

**2007 Annual Report on
Traumatic Work-Related Fatalities in Michigan**

A Joint Report

of

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Summary

This is the 7th annual report on traumatic work-related fatalities in Michigan. **One hundred twenty individuals died in 2007 from a traumatic injury at work, a decrease from the 157 in 2006.** The number of deaths has decreased since the peak in 1999 at 182 (Figure 1). The rate of traumatic work-related fatalities in Michigan for 2007 was 2.9 deaths/100,000 workers, which was lower than the national rate of 3.7 deaths/100,000 workers. There have been no changes in the system to track these deaths since 1992 so the changes in the number of deaths each year cannot be attributed to differences in data collection.

The 120 individuals who died had 118 different employers. Two employers had a fatal incident when more than 1 person died. A description of each work-related death is in Appendix I. Copies of the Michigan Fatality Assessment and Control Evaluation (MIFACE) reports of onsite investigations and summaries of Michigan Occupational Safety and Health Administration (MIOSHA) inspections are at the Michigan State University Department of Occupational and Environmental Medicine (MSU OEM) website: www.oem.msu.edu/.

Industries were classified using the North American Industry Classification System¹ (NAICS). There were 18 deaths in Construction (NAICS 23), 14 deaths in Manufacturing (NAICS 31-33), 13 deaths in Agriculture, Forestry, Fishing and Hunting (NAICS 11), 11 deaths in Transportation and Warehousing (NAICS 48-49), and 10 deaths each in Administrative and Support and Waste Management (NAICS 56) and Retail Trade (NAICS 44-45). **The largest numerical change in the number of deaths occurred in the Construction classification where the number of deaths decreased from 42 in 2006 to 18 in 2007.** There were 5 deaths in the Information sector (NAICS 51), and 1 death in the Utilities sector (NAICS 22). No deaths had occurred in these industry sectors in 2006. Mining (NAICS 21) did not have a work-related death in 2007 as compared to 3 in 2006.

The ranking of industries by risk of death differed from the ranking of industries by the largest number of deaths. **Agriculture had the highest annual average incidence rate per 100,000 workers (16.1), followed by Construction, which had an incidence rate of 10.8.** The incidence rate for Transportation and Warehousing was 10.1, and Information was 7.6.

The overall fatality rate per 100,000 workers in Michigan for 2007 was 2.9, which was less than the United States fatality rate of 3.7. However, 6 industry sectors in Michigan had a higher fatality rate than the corresponding United States fatality rate: Construction (10.8 vs. 10.3); Information (7.6 vs. 2.3); Utilities (5.0 vs. 3.9); Other Services (5.1 vs. 2.5), and Public Administration (3.2 vs. 2.4).

The most common cause of death involved motor vehicles (28, 23.3%), followed by homicide (20, 16.7%) and then falls and struck by an object (17 each, 14.2%). Sixteen individuals died as a result of a machine-related event (13.3%). Six (5.0%) individuals committed suicide while at work. Four (3.3%) individuals each died as a result of an electrocution or a toxic exposure. Animal contact was the cause of death for 2 (1.7%) individuals and 2 (1.7%) individuals died from a drug overdose. One (0.8%) individual died as a result of a fire/explosion, and 1 (0.8%) individual died from a heart condition worsened by working in a hot environment. Two (1.7%) individuals were firefighters who died from heart attacks sustained while at work.

Most deaths occurred among men (86.7%). The average age of death was 48.2 years and ranged from 15 to 89. Of those individuals who died, 81.7% were Caucasian. Fatal injuries occurred in 37 of Michigan's 83 counties, with Wayne County having the largest number of deaths, 27.

For 12 (10.7%) of the 112 non-suicide/non-overdose deaths, illegal drugs, alcohol, or prescribed medications may have contributed to the individual's death. Illegal drugs may have been a factor in 4 of these deaths. One of the 4 individuals who tested positive for illegal substances also tested positive for prescribed medication. Although a total of 7 individuals tested positive for alcohol in their bloodstream at the time of their death, alcohol levels were not above 0.08% in 3 deaths. Prescribed medication not in combination with other substances may have been a factor in 4 deaths.

MIOSHA staff investigated 31 of the deaths at 31 employers. The police investigated 58 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 56 different employers. Federal OSHA investigated 1 death. The remaining 30 work-related fatalities (30 employers) were not investigated by any regulatory agency as to cause of death other than by the police to exclude a homicide or suicide.

Traumatic work-related fatalities are preventable. The descriptions of the traumatic work-related deaths in Appendix I highlight these tragedies and the need to take action to prevent them. Further efforts to investigate the circumstances leading to these deaths and disseminate information from what we learn are necessary to educate and, where applicable, recommend change in regulations to prevent similar deaths from occurring in the future. These efforts will also be useful in preventing the larger number of similar traumatic events that do not result in a work-related death.

Background

The Michigan Fatality Assessment and Control Evaluation (MIFACE) is a joint research project of Michigan State University College of Human Medicine's Occupational and Environmental Medicine Division and the Michigan Department of Labor and Economic Growth. Surveillance and prevention activities of traumatic work-related deaths by MIFACE began January 1, 2001.

The purpose of the MIFACE surveillance project is three-fold: 1) identify types of industries and work situations where workers are dying from traumatic work-related incidents, 2) identify the underlying cause(s) of the work-related fatality, and 3) formulate and disseminate prevention strategies to reduce the number of work-related fatalities. MIFACE uses the National Institute for Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation (FACE) program as a model. Since 1982, NIOSH has funded a multi-state FACE program. The goal of the FACE program is to "prevent occupational fatalities across the nation by identifying and investigating work situations at high risk for injury and then formulating and disseminating prevention strategies to those who can intervene in the workplace." NIOSH FACE 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 are an important part of both the NIOSH and MIFACE programs.

Methods

MIFACE uses numerous sources to identify persons who have died from a work-related injury: (1) MIOSHA, (2) Police Departments, including the Fatality Analysis Reporting System (FARS) State of Michigan Traffic Crash Report, (3) County Clerks, (4) Medical Examiners, (5) Michigan State University County Extension Offices, (6) Newspaper Articles, and (7) Emergency Service Providers, including Fire Departments.

MIFACE has adopted the United States Department of Labor, Bureau of Labor Statistics (BLS), Census of Fatal Occupational Injuries² (CFOI) definitions of traumatic injury, work relationship, and work. BLS collects the official statistics of work-related deaths in all states. A traumatic injury is any unintentional or intentional wound or damage to the body resulting from acute exposure to energy -- such as heat or electricity or kinetic energy from a crash -- 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. 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 the person was there to work; or (2) off the employer's premises and the person was there to work, or the event or exposure was related to the person's work or status as an employee. The employer's premises include buildings, grounds, parking lots, and other facilities and property used in the conduct of business. Work is defined as duties, activities, or tasks that produce a product or result; that are done in exchange for money, goods, services, profit, or benefit; and, that are legal activities in the United States. Fatalities to volunteer workers who are exposed to the same work hazards and perform the same duties or functions as paid employees and that meet the CFOI work relationship criteria are in-scope. Deaths from natural causes, such as heart attacks that occur at work, are not included (with the exception of fire fighters). Suicides are included, following the protocol established by the NIOSH FACE program as well as that of BLS.

Once an individual has been identified and confirmed as an eligible work-related death, various sources of information are used to describe the circumstances associated with the fatal event. Basic information collected includes: the size of the company; the content of the safety program; the decedent's age, gender, and occupation; tasks the decedent was performing; tools or equipment the decedent was using; the working environment; the energy exchange resulting in the fatality; and the role of management in controlling how these factors interact.

The level of information collected for each fatality depends on the type of incident. For homicides, suicides and most transportation-related fatalities that occur while the individual is at work, MIFACE collects source documents and does not attempt to perform an on-site investigation.

Source documents include reports from agencies that investigate the death or provide emergency services when the event occurs, death certificates, medical examiner reports and, when appropriate, the MIOSHA fatality investigation narrative. Information about work-related fatalities that involve motor vehicles is obtained from the State of Michigan Traffic Crash Report (UD-10) that is completed by the police agency that responds to the incident.

For the remaining work-related fatalities, including agricultural fatalities, MIFACE initiates contact with employers or farm family members to request permission for an on-site investigation. Employer participation in the MIFACE program is voluntary and is unrelated to any regulatory or

enforcement procedures. It is important to note that MIFACE investigators do not enforce compliance with MIOSHA rules and regulations and do not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE with employer agreement, accompanies the MIOSHA compliance officer. MIFACE also interviews the compliance officers about their investigations.

When the MIFACE on-site fatality investigation is completed, a report is written based on the information gathered during the investigation and from reviewing the source documents. Neither reports nor educational materials produced by the MIFACE program contain personal identifiers. The MIFACE report contains a summary of the fatal incident, a detailed narrative of the fatal incident, the cause of death, pictures/drawings, and prevention recommendations to minimize the chances of a similar fatality occurring in the future. Before releasing the MIFACE report, the report is reviewed by members of the MIFACE advisory board and MIOSHA (if MIOSHA conducts an investigation).

The MIFACE report is sent to the employer, business trade organizations, labor unions and trade journals and other groups that could potentially affect work practice changes to eliminate or reduce the chances of a fatality occurring under similar circumstances in the future. The reports are also posted on the MSU OEM website at www.oem.msu.edu/. Also posted on the website are summaries of MIOSHA investigated cases and Hazard Alerts summarizing individual work-related cases as well as Hazard Alerts for specific targeted industrial sectors.

The 2002 North American Industry Classification System (NAICS) has 20 sectors that group establishments into industries according to primary economic activity. NAICS uses a 6-digit coding system to identify particular industries and how those industries are placed within the NAICS coding structure. MIFACE classifies an establishment to an industry when the establishment's primary activity meets the definition for that industry.

The 2000 Standard Occupational Classification³ (SOC) system is used to categorize occupations of the individuals who died. The 2000 SOC is divided into 23 major groups, which are sometimes called "job families." The "job families" group individuals according to the nature of the work performed, placing all people who work together into the same group regardless of their skill level. The 23 "job families" are further subdivided using a 6-digit structure for its 821 detailed occupations within those groups.

Results

There were 120 traumatic work-related fatalities in 2007. One hundred fourteen (95.0%) of the 120 work-related traumatic incidents occurred in 2007. Six individuals died from complications from injuries that occurred prior to 2007; 1 individual was injured in a fall from a piece of machinery in 1991, 1 individual was struck in the head by a steel beam in 1997, and 1 individual injured his knee in 2005. Three individuals were injured in 2006; 2 individuals each were injured in motor vehicle crashes and 1 individual was injured during an altercation in a parking lot. The number of traumatic work-related deaths per year in Michigan since 1992 is shown in Figure 1.

Demographics

The demographic characteristics of all workers who died from a traumatic work-related injury in 2007 are shown in Table 1.

Gender

One hundred four (86.7%) of the individuals who died were men and 16 (13.3%) were women. 2007 had the highest number of women dying on the job since MIFACE began its statewide surveillance project in 2001. The previous highest number of work-related deaths for women was 12, which occurred in both 2001 and 2002.

Race

Ninety eight (81.7%) individuals who died were identified as Caucasian on their death certificate, 14 (11.7%) were identified as African-American, 1 (0.8%) was identified as Asian/Pacific Islander, 1 (0.8%) was identified as American Indian/Alaskan Native, and 6 (5.0%) were identified as Hispanic. Eighty-six (82.7%) men were identified as Caucasian, 10 (9.6%) men were identified as African-American, 1 (1.0%) man was identified as Asian/Pacific Islander, and 1 (1.0%) man was identified as American Indian/Alaskan Native. Six (5.8%) men were identified as Hispanic. Twelve (75.0%) women were identified as Caucasian and 4 (25.0%) women were identified as African-American.

Ethnicity

Eight individuals were identified as Hispanic for their ethnicity. Seven men were identified as Hispanic; the 6 men identified above as Hispanic for their race were identified as Hispanic for their ethnicity, and 1 man identified as Caucasian for his race was identified as Hispanic for ethnicity. One woman identified as Caucasian for her race was identified as Hispanic for her ethnicity.

Age

The age distribution of the individuals who died from a work-related injury is shown in Table 1 and Figure 2 and by industry in Table 2. The ages ranged from 15 to 89, with 1 death in a youth (age 15) and 10 deaths in individuals 70+ years old. The average age was 48.2 years, which was higher than the average of 44.6 years in 2006. One hundred nine (90.8%) deaths occurred in individuals between the ages of 18-69.

Individuals 50-59 years of age had the greatest number of deaths (35, 29.2%), followed by individuals in the age group of 40-49 years of age (28, 23.3%). These middle-aged workers comprised over 50% of the traumatic work-related deaths.

The 15-year-old youth died while volunteering to help his father at his father's workplace. The youth was standing under a raised skid steer loader forklift attachment that was being used to transport a bale of hay. The youth activated the lever controlling the lift arm movement while positioned under the raised lift arms. The lift arms lowered, and he was pinned on the right side of the skid steer loader between the right loader arm and the frame of the machine.

Three of the 10 individuals with ages ranging from 70-89 who died from traumatic work-related events worked in Agriculture; all were farm owner/operators. Three individuals worked in Retail Trade; 1 individual was involved in a motor vehicle accident and 2 individuals fell while working at the store. One individual who worked in Health Care and Social Assistance was killed in a motor vehicle crash. One individual worked in Wholesale Trade; he was overcome by ammonia at a grain elevator. One individual was a real estate broker who fell down the stairs at a residence being shown. One individual who worked in Public Administration was an EMS responder; he was providing EMS response at a home when he suffered a fatal heart attack

One-third of the deaths in Construction occurred between the ages of 50-59 (6, 33.3%). Similar to Construction, greater than one-third (5, 38.5%) of the deaths in Agriculture and 4 (40.0%) deaths in Administrative and Support and Waste Management and Remediation Services were among individuals 50-59 years of age. Contrasting with these 3 industrial sectors, Manufacturing had more than one-third (6, 42.9%) of the deaths among those aged 40-49. Within Construction, ages 30-39 and 40-49 had 5 (27.8%) deaths each. In Agriculture, 9 (69.2%) individuals were 50+ years of age when they died.

Marital Status

Seventy (58.8%) individuals who died from traumatic incidents were married, 26 (21.8%) were never married, 20 (16.8%) were divorced, and 3 (2.5%) were widowed. Marital status was unknown for 1 individual.

Educational Level

Table 1 shows the distribution of educational level and Table 3 shows the distribution of educational level by industry. Overall, 19 (16.0%) individuals had not completed high school, 56 (47.1%) completed high school and received a high school diploma, 37 (31.1%) completed 1-4 years of college, and 7 (5.9%) had over five years (5+) of college. The educational level for 1 individual was unknown.

Within industries having 10 or more deaths, the most common education level among individuals who died was completing high school but no college. Administrative and Support and Waste Management and Remediation Services had the highest percentage of individuals (6, 60.0%) who died who were high school graduates but did not attend college. This industry sector was followed by Manufacturing (8 deaths, 57.1%), Agriculture, Forestry, Fishing and Hunting (6 deaths, 46.2%), Transportation and Warehousing (5 deaths, 45.5%), Construction (8 deaths, 44.4%), and Retail Trade (4 deaths, 40.0%).

Forty-four (37.0%) individuals who died had attended college for at least one year. In Construction, 8 (44.4%) individuals had attended college 1-4 years. Manufacturing also had a high percentage of individuals (5, 35.7%) who died attending college for 1-4 years. Three (30.0%) individuals in Retail Trade and 3 (27.3%) individuals in Transportation and Warehousing had attended college 1-4 years. Within Agriculture and Administrative and Support and Waste Management and Remediation Services with 2 (15.4%) and 2 (20.0%) individuals, respectively, had attended college 1-4 years. Three of the 6 industries with 10 or more deaths had deaths of individuals who had a

post college graduate education: Manufacturing, Retail Trade, and Administrative and Support and Waste Management and Remediation Services.

Nineteen (16.0%) individuals who died in 2007 as a result of a work-related traumatic injury had not completed high school. Five (26.3%) of these 19 individuals who had not completed high school were working in Agriculture. Three (15.8%) of the 19 individuals worked in Transportation and Warehousing, 2 (10.5%) individuals worked in Construction, 2 (10.5%) individuals worked in Retail Trade, and 1 (5.3%) individual worked in Administrative and Support and Waste Management and Remediation Services. One of the 19 deaths included the 15-year-old youth.

Drug/Alcohol/Medication Use

Eighty-two (73.2%) of the 112 non-suicide/non-overdose cases are known to have had an alcohol screen performed after death. Seven individuals (8.5%) had measurable blood alcohol levels at the time of their death. Five individuals had blood alcohol levels near, at, or above 0.08%: 0.07%, 0.09%, 0.17%, 0.22%, and 0.29%. Two individuals tested positive for alcohol, but at levels below that associated with impairment: 0.021%, and 0.05%.

Eighty (71.4%) of the 112 non-suicides, non-overdose cases had a drug screen performed after death. Four individuals (5.0%) tested positive for illegal drugs and 18 (22.5%) individuals tested positive for metabolites of medication (prescription and over-the-counter). Results of caffeine, nicotine, and cotinine (a metabolite of nicotine) were excluded from these counts. Two individuals tested positive for cocaine and its metabolite. One individual tested positive for marijuana and its metabolite. One individual tested positive both for marijuana and its metabolite as well as a prescription medication. For 4 of the deaths, medications not in combination with other substances might have been a factor in the death. The prescription medications in these deaths were: oxycodone, hydrocodone, hydromorphone, and propoxyphene.

Among the non-suicide/non-overdose deaths, a total of 12 of 112 (10.7%) individuals had alcohol, illegal drugs, or prescription medications in their system at levels that may have been a risk factor for the occurrence of the traumatic injury.

Work-Related Death Details

Day of Injury

Table 4 shows the day of injury for industries with 11 or more deaths. Overall, the largest number of work-related fatal injuries occurred on a Tuesday (24, 20.0%). Saturday had the next highest number of work-related fatal injuries (21, 17.5%). Friday had 20 (16.7%) fatal injuries, Monday had 19 (15.8%), Wednesday had 17 (14.2%), Thursday had 11 (9.2%), and Sunday had 8 (6.7%).

In the Construction industry, the deaths were fairly evenly distributed through the traditional workweek, with the exception of Tuesday, which had 1 death. Friday had the highest number of work-related injuries (4, 22.2%), followed by Monday, Wednesday and Thursday (3 each, 16.7%). The weekend days of Saturday and Sunday each had 2 (11.1%) deaths. In Manufacturing, Monday and Saturday were the days when most fatal injuries occurred (4 each, 28.6%), followed by Friday (3, 21.4%) and Tuesday, Wednesday, and Thursday (1 each, 7.1%). In Agriculture, Saturday had

the highest number of fatal injuries (4, 30.8%), followed by Sunday, Monday, Tuesday and Thursday (2 each, 15.4%). Wednesday had 1 (7.7%) death and Friday did not have any fatal incidents. Tuesday was the weekday when most work-related fatal injuries in the Transportation and Warehousing industry occurred (4, 36.4%), followed by Friday (3, 27.3%), Monday (2, 18.2%), and Wednesday and Saturday (1 each, 9.1%). No fatal incidents in the Transportation and Warehousing industry sector occurred on Sunday or Friday.

Tuesday was the day of the week when the most work-related homicides occurred (6, 30.0%), followed by Saturday (4, 20.0%), Sunday (3, 15.0%) and Wednesday, Thursday, and Friday (2 each, 10.0%). One (5.0%) homicide occurred on a Monday.

