lawn mower flipped 180 degrees and pinned the decedent underneath the mower. The decedent was able to call his co-worker before dying. The rollover protection system was in the down position, and he was not wearing the seat belt that was on the lawn mower. The rollover protection system's metal post was resting on the back of the decedent's neck. The incident occurred in a non-traffic area in daylight and clear weather.

FALL

106. A male tree cutter in his early 50's died when his boom lift failed, and he fell 40 feet. The decedent was working at a residential property, cutting down tree limbs, when his boom lift failed. The boom arm rapidly dropped and hit the ground, throwing him from the lift basket, causing multiple blunt force

injuries. Emergency response found the decedent on the ground, where CPR was in progress, but unsuccessful. He was pronounced dead at the scene.

FIRE/EXPLOSION

107. A male landscaper in his late 50's died due to complications related to burns. The decedent was burned from an electrical fire in his barn. The decedent was transported to a local hospital by EMS where he later died due to his injuries.

108. A female security guard in her mid-40's died when she was involved in a single motor vehicle crash. The decedent's vehicle was found on fire and still in reverse gear lodged against a light pole. The vehicles tires appeared to have been spinning for a prolonged period of time based on first responders noting the front wheels had dug into the ground. The friction created by the spinning tires is suspected to be the cause of the fire. The decedent was pronounced dead at the scene.

MACHINE

109. A male landscaping operator in his late teens died when he was caught in a piece of landscaping equipment. The decedent was instructing several of his co-workers on how to operate a rented skid steer equipped with a bucket attachment. The skid steer was being used to remove fence panels. While removing the panels, one of the panels became entangled in chicken wire. The decedent was demonstrating to his co-workers how to raise the bucket while he was standing in the bucket. As the decedent raised the bucket, he slipped and became caught between the mast and the frame of the cab. The decedent was transported by helicopter to a nearby hospital where he later was pronounced dead.

110. A male landscaper in his late 40's died when he was caught in a woodchipper. The decedent was feeding tree branches into a woodchipper when he was pulled into the rotor blades. The decedent was transported by EMS to a local hospital where he died from his injuries.

111. A male arborist in his mid-30's died after being crushed under the ROPS of the loader. He was working on a private asphalt driveway, a portion of which was on a downgrade and slightly curved. The decedent was operating a Gehl loader with grapple attachment used for lifting logs. In the process of placing a log into the back of a truck he attempted to reposition one of the logs coming out of the grapple. The loader was articulated all the way to the left with the grapple fully upright and extended when the back-left tire slid off the asphalt. The loader then flipped onto its left side trapping the decedent underneath the upper portion of the roll cage. The decedent was reported to not be wearing a seat belt and was holding a vape in his right hand. He died at the scene.

MOTOR VEHICLE CRASH

112. A male landscaper in his early 20's died when he was involved in a single motor vehicle crash. The decedent was traveling southbound when he lost control of his dump truck, which was towing a woodchipper. The dump truck went airborne after it veered off the right shoulder into a grass ditch, tipped over, slid, and impacted a driveway culvert. The decedent was pronounced dead at the scene. No other vehicles were involved in the crash. The decedent was not wearing a seatbelt at the time of the crash. The roadway was dry and the weather was clear with good visibility. The posted speed limit was 55 mph.

113. A male truck driver in his early 60's died after losing control of his semi-truck. The decedent was travelling eastbound in a posted construction zone. The decedent lost control of the semi-truck veering slightly off the right shoulder on to a dirt patch. The decedent attempted to regain control causing the semi-truck to pass over both eastbound lanes and overturn the vehicle onto its side. The decedent was pronounced dead at the scene. The decedent was wearing a seat belt and the vehicle's air bag was deployed. No other vehicles were involved in the crash. The roadway was dry at the time of the crash. The crash occurred in daylight. The posted speed limit was 60 mph in the construction zone.

114. A male garbage truck driver in his early 30's died when he was involved in a motor vehicle crash. The decedent was traveling westbound when his garbage truck struck the trailer of a turning semi-truck. The posted speed limit was 55 mph.