Month of Injury

Table 5 shows the month of injury for industries with 11 or more deaths. March had the highest number of injuries resulting in fatalities with 14 (11.7%), followed by May (13, 10.8%), and January, June, August, September and November (11 each, 9.2%). February had 10 (8.3%) incidents, October had 9 (7.5%) incidents, December had 8 (6.7%) incidents, April had 6 (5.0%) incidents, and July had 5 (4.2%) incidents.

Of the 18 incidents in the Construction industry, March and August each had 4 (22.2%) incidents, followed by May (3, 16.7%), September and November (2 each, 11.1%) and January, February and October (1 each, 5.6%). In Construction, April, June, July and December did not have a work-related traumatic incident. In Manufacturing, the largest number of work-related fatal injuries occurred in November (4, 28.6%), followed by January, March, and September (2 each, 14.3%), and May, July, October, and December (1 each, 7.1%). In Manufacturing, February, April, June, and August did not have a work-related traumatic incident.

In Agriculture, the 13 fatal injuries occurred during 6 months of the year. October (5, 38.5%) was the most likely month for a fatal injury, followed by April, June and September (2 each, 15.4%) and January and March (1 each, 7.7%). No fatal injuries occurred in Agriculture during the months of February, May, July, August, November, and December. Within the Transportation and Warehousing industry, the most likely months for a work-related fatal injury to occur were in March, April, August, and December (2 each, 18.2%). The months of February, May, and July each had 1 (9.1%) fatal incident. Five months (January, June, September, October, and November) did not have a fatal injury occur in Transportation and Warehousing.

The largest number of work-related homicides occurred in January (20.0%), followed by September and November (3 each, 15.0%), followed by September and November (3 each, 15.0%), February, August, and December (2 each, 10.0%) and then March, April, May and July (1 each, 5.0%). No work-related homicides occurred in June or October.

Table 6 shows the means of death by the month the injury occurred. Motor vehicle incidents were fairly evenly distributed throughout the year; the largest number of the incidents occurred in March (5, 17.9%), followed by January, May, August and December (3 each, 10.7%) Nearly one-quarter of the fatal falls occurred in May (4, 23.5%), followed by February and March (3 each, 17.6%). March and November were the most common months for a struck by incident to occur (3 each, 17.6%), followed by April, July and August (2 each, 11.8%). Machine-related incidents were most

likely to occur in June (4, 25.0%), followed by October (3, 18.8%) and then January and September (2 each, 12.5%).

Time of Injury

The time of the injury could be placed within a 4-hour time period in 109 of the 120 (90.8%) work-related deaths. The 24-hour day was divided into 4-hour time periods: 12:00 a.m. - 3:59 a.m., 4:00 a.m. - 7:59 a.m., 8:00 a.m. - 11:59 a.m., 12:00 p.m. - 3:59 p.m., 4:00 p.m. - 7:59 p.m., and 8:00 p.m. - 11:59 p.m.

Table 7 shows the 4-hour time periods for industries with 11 or more deaths. Overall, 35 (32.1%) fatal injuries occurred between 12:00 p.m. - 3:59 p.m., 31 (28.4%) occurred between 8:00 a.m. - 11:59 a.m., 19 (17.4%) occurred between 4:00 p.m. - 7:59 p.m., 12 (11.0%) fatal incidents occurred between 8:00 p.m. - 11:59 p.m., 7 (6.4%) occurred between 12:00 a.m. - 3:59 a.m., and 5 (4.6%) occurred between 4:00 a.m. - 7:59 a.m.

Within Construction, for the 17 individuals with a known time of injury, all injuries occurred within the 12-hour time span of 8:00 a.m. to 7:59 p.m. Nine (52.9%) injuries occurred between the work hours of 12:00 p.m. - 3:59 p.m., 7 (41.2%) injuries occurred between 8:00 a.m. - 11:59 a.m., and 1 (5.9%) injury occurred between the hours of 4:00 p.m. - 7:59 p.m. Similarly, Agriculture also had all of the fatal injuries occur within the same 12-hour time span. Six (46.2%) injuries occurred between the work hours of 12:00 p.m. - 3:59 p.m., 5 (38.5%) injuries occurred between the hours of 4:00 p.m. - 7:59 p.m., and 2 (15.4%) injuries occurred between 8:00 a.m. - 11:59 a.m. Fifty percent of the deaths which occurred in Manufacturing happened between the hours of 12:00 p.m. - 7:59 p.m. Three (21.4%) deaths occurred between 12:00 p.m. - 3:59 p.m. and 4 (28.6%) deaths occurred during the time period of 4:00 p.m.-7:59 p.m. In the Transportation and Warehousing industry, 4 (40.0%) fatal injuries with a known time of injury occurred in the time period of 8:00 p.m. - 11:59 p.m., and 3 (30.0%) fatal injuries occurred between 8:00 a.m. - 11:59 a.m.

Most homicides with a known time of injury occurred during the morning hours of a standard work shift, 8:00 a.m. - 11:59 a.m. (5, 29.4%).

Place of Death

For 46 (38.3%) individuals, the place of death was at the scene of the traumatic incident. For 71 (59.2%) individuals, the place of death was the hospital, for 2 (1.7%) individuals, the place of death was identified as a home, and for 1 (0.8%) individual, the place of death was identified as a nursing home.

Geographic Distribution

Table 8 and Figure 3 show the county in which the decedent worked where he/she was fatally injured. Thirty-seven (44.6%) of the 83 Michigan counties had a traumatic fatal work-related injury occur in 2007. The southeast Michigan counties of Wayne, Oakland, Macomb, and Washtenaw accounted for 37.5% of the fatal work-related injuries in 2007. Wayne County accounted for 27 (22.5%) work-related fatal injuries, Oakland County had 10 (8.3%) fatal injuries, and Macomb and Washtenaw counties each had 4 (3.3%) fatal injuries. Kent County had 14 (11.7%) work-related

fatal injuries, twice the number that occurred in Kent County in 2006. Two additional counties had 4 fatal injuries, 6 counties had 3 fatal injuries, 11 counties had 2 fatal injuries, and 13 counties had 1 fatal injury.

Industry Information

Number of Deaths by Industry Sector and Annual Incidence Rates

Table 9 shows the number of work-related fatalities and Michigan's annual incidence rate by industry sector for 2007. Table 10 compares the incidence rate by industry sector in Michigan to the United States incidence rate by industry sector for 2007. Incidence rates are calculated per 100,000 workers.

There was an overall decrease in the number of work-related deaths in 2007 compared to 2006, although several industry sectors had an increase in the number of deaths in 2007. Other Services (except Public Administration) had 9 deaths in 2007, an increase of 4 deaths compared to 2006. Public Administration had an increase from 5 deaths in 2006 to 9 deaths in 2007. Five deaths occurred in Information, an industry sector which had no deaths in 2006. There was 1 death in the Utilities industry sector, which also had no deaths in 2006. Arts, Entertainment and Recreation, and Accommodation and Food Services each had 1 more death in 2007 compared to 2006 (1 death in 2006 to 2 deaths in 2007, and 4 deaths in 2006 to 5 deaths in 2007, respectively).

Two industry sectors, Retail Trade, and Real Estate and Rental and Leasing had the same number of deaths in 2007 as in 2006 (10 and 1, respectively). There were no deaths in the Mining sector in 2007.

Nine industries showed a decrease in the number of deaths in 2007 compared to 2006: Agriculture, Forestry, Fishing and Hunting, Construction, Manufacturing, Wholesale Trade, Transportation and Warehousing), Professional, Scientific and Technical Services, Administrative and Support and Waste Management and Remediation Services, Educational Services, and Health Care and Social Assistance. Within Health Care and Social Assistance, in 2007, 2 of the 5 individuals who died worked in Social Assistance; in 2006 all of the 6 individuals who died worked exclusively in Health Care.

There were 5 fewer deaths in 2007 in Agriculture (18 in 2006, 13 in 2007). Although there was a slight increase in the number of deaths of individuals involved in Animal Production, the number of deaths of individuals involved in Forestry and Logging decreased by 50% and the number of deaths of individuals involved in Crop Production decreased by 37%.

The number of deaths occurring in Construction decreased dramatically from 42 in 2006 to 18 in 2007, a decrease of nearly 60%. The number of Construction deaths in 2007 is the lowest number of Construction deaths since MIFACE surveillance began in 2001. The most significant statistical decrease in the number of deaths occurred in Heavy and Civil Engineering Construction classification; the number of deaths decreased from 9 (21.4%) in 2006 to 1 (5.5%) in 2007. Although the number of deaths decreased for Specialty Trade Contractors, (24 deaths in 2006 to 15 deaths in 2007), the percentage of the total number of deaths in Construction among Specialty Trade Contractors increased from 57.1% in 2006 to 83.3% in 2007.

The number of Manufacturing deaths decreased from 19 in 2006 to 14 in 2007. The highest number of deaths in Manufacturing occurred within Transportation Equipment Manufacturing (4 of 14, 28.6%), followed by Primary Metal Manufacturing (3 of 14, 21.4%). Primary Metal Manufacturing had an increase in the number of deaths in 2007 (3 in 2007 compared to 2 in 2006).

In Wholesale Trade, a decrease of 2 deaths occurred compared to 2006 (6 in 2006 to 4 in 2007). All of the 2007 deaths occurred in Merchant Wholesalers, Nondurable Goods. In 2006, 3 industry subgroups had work-related fatal incidents.

Transportation and Warehousing also had a large decrease in the number of work-related deaths compared to 2006 (19 in 2006 compared to 11 in 2007). In 2006, all of the 19 deaths occurred in the Transportation (NAICS 48) sector. In 2007, 9 of the deaths occurred in Transportation. The biggest decrease in 2007 occurred in Truck Transportation. In 2006, 12 individuals died and in 2007, 6 individuals died. Warehousing and Storage (NAICS 49) had 2 deaths in 2007.

From 2006 to 2007, Professional, Scientific and Technical Services had a decrease of 1 death, Administrative and Support and Waste Management and Remediation Services had a decrease of 2 deaths, and Educational Services had a decrease of 2 deaths.

There were 4 more deaths in 2007 in Public Administration compared to 2006. In 2006, all of the individuals who died worked in the Justice, Public Order and Safety Activities subgroup. In 2007, 6 of the 9 individuals who died worked in this subgroup. The remaining 3 deaths occurred among two new subgroups (Executive, Legislative and Other General Government Support and Regulation and Administration of Transportation Programs).

Agriculture, Forestry, Fishing and Hunting had the highest incidence rate per 100,000 workers (16.1) for all 2-digit NAICS industry sectors in Michigan in 2007. Construction was next with an incidence rate of 10.8, followed by Transportation and Warehousing with an incidence rate of 10.1. Information had an incidence rate of 7.6, Other Services had an incidence rate of 5.1, and Utilities had an incidence rate of 5.0. Although both Retail Trade and Administrative and Support and Waste Management and Remediation Services had the same number of deaths (10), the incidence rate (2.0) for Retail Trade was lower than Administrative and Support and Waste Management and Remediation Services (3.7) because more individuals were employed in the Retail Trade industry.

Table 10 compares the incidence rate by industry in Michigan to national rates for 2007. The overall fatality rate per 100,000 workers in Michigan for 2007 was 2.9, less than the United States fatality rate of 3.7.

Six industry sectors had higher fatality rates per 100,000 workers than the United States fatality rates: Construction (10.8 vs. 10.3); Information (7.6 vs. 2.3); Utilities (5.0 vs. 3.9); Other Services (5.1 vs. 2.5), and Public Administration (3.2 vs. 2.4).

Several Michigan industries had notably lower fatality rates than the United States fatality rates: Agriculture (16.1 vs. 27.3), Transportation and Warehousing (10.1 vs. 15.9), Wholesale Trade (2.4 vs. 4.5), and Professional and Business Services (2.1 vs. 3.1).

Education and Health Services and Retail Trade had the same fatality rates per 100,000 workers as the United States rate of 0.7 and 2.0, respectively.

Means of Death by Industry Sector

Table 11 shows the means of death by industry sector. Similar to all of the preceding years of MIFACE data collection, a fall from a height was again the leading cause of death in the Construction industry. Although a fewer number of deaths in Construction were caused by a fall from a height in 2007 compared to 2006 (7 in 2007 vs. 13 in 2006), the percentage of death by this cause increased, 38.9% in 2007 vs. 31.0% in 2006. With the exception of 2006, when the number of deaths due to being struck by an object increased dramatically (10 struck by deaths), the number of deaths in 2007 due to being struck by an object was comparable to all previous years (5 deaths in 2007). Two (11.1%) workers in Construction died as a result of an electrocution. A motor vehicle crash and a toxic exposure (muriatic acid) each resulted in the death of 1 (5.6%) Construction worker. An assailant killed 1 (5.6%) Construction worker and 1 (5.6%) Construction worker died as a result of a self-inflicted injury.

A machine-related event was the leading cause of death in Manufacturing. Five (35.7%) of the 14 deaths were a result of a machine-related event. Two (14.3%) individuals died as a result of being struck by an object. Two (14.3%) individuals each died as a result of a homicide and a self-inflicted injury. A motor vehicle crash and drug overdose was the cause of 1 (7.1%) death each.

Like Manufacturing, a machine-related event was the leading cause of death in Agriculture, Forestry, Fishing, and Hunting. Eight (61.5%) of the 13 work-related fatal injuries in Agriculture were a result of a machine-related incident. Two (15.4%) individuals died as a result of contact with animals. One (7.7%) individual died from an electrocution, 1 (7.7%) individual died as a result of a motor vehicle striking his tractor, and 1 (7.7%) individual died when a falling tree struck him.

Five (45.5%) of the 11 deaths in Transportation and Warehousing involved motor vehicles. Four (36.4%) individuals were struck by an object, 1 (9.1%) individual died as a result of a homicide, and 1 (9.1%) individual died as a result of a drug overdose.

In 2007, all of the deaths in Accommodation and Food Services and 5 of the 10 deaths in Retail Trade were a result of a homicide.

Occupations

Table 12 and Figure 4 show the distribution of Standard Occupational Classification categories. The occupational category with the highest number of work-related deaths was Transportation and Material Moving Occupations (53-0000) accounting for 24 (20.0%) of the 120 work-related deaths in 2007. Within this major grouping, 15 (62.5%) were Motor Vehicle Operators. Within the Motor Vehicle Operators group, 8 (53.3%) individuals were Truck Drivers, Heavy and Tractor-Trailer.

Management Occupations (11-000) was the next highest occupational category grouping and accounted for 23 (19.2%) of the work related deaths. Eight (34.8%) individuals were Farmers and Ranchers, and 7 (30.4%) individuals were General and Operations Managers.

Construction and Extraction Occupations (47-0000) had the third highest number of work-related deaths (16, 13.3%). This represents a decrease from fourteen deaths in 2006. Within this major grouping, 12 (75.0%) individuals were Construction Trade Workers. Three (25.0%) of the 12 Construction Trade Workers who died were Roofers, 2 (16.7%) individuals were Carpenters, and 2 (16.7%) individuals were Structural Iron and Steel Workers. One (6.3%) death each occurred among the following Construction Trade Workers group: Construction Laborers, Drywall and Ceiling Tile Installers, Electricians, Painters, Construction and Maintenance, and Plumbers, Pipefitters and Steamfitters.

Protective Services (33-0000) occupations and Farming, Fishing, and Forestry occupations (45-0000) each had 8 (6.7%) deaths. In Protective Services, 4 of the 8 deaths occurred in the Fire Fighting and Prevention Workers, an increase of 3 deaths compared to 2006. Two security guards died in 2007 compared to 5 security guards in 2006. Within Farming, Fishing and Forestry, 5 (62.5%) of the workers were Agricultural Workers and 3 (37.5%) were Forest, Conservation and Logging Workers.

Decedent's Activity at the Time of the Fatality

The activity of the decedent at the time of the fatality was identified for 88 (93.6%) of the 94 non-homicide/non-suicide related deaths. The individual was the operator in 64 (72.7%) incidents or a coworker directly involved in the work activity in 15 (17.0%) incidents. Four (4.5%) individuals were passengers in a vehicle, an armored car, a car, a van, or a pick-up truck. Two (2.3%) individuals died as a result of a drug overdose. One (1.1%) individual was a coworker who was not directly involved in his coworker's activity; the decedent was struck by his coworker's powered industrial truck. One (1.1%) individual was killed when a vehicle struck him while he was walking in an active roadway. One (1.1%) individual died after he fell asleep while his van was running and he died from carbon monoxide poisoning. The activity of the decedent was unknown for 6 incidents.

In 40 (35.4%) of the fatal incidents, the individual who died was working indoors. The individual was working outdoors in 73 (64.6%) incidents. The work location of the decedent was unknown for 7 incidents.

The decedent was working alone in 63 (59.4%) incidents and working with a coworker in 43 (40.6%) incidents. Whether the decedent was working alone or with a coworker could not be identified in fourteen incidents.

For the 20 homicide incidents, 9 (52.9%) victims were working alone and 8 (47.1%) victims were working with a coworker. Working alone or with a coworker could not be determined in 3 homicide cases.

Working Status of Decedent

One hundred eighteen employers were associated with the 120 individuals who died on the job in 2007. Two employers had a fatal incident where more than 1 person died during the incident. Seventy-five (65.8%) individuals were identified as employees. Twenty-eight (24.6%) individuals were identified as either self-employed or the business owner. Eight (7.0%) individuals were identified as contract/temporary employees. Three (2.6%) individuals were volunteers. Employer status, i.e. self-employed, employee, or temporary worker could not be established for 6 individuals.

Means of Work-Related Death

Table 11 summarizes the 120 work-related fatalities by means of death. See Appendix I for a description of each death grouped by means of death. Motor vehicle events accounted for 28 (23.3%) work-related fatalities in 2007. Twenty (16.7%) individuals died as a result of a homicide. Seventeen (14.2%) individuals each died as a result of being struck by an object and a fall from a height. A machine was involved in 16 (13.3%) deaths. Six (5.0%) individuals committed suicide while at their workplace. Electrocutions accounted for 4 (3.3%) deaths. Four (3.3%) individuals died as a result of a toxic exposure. There were 2 (1.7%) fatal events involving animals and 2 (1.7%) individuals died from a drug overdose. One (0.8%) individual died as a result of a fire/explosion and 1 (0.8%) individual died from complications of working in a hot environment. Two fire fighters died from heart attacks that were sustained while they were at work.

Animals

Animals were involved in 2 fatal incidents. In 1 incident, a bull trampled a farmer. In the other incident, an individual died after a horse kicked him in the head.

Drug Overdose

Two individuals died as a result of a drug overdose. A truck driver died due to unintentional multiple drug toxicity of his prescription medication. One individual died due to a drug overdose that involved illegal drugs.

Electrocution

Four individuals were electrocuted. All of the deaths involved indirect contact with energized overhead lines. Two electrocutions were a result of an aluminum extension ladder contacting the overhead line; 1 ladder contacted a 13,200-volt power line and 1 ladder contacted a 4,500-volt power line. One individual was electrocuted when he was holding a spray gun connected to a truck boom that contacted a 7,200-volt power line. The fourth incident involved electricity from a downed power line energizing the ground where the decedent was working.

Fall

Falls accounted for 17 of the work-related fatalities. The reason for the fall was identified for 9 (52.9%) individuals. Six (66.7%) individuals slipped or tripped which contributed to their fall. Two

(22.2%) incidents involved the decedent working on a structure that collapsed. One (11.1%) individual fell from the edge of a flat roof.

The distance the worker fell was identified in only 8 (47.1%) of the 17 fall events. Two (25.0%) individuals fell less than 10 feet; 1 individual fell approximately 4 feet and 1 individual fell 7 feet. Three (37.5%) incidents had falls between 10-19 feet: 10-foot fall, 12-foot fall, and a 15-foot fall. Three (37.5%) individuals had falls of 20 feet or higher: two 20-foot falls, and one 28-foot fall.

The surface location from which the worker fell was identified for 13 (76.5%) of the 17 falls. Individuals fell from a scaffold or ladder in 5 (38.5%) incidents. Three (23.1%) incidents involved a fall down a flight of stairs. A fall from an unguarded roof edge occurred in 2 (15.4%) incidents. Two (15.4%) individuals fell from a vehicle, machinery or equipment. A fall through a roof section that collapsed occurred in 1 (7.7%) incident.

The surface to which the worker fell was identified for 9 (52.9%) of the 17 falls. Six (66.7%) individuals fell to a concrete, rock or asphalt surface. One (11.1%) individual fell to packed dirt, 1 (11.1%) individual fell to frozen sand, and 1 (11.1%) individual fell to a tiled floor.

The condition of the work surface the decedent fell from was known in 8 (47.1%) of the 17 fall incidents. The decedent fell from a dry working surface in 6 (75.0%) incidents, a wet working surface in 1 (12.5%) incident, and a ladder that was placed on frozen sand in 1 (12.5%) incident. One of the 6 falls that occurred from a dry surface was poorly lit, which may have been a factor in the fall.

Fourteen (82.4%) of the 17 falls could be classified regarding the location and type of work performed at the incident site. Seven (50.0%) of the 14 fall events occurred while individuals were working on construction activities (5 (71.4%) during commercial construction activities and 2 (28.6%) during residential construction activities). Three (21.4%) fall incidents occurred at a retail store. Three (21.4%) falls occurred due to a fall down a staircase in a residential home. One (7.1%) fall occurred in the back yard of a residential home from a ladder or a tree.

Fire/Explosion

One individual died when a natural gas regulator in a heating, ventilation, and air conditioning (HVAC) unit exploded and caused a fire. The decedent was trapped inside the HVAC unit.

Heat/Cold

One individual died after he had been working in a hot environment in a hold of a freight ship.

Homicides

There were 20 work-related homicides, an increase of 9 work-related homicides compared to 2006. Sixteen (80.0%) of the homicide victims were men and 4 (20.0%) were women. Sixteen (80.0%) work-related homicide victims were Caucasian, 3 (15.0%) individuals were African-American, and 1 (5.0%) individual was Asian/Pacific Islander. Of the 16 men who were homicide victims, 12

(75.0%) were Caucasian, 3 (18.8%) were African-American, and 1 (6.3%) was Asian/Pacific Islander. All of the women who died were Caucasian.

The ages of the victims ranged from 27 to 63. The average age at the time of the incident was 45.6 years old. A gun was the cause of death in 13 (65.0%) homicides. Five (25.0%) individuals died as a result of being stabbed by a knife. One (5.0%) individual died from blunt force head injuries and 1 (5.0%) individual died after being punched in an altercation and striking his head on the pavement after he fell.

Five (25.0%) of the 20 individuals had worked in Retail Trade. Five (25.0%) victims worked in the Accommodation and Food Service sector. Three (15.0%) individuals worked in the Information sector. Two (10.0%) individuals were killed while at work in a Manufacturing facility. One (5.0%) individual each died as a result of a homicide in the following industries: Construction, Transportation and Warehousing, Professional, Scientific, and Technical Services, Other Services, and Public Administration.

Machine-Related Deaths

There were 16 machine-related fatalities. The leading causes of a machine-related death were being run over by the machine or being caught between the machinery and another object (4 deaths each, 25.0%). Three of the 4 individuals who were run over by a machine (tractor) worked in Agriculture. The fourth individual run over by a machine (tractor/brush hog) worked in Public Administration. Two of the 4 individuals who were caught between the machinery and another object worked in Agriculture. Both of these deaths involved a tractor; 1 individual was pinned between the tractor and a building and 1 individual was pinned between the tractor and a trailer. The remaining 2 individuals who died as a result of being caught between the machine and another object both worked in Manufacturing. One individual was caught between a car carrier and conveyor platform and 1 individual was caught between two forklifts. Three (18.8%) individuals were killed when they became entangled in a moving machinery part. Two of the 3 individuals worked in Agriculture; 1 individual was entangled in the auger of a manure spreader and 1 individual was entangled in an unprotected posthole auger connection to the arm of a tractor attachment. The third individual was working in Other Services; he was entangled in a rotating brush at a car wash facility. Two (12.5%) individuals were crushed by a machine, both of whom worked in Manufacturing: 1 individual was killed when the hydraulically operated door of a machine closed while he was leaning into the machine and 1 individual died when he was crushed between the returning carriage and the frame of a bench draw machine. One individual who worked in Agriculture died when he was caught between a tree shear and a front-end loader frame. One individual who worked in Manufacturing died when the trailer he was unloading pulled away from the dock and the fork truck he was driving turned on its side and landed on top of him on the pavement.

Motor Vehicle Related Deaths

There were 28 motor vehicle related fatalities in 2007, all single fatality incidents. In 5 incidents the decedent was a passenger and in 2 incidents, the decedent was a pedestrian. Two incidents involved racecar drivers who were driving in a sanctioned race.

Work-related deaths involving motor vehicles usually were 2-unit incidents (13, 46.4%) followed by single-unit incidents (10, 35.7%). Three (10.7%) 3-unit incidents, 1 (3.6%) 4-unit incident, and 1 (3.6%) 5-unit incident were each involved in the remaining work-related deaths. A “unit” is identified as a motor vehicle, bicycle, pedestrian, or train involved in the crash and individually reported; therefore, a car-animal crash or a car-tree crash is categorized as a single-unit incident.

The responding enforcement agency identified the type of crash in 24 (85.7%) of 28 incidents. The enforcement agency identified a single motor vehicle in 10 (41.7%) incidents, 6 (25.0%) rear-end incidents, 3 (12.5%) sideswipe-opposite incidents, 2 (8.3%) angle incidents, 1 (4.2%) head-on left-turn incident, 1 (4.2%) rear-end right-turn incident, and 1 (4.2%) sideswipe-same incident. A single motor vehicle includes those cases in which a motor vehicle was (a) the only traffic unit and (b) the only motor vehicle involved collided with a bicyclist, pedestrian, animal, railroad train, or any other non-motorized unit. A sideswipe-opposite incident indicates that the vehicles are traveling in opposite directions and they make a glancing side impact. The sideswipe-same incident indicates that the vehicles are traveling in the same direction making side contact.

The majority of crashes occurred during daylight hours (20, 71.4%). Seven (25.0%) incidents occurred at night; 3 nighttime crashes occurred on a road that was lit and 4 night time crashes occurred on an unlit road. One (3.6%) crash occurred at dawn.

The weather was clear in 14 (50.0%) incidents, cloudy in 8 (28.6%) incidents, raining in 3 (10.7%) incidents, snow and/or blowing snow in 2 (7.1%) incidents, and severe wind conditions in 1 (3.6%) incident.

Most crashes occurred primarily on 2-lane roads (15, 53.6%). Six (21.4%) crashes occurred on 4-lane roadways. One of the six 4-lane incidents was a raceway. Five (17.9%) crashes occurred on a 3-lane roadway. One (3.6%) crash occurred on a 5-lane roadway and 1 (3.6%) crash occurred on a 0-lane roadway (race way). In 19 (67.9%) of the 28 incidents, the roadway was dry. Roadway surface conditions may have been a factor in 9 (32.1%) incidents. The roadway surface was wet in 4 (14.3%) incidents, icy in 2 (7.1%) incidents, snowy in 2 (7.1%) incidents, and slushy in 1 (3.6%) incident.

The speed limit was 55 miles per hour (mph) in 13 (50.0%) incidents, and 70 mph in 4 (15.4%) incidents. Two (7.7%) incidents each occurred in a 45-mph speed zone and a 65-mph speed zone. One (3.8%) incident each occurred at the following speed limits: 30 mph, 35 mph, 40 mph, 50 mph, and 60 mph. The posting of speed limit signs was known for the 26 roads where posting was appropriate: the speed limit was posted on 23 (88.5%) roads and not posted on 3 (11.5%) roads. Speed limits and their posting were not applicable for the racecar drivers.

Restraint system use (seat belt/shoulder harness) was identified by the responding enforcement agency for 20 (80.0%) of the 25 individuals who died and could have been using restraints (2 individuals were pedestrians and one individual driving a farm tractor not equipped with a restraint system). Fourteen (70.0%) of the individuals (12 drivers and 2 passenger) were wearing either a lap belt or a shoulder and lap belt combination at the time of the fatal injury. Two (33.3%) of the 6 unrestrained individuals were ejected from their vehicles.

The presence or absence of airbags in the vehicle was identified for 25 vehicles where the decedent was the driver or passenger. The presence or absence of an airbag was not applicable for the 2 pedestrian fatalities or in the incident involving the driver of the farm tractor. An airbag was present in 12 (48.0%) of the vehicles involved in fatal incidents; 13 (52.0%) vehicles were not equipped with an airbag. The airbag deployed at the time of the crash in 9 (75.0%) of the 12 vehicles with an airbag, and did not deploy in 3 (25.0%) vehicles.

For 7 (26.9%) of the 26 individuals, the motor vehicle they were driving at the time of the crash was a car. Seven (26.9%) individuals were the drivers of semi-trucks. Six (23.1%) individuals (4 drivers, 2 passengers) were occupants in a van. Pick-up trucks were involved in fatal crashes in 2 (7.7%) incidents (1 driver, 1 passenger) and trucks less than 10,000 pounds were involved in 2 (7.7%) incidents (1 driver, 1 passenger). Other vehicles involved in fatal crashes included: racecars (2 drivers), ambulance (1 passenger), and a farm tractor (1 driver).

The decedent was the driver of the vehicle in 21 (75.0%) of the 28 incidents. The driver's condition was indicated by the responding enforcement agency as appearing normal in 9 (42.9%) incidents. The responding enforcement agency indicated that alcohol use might have contributed to 1 (4.8%) death. The driver's condition was indicated as unknown in 11 (52.4%) incidents.

For 5 incidents, the decedent was a passenger in the vehicle. The condition of the driver of the vehicles in which a passenger was killed was described as normal. The vehicle drivers for 2 passengers experienced a seizure, causing the crash and death of the passengers. The condition of the drivers for 2 passengers was described by the responding enforcement agency as unknown.

One pedestrian was struck by a drunk driver. One pedestrian was the victim of a several drivers striking him with their vehicles and leaving the incident scene. The conditions of these drivers are unknown.

The investigating enforcement agency indicates on the UD-10 crash report whether the driver action(s) contributed to the crash, i.e. "at fault" in any way (hazardous action). The responding enforcement agency completed the hazardous action information for the driver of the vehicle involved in the incident for 20 (95.2%) of the 21 incidents where the driver died. The responding enforcement agency noted that the driver who died was not "at fault" in 8 (40.0%) of the 20 incidents. In 4 (20.0%) crashes, the driver was unable to stop in an assured clear distance. In 3 (15.0%) crashes, the driver of the vehicle was driving too fast. One (5.0%) driver drove left of center, 1 (5.0%) driver made an improper turn, and 1 (5.0%) driver's hazardous action was identified as careless/negligent driving. The responding enforcement agency identified the hazardous action as "Other" in 2 (10.0%) crashes with no explanation.

All motor vehicle work-related fatalities were classified into three broad categories: non-collision, collision with a non-fixed object, and collision with a fixed object. Three (10.7%) non-collisions occurred; the vehicle overturned in all of the incidents. Sixteen (57.1%) of the 28 motor vehicle-related incidents involved collisions with a non-fixed object. Twelve (75.0%) of the 16 collisions with a non-fixed object involved a collision with a moving motor vehicle in transport. Two (16.7%) non-fixed object collisions involved the vehicle striking pedestrians. One (6.3%) collision involved the decedent's vehicle striking a parked motor vehicle. One (6.3%) fatality occurred when steel beams that were ejected from a vehicle in front of him struck his truck cab. Collisions with a fixed

object occurred in 9 (32.1%) of the 28 motor vehicle work-related incidents. Five (55.6%) vehicles struck a tree, 1 (11.1%) vehicle struck a power pole, 1 (11.1%) vehicle struck a fence, 1 (11.1%) vehicle struck a building, and 1 (11.1%) vehicle struck an “other” fixed object.

Struck By

Seventeen individuals were fatally injured when an object struck them. Three (17.6%) incidents involved the decedent being struck by a steel beam. A tree or tree limb striking a worker was the cause of death for 2 (11.8%) individuals. Two (11.8%) fatal incidents occurred when elevated vehicles (car, van) the decedents were working under fell from their supports and landed on them. The following 10 objects each struck 1 (5.9%) individual: public school bus, engulfed by corn in a silo, dirt being emptied from the dump box of a truck, forklift, frozen food pallets, Go Tract vehicle being placed on a trailer, pressurized end cap, push back tug as it was returning to the airport terminal, steel poles, and a pick-up truck.

Suicide

Six individuals committed suicide while at their workplace. Four individuals died from a self-inflicted gunshot wounds. One individual died from a self-inflicted hanging, and 1 individual died after jumping from a building.

Toxic Exposure

Four individuals died due to a toxic exposure while working. One individual died from complications after inhaling ammonia during the loading of an anhydrous ammonia tanker. One individual died after he inhaled muriatic acid fumes during the cleaning of bathroom ceramic tiles. One individual died from complications from an asthma attack after inhaling bleach in the laundry area of a nursing home. One individual was overcome by carbon monoxide after he fell asleep in his running work van.

MIOSHA Fatality Investigations

For each company that had a work-related fatality, the Federal OSHA Integrated Management Information System (IMIS) was accessed to determine the previous MIOSHA compliance activity at the company. The IMIS database identified that 18 employers, whose work activity was considered in-scope for a MIOSHA inspection, had a work-related compliance inspection prior to 2007 and 2 employers (a foundry and a utility) had a prior work-related fatality. In 2002, a millwright who worked in a foundry died when he fell 30 feet through an unguarded 60-inch air duct in a dust collection plenum. In 2005, a mechanic for a utility company was killed when a tractor-trailer truck rear-ended the car he was driving. Of the 120 work-related fatalities at 118 employers in 2007, MIOSHA personnel conducted an on-site investigation for 31 (25.8%) fatalities.

Depending upon the work being performed at the time of the MIOSHA inspection, a company can receive citations from the applicable MIOSHA compliance division. Prior to October 2003, MIOSHA had 3 compliance divisions; Occupational Health, General Industry Safety, and Construction Safety. In October 2003, MIOSHA reorganized the compliance divisions to 2

divisions; the General Industry Safety and Health Division and the Construction Safety and Health Division. Two of the 18 companies were inspected by MIOSHA prior to 2003; 1 company was inspected by the Occupational Health Division, and 1 company was inspected by both the Occupational Health Division and the General Industry Safety Division. Two companies had a compliance inspection both prior to and after the 2003 reorganization. One company had an Occupational Health Division inspection prior to the reorganization and a General Industry Safety and Health Division inspection after the reorganization. One company had a General Industry Safety Division inspection prior to the reorganization and a Construction Safety and Health Division inspection after the reorganization.

Fourteen (77.8%) of the 18 previously inspected companies were inspected by the appropriate MIOSHA compliance division after the 2003 reorganization. Seven companies had received a MIOSHA Construction Safety and Health Division compliance inspection and 6 companies had received a MIOSHA General Industry Safety and Health Division compliance inspection. One company was inspected by both the General Industry Safety and Health and Construction Safety and Health Divisions.

For 2007, MIFACE requested, received permission, and conducted a work-related fatality investigation at 14 facilities. One investigation of a 2007 death is planned for 2009. Copies of completed MIFACE investigation reports and summaries of MIOSHA inspections are available on the MSU Occupational and Environmental Medicine web site. Select the MIFACE link to view the reports and summaries (www.oem.msu.edu/).

Hispanic Initiative

The US Department of Labor, Bureau of Labor Statistics (BLS) has analyzed the Census of Fatal Occupational Injury (CFOI) data and reported a higher fatal work injury rate for Hispanic workers than for other racial/ethnic groups. As a result, Federal OSHA is currently collecting additional information during all investigations that includes the primary language and country of origin of the decedent. OSHA has also formed the Hispanic Worker Task Force that includes hazard awareness and workplace rights.

In partnership with Federal OSHA, NIOSH has added fatalities among Hispanic workers to the list of current targets for the Federal in-house FACE program. Information gathered will be made available to the OSHA Hispanic Worker Task Force. The MIFACE program supports the concept and rationale of this initiative. As a result, we have utilized an Immigrant Workers/Limited English Speakers Workers investigation guide, which was developed in conjunction with the other FACE states, during on-site investigations.

There were 8 deaths of Hispanic workers in Michigan in 2007. Six of these 8 individuals were between the ages of 16-65. Using the United States Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2007, this was a rate of 2.35/100,000 for 16-65 year-old Hispanics as compared to a rate of 1.65/100,000 for 16-65 year-old Caucasians and 1.61/100,000 for 16-65 year-old African-Americans.

In 2007, 2 Hispanics worked for a Wholesale Trade employer; 1 youth died in a machine-related incident and 1 individual died in a motor vehicle crash. Two Hispanics were employed in the Other

Services industry sector; 1 individual died in a motor vehicle crash and 1 individual died in a machine-related incident. One Hispanic died due to a fall in a construction-related incident, and 1 Hispanic died due to a drug overdose at his manufacturing employer. One Hispanic died in a Retail Trade (fall from ladder) incident. One Hispanic died in an Administrative and Support and Waste Management and Remediation Services (fall from roof) incident. One of the 8 companies (Other Services) agreed to participate in the MIFACE research program in 2009. One company asked to be re-contacted in 2009 for possible participation. Three companies declined and MIFACE did not contact 3 companies (2 motor vehicle incidents and 1 drug overdose).

Case Narratives

Based on the information collected during MIFACE on-site investigations and/or from source documents, a brief narrative summary organized alphabetically by means of death of each of the 120 traumatic work-related deaths in 2007 is included in Appendix I. Table 13 gives the case narrative number and means of death by NAICS code. When a brand name of equipment is known, MIFACE included this information in the narrative; this does not signify that there was a defect or other problem with the machine (unless noted).

Copies of the MIFACE reports of onsite investigations (Investigation Report) and MIFACE Summaries of MIOSHA Inspections (Summary), which includes the MIOSHA citation(s) issued at the MIOSHA/employer closing conference can be found on the MSU OEM website: www.oem.msu.edu/. A case narrative in Appendix I may reference an Investigation Report or a Summary that is posted on the MSU OEM website. To access the referenced Investigation Report or Summary, click on MIFACE on the MSU OEM website homepage, and then click on the Investigation Report or Summary tab. Each case narrative with a referenced Investigation Report or Summary states the industry to select in the Industry drop down menu. The Fatality Type drop down menu selection is the cause of death (e.g. fall, motor vehicle, struck by, etc.). After selecting the appropriate industry and fatality type, click the Search button, and then scroll down the page to the appropriate reference.

Comparison to the Census of Fatal Occupational Injuries Data

The Census of Fatal Occupational Injuries (CFOI) is the surveillance system funded in every state by the United States Department of Labor Bureau of Labor Statistics (BLS). CFOI also reported 120 deaths in 2007 per the BLS website viewed on December 17, 2008 (www.bls.gov/ro5/cfoimi.htm).