115. A female pest control technician in her early 30's died when she was involved in a motor vehicle crash. The decedent was traveling southbound in a pickup truck when she crossed the centerline and was struck head-on by a loaded semi-truck. The decedent was pronounced dead at the scene. The posted speed limit was 55 mph.

STRUCK BY

116. A male tree cutter in his early 60's died when he was struck by a falling tree. The decedent had used a chainsaw to cut down a large diameter tree. It twisted as it fell, falling upon the decedent, causing multiple blunt force injuries. Emergency response found the decedent on his back, not breathing and without a pulse. Resuscitation efforts were unsuccessful, and he was pronounced dead at the scene.

117. A male tree trimmer in his early 40's died as the result of being struck in the head by tree debris when the rope winch line for the woodchipper equipment he was operating failed. The winch line installed on the woodchipper was utilized to assist in pulling felled tree material to the entry of the machine, where the operator would then manually load the material into the chipper. It is suspected that a portion of the material the decedent was pulling into the machine broke loose under the tension of the winch and became a projectile which impacted the decedent in the face and head. The rope of the winch also contacted the decedents body, creating abrasions. Other workers were working in the same general area as the decedent, but no one directly witnessed the incident. The decedent was pronounced dead at the scene.

EDUCATIONAL SERVICES (3 deaths)

DROWNING

118. A female in her early 50s, who worked as an aquatic supervisor was vacuuming a pool using SCUBA gear at a high school. During the task, she surfaced from the deep end and began swimming toward the shallow end. She was observed coughing, and a spotter inquired about her condition. While standing in the shallow end after taking off her air tank, the individual looked toward the spotter but suddenly fell backward into the water. The spotter, along with a colleague, immediately pulled her from the pool and began resuscitation efforts while contacting EMS. EMS arrived and continued resuscitation efforts, but despite these interventions, she was transported to the hospital where she was later pronounced dead. The cause of death was determined to be drowning.

STRUCK BY

119. A female crossing guard in her mid-70's was struck by a vehicle in the crosswalk. She was struck by a vehicle travelling approximately 35 miles an hour. The decedent was awake after the incident but did not recall what had happened. She was taken to a nearby hospital where she died from complications of multiple blunt force injuries sustained in the incident.

SUICIDE

120. A female university employee in her early 40's died from a self-inflicted hanging.

HEALTH CARE AND SOCIAL ASSISTANCE (3 deaths)

FALL

121. A female assisted living facility nurse's aide in her mid-30's died from complications related to a fall. The decedent slipped on a wet floor and was transported by EMS to a local hospital. After a subsequent fall at home and surgery, the decedent died due to complications.

MOTOR VEHICLE CRASH

122. A female child daycare worker in her early 40's died when she was involved in a motor vehicle crash. The decedent was traveling westbound when a second vehicle, attempting to pass, collided with her vehicle causing the crash. The decedent was transported by EMS to a local hospital and later died of her injuries. The decedent was wearing a seat belt and an airbag deployed. The roadway was slush covered at the time of the crash. The posted speed limit was 55 mph.

SUICIDE

123. A male maintenance employee at a nursing care facility in his late 20's died from a self-inflicted hanging.

ARTS, ENTERTAINMENT AND RECREATION (4 deaths)

ASPHYXIATION

124. A male golf course owner in his mid-40's was found unresponsive with a 4'x6' pallet laying on top of him. He was working alone moving debris to a dumpster approximately 20 feet. He was found with the pallet, which weighed 80-100, on top of his midsection. He was declared dead at the scene.

DRUG OVERDOSE

125. A male casino owner in his late 50's died at his place of employment due to a drug overdose. The decedent was pronounced dead at the scene.