Discussion

There were 120 traumatic work-related fatalities in Michigan in the year 2007. Six individuals sustained injuries in a previous year and died in 2007. One individual was injured in a fall from a piece of machinery in 1991, 1 individual was struck in the head by a steel beam in 1997, and 1 individual injured his knee in 2005. Three individuals were injured in 2006: 2 individuals were injured in motor vehicle crashes and 1 individual was injured during an altercation in a parking lot. The major sources for identifying traumatic work-related deaths were the 24-hour MIOSHA hotline, a newspaper clipping service, the State Police vehicular data reporting system, and death

certificates. There were on the average 2.3 traumatic work-related fatalities per week although the deaths were not evenly distributed throughout the year. March was the most common month for the occurrence of a fatal traumatic injury (14 incidents) and the month of May was the second most common month (13 incidents).

Individuals who died from a traumatic work-related fatality were most likely to be men (87%), white (82%), married (59%) and had at least a high school education (47%). The average age of death was 48 but ranged from 15 to 89. The largest number of deaths occurred in Construction (18, 15.0%). Agriculture (13 deaths, 10.8%) had the highest risk of traumatic work-related fatalities. The rate in Agriculture was 16.1/100,000 workers as compared to 10.8/100,000 workers in Construction (Table 9) and 10.1/100,000 workers in Transportation and Warehousing. Despite the high fatality rate in Agriculture, farms with fewer than 11 employees are exempted from many workplace regulations.

Among the non-suicide/non-overdose deaths, a total of 12 of 112 (10.7%) individuals had alcohol, illegal drugs, or prescription medications in their system at levels that may have been a risk factor for the occurrence of the traumatic injury.

MIOSHA staff investigated 31 of the deaths at 31 employers. The police investigated 58 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 56 different employers. Federal OSHA investigated 1 death. The remaining 30 work-related fatalities (30 employers) were not investigated by any regulatory agency as to cause of death other than by the police to exclude a homicide or suicide.

MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members. Due to the circumstances of the fatality, MIFACE attempted to contact the employer in 2 of the work-related fatality incidents investigated by the police. Both employers declined to participate in the MIFACE research. MIFACE attempted to investigate 20 of the 30 work-related fatalities not inspected by a regulatory or enforcement agency. MIFACE conducted an on-site investigation at 4 of these employers and was denied the opportunity for a site visit at 16 of the 20 attempted contacts. MIFACE did not attempt to contact the remaining 10 other companies/families not investigated by any regulatory agency.

On our web site, www.oem.msu.edu/, are copies of the completed MIFACE Investigation Reports, Hazard Alerts, and MIFACE summaries of investigations conducted by the MIOSHA program. 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 (e.g. trench wall cave-ins). MIFACE summaries of investigations conducted by the MIOSHA program include a summary of the work-related fatality incident and the citations issued to the employer by MIOSHA at the conclusion of the fatality investigation. For each MIFACE Investigation Report and Hazard Alert there is a dissemination plan to maximize awareness of the Report and Hazard Alert. Investigation Reports and Hazard Alerts are sent to appropriate trade associations, unions, trade journals and in some cases other employers doing the same type of work. A special effort in conjunction with the Michigan Farm Bureau to provide educational sessions to farmers is ongoing.

Traumatic occupational fatalities are an important public health issue in Michigan as they are throughout the United States. There were 37 fewer deaths in 2007 than in 2006. All industry classifications had a fewer number of deaths with the exception of Accommodation and Food Services and Arts, Entertainment, and Recreation, which each had an increase of 1 death, and Other Services and Public Administration, which had an increase of 4 deaths. Retail Trade and Real Estate and Rental and Leasing each had the same number of deaths (10 and 1 respectively) as in 2006. For the first time since 2001, the Mining industry did not have a reported work-related fatality.

We are unable to explain the relatively large variations in deaths noted in certain industries. For example, in Construction, there were 32 deaths in 2004, 23 deaths in 2005, 42 deaths in 2006 and 18 deaths in 2007. In Agriculture, there were 33 deaths in 2003 when in the years before and after 2003 the number of deaths have ranged from 13-21. An explanation for these variations might provide insights into preventing future deaths.

This decrease in the number of work-related fatalities in Michigan in 2007 continues the downward trend in the number of deaths since 1999, with the exception of 2006. On a national basis, 30 states, including Michigan had fewer deaths in 2007. Nineteen states, and the District of Columbia reported a higher number of deaths. One state's number of deaths was unchanged from 2006. BLS noted that the national 2007 annual fatality rate, 3.7 deaths/100,000 workers, was the lowest annual fatality rate ever reported by the fatality census. Since MIFACE began surveillance of all traumatic work-related fatalities in 2001, 2.9 deaths/100,000 workers is the lowest fatality rate MIFACE has reported for Michigan. Traumatic occupational deaths are not random events. Information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future.

Understanding the root cause of these tragic events and then sharing that information with stakeholders - from individuals to groups - is what makes these efforts worthwhile. If what we learn from any of these deaths can help prevent another death, then the surveillance program has been successful in its goal. Most of 120 deaths in this report could have been prevented. An awareness of the hazards of one's job, the provision of safe equipment, and an attitude of safety-mindedness on the part of labor and management are critical to prevent future fatal events. All of these factors would be useful in reducing the even larger burden of nonfatal traumatic work-related injuries.

We are extremely appreciative of the support of the MDLEG MIOSHA Safety and Health officers, the employers, the families and the experts who have worked with us to improve work conditions in Michigan. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2010 and plan to continue to identify ways to prevent work-related traumatic deaths and share what we have learned with those who may benefit from this knowledge.

References

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2. U.S. Department of Labor, Bureau of Labor Statistics, Census of Fatal Occupational Injuries. Internet Address: <http://www.bls.gov/>
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**Table 1. Demographic Characteristics of Traumatic
Work-Related Fatalities, Michigan 2007**

Demographic Characteristic	Number	Percent
Sex		
Male	104	86.7
Female	16	13.3
Race		
White	98	81.7
Black	14	11.7
Asian/Pacific Islander	1	0.8
American Indian/Alaskan Native	1	0.8
Hispanic	6	5.0
Age		
<20	3	2.5
20-29	12	10.0
30-39	19	15.8
40-49	28	23.3
50-59	35	29.2
60-69	13	10.8
70-79	6	5.0
80-89	4	3.3
Marital Status		
Never Married	26	21.8
Married	70	58.8
Divorced	20	16.8
Widowed	3	2.5
Unknown	1	--
Educational Level		
Less than High School	19	16.0
High School Graduate	56	47.1
Some College (1-4 years)	37	31.1
Post College (5+ years)	7	5.9
Unknown	1	--
Total	120	

Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2007

Age									
Industry Sector (NAICS Code)	13-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Totals
	Number								
Agriculture, Forestry, Fishing and Hunting (11)	--	2	1	1	5	1	2	1	13
Utilities (22)	--	--	1	--	--	--	--	--	1
Construction (23)	--	1	5	5	6	1	--	--	18
Manufacturing (31-33)	--	2	2	6	4	--	--	--	14
Wholesale Trade (42)	1	--	--	1	1	--	--	1	4
Retail Trade (44-45)	--	--	--	5	1	1	1	2	10
Transportation and Warehousing (48-49)	1	1	3	2	3	1	--	--	11
Information (51)	--	--	2	1	1	1	--	--	5
Real Estate and Rental and Leasing (53)	--	--	--	--	--	--	1	--	1
Professional, Scientific, and Technical Services (54)	--	--	--	--	--	1	--	--	1
Administrative and Support and Waste Management and Remediation Services (56)	--	2	1	1	4	2	--	--	10
Educational Services (61)	--	--	--	--	1	1	--	--	2
Health Care and Social Assistance (62)	--	--	1	--	2	1	1	--	5
Arts, Entertainment, and Recreation (71)	--	--	--	1	1	--	--	--	2
Accommodation and Food Services (72)	--	--	2	1	1	1	--	--	5
Other Services (except Public Administration) (81)	1	3	1	1	2	1	--	--	9
Public Administration (92)	--	1	--	3	3	1	1	--	9
Totals	3	12	19	28	35	13	6	4	120

**Table 3. Traumatic Work-Related Fatalities by
Education Level and Industry Sector, Michigan 2007**

Industry Sector (NAICS Code)	Did Not Complete High School		Completed High School No College		Some College (1-4 Years)		Post College (5+ Years)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing and Hunting (11)	5	38.5	6	46.2	2	15.4	--	--
Utilities (22)	--	--	1	100.0	--	--	--	--
Construction (23)	2	11.1	8	44.4	8	44.4	--	--
Manufacturing (31-33)	--	--	8	57.1	5	35.7	1	7.1
Wholesale Trade (42) ^a	2	66.7	--	--	1	33.3	--	--
Retail Trade (44-45)	2	20.0	4	40.0	3	30.0	1	10.0
Transportation and Warehousing (48-49)	3	27.3	5	45.5	3	27.3	--	--
Information (51)	--	--	3	60.0	2	40.0	--	--
Real Estate and Rental and Leasing (53)	--	--	--	--	1	100.0	--	--
Professional, Scientific, and Technical Services (54)	--	--	1	100.0	--	--	--	--
Administrative and Support and Waste Management and Remediation Services (56)	1	10.0	6	60.0	2	20.0	1	10.0
Educational Services (61)	--	--	--	--	1	50.0	1	50.0
Health Care and Social Assistance (62)	1	20.0	2	40.0	1	20.0	1	20.0
Arts, Entertainment, and Recreation (71)	--	--	2	100.0	--	--	--	--
Accommodation and Food Services (72)	2	40.0	2	40.0	1	20.0	--	--
Other Services (except Public Administration) (81)	--	--	5	55.6	3	33.3	1	11.1
Public Administration (92)	1	11.1	3	33.3	4	44.4	1	11.1
Total	19	16.0	56	47.1	37	31.1	7	5.9

^a Education level unknown for one individual.

Table 4. Traumatic Work-Related Fatalities by Day of the Week, Michigan 2007

Day of Injury	All Deaths		Construction ^a (NAICS 23)		Manufacturing (NAICS 31-33)		Agriculture, Forestry, Fishing and Hunting (NAICS 11)		Transportation and Warehousing (NAICS 48-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sunday	8	6.7	2	11.1	--	--	2	15.4	--	--	3	15.0
Monday	19	15.8	3	16.7	4	28.6	2	15.4	2	18.2	1	5.0
Tuesday	24	20.0	1	5.6	1	7.1	2	15.4	4	36.4	6	30.0
Wednesday	17	14.2	3	16.7	1	7.1	1	7.7	1	9.1	2	10.0
Thursday	11	9.2	3	16.7	1	7.1	2	15.4	--	--	2	10.0
Friday	20	16.7	4	22.2	3	21.4	--	--	3	27.3	2	10.0
Saturday	21	17.5	2	11.1	4	28.6	4	30.8	1	9.1	4	20.0
Total	120		18^b		14^c		13		11^b		20	

^a Only industries with 11 or more deaths are included in the table.

^b One individual was a homicide victim.

^c Two individuals were homicide victims.

Table 5. Traumatic Work-Related Fatalities by Month of Injury, Michigan 2007

Month of Injury	All Deaths		Construction ^a (NAICS 23)		Manufacturing (NAICS 31-33)		Agriculture, Forestry, Fishing and Hunting Deaths (NAICS 11)		Transportation and Warehousing (NAICS 48-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	11	9.2	1	5.6	2	14.3	1	7.7	--	--	4	20.0
February	10	8.3	1	5.6	--	--	--	--	1	9.1	2	10.0
March	14	11.7	4	22.2	2	14.3	1	7.7	2	18.2	1	5.0
April	6	5.0	--	--	--	--	2	15.4	2	18.2	1	5.0
May	13	10.8	3	16.7	1	7.1	--	--	1	9.1	1	5.0
June	11	9.2	--	--	--	--	2	15.4	--	--	--	--
July	5	4.2	--	--	1	7.1	--	--	1	9.1	1	5.0
August	11	9.2	4	22.2	--	--	--	--	2	18.2	2	10.0
September	11	9.2	2	11.1	2	14.3	2	15.4	--	--	3	15.0
October	9	7.5	1	5.6	1	7.1	5	38.5	--	--	--	--
November	11	9.2	2	11.1	4	28.6	--	--	--	--	3	15.0
December	8	6.7	--	--	1	7.1	--	--	2	18.2	2	10.0
Total	120		18^b		14^c		13		11^b		20	

^a Only industries with 11 or more deaths are included in the table.

^b One individual was a homicide victim.

^c Two individuals were homicide victims.

Table 6. Traumatic Work-Related Fatalities by Means of Death and Month of Injury, Michigan 2007

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	Number												
Animal										2			2
Drug Overdose					1			1					2
Electrocution					1				2	1			4
Fall	2	3	3		4	1		1	1	1		1	17
Fire/Explosion											1		1
Heat/Cold										1			1
Homicide	4	2	1	1	1		1	2	3		3	2	20
Machine	2		1	1		4		1	2	3	1	1	16
Motor Vehicles	3	2	5	2	3	1	2	3	2		2	3	28
Other						1						1	2
Struck By		1	3	2	1	1	2	2	1	1	3		17
Suicide			1		1	2		1			1		6
Toxic Exposure		2			1	1							4
Total	11	10	14	6	13	11	5	11	11	9	11	8	120

Table 7. Traumatic Work-Related Fatalities by 4-Hour Time Periods, Michigan 2007

Time of Day	All Deaths		Construction ^a (NAICS 23)		Manufacturing (NAICS 31-33)		Agriculture, Forestry, Fishing and Hunting (NAICS 11)		Transportation and Warehousing (NAICS 48-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12am-3:59am	7	6.4	--	--	2	14.3	--	--	1	10.0	3	17.6
4am-7:59am	5	4.6	--	--	1	7.1	--	--	--	--	1	5.9
8am-11:59am	31	28.4	7	41.2	2	14.3	2	15.4	3	30.0	5	29.4
12pm-3:59pm	35	32.1	9	52.9	3	21.4	6	46.2	1	10.0	3	17.6
4pm-7:59pm	19	17.4	1	5.9	4	28.6	5	38.5	1	10.0	2	11.8
8pm-11:59pm	12	11.0	--	--	2	14.3	--	--	4	40.0	3	17.6
Total	109^b		17^c		14^e		13		10^d		17^f	

^a Only industries with 11 or more deaths are included in the table.

^b Time of injury was unknown for 11 deaths.

^c Time of injury was unknown for one death and one individual was a homicide victim.

^d One individual was a homicide victim

^e Two individuals were homicide victims.

^f Time of injury was unknown for three deaths.

**Table 8. Traumatic Work-Related Fatalities by County of Injury,
Michigan 2007**

County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	--	--	Gratiot	--	--	Missaukee	--	--
Alger	--	--	Hillsdale	2	1.7	Monroe	3	2.5
Allegan	3	2.5	Houghton	--	--	Montcalm	2	1.7
Alpena	--	--	Huron	1	0.8	Montmorency	--	--
Antrim	--	--	Ingham	4	3.3	Muskegon	--	--
Arenac	--	--	Ionia	1	0.8	Newaygo	--	--
Baraga	--	--	Iosco	1	0.8	Oakland	10	8.3
Barry	2	1.7	Iron	--	--	Oceana	--	--
Bay	3	2.5	Isabella	2	1.7	Ogemaw	--	--
Benzie	--	--	Jackson	2	1.7	Ontonagon	--	--
Berrien	3	2.5	Kalamazoo	1	0.8	Osceola	1	0.8
Branch	--	--	Kalkaska	--	--	Oscoda	--	--
Calhoun	--	--	Kent	14	11.7	Otsego	--	--
Cass	--	--	Keweenaw	--	--	Ottawa	1	0.8
Charlevoix	--	--	Lake	--	--	Presque Isle	--	--
Cheboygan	1	0.8	Lapeer	2	1.7	Roscommon	--	--
Chippewa	--	--	Leelanau	--	--	Saginaw	2	1.7
Clare	1	0.8	Lenawee	--	--	St. Clair	3	2.5
Clinton	1	0.8	Livingston	2	1.7	St. Joseph	2	1.7
Crawford	--	--	Luce	--	--	Sanilac	--	--
Delta	1	0.8	Mackinac	2	1.7	Schoolcraft	--	--
Dickinson	--	--	Macomb	4	3.3	Shiawassee	--	--
Eaton	3	2.5	Manistee	--	--	Tuscola	--	--
Emmet	--	--	Marquette	2	1.7	Van Buren	1	0.8
Genesee	4	3.3	Mason	1	0.8	Washtenaw	4	3.3
Gladwin	1	0.8	Mecosta	--	--	Wayne	27	22.5
Gogebic	--	--	Menominee	--	--	Wexford	--	--
Grand Traverse	--	--	Midland	--	--	Unknown	--	--

**Table 9. Traumatic Work-Related Fatalities by Industry Sector,
Michigan 2007**

Industry Sector (NAICS Code)	Number	Percent	Number Of Employees^c	2007 Michigan Rate^d
Agriculture, Forestry, Fishing and Hunting (11)	13	10.8	80,977	16.1
Crop Production (111)	5	4.2	50,170 ^a	10.0
Animal Production (112)	6	5.0	29,713 ^a	20.2
Forestry and Logging (113)	2	1.7	4,094 ^b	48.9
Utilities (22)	1	0.8	20,200	5.0
Electric Power Generation, Transmission and Distribution (221)	1	0.8	*	*
Construction (23)^e	18	15.0	166,200	10.8
Construction of Buildings (236)	2	1.7	38,000	5.3
Heavy and Civil Engineering Construction (237)	1	0.8	17,700	5.6
Specialty Trade Contractors (238)	15	12.5	110,500	13.6
Manufacturing (31-33)^e	14	11.7	616,800	2.3
Food Manufacturing (311)	1	0.8	33,700	3.0
Paper Manufacturing (322)	1	0.8	*	*
Plastics and Rubber Products Manufacturing (326)	1	0.8	39,000	2.6
Primary Metal Manufacturing (331)	3	2.5	24,700	12.1
Fabricated Metal Product Manufacturing (332)	2	1.7	80,000	2.5
Machinery Manufacturing (333)	2	1.7	69,700	2.9
Transportation Equipment Manufacturing (336)	4	3.3	203,500	2.0
Wholesale Trade (42)	4	3.3	169,100	2.4
Merchant Wholesalers, Nondurable Goods (424)	4	3.3	48,700	8.2
Retail Trade (44-45)	10	8.3	489,700	2.0
Motor Vehicle and Parts Dealers (441)	1	0.8	56,500	1.8
Furniture and Home Furnishing Stores (442)	1	0.8	*	*
Building Material and Garden Equipment and Supplies Dealers (444)	1	0.8	43,300	2.3
Food and Beverage Stores (445)	3	2.5	81,500	3.7
Health and Personal Care Stores (446)	1	0.8	33,800	3.0
Gasoline Stations (447)	1	0.8	24,500	4.1
Clothing and Clothing Accessories Stores (448)	1	0.8	41,700	2.4
General Merchandise Stores (452)	1	0.8	111,500	0.9
Transportation and Warehousing (48-49)	11	9.2	108,900	10.1
Truck Transportation (484)	6	5.0	40,900	14.7
Support Activities for Transportation (488)	3	2.5	*	*
Warehousing and Storage (493)	2	1.7	13,800	14.5
Information (51)	5	4.2	65,600	7.6
Publishing Industries (except Internet) (511)	3	2.5	22,900	13.1
Motion Pictures and Sound Recording Industries (512)	1	0.8	*	*
Telecommunications (517)	1	0.8	23,000	4.3

Industry Sector (NAICS Code)	Number	Percent	Number Of Employees ^c	2007 Michigan Rate ^d
Real Estate and Rental and Leasing (53)	1	0.8	53,600	1.9
Real Estate (531)	1	0.8	37,100	2.7
Professional, Scientific, and Technical Services (54)	1	0.8	244,200	0.4
Professional, Scientific, and Technical Services (541)	1	0.8	244,200	0.4
Administrative and Support and Waste Management and Remediation Services (56)	10	8.3	271,800	3.7
Administrative and Support Services (561)	8	6.7	*	*
Waste Management and Remediation Services (562)	2	1.7	*	*
Educational Services (61)	2	1.7	426,200	0.5
Educational Services (611)	2	1.7	426,200	0.5
Health Care and Social Assistance (62)	5	4.2	546,400	0.9
Hospitals (622)	2	1.7	216,800	0.9
Nursing and Residential Care Facilities (623)	1	0.8	93,000	1.1
Social Assistance (624)	2	1.7	61,200	3.3
Arts, Entertainment, and Recreation (71)	2	1.7	62,700	3.2
Performing Arts, Spectator Sports, and Related Industries (711)	2	1.7	9,800	20.4
Accommodation and Food Services (72)	5	4.2	341,800	1.5
Food Services and Drinking Places (722)	5	4.2	306,900	1.6
Other Services (except Public Administration) (81)	9	7.5	176,700	5.1
Repair and Maintenance (811)	5	4.2	38,700	12.9
Personal and Laundry Services (812)	3	2.5	40,100	7.5
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	1	0.8	97,800	1.0
Public Administration (92)	9	7.5	279,500	3.2
Executive, Legislative, and Other General Government Support (921)	1	0.8	*	*
Justice, Public Order, and Safety Activities (922)	6	5.0	*	*
Administration of Human Resource Programs (923)	1	0.8	*	*
Regulation and Administration of Transportation Programs (926)	1	0.8	*	*
Totals	120		4,123,377	2.9

^a Source: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. www.nass.usda.gov/census/. November 22, 2004.

^b Source: Land Policy Institute, Michigan State University, Report # 2007-06. www.landpolicy.msu.edu/.

^c Source: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2007. Accessed November 11, 2008. www.milmi.org/cgi/dataAnalysis/

^d Incidence rates calculated per 100,000 workers.

^e Industry subsector unknown for one individual.

* No Data provided on IES report.

**Table 10. Traumatic Work-Related Fatalities by Industry Sector^a,
Michigan Rates Compared to US Rates, 2007**

Industry Sector (NAICS Code)	Number of MI Fatalities	2007 Michigan Rate	2007 US Rate^b
Agriculture, Forestry, Fishing and Hunting (11)	13	16.3	27.3
Utilities (22)	1	5.0	3.9
Construction (23)	18	10.8	10.3
Manufacturing (31-33)	14	2.3	2.4
Wholesale Trade (42)	4	2.4	4.5
Retail Trade (44-45)	10	2.0	2.0
Transportation and Warehousing (48-49)	11	10.1	15.9
Information (51)	5	7.6	2.3
Real Estate and Rental and Leasing (53)	1	1.9	**
Professional and Business Services (54, 56)	11	2.1	3.1
Educational and Health Services (61, 62)	7	0.7	0.7
Leisure and Hospitality (71, 72)	7	1.7	2.1
Other Services (except Public Administration) (81)	9	5.1	2.5
Public Administration (92)	9	3.2	2.4
Total	120	2.9^c	3.7^c

^a Sources: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. www.nass.usda.gov/census/. November 22, 2004. Land Policy Institute, Michigan State University, Report # 2007-06. www.landpolicy.msu.edu/. Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2007. November 11, 2008. www.milmi.org/cgi/dataAnalysis/

^b Bureau of Labor Statistics News, United States Department of Labor, USDL 07-1202, Release Date: October 23, 2008. <http://www.bls.gov/iif/home.htm>

^c Incidence rates calculated per 100,000 workers.

Table 11. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2007

Industry Sector (NAICS Code)	Animal (1.7%)	Drug Overdose (1.7%)	Electrocution (3.3%)	Fall (14.2%)	Fire/Explosion (0.8%)	Heat/Cold (0.8%)	Homicide (16.7%)	Machine (13.3%)	Motor Vehicle (23.3%)	Other (1.7%)	Struck By (14.2%)	Suicide (5.0%)	Toxic Exposure (3.3%)	Total
Agriculture, Forestry, Fishing and Hunting (11)	2		1					8	1		1			13
Utilities (22)											1			1
Construction (23)			2	7			1		1		5	1	1	18
Manufacturing (31-33)		1			1		2	5	1		2	2		14
Wholesale Trade (42)								1	2				1	4
Retail Trade (44-45)				3			5		1			1		10
Transportation and Warehousing (48-49)		1					1		5		4			11
Information (51)				1			3		1					5
Real Estate and Rental and Leasing (53)				1										1
Professional, Scientific, and Technical Services (54)							1							1
Administrative and Support and Waste Management and Remediation Services (56)			1	3					4		1		1	10
Educational Services (61)									1		1			2
Health Care and Social Assistance (62)				1					3				1	5
Arts, Entertainment, and Recreation (71)									2					2
Accommodation and Food Services (72)							5							5
Other Services (except Public Administration) (81)							1	1	3		2	2		9
Public Administration (92)				1		1	1	1	3	2				9
Total	2	2	4	17	1	1	20	16	28	2	17	6	4	120

**Table 12. Traumatic Work-Related Fatalities by
Standard Occupational Code (SOC), Michigan 2007**

SOC Number	SOC Classification	Number	Percent
11	Management Occupations	23	19.2
11-1000	Top Executives		
11-1021	General and Operations Managers	7	5.8
11-3000	Operations Specialties Managers		
11-3031	Financial Managers	1	0.8
11-9000	Other Management Occupations		
11-9012	Farmers and Ranchers	8	6.7
11-9021	Construction Manager	1	0.8
11-9032	Education Administrators, Elementary and Secondary Schools	1	0.8
11-9051	Food Service Managers	1	0.8
11-9081	Lodging Managers	1	0.8
11-9199	Managers, All Other	3	2.5
13	Business and Financial Operations Occupations	1	0.8
13-2000	Financial Specialists		
13-2051	Financial Analysts	1	0.8
21	Community and Social Services Occupations	2	1.7
21-1000	Counselors, Social Workers, and Other Community and Social Service Specialists		
21-1099	Community and Social Service Specialists, All Other	1	0.8
21-2000	Religious Workers		
21-2011	Clergy	1	0.8
27	Arts, Design, Entertainment, Sports, and Media Occupations	2	1.7
27-2000	Entertainers and Performers, Sports and Related Workers		
27-2021	Athletes and Sports Competitors	2	1.7
29	Healthcare Practitioners and Technical Occupations	1	0.8
29-1000	Health Diagnosing and Treating Practitioners		
29-1111	Registered Nurses	1	0.8
31	Healthcare Support Occupations	1	0.8
31-1000	Nursing, Psychiatric, and Home Health Aides		
31-1013	Psychiatric Aides	1	0.8
33	Protective Services Occupations	8	6.7
33-2000	Fire Fighting and Prevention Workers		
33-2011	Fire Fighters	4	3.3
33-3000	Law Enforcement Workers		
33-3051	Police and Sheriff's Patrol Officers	2	1.7
33-9000	Other Protective Service Workers		
33-9032	Security Guards	2	1.7

SOC Number	SOC Classification	Number	Percent
35	Food Preparation and Serving Related Occupations	2	1.7
35-1000	Supervisors, Food Preparation and Serving Workers		
35-1012	First Line Supervisors/Managers of Food Preparation and Serving Workers	1	0.8
35-2000	Cooks and Food Preparation Workers		
35-2011	Cooks, Fast Food	1	0.8
37	Building and Grounds Cleaning and Maintenance Occupations	7	5.8
37-1000	Supervisors, Building and Grounds Cleaning and Maintenance Workers		
37-1012	First-Line Supervisor/Managers of Landscaping, Lawn Service, and Groundskeeping Work	1	0.8
37-2000	Building Cleaning and Pest Control Workers		
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2	1.7
37-2012	Maids and Housekeeping Cleaners	1	0.8
37-2019	Building Cleaning Workers, All Others	1	0.8
37-3000	Grounds Maintenance Workers		
37-3013	Tree Trimmers and Pruners	1	0.8
37-3019	Grounds Maintenance Workers, All Others	1	0.8
39	Personal Care and Service Occupations	3	2.5
39-6000	Transportation, Tourism, and Lodging Attendants		
39-6011	Baggage Porters and Bellhops	1	0.8
39-9000	Other Personal Care and Service Workers		
39-9011	Child Care Workers	1	0.8
39-9099	Personal Care and Service Workers, All Other	1	0.8
41	Sales and Related Occupations	5	4.2
41-1000	Supervisors, Sales Workers		
41-1011	First Line Supervisors/Managers of Retail Sales Workers	2	1.7
41-3000	Sales Representatives, Services		
41-3011	Advertising Sales Agents	1	0.8
41-9000	Other Sales and Related Workers		
41-9021	Real Estate Brokers	1	0.8
41-9099	Sales and Related Workers, All Other	1	0.8
43	Office and Administrative Support Occupations	3	2.5
43-4000	Information and Record Clerks		
43-4171	Receptionists and Information Clerks	1	0.8
43-5000	Material Recording, Scheduling, Dispatching, and Distributing Workers		
43-5021	Couriers and Messengers	1	0.8
43-5081	Stock Clerks and Order Fillers	1	0.8

SOC Number	SOC Classification	Number	Percent
45	Farming, Fishing, and Forestry Occupations	8	6.7
45-2000	Agricultural Workers		
45-2091	Agricultural Equipment Operators	1	0.8
45-2092	Farm Workers and Laborers, Crop, Nursery, and Greenhouse	2	1.7
45-2093	Farm Workers, Farm and Ranch Animals	2	1.7
45-4000	Forest, Conservation, and Logging Workers		
45-4021	Fallers	1	0.8
45-4029	Logging Workers, All Others	2	1.7
47	Construction and Extraction Occupations	16	13.3
47-1000	Supervisors, Construction and Extraction Workers		
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	3	2.5
47-2000	Construction Trade Workers		
47-2031	Carpenters	2	1.7
47-2061	Construction Laborers	1	0.8
47-2081	Drywall and Ceiling Tile Installers	1	0.8
47-2111	Electricians	1	0.8
47-2141	Painters, Construction and Maintenance	1	0.8
47-2152	Plumbers, Pipefitters, and Steamfitters	1	0.8
47-2181	Roofers	3	2.5
47-2221	Structural Iron and Steel Workers	2	1.7
47-4000	Other Construction and Related Workers		
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	1	0.8
49	Installation, Maintenance, and Repair Occupations	7	5.8
49-1000	Supervisors of Installation, Maintenance, and Repair Workers		
49-1011	First Line Supervisors/Managers of Mechanics, Installers, and Repairers	1	0.8
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers		
49-3023	Automotive Service Technicians and Mechanics	2	1.7
49-9000	Other Installation, Maintenance, and Repair Occupations		
49-9042	Maintenance and Repair Workers, General	1	0.8
49-9043	Maintenance Workers, Machinery	1	0.8
49-9051	Electrical Power Line Installers and Repairers	1	0.8
49-9052	Telecommunications Line Installers and Repairers	1	0.8
51	Production Operations	7	5.8
51-1000	Supervisors, Production Workers		
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	1	0.8

SOC Number	SOC Classification	Number	Percent
51-4000	Metal Workers and Plastic Workers		
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1	0.8
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	1	0.8
51-4111	Tool and Die Makers	1	0.8
51-4121	Welders, Cutters, Solderers, and Brazers	1	0.8
51-9000	Other Production Occupations		
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1	0.8
51-9199	Production Workers, All Other	1	0.8
53	Transportation and Material Moving Occupations	24	20.0
53-3000	Motor Vehicle Operators		
53-3022	Bus Drivers, School	1	0.8
53-3031	Drivers/Sales Workers	3	2.5
53-3032	Truck Drivers, Heavy and Tractor-Trailer	8	6.7
53-3033	Truck Drivers, Light or Delivery Services	2	1.7
53-3099	Motor Vehicle Operators, All Other	1	0.8
53-5000	Water Transportation Workers		
53-5011	Sailors and Marine Oilers	1	0.8
53-7000	Material Moving Workers		
53-7051	Industrial Truck and Tractor Operators	3	2.5
53-7061	Cleaners of Vehicles and Equipment	1	0.8
53-7062	Laborers and Freight, Stock and Material Movers, Hand	2	1.7
53-7081	Refuse and Recyclable Material Collectors	1	0.8
53-7121	Tank Car, Truck, and Ship Loaders	1	0.8
Total		120	

**Table 13. Narrative Case Number by Means of Death and Industry Sector,
Michigan 2007**

Industry Sector (NAICS Code)	Narrative Case Number
Agriculture, Forestry, Fishing, and Hunting (11)	
Animal	1, 2
Electrocution	5
Machine-Related	48-55
Motor-Vehicle Related	64
Struck By	94
Utilities (22)	
Struck By	95
Construction (23)	
Electrocution	6, 7
Fall	9-15
Homicide	28
Motor Vehicle-Related	65
Struck By	96-100
Suicide	111
Toxic Exposure	117
Manufacturing (31-33)	
Drug Overdose	3
Homicide	29, 30
Fire/Explosion	26
Machine-Related	56-60
Motor Vehicle	66
Struck By	101, 102
Suicide	112, 113
Wholesale Trade (42)	
Machine-Related	61
Motor Vehicle-Related	67, 68
Toxic Exposure	118
Retail Trade (44-45)	
Fall	16-18
Homicide	31-35
Motor Vehicle-Related	69
Suicide	114

Industry Sector (NAICS Code)	Narrative Case Number
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Transportation and Warehousing (48-49)	
Drug Overdose	4
Homicide	36
Motor Vehicle-Related	70-74
Struck By	103-106

Information (51)	
Fall	19
Homicide	37-39
Motor Vehicle-Related	75

Real Estate and Rental and Leasing (53)	
Fall	20

Professional, Scientific, and Technical Services (54)	
Homicide	40

Administrative and Support and Waste Management and Remediation Services (56)	
Electrocution	8
Fall	21-23
Motor Vehicle-Related	76-79
Struck By	107
Toxic Exposure	119

Educational Services (61)	
Motor Vehicle	80
Struck By	108

Health Care and Social Assistance (62)	
Fall	24
Motor Vehicle-Related	81-83
Toxic Exposure	120

Arts, Entertainment, and Recreation (71)	
Motor Vehicle-Related	84, 85

Accommodation and Food Service (72)	
Homicide	41-45

Industry Sector (NAICS Code)	Narrative Case Number
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Other Services (Except Public Administration) (81)	
Homicide	46
Machine-Related	62
Motor Vehicle-Related	86-88
Struck By	109, 110
Suicide	115, 116

Public Administration (92)	
Fall	25
Heat/Cold	27
Homicide	47
Machine-Related	63
Motor Vehicle-Related	89-91
Other	92, 93

Figure 1. Traumatic Work-Related Fatalities, Michigan 1992-2007

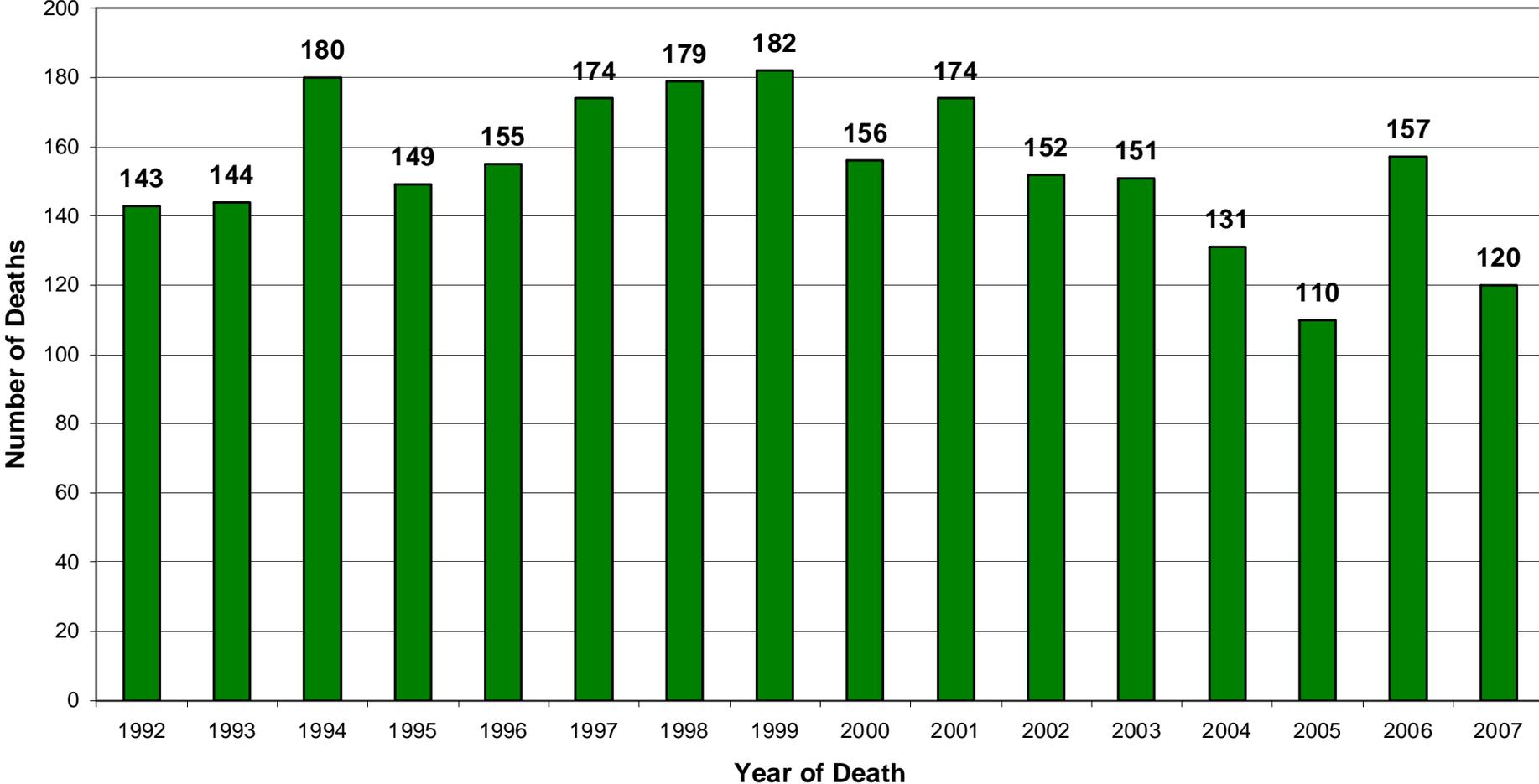


Figure 2. Age Distribution of 120 Acute Traumatic Work-Related Fatalities, Michigan 2007