FALL

126. A male slot technician in his 60's died after an unwitnessed fall in a casino, where he hit his head. Although the deceased had a history of type 2 diabetes and a pacemaker, he had not fallen in the past. While being driven to the hospital, the decedent had stroke-like symptoms and a seizure and became unconscious. At the hospital the decedent was found to have suffered a subarachnoid hemorrhage and was not able to be resuscitated.

127. A male volleyball referee in his late 70's died from complications related to a fall. The decedent fell from an elevated stand during a volleyball match. The decedent was transferred to a local hospital by EMS where he died 2 months later.

ACCOMMODATION AND FOOD SERVICES (5 deaths)

DRUG OVERDOSE

128. A male night auditor in his early 20's died from a multiple drug overdose. He was found unresponsive behind the hotel front counter by a hotel guest. Resuscitation efforts were unsuccessful, and he was pronounced dead at the scene.

129. A male hotel worker in his late teens died as the result of a drug overdose from fentanyl and kratom while at work. He was found with a co-worker who had also overdosed. He and this co-worker went to the employee bathroom where they proceeded to inject heroin mixed with fentanyl. The decedent was found on the floor unconscious and with no pulse. His co-worker was hysterical but alert. CPR was performed on the decedent prior to being transported by EMS to a hospital. The decedent was unresponsive to Narcan and was pronounced brain dead 3 days after arriving at the hospital. It is unknown when the kratom was ingested.

130. A male hotel employee in his early 40's died from a multiple drug overdose. He was found unresponsive by the hotel owner's son and the decedent's wife in one of the hotel's rooms.

HOMICIDE

131. A male full-service restaurant manager in his later 30's died from a gunshot wound in the parking lot at his place of employment. The decedent was pronounced dead at the scene.

132. A male hotel security guard in his late 30's died when he was shot multiple times. The decedent was pronounced dead at the scene.

OTHER SERVICES (7 deaths)

ASPHYXIATION

133. A male general automotive repair shop mechanic in late 50's died when the vehicle he was working on fell. The decedent was working under the front passenger side of the vehicle when it fell on top of him. The decedent was pronounced dead at the scene.

134. A male mechanic in his late 40's died as the result of asphyxiation after his clothes becoming entangled in the rear passenger side brake drum of a pickup truck he was working on in his home garage. He was found in this entrapped state by a family member who proceeded to call emergency

services. At the time he was found, the truck was elevated on jack stands, running, and in drive. The engine was shut off by the family member who discovered him but was not put in park. When emergency services arrived, the vehicle was stabilized, and the clothing of the decedent was cut free from the vehicle. The decedent was pronounced dead at the scene.

FIRE/EXPLOSION

135. A male general automotive repair shop mechanic in his mid-50's died due to a vehicle fire. The decedent was working on the fuel line when the gasoline spilled onto a nearby shop light and ignited. The decedent was transported by EMS to a local hospital where he later died.

MOTOR VEHICLE

136. A male church van driver in his early 60's died when he was involved in a motor vehicle crash. The decedent was the driver of a large passenger van involved in a rollover crash. The decedent was transported to a local hospital by EMS where he later died.

SUICIDE

137. A male motorcycle repair mechanic in his late 60's died as the result of a self-inflicted gunshot wound to the head. The decedent was pronounced dead at the scene.

TOXIC EXPOSURE

138. A male in his late 30s was found in a tattoo shop. The decedent was visibly intoxicated and had ingested three bottles of hand sanitizer. The decedent had been experiencing symptoms consistent with COVID-19. Based on misinformation, he believed ingesting hand sanitizer would help treat his COVID-19 infection. The decedent was transported to the hospital and died five days later from respiratory failure due to COVID-19 and ingestion of hand sanitizer.

ANIMAL

139. 21MI081 A female veterinary technician in her mid-20's died when she was stung by a bee. The decedent was stung by a bee on the hip. The decedent was transported by EMS to a local hospital and subsequently to a regional hospital where she died from complications of the bee sting.

PUBLIC ADMINISTRATION (1 death)

HOMICIDE

140. A male police officer in his late 30's died due to injuries sustained in a vehicle pursuit while on duty.