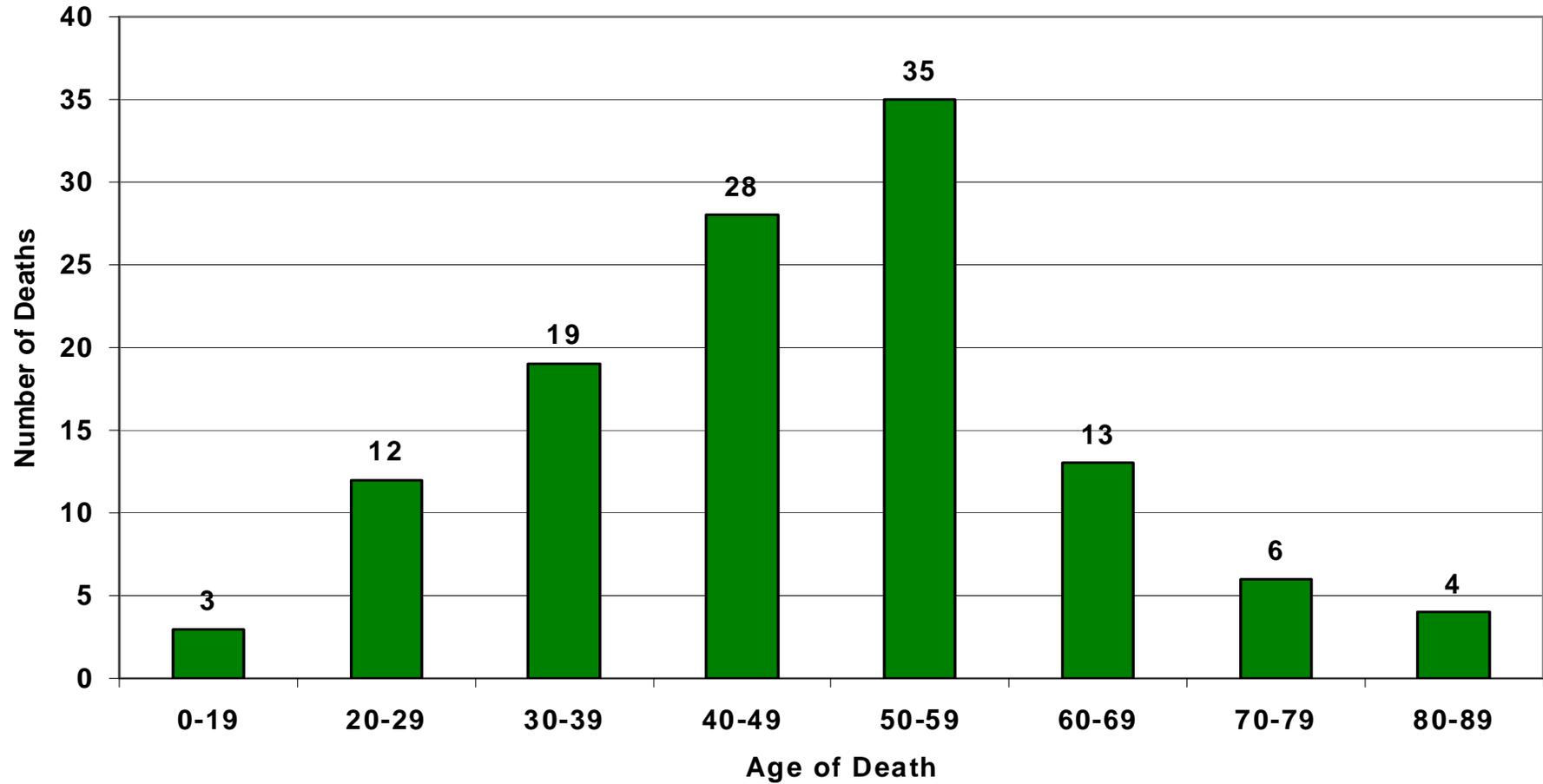
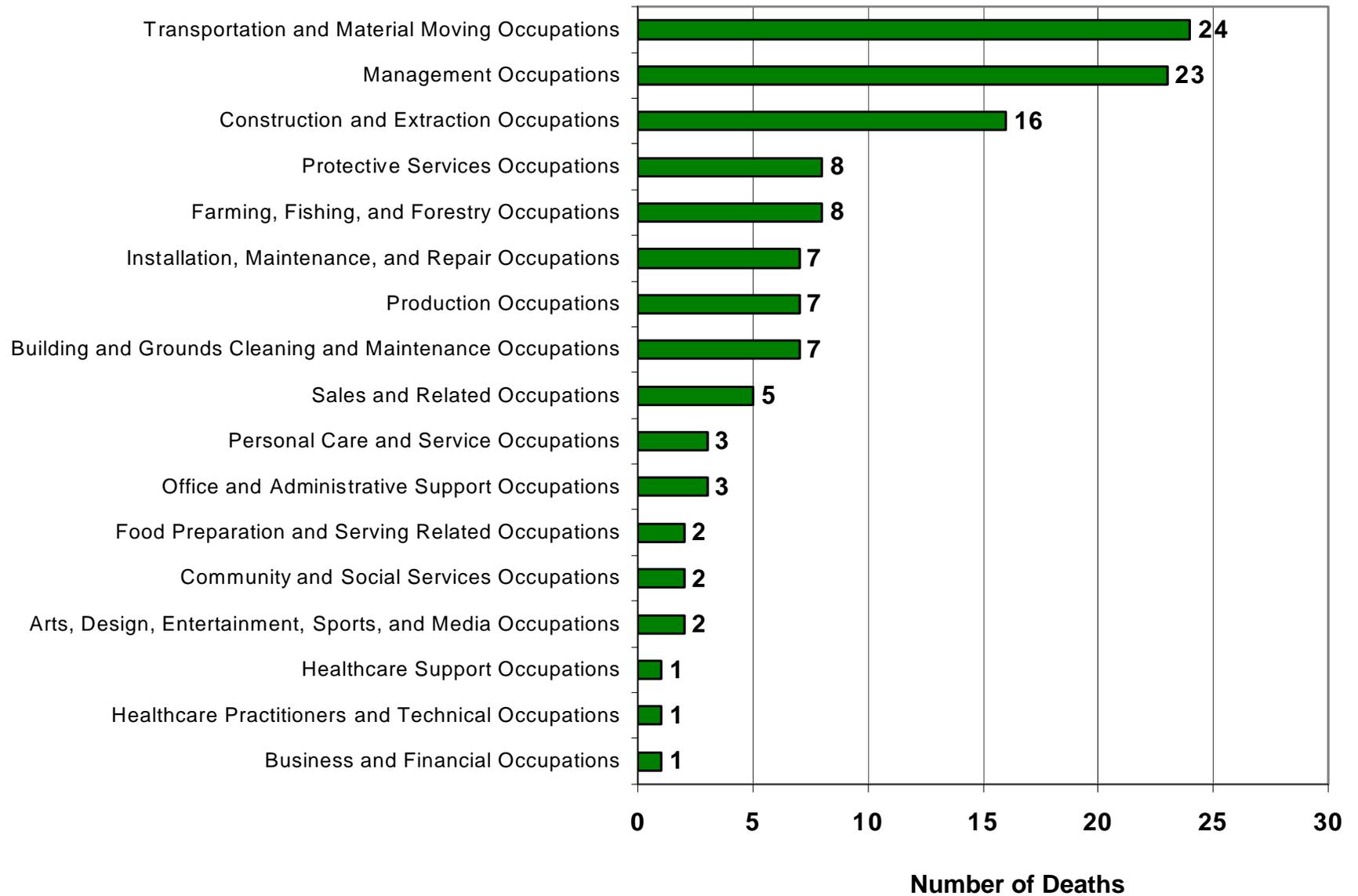


Figure 4. Traumatic Work-Related Fatalities by Occupation, Michigan 2007



APPENDIX I

2007 Acute Traumatic Work-Related Death Narratives by Cause of Death

Animal (2)

Agriculture

Cases 1-2

Case 1

74-year-old male farmer was trampled by a bull.

Case 2

53-year-old male died after a horse kicked him in the head.

Drug Overdose (2)

Case 3

49-year-old Hispanic male welder died due to a drug overdose while at work. (Manufacturing)

Case 4

25-year-old male tractor-trailer driver died due to unintentional multiple drug toxicity of his prescription medication. The decedent, who was also performing truck driver instruction duties for a new student driver, had completed his delivery and had stopped at another location to park and sleep overnight. The student driver found the decedent dead in the sleeper bunk in the truck cab. (Transportation and Warehousing)

Electrocution (4)

Case 5

22-year-old male laborer was electrocuted when the boom of a stake truck modified to paint Christmas trees contacted an energized overhead 7,200-volt power line while he held an aluminum paint gun connected to the boom by a metal-reinforced hose. One coworker (Coworker #1) drove the stake truck. A second coworker (Coworker #2) was painting trees with a second aluminum paint gun connected to the boom via a spray line. The boom was extended as Coworker #1 attempted to drive uphill over two rises leading to the road. Both the decedent and Coworker #2 were holding the paint guns as the boom contacted the 7,200-volt line that was 26 feet 3 inches above the roadway. The decedent was electrocuted and thrown to the ground. Coworker #2 was knocked unconscious and fell to the ground. Coworker #1 exited the stake truck to assist the decedent. Coworker #2 regained consciousness and ran to the decedent, who at this time was still breathing. Coworker #2 provided CPR as Coworker #1 ran to a nearby vehicle. The two coworkers placed the decedent into the vehicle. Coworker #2 continued to administer CPR while en route to the nearest hospital, which was 17 minutes (approximately 13 miles) away. The decedent died at the hospital. *Reference:* MIFACE Investigation Report #07MI121, Industry - Agriculture (11).

Construction Cases 6-7

Case 6

42-year-old male painter was electrocuted when the aluminum extension ladder that he and the company owner were repositioning contacted an overhead primary 13,200-volt electrical power line. The decedent and the owner had been painting the trim on a two-story residential home. The aluminum extension ladder was extended 20 to 24 feet. The electrical lines were 20 feet 3 inches above the landscaped grade and located approximately 18 feet away from the ladder base. The ladder was being repositioned for a coworker who had just arrived at the jobsite. To reposition the ladder, the company owner and decedent stabilized the ladder and then stood the ladder up to a vertical position. When the company owner noticed that the ladder was too close to the wires, he shouted to the decedent to watch it. The ladder touched the 13,200-volt line and both workers were held for a few seconds. The electrical force then threw both men 10 feet to each side of the ladder. The base of the ladder melted which caused the ladder to disengage from the primary wire and come to rest on a cable wire. The company owner started convulsing. The decedent crawled a few feet away from the ladder and then became unconscious after the electric shock. The coworker for whom the ladder was being repositioned was working on the lower roof area and witnessed the incident. This coworker called out to the other coworker, who was the owner's daughter, to call 911. The daughter attempted to help her father and felt the electrical current as she approached him. Both victims were taken to the hospital where the decedent died. The decedent's toxicology blood test results indicated the presence of cocaine and benzoylecgonine. *Reference:* Summary Case #172, Industry - Construction (23).

Case 7

33-year-old male carpenter was electrocuted while carrying a 28-foot extended aluminum extension ladder that contacted an overhead primary 4,500-volt power line located approximately 19 feet from a residence under construction. The decedent was a member of a three-person crew installing gutters on a two-story addition with a walkout basement. The decedent was getting ready to install a downspout at the southeast corner of a home. He was carrying the 28-foot aluminum extension ladder to the southwest corner of the home to install another downspout. To reach the southwest corner, the decedent walked around the rutted ground slope to a walkout basement, avoiding a second floor balcony above the excavated area. As he was walking with the extended ladder in an upright position, the ladder contacted the 4,500-volt overhead line. The distance from the power line and the edge of the home was 19 feet 6 inches. The power line height was approximately 24 feet above the ground at the point of contact. The edge of the roofline was 20 feet above ground. His coworkers were working on the roof when they heard some people yelling. They walked toward the edge of the roof and saw the decedent laying face up on the ground. An employee from another company grabbed the ladder and leaned it up against the roof so the decedent's coworkers could get down. Once on the ground, one of his coworkers began CPR, which was continued by emergency response personnel when they arrived. The decedent was declared dead at a local hospital. *Reference:* Summary Case #162, Industry - Construction (23).

Case 8

29-year-old male supervisor for a landscaping and tree-trimming firm was electrocuted when an energized power line broke, fell to the ground, and the current passed through the dew-covered grass. The decedent was a member of a three-person crew removing dead trees near a power line.

Another crewmember had cut a branch and the branch fell onto a guy wire. The decedent was attempting to dislodge the branch from the guy wire of a cable television line by pulling on it when the guy wire broke. The lower part of the guy wire fell to the ground and the top part flipped up and struck the energized overhead power line. The power line was sparking, and then the power line fell to the ground. When the energized line touched the ground, the ground became energized. Current passed through the dew-covered ground and electrocuted him. *Reference:* Summary Case #171, Industry - Administrative, Support, Waste Management and Remediation Services (56).

Fall (17)

Construction Cases 9-15

Case 9

34-year-old male self-employed roofer fell from the unprotected roof edge of a residential home under construction. A friend of the decedent, who was also a roofing contractor, had hired him. There were four to six members on the work crew. The sequence of events leading to the fall is unknown. The decedent was not wearing or using personal fall protection equipment. When his coworkers discovered he had fallen, they called for emergency response. Emergency response arrived, and he was taken by helicopter to a nearby hospital. The decedent died five days later of medical complications from the injuries sustained at the time of the fall. *Reference:* Investigation Report #07MI072, Industry - Construction (23).

Case 10

53-year-old male handyman died from a traumatic head injury after falling down a set of stairs at the motel where he was performing maintenance work. A motel guest found him unresponsive at the bottom of the stairs.

Case 11

41-year-old male, working for a temporary agency, fell 15 feet through a section of roof that collapsed. He died several weeks later. During the previous weeks, roofing company personnel had been on the 50-foot, low-sloped roof performing inspections and doing repair work without incident. The roof composition was modified bitumen installed over 1/2-inch wood fiber insulation board. This was installed over a built-up tar and gravel roof on a composite roof deck comprised of two 1/4-inch sheets of cement board with high-density wood fiber sandwiched between them. The roofing company hired the decedent and another worker from the same temporary agency to perform roofing work. The decedent and other laborer arrived at the site and met the roofing company project leader who was also assigned safety-monitoring duties. The three-person work crew began to tear off the top layer of roofing and insulation, starting in the southwest roof corner. After removing three rows of roofing along the east wall, a skid of roofing material was uploaded to the southeast roof corner. Each crewmember picked up a 90-pound roll of roofing material to carry to the other side of the roof. The roofing company project leader and the decedent's coworker set down their roofing material and turned to return to get more material when they noticed that the decedent was not with them. As they walked back to the staging area, they looked for him and observed a hole in the roof. The decedent had fallen approximately 15 feet through the roof opening, landing first on some equipment, and then the concrete floor. Emergency response was notified and the decedent was taken to a local hospital. The decedent

died three weeks later of medical complications from the injuries sustained at the time of the fall. *Reference: Summary Case #167, Industry - Construction (23).*

Case 12

28-year-old male hotel assistant manager died when he fell approximately 20 feet from a fiberglass ladder. The hotel was undergoing renovation. Company A, which also owned the hotel, was acting as the general contractor for the hotel's renovation. Company A had two individuals (Co-owner #1 and Co-owner #2) on site at the time of the incident. Company A had subcontracted the trim work to a local contractor. This local contractor had not completed the trim installation on the west wall of the addition. One of the co-owners of Company A (Co-owner #1) noted the decedent cutting and staining several pieces of 10-foot-long wood trim in the saw area adjacent to the area where trim still needed to be installed. Co-owner #2 called Co-owner #1 away from the saw area. Co-owners #1 and #2, who were both related to the decedent, were unaware that the decedent had placed a 28-foot extension ladder against the wall to be trimmed. The decedent ascended to the top of the ladder and using a nail gun, installed two sections of trim, beginning the trim installation at the wall/ceiling junction. The fall event was unwitnessed. Co-owner #1 found the decedent on the floor between the ladder and the west wall. The ladder was found leaning against a light fixture approximately 10 feet away. Emergency response was called. The decedent was transported to a local hospital where he subsequently died. *Reference: Investigation Report #07MI136, Industry - Construction (23).*

Case 13

31-year-old Hispanic male laborer was killed when he landed head first onto cement after he fell nearly 29 feet from a flat roof. The decedent was one of three employees on a roof laying roofing material. The decedent was placing metal two-inch seam plates at the perimeter of the 190-foot by 88-foot roof. After the decedent placed the seam plates, one of his coworkers screwed them down. The third coworker, who was acting as safety monitor as well as having other duties on the roof, was approximately 95 feet away. At the time of the incident, the crew was using a warning line that the steel erectors had left on the roof. This warning line consisted of stanchions and yellow rope and chain that were not properly flagged. The work crew took a work break. After the break, the decedent also started to screw the two-inch plates down. Backing toward the roof corner, the decedent backed under the warning line and began to pull his power cord toward the roof corner. The safety monitor noticed that the decedent was nearing the edge of the roof and yelled for him to stop and watch out for the roof edge. There was a lot of jobsite noise at the time of the incident. Apparently, the decedent did not hear him. The decedent took a few more steps backward and fell from the roof edge. Emergency response was called and the decedent was transported to a local hospital where he died. *Reference: Summary Case #158, Industry - Construction (23).*

Case 14

43-year-old male carpenter was injured when he jumped/fell from a ladder that slipped away from the drip edge of a house. The decedent positioned the fiberglass extension ladder diagonally across the inside corner of the roof to secure a 2- by 4-inch piece of wood to the fascia under the drip edge to protect the drip edge. The ladder's safety feet were in an up position on frozen soil. He called to his coworker to hold the ladder while he accessed the roof area. The coworker stood underneath the ladder and held rung #5 with his right hand and rung #7 with his left hand. The decedent climbed the ladder while holding the wood, to rung #8 or #9 when the base of the ladder slipped away from the house. The falling ladder struck the coworker on his shoulder and

arm and knocked him to the ground. The decedent fell to the coworker's left and landed on his back. Emergency response was called and the decedent was taken to a local hospital. After assessment, the decedent was transported to another hospital where he died six days later. *Reference:* Investigation Report #07MI007, Industry - Construction (23).

Case 15

56-year-old male construction foreman of a masonry crew was critically injured when he fell while climbing the tower of a Hydro Mobile scaffold system, Model #MU724J. While climbing the scaffold, he may have had a cerebral infarction (blockage of the flow of blood to the cerebrum, causing or resulting in brain tissue death). He died two days later. The scaffold's 60-foot long, 5-foot wide platform access was located 32 feet from the ground. The fixed ladder supplied by the manufacturer was not installed. Two members of the crew, Coworker #1 and Coworker #2, climbed the scaffold tower to the platform to prepare the wall and winterize the scaffold. The decedent arrived and began to climb the tower to access the platform. When the decedent was approximately six to ten feet above the ground, Coworker #1 witnessed the decedent suddenly fall backwards from the scaffold to the ground and then roll to his left side. Coworker #1 descended from the scaffold to assist the decedent. The decedent was unconscious but still breathing. Coworker #2 descended to stay with the decedent while Coworker #1 ran to the general contractor's work trailer for assistance. Emergency response was called. Emergency response arrived, and after approximately one hour, the decedent was airlifted to a local hospital where he died two days later. *Reference:* Investigation Report #07MI013, Industry - Construction (23).

Retail Trade

Cases 16-18

Case 16

81-year-old male greeter at a clothing store died as a result of medical complications of a neck fracture due to an unwitnessed collapse/fall at the store.

Case 17

48-year-old female store clerk died after suffering blunt force head trauma. The decedent was organizing and cleaning a storage room in the store. The incident was unwitnessed. She was found lying unconscious on the floor by a customer who entered the storage room to use a nearby bathroom. The customer alerted the pharmacist at the pharmacy counter located beside the storage room. The store pharmacist observed the decedent lying unconscious on the floor. He noticed a large box on the floor next to her. 911 was called and the decedent was transported to the hospital where she died.

Case 18

83-year-old female stock person died from complications of a fall from a ladder. The decedent was using the ladder to stock shelves. As she was descending the ladder, she missed the last two rungs and fell to the floor on her right side. She was transported to a local medical clinic where she was diagnosed with a broken right hip. A few days later, she was hospitalized for surgical repair of the hip. She died of surgical complications as a result of the fall.

Case 19

31-year-old male installation/repair service technician died after falling from an unknown height from an unknown location (ladder or tree). The decedent was installing cable service for a homeowner. The telephone strand was behind the residence. The telephone strand had a downward slope between the two support poles. A tree was located in the same area where the decedent had placed a 28-foot fiberglass portable extension ladder with adjustable hooks attached at the top of the ladder. The ladder had rubber boots with a rigid design and a metal spur wheel on each rail. To access the strand terminal, he placed the ladder against the telephone strand. It appears that he placed the ladder at an appropriate angle (4:1) against the line in compliance with MIOSHA requirements. To support the ladder against the telephone strand, both ladder hooks should have been in contact with the strand. In this incident, due to the downward “swoop” of the cable, only one hook rested directly on the line and the other hook was above the line. The homeowner heard the decedent move the ladder to the line and saw him on the ladder while the ladder was positioned on the line. A short time later, the homeowner heard a “thump.” Upon seeing the decedent on the ground, the homeowner called 911. Emergency response arrived and the decedent was transported to a local hospital where he was declared dead. *Reference:* Summary Case #159, Industry - Information (51).

Case 20

70-year-old female real estate broker fell down a flight of stairs while showing a residential home. The stairs were dry but poorly lit. (Real Estate and Rental and Leasing)

Administrative & Support & Waste Management & Remediation**Cases 21-23****Case 21**

54-year-old male tree trimmer died from complications sustained after falling an unknown height from mechanical equipment. The incident occurred in 1991.

Case 22

62-year-old female housekeeper fell down a flight of stairs at a residence and sustained fractures to her spine. She died several weeks later from complications sustained at the time of the fall. The incident was unwitnessed. She was found at the bottom of the stairs by the homeowner when the homeowner returned home for lunch. The decedent was transported to a local hospital (hospital #1) and then transferred to another hospital (hospital #2), where she underwent surgery for fractures of her spine. After a period of recovery in the hospital, she was transferred to a local long-term care center. After several weeks, the individual’s health began to deteriorate, and she was transferred to hospital #2, where she died. *Reference:* Investigation Report #07MI079, Industry - Administrative, Support, Waste Management and Remediation (56).

Case 23

33-year-old Hispanic male construction laborer fell 12 feet from the flat roof he was standing on to the ground below. The decedent was standing on the roof holding the power wash hose for his coworker who was on the ground. The decedent was lowering the hose to his coworker when his coworker heard the decedent fall to the ground. The coworker did not observe the decedent falling from the roof. The decedent landed on a metal ring that surrounded the base of a tree. The decedent, who had a history of seizures, had not informed the employer of his medical condition. He died three weeks later from complications of the head injury he sustained at the time of the

fall. Toxicology taken at the time of hospital admission indicated the presence of marijuana in his system.

Case 24

63-year-old male volunteer for a 501(c)(3) not-for-profit organization that operated a county food bank and distributed food to various charities died after falling approximately four feet from a delivery truck as he delivered food to a local charity. (Health Care and Social Assistance)

Case 25

61-year-old male police officer for a university died from complications of a knee injury sustained at work in 2005. (Public Administration)

Fire/Explosion (1)

Case 26

38-year-old male refrigeration technician died when an explosion occurred in a heating, ventilation, and air conditioning (HVAC) unit. The decedent was in the process of starting up the HVAC unit because all the units had been shut down to permit a tie-in/tap-in to the existing natural gas pipeline that fed the HVAC units in the building. The tie-in/tap-in was a new connection for the new HVAC unit that was to be placed on the roof of Building A. The HVAC unit involved in the incident was 30 feet long, 10 feet 4 inches wide, and 4 feet tall from the outside. It had a central equipment room. To access the inside of the HVAC unit, the decedent used a three-step ladder. The doorway to the corridor was 2-1/2 feet above the roof's walking surface. The decedent entered the unit and walked into the HVAC equipment room. The burner assembly, which was approximately 5-1/2 feet long, was located approximately 7 feet from doorway. The HVAC startup button was located approximately 16 feet from the door. He pressed the startup button and then the natural gas regulator exploded. This ignited the natural gas, and the flame shot across the corridor preventing his escape through the equipment room door. It appears he was attempting to find outside air in order to inhale fresh air and to avoid the smoke and superheated air inside the equipment room. The fusible link on a nearby damper, sensing the fire, automatically shut the damper to prevent outdoor air and its oxygen from feeding the fire. The decedent was found on the floor with his face near a drain that was near the damper. The direct cause of the explosion is unknown. *Reference:* Summary Case #178, Industry - Manufacturing (31-33).

Heat/Cold (1)

Case 27

53-year-old male seaman had been working in the hold of a freight ship when he collapsed suddenly. He died from arteriosclerotic heart disease. Physical exertion in a hot environment contributed to his death. (Public Administration)

Homicide (20)

Case 28

45-year-old male dry wall repairman was stabbed and killed. He had been performing drywall repair at an apartment building. (Construction)

Manufacturing
Cases 29-30

Case 29

47-year-old male deliveryman was shot and killed while making an ice cream delivery at a supermarket.

Case 30

27-year-old male machine operator was killed as a result of a gunshot fired by a coworker.

Retail Trade
Cases 31-35

Case 31

46-year-old male gas station owner was killed when he was shot and killed during an argument with a neighboring business.

Case 32

60-year-old male art storeowner was killed by an assailant using a blunt instrument at his store.

Case 33

45-year-old male convenience store co-owner was shot and killed by gunshot wounds inflicted during a fight with his business partner.

Case 34

41-year-old male grocery store owner was shot and killed during a robbery.

Case 35

40-year-old male store employee was shot and killed while he was sweeping the store floor

Case 36

44-year-old male truck driver was killed when he was stabbed during an altercation with another truck driver at a truck stop. (Transportation and Warehousing)

Information
Cases 37-39

Case 37

30-year-old female sales representative for a newspaper company was killed by a gunshot wound to the chest after an assailant rammed her car causing it to overturn.

Case 38

44-year-old female theatre co-owner was shot and killed at her theatre.

Case 39

52-year-old male single copy newspaper sales representative was shot and killed while placing newspapers in a newspaper dispenser.

Case 40

63-year-old female receptionist was shot and killed by a disgruntled employee. (Professional, Scientific & Technical Services)

Accommodation and Food Service**Cases 41-45****Case 41**

39-year-old male security guard was killed when he was shot in a nightclub parking lot.

Case 42

62-year-old male restaurant owner died from complications of a skull fracture sustained after being punched and falling to the ground. The decedent had argued with an individual who was not a customer but had parked his vehicle in the restaurant parking lot. The incident occurred in 2006.

Case 43

38-year-old male restaurant cook was shot and killed while at work.

Case 44-45

49-year-old female restaurant manager and a 52-year-old male kitchen manager were killed by a disgruntled employee. Both individuals sustained multiple stab wounds.

Case 46

59-year-old male laundromat employee was killed by gunfire during a robbery. (Other Services)

Case 47

29-year-old male police officer was shot and killed while responding to a domestic dispute. (Public Administration)

Machine (16)**Agriculture****Cases 48-55****Case 48**

89-year-old male farmer died when he was crushed between a Farmall Super 8 farm tractor and a brick utility building. A family member was assisting the decedent in adding weight to the tractor that had a plow attached, so the tractor could be used to plow the snow. A family member had been blowing snow with a snow blower when the decedent called for him to help add the weight. The family member, whose boots were snow-covered, drove the tractor up to the decedent who was attempting to hook up a chain to the large weight to drag it away from the building. The family member indicated that the decedent motioned for him to pull the tractor a little closer so the chain could reach. As the family member pulled forward, the family member's foot slipped off of the clutch. When the tractor lunged forward, it crushed the decedent between the tractor and the building. The family member quickly drove the tractor away from the decedent. The family member ran up to the decedent after exiting the tractor and the decedent told him to get his mother and to call 911. The decedent was taken to a local hospital and then transferred to another hospital, where he died.

Case 49

56-year-old male farmer was killed when he became entangled in a posthole auger connection to the arm of a tractor attachment on his equine operation. The decedent and his spouse had been setting fence posts for a new area for their horses. The spouse left the decedent to look for their grandchild. As she was returning to the work area, she heard her husband cry out. She ran to the tractor and found him entangled in the auger. She stopped the tractor and attempted to untangle him, but was unable to do so. She attempted to call 911 using her cell phone. Unable to get a signal, she ran to their home and used the landline to call for emergency response. Returning to her husband, she found him not breathing. Emergency response arrived, and he was declared dead at the scene. *Reference:* Investigation Report #07MI122, Industry - Agriculture (11).

Case 50

47-year-old male farmer died after being run over by a farm tractor. The decedent was hooking up a piece of farm equipment to his tractor when the tractor jumped into gear and ran over him. The tractor had a hay bailer attached to the rear of the tractor. The decedent was found a short time later by two people who were working at the property. They noticed the tractor was hung up in the yard with its wheels still turning, and they noticed the decedent lying in the grass. They started CPR and called 911. The decedent was transported to the hospital and died a short time later from his injuries.

Case 51

68-year-old male farmer died when he was run over by an International Farmall Model 756 tractor. The decedent was working on the fuel system of the tractor near a tree. The decedent's family member, who was with him while he was working, went into the house. The family member stated that the tractor was not running at this time. While in the house, the family member heard the tractor start up, and then heard the decedent yell for help. Arriving at the incident scene, the family member observed the decedent laying on his side under the tree and the tractor not in the yard, but across the street in a neighbor's yard. The decedent stated the tractor ran over him. It appears that the decedent may have been holding the clutch in with his hand while working on the tractor's fuel system. He may have released the clutch slightly, which made it pop into gear, causing the tractor to move forward and run over him.

Case 52

70-year-old male self-employed carpenter/cattle farmer died from chest compression after being pinned between a home fabricated "bucket" of a 1942 Farmall, 5-speed tractor and the back of a flat bed trailer. The bucket had two pieces of curved metal on either side with cross bars between the two curved pieces. The decedent was using the tractor bucket to load metal parts into a flat bed trailer. The flat bed trailer was not connected to another piece of equipment but was blocked with pieces of cement brick. The ground was sloped with a slight gradual decline. A neighbor who was passing by noticed that the tractor was running and not in gear. It was unknown if the parking brake was set. The neighbor found the decedent pinned against the trailer by the bucket cross arm. His neighbor backed up the tractor freeing the decedent and called 911. CPR attempts by EMS were unsuccessful.

Case 53

37-year-old male dairy farmer died due to complications from an injury sustained while he was working in the barn with a 10 HP electric auger mixing cattle feed. Another person, who did not

know that the decedent was in the mixer for cattle feed, turned the mixer on and the mixer blades severely cut and damaged his right foot. Emergency response was called and the decedent was transported to a local hospital, where the decedent's foot was amputated. While the decedent was recovering at the hospital post-amputation, he had a pulmonary embolism and died.

Case 54

23-year-old male logger died when he was crushed between a tree shear and a front-end loader frame. The logging company was contracted to clear cut trees at the incident site. The company owner noted a hydraulic leak in his John Deere Model 544B articulated front-end loader equipped with an 18-inch Mobark tree shear. The owner and Employee A propped up the tree shear with a log that was six inches in diameter and approximately seven and one-half feet long to get a better look at the leaking hydraulic line. The decedent had been using a chain saw at a log pile located on the passenger side of the 544B tractor approximately 15 feet away. The owner was working on the 544B tractor between the driver's side tires. When the owner heard the decedent's chain saw stop, he called out to the decedent to come and help him. It appears that the decedent put down his chain saw and walked around the front of the tractor and under the tree shear. The log supporting the shear somehow became dislodged, and the shear fell, crushing the decedent between the tree shear and the tractor frame. Upon hearing a noise, the owner walked to the front of the tractor and found the decedent. The owner drove the work vehicle one-quarter of a mile to Employee A's location. Employee A was filling holes in the logging road with another front-end loader. The owner drove the front-end loader to the incident site and Employee A drove the work vehicle. The owner used the front-end loader to lift the shear from the decedent. After raising the shear and moving the decedent, the owner began CPR and Employee A drove the work vehicle to another location to get a signal on his cell phone to call for emergency response. Emergency response arrived and the decedent was declared dead at the scene. *Reference: Summary Case #164, Industry - Agriculture (11).*

Case 55

53-year-old male farmer died when a John Deere, Model 4630 tractor ran over him. The decedent was in the process of putting the tractor away in a shed. The tractor, facing south, was parked outside of the shed. The south side of the shed had an open door. The shed had a cement floor with a slight decline from north to south. It appears that the decedent was near the rear right tire of the tractor and at some point the tractor began to roll toward the south. The investigating police found the tractor's gear level in the neutral position. The decedent was found lying face down with his head pointing north towards the open shed door.

Manufacturing

Cases 56-60

Case 56

48-year-old male maintenance supervisor was killed when he was pinned by a clam-shell car carrier against the floor of an overhead platform. The decedent was supervising a seven-person crew who were performing troubleshooting of a radio data reader system. The radio data reader system was not correctly reading the radiofrequency tag on the car carriers as the cars were progressing down the assembly line. The automotive line was in operation. The crew left the incident site in their attempt to troubleshoot the problem. Upon their return, one of the crewmembers noticed that the clam-shell carrier was not cycling and that it was tilted at an awkward angle. One of the coworkers ascended via a ladder to the platform and found the

decedent pinned by the clam-shell carrier to the floor of the platform. The decedent had not locked-out the conveyor line prior to entering the carrier/platform area. The coworker yelled down to his other coworkers to stop the line. Measurements taken by police after the incident showed that the carrier lowered to about four to five inches above the platform. *Reference:* Summary Case #179, Industry - Manufacturing (31-33).

Case 57

43-year-old male forklift operator was killed when the trailer he was boarding to unload pallets pulled away from the loading dock causing both the Hyster 55 forklift and the decedent to fall to the ground. The truck driver stated he was instructed to pull the trailer from the dock and transport it to another dock. The driver backed under the trailer and then pulled forward to ensure the truck was hooked to the trailer. He exited from the cab and let the legs up. He pulled the trailer away from the dock over the wheel chocks while the decedent was boarding it to remove pallets. The forklift was equipped with a seat belt. The forklift appeared to be about half way onto the trailer when the trailer was pulled forward. As the forklift fell from the trailer to the ground, it rotated to its passenger side. The decedent, who was not wearing the seatbelt was ejected and was pinned under the forklift's overhead guard when the forklift landed on its side. *Reference:* Summary Case #157, Industry - Manufacturing (31-33).

Case 58

26-year-old male machine operator was crushed between the carriage and frame of a bench draw machine while manually resetting a pipe grip on the carriage. One of the decedent's coworkers (Coworker 1) was operating a nearby bench draw machine, but had run out of work for the machine. Coworker 1 walked over to the bench draw machine the decedent was operating to assist the decedent in resetting the pipe grip, which had fallen to the floor. To reset the pipe grip, the plant supervisor indicated to the MIOSHA compliance officer that the bench draw operator was required to lock out the main control switch on the control panel located on the work platform, leave the platform, and depress the carriage emergency stop button located on the path to the machine prior to entering the point of operation to pick up the pipe grip from the floor. The decedent, who had been operating the bench draw machine for approximately three weeks, did not lock out the control panel. It is unknown if he depressed the carriage emergency stop button. Coworker 1 reset the grip by depressing the manual button to "jog" the carriage back into rest position. The buttons on the control panel were not labeled and Coworker 1 was unfamiliar with this bench draw machine. It appears that he depressed the wrong button on the control panel and instead of "jogging" the carriage back to position, he depressed the auto button and the carriage returned to the rest position at full speed. The returning carriage and the frame of the machine crushed the decedent's head. A nearby crane operator noted the decedent lying motionless on the floor and sounded the crane horn in the manner used to indicate an emergency situation. The team leader, hearing the crane horn, arrived at the incident site, and per company procedure, called for security to contact 911. Emergency response arrived and the decedent was declared dead at the scene. *Reference:* Summary Case #175, Industry - Manufacturing (31-33).

Case 59

53-year-old male maintenance worker was injured when his pelvis was crushed between two forklift trucks. He died eight days later from medical complications. The forklift he was working on was called a "manipulator." The forks were removed and replaced with tongs that could grab and rotate parts so the parts could be placed into a hammer forge. The decedent was repairing a hydraulic leak in the manipulator's hydraulic hose. The forklift was operated by hydrostatic

drive. The unit he was repairing was located in an aisle-way. Another forklift was parked close by. The decedent lifted the diamond plate under the foot pedal, and then pressurized the hydraulic lines so he could find the leak location. At some point, the foot pedal linkage was engaged, and the forklift moved forward. He was caught between the moving forklift and the parked forklift. *Reference: Summary Case #174, Industry - Manufacturing (31-33).*

Case 60

40-year-old male machine operator was killed when the hydraulically operated door of a shot blast machine closed while the decedent's head and upper chest were inside the machine. During the normal operation of the machine, the operator pushed a single activating button to start the automatic cycle of the machine when the required number of parts accumulated into the shot blast machine's loading mechanism. The shot blast machine hydraulic door opened and the loading mechanism dumped the parts to be machined into the shot blast machine. After dumping the parts, the loading mechanism returned to its original position. After the loading mechanism had returned to its original position, the hydraulic door of the shot blast machine required seven to eight seconds to close with 3,000-psi pressure. During the loading cycle and the opening and closing cycle of the shot blast machine door there was an audible alarm. MIOSHA compliance personnel noted that the audible alarm could barely be heard over the noise of the machine. Upon completion of the cleaning cycle the door of the shot blast machine opened and the machine tipped forward and dumped the cleaned parts on to a shaker conveyor and then returned to its original position. Once the machine was back into the cleaning position, a limit switch was made and the door would automatically close after 70 seconds, automatically starting the shot blast machine unless the operator switched the machine from automatic to manual mode. When the shot blast machine was in the automatic mode, if the shot blast door remained open for more than 70 seconds, the door would close automatically. The operator could interrupt the shot blast machine's cleaning and dumping cycles at any time while the machine was in the automatic mode. It is unknown why the decedent was positioned with his chest and head inside the open door of the shot blast machine. He may have been reaching in to pick up parts that fell from the loading mechanism or performing a change over from one part to another. A coworker found him pinned by the door of the shot blast machine. His coworker requested the assistance of another coworker to remove the decedent from the machine. One of the coworkers manually changed the machine operation from automatic to manual to permit the opening of the shot blast door. *Reference: Summary Case #177, Industry - Manufacturing (31-33).*

Case 61

15-year-old Hispanic male youth died when he was pinned between the lifting arms and frame of a GEHL, Model 4635 SX skid steer loader equipped with a forklift attachment. The youth was assisting his father at his father's place of work. The event was unwitnessed. The loader was being used to transport a round bale of hay. It appears that the decedent activated the lever controlling the lift arm movement while positioned under the raised lift arms. The lift arms lowered, and the decedent was pinned on the right side of the skid steer loader between the right arm and the frame of the machine. (Wholesale Trade)

Case 62

18-year-old Hispanic male employee of an automatic car wash died when he became entangled in the power washing machinery. The decedent was in the process of closing the car wash for the night when a vehicle, which had previously been washed, returned to be re-washed. The customer washed down the front of the vehicle with a portable power washer, and then threw the

power washer's hose and gun into the car wash building. After the customer entered the vehicle, the decedent activated the car wash and the vehicle was moved via conveyor through the car wash. The first wash area had two vertical rotating brushes, one located on each side of the vehicle. The brushes measured 6-feet 4-inches high and approximately 30 inches in diameter. The bristles of the revolving brushes were composed of a foam type material. The portable power wash unit was located near the brush that cleaned the passenger side of the vehicle. After the vehicle proceeded through the first set of brushes, the decedent retrieved the power wash unit. As he was moving the power wash unit, the power washer's hose became entangled in the passenger side rotating brush. The hose wrapped around the decedent's ankle and pulled him into the rotating brush. Both brushes continued to spin until the wash cycle was completed. Another customer who, upon seeing the lights of the car wash still on, entered the car wash to have his car washed and discovered the decedent. EMS arrived and pronounced him dead at the scene. *Reference:* Summary Case #176, Industry - Other Services (81).

Case 63

45-year-old male laborer was killed when he was run over by the John Deere 5410 riding tractor, equipped with a rollover protection structure, and the Woods 3180, 15-foot wide bush hog type mower he was operating to cut two- to three-foot high grass in a park. The decedent was working alone. The decedent was operating the tractor/mower in a circular motion over uneven ground with rut depth ranging from one inch to a maximum of six inches. The employer required employees who were operating the tractor to cut grass to wear the tractor's seat belt, goggles and earplugs. The decedent was not wearing any of the required equipment. The decedent either got off or was thrown off the tractor and was run over by both the tractor and the mower deck. Another employee entered the park at 1:30 p.m. looking for the decedent and found the decedent's tractor at a dead stop after running into a stump/dirt area. The tractor was running, tires were spinning, and the power take off for the mower was engaged and running. This employee looked for the decedent and found the decedent's body lying on the ground about 10 to 15 feet from the tractor. This employee called 911 and then called the yard where they were assigned. The seat belt was in working condition. Emergency response arrived and the decedent was declared dead at the scene. *Reference:* Investigation Report #07MI072, Industry - Public Administration (92).

Motor Vehicle (28)

Case 64

53-year-old male farmer died when the John Deere 3020 tractor he was operating on a dry, two-lane road was struck in the rear by a semi truck. Both vehicles were traveling northbound on the road. The tractor and trailer were in the travel portion of the road. The blacktop roadway had paved shoulders that transitioned to gravel and then to grass ditches. The speed limit was 55 mph and was posted. The tractor was hauling a port-a-box wood wagon. The tractor was traveling to the eastern-most edge of the northbound pavement while straddling the fog line and extending approximately three feet into the northbound portion of the roadway. The semi truck struck the left rear corner of the port-a-box wood wagon causing the wagon and tractor to become separated and the tractor to roll over several times. The semi truck subsequently jackknifed. The decedent was ejected from the tractor seat. The tractor and the wagon were both equipped with a slow moving vehicle signs. *Reference:* Investigation Report #07MI044, Industry - Agriculture (11).

Case 65

56-year-old male driver of an electrical company's van was hit by a tractor-trailer and killed as he was traveling to a worksite. The incident occurred on a dry, two-lane roadway with a posted speed limit of 55 mph. The tractor-trailer driver was traveling southbound when a northbound minivan driver swerved across the centerline into the southbound lane. The minivan struck the tractor's driver side door, which caused the tractor-trailer to tip over to the point where only its passenger side wheels were contacting the road. The tractor-trailer then veered across the road into the northbound lane where it collided with the decedent's company van. The van caught fire and sustained extensive damage from the collision. The restraint use was identified on the crash report as unknown. The van's airbags deployed. (Construction)

Case 66

52-year-old female factory worker was a passenger in a coworker's pick-up truck that was enroute to another company work location when the vehicle left the roadway and overturned. The dark, two-lane expressway was covered with one to two inches of snow. Wind speeds caused the roadway to become icy. The vehicle was traveling westbound on a curve when it spun clockwise and left the roadway to the right. The vehicle slid down a slope toward a ditch filled with less than one foot of water. Upon reaching the ditch, the truck overturned one and one-half revolution, coming to rest on its cab roof during the second partial revolution. The decedent was wearing a seat belt/shoulder harness. The vehicle's air bags did not deploy. The decedent was held upside down by the lap/shoulder harness with her head pushed downward on her chest when emergency response arrived. (Manufacturing)

Wholesale Trade**Cases 67-68****Case 67**

54-year-old male truck driver died from injuries after the tractor-trailer he was driving struck a tree, which was lying on a dark, unlighted roadway with a posted speed limit of 55 mph. The decedent was driving his truck hauling a trailer loaded with 13,400 gallons of gasoline when he struck the tree. After striking the tree, the truck veered off the roadway and struck another tree. He had not applied the brakes before hitting the tree in the roadway. He was wearing a seatbelt.

Case 68

46-year-old Hispanic male laborer for a nursery operation was killed while driving a minivan back to a migrant camp. The decedent was southbound on a two-lane road with a posted speed limit of 45 mph. He struck several mailboxes and then a northbound vehicle. The minivan continued southbound out of control and struck a tree. The decedent was not wearing a seatbelt/shoulder harness. The van's airbag did deploy. The decedent's blood alcohol was 0.29%.

Case 69

73-year-old male driver for an automobile dealership died from medical complications after his car was struck by another vehicle. The decedent, driving a passenger car, was traveling northbound in the left lane of a two-lane roadway. The oncoming vehicle, a pick-up truck, was traveling southbound in the right lane. The decedent was attempting to make a left turn at an intersection so he could travel westbound. In the left southbound lane was a large stake bed truck. The stake bed truck was a visual impairment for both the decedent and the pick-up truck driver. The oncoming vehicle struck the decedent's vehicle on the passenger side. The decedent

was wearing a lap/shoulder harness. The passenger side curtain airbags did not deploy. The force of the collision caused the passenger side of the car to intrude almost two feet. The decedent's head contacted the passenger side door. The decedent died in the hospital approximately three weeks after the incident, which occurred in 2006. (Retail Trade)

Transportation and Warehousing Cases 70-74

Case 70

57-year-old male tow truck driver was killed when he was struck on the roadway shoulder by an oncoming vehicle while he was changing a tire on a vehicle parked on the road shoulder. The tow truck, a flat bed wrecker, was parked behind the disabled vehicle with its overhead oscillating lights turned on. The wrecker was completely on the shoulder. The decedent was at the rear of the disabled vehicle releasing the spare tire. The oncoming vehicle that was traveling in the right lane crossed the lane's fog line and struck the rear of tow vehicle. The tow vehicle was pushed forward approximately 8-1/2 feet into the rear of the disabled vehicle, crushing the decedent between the tow vehicle and the disabled vehicle. A preliminary breath test (PBT) was given to the driver of the vehicle striking the tow vehicle by the responding police department. The result of the PBT was 0.114%.

Case 71

39-year-old male semi-truck driver died after being crushed by a steel I-beam. The incident occurred on a three-lane roadway, which was curved and had a posted speed limit of 55 mph. An over-pass spanned the roadway. Truck #1 was carrying a load of 57,000 pound steel I-beams for a bridge girder assembly. The total height on the front of the trailer as measured by responding police was 13 feet 9 inches. While in the right lane of the roadway, Truck #1 passed under a bridge over-pass marked with a black on yellow backed sign indicating 13 feet 8 inches. An I-beam on top of the truck's trailer bed struck the underside of the bridge over-pass and was dislodged from its securement chains. The beam pirouetted in a clockwise direction as it dug into the roadway surface. As the decedent's vehicle traveled alongside in the center lane, the beam collided with the decedent's truck cab, penetrated it, and crushed the decedent.

Case 72

58-year-old male independent contractor for a vehicle transport company was killed while driving a rental truck towing a small passenger car he was transferring to a Michigan site from another state. The posted 55 mph two-lane roadway was dry. It appears that the decedent drove the truck across the roadway's centerline and collided with a tree. Restraint use was identified as unknown by the responding police agency. The rental truck was not equipped with an airbag.

Case 73

48-year-old male truck driver died when the tractor-trailer he was driving rear-ended another tractor-trailer (Vehicle #1). The incident occurred on a four-lane expressway with a posted speed limit of 55 mph. After striking Vehicle #1, the decedent's vehicle continued along the side of Vehicle #1 and the median wall. Vehicle #1 was forced into the rear of Vehicle #2. The decedent's tractor cab was torn off of the frame and the decedent was trapped inside of the cab, with the cab against Vehicle #2's trailer. The decedent was wearing a seatbelt. The tractor cab was not equipped with an air bag.

Case 74

50-year-old male truck driver was killed when an oncoming vehicle struck him while he was standing in the roadway. The decedent's tractor-trailer had struck another vehicle, causing that vehicle to end up in the center eastbound lane of an expressway with a posted speed limit of 70 mph. The decedent's vehicle stopped in the left lane. The decedent exited the tractor cab and was crossing the left lane to check on the occupants of the vehicle he had hit. He was struck by the oncoming vehicle, thrown into the vehicle in the center lane, and then landed in the right lane. He was subsequently run over by several other vehicles. The vehicle that struck him and the vehicles that ran over him did not stop and left the incident scene.

Case 75

65-year-old male newspaper deliveryman was killed when the car he was driving crossed the centerline and struck the left quarter panel of another vehicle as he approached a 90-degree corner. The two-lane roadway had a posted speed limit of 55 mph. The decedent was not wearing a seatbelt/shoulder harness. The vehicle's airbag did not deploy. (Information)

Administrative & Support & Waste Management & Remediation Services**Cases 76-79****Case 76**

65-year-old male janitor died from medical complications after his car left the roadway. The decedent was traveling between worksites. The decedent's vehicle (Vehicle #1) was traveling eastbound in the left lane of a four-lane expressway. Another vehicle (Vehicle #2) was traveling eastbound in the right lane. As Vehicle #2 changed from the right lane to the left lane, the driver did not see Vehicle #1. Vehicle #1, in an attempt to avoid the impending collision, left the roadway, entered the median and overturned. The decedent was wearing a lap/shoulder belt. The vehicle's airbag did not deploy. The decedent was taken to a local hospital, and then transferred to another hospital. One month after the incident and while still in the hospital, the decedent died. The incident occurred in 2006.

Case 77

58-year-old female security guard was killed when an oncoming vehicle struck the parked van she was sitting in. The van had been traveling southbound on a paved four-lane expressway when it began to stall. The van's driver left the expressway and parked the van on the road's shoulder. The oncoming vehicle, which was also traveling southbound, lost control and swerved onto the left shoulder of the road. The oncoming vehicle struck the median wall and then struck the parked van. The decedent was wearing a lap and shoulder harness.

Case 78

56-year-old female who worked for a septic tank company died when the vehicle she was in overturned on a highway. The driver of the truck in which she was a passenger lost control of the vehicle, and the truck overturned. The incident occurred in a construction zone with a lane closure. The decedent was wearing a seat belt. The vehicle was not equipped with an airbag.

Case 79

27-year-old male sanitation engineer was driving a single-axle, 15,000-pound garbage truck. The road was a two-lane, dry, gravel road with an unposted speed limit of 55 mph. The roadway was "smooth", i.e., no chatter bumps, ruts, etc. The truck left the roadway to the left side of the road

and struck two trees. The first tree, a six-inch diameter tree, struck the driver's side of the vehicle. The second tree contacted the middle of the cab. He was declared dead at the scene. The decedent was not wearing a seat belt and the vehicle was not equipped with an air bag. Toxicological results showed the presence of cannabinoids and opiates.

Case 80

64-year-old male principal died when the vehicle he was driving (Vehicle #1) struck the rear of a box truck (Vehicle #2), and then struck a car (Vehicle #3). Vehicles #2 and #3 were stopped in the right lane of a straight, two-lane concrete freeway due to a traffic buildup caused by construction. The incident did not occur in the construction zone. The decedent was traveling above the 70 mph speed limit. The decedent attempted to avoid a rear end collision with Vehicle #2 by veering his vehicle onto to the right shoulder of the road. He was unable to avoid striking Vehicle #2. Vehicle #1's left front including the door made contact with the right rear of Vehicle #2. After striking Vehicle #2, the decedent's vehicle continued to travel on the road's shoulder and struck Vehicle #3, which was stopped in front of Vehicle #2. After making contact with Vehicle #3, the decedent's vehicle overturned, partially ejecting the decedent. The decedent was wearing a lap/shoulder harness. The vehicle's airbags deployed. (Educational Services)

Health Care & Social Assistance

Cases 81-83

Case 81

74-year-old male hospital volunteer was killed while delivering supplies when the trailer of an oncoming tractor-trailer was blown by high winds across a roadway struck the decedent's vehicle. The decedent was traveling northbound on a three-lane road: one northbound lane, one southbound lane, and a center turn lane. The semi tractor-trailer was traveling southbound. There was a "white-out" area caused by winds that were blowing snow across the roadway. Wind gusts were determined to be near 30 mph. The roadway was slushy in the whiteout area. The trailer was blown by the winds and jackknifed, becoming perpendicular into the northbound lane. It appears that the decedent saw the jackknifed trailer on his side of the roadway and attempted to move off of the roadway. His vehicle struck the left rear trailer tire. Subsequent contacts with the trailer occurred, and then the vehicle left the roadway. The decedent was wearing a lap/shoulder harness.

Case 82

50-year-old female child caregiver was killed when the van in which she was an unrestrained passenger left the roadway, struck a planter in front of a building, and then came to rest against the building. The driver of the van, according to the police report, may have suffered a seizure or "blacked out." The van was traveling on a four-lane roadway with a posted speed limit of 35 mph. The van's airbags deployed.

Case 83

32-year-old female registered nurse riding in an ambulance was killed when the ambulance struck the rear of an empty semi-flatbed trailer logging truck located on the shoulder of the roadway. The two-lane roadway surface had a layer of thin hard-packed snow. The roadway's lane markings were not visible. The decedent was in the treatment compartment of the ambulance tending to a patient that was being transported to another facility. The ambulance, which was traveling northbound, began to rotate clockwise after striking the trailer, traveled

across the road and landed in the southbound ditch. It is unknown if the decedent was using a restraint system at the time of the crash.

Arts, Entertainment & Recreation

Cases 84-85

Case 84

49-year-old male racecar driver was killed when he lost control of his racecar on a 1/4-mile oval, banked, paved racetrack. A sand berm and a six-foot chain link fence surrounded the track. The decedent's car left the raceway, landed on the sand berm, and then crashed into and sheered off a metal fence post. The racecar came to rest with the car's roll cage against a metal I-beam. The decedent was wearing a helmet and his safety harness.

Case 85

51-year-old male manager died when the racecar he was driving during a sanctioned sprint car race on a one-half mile dry racetrack struck a concrete wall at the racetrack and rolled over. The surface of the racetrack was bituminous asphalt and the turns were banked at 15 to 25 degrees. The track was surrounded on three sides by bleachers with a concrete wall and fencing to separate the spectators from the track. The car he was driving was a hand-assembled sprint-style racing vehicle.

Other Services

Cases 86-88

Case 86

27-year-old Hispanic male mechanic was killed when he lost control of the vehicle he was driving, crossed the centerline, and struck an oncoming vehicle. The three-lane roadway was dry. The decedent was wearing a lap/shoulder harness. The vehicle was not equipped with an airbag.

Case 87

26-year-old male delivery driver for a laundry service was killed as a result of being ejected from the van he was driving after it struck a power pole and overturned. The decedent was driving on an icy, two-lane asphalt road. Wind gusts were up to 45 mph. The decedent was traveling northbound and slid left of center. It appeared that he overcorrected, slid off to the east side of the road, rolled down an embankment, and struck a power pole. The impact with the pole caused the van to roll at least three times, coming to rest on the roof. The decedent was not wearing a seatbelt/shoulder harness and was ejected from the van. He was killed when the van rolled on top of him. The van was not equipped with an air bag.

Case 88

58-year-old male minister was killed when the vehicle he was driving rear-ended a tree trimming truck and trailer, which were stopped in a dry, five-lane roadway behind another vehicle. The roadway's posted speed limit was 40 mph. The decedent's seat belt use was unknown. The airbag deployed.

Public Administration

Cases 89-91

Case 89

47-year-old male career fire fighter died after he was ejected from his fire engine when it was struck by a sport utility vehicle (SUV). The decedent was driving the fire engine with its lights and sirens activated enroute to a structure fire. The fire station lieutenant was seated in the front passenger seat. Two additional fire fighters were seated in the back seats behind the fire engine's front compartment. As the fire engine proceeded through an intersection, a speeding SUV struck the passenger side of the fire engine near the windshield. The decedent was ejected along with the lieutenant through the passenger front windshield. The lieutenant landed in the street in front of the SUV approximately ten yards away from the fire engine. After the decedent was ejected, he rolled underneath the fire engine. The fire engine came to rest on top of the decedent's chest. The decedent expired as the fire engine was removed from his chest. Although the other two fire fighters were not ejected, they sustained serious injuries. These two fire fighters and the lieutenant were taken by ambulance to a local hospital. The driver of the SUV was pronounced dead at the scene. *Reference:* Investigation Report #07MI011, Industry - Public Administration (92).

Case 90

55-year-old male mental health assistant was killed when the van he was driving struck an oncoming vehicle (Vehicle #1), which had spun out of control and crossed the centerline of a slushy, two-lane roadway. The police report indicated that heavy snow was falling and the road conditions were poor. The driver of Vehicle #1, traveling at approximately 30 mph in a posted 50-mph zone, hit a patch of icy roadway. Vehicle #1 slid out of control, and crossed the centerline into the path of the decedent who was traveling approximately 40 mph. The decedent was unable to stop his vehicle and struck Vehicle #1. The decedent was wearing a lap/shoulder belt and the van's airbags deployed. The decedent was transported to a local hospital where he died two weeks later from injuries sustained at the time of the crash.

Case 91

47-year-old man volunteer fireman died when the pick-up truck he was driving collided with a large tree that had fallen across the road while he was responding to an emergency call. The incident occurred on a wet, dark, unlighted roadway with a posted speed limit of 55 mph. The police report indicated that it was raining very heavily at the time of the incident, which would have impaired the decedent's vision. Witnesses heard the skidding and then a crash. The front part of his truck slid under the tree. The decedent was wearing a seat belt/shoulder harness and the truck's air bags deployed.

Other (2)**Public Administration****Cases 92-93****Case 92**

56-year-old male firefighter died from a heart attack, which occurred while fighting a residential fire. He had been operating the pumper on an apparatus.

Case 93

74-year-old male firefighter had responded with an EMS crew to a medical emergency at a residence. He sat down in a chair and then lost consciousness after having a heart attack.

Struck By (17)

Case 94

59-year-old male lumberjack was killed when the tree he was felling struck him. The decedent was felling trees while his coworker was skidding them to the loading site. A state forester had identified a 32- to 36-inch diameter locust tree as “stormed-damaged”. The decedent made an improper cut on this tree, leaving less than 1/2-inch of hinge wood. The immediate cut zone had not been cleared for egress. After completing the cut, the decedent walked away at a 90-degree angle with his back to the tree. The tree dropped onto a snag in a nearby tree and then bounced and rolled, pinning the decedent to the ground. (Agriculture)

Case 95

34-year-old male journeyman lineman was killed when a Go-Tract Model GT300 he was directing onto a trailer struck him. After replacing the cross-arms and three insulators on an energized 46kV line, the four-person crew, all of whom were journeyman lineman, were loading the Go-Tract onto the trailer. Coworker #1, the lineman in charge, was operating the Go-Tract. Coworkers #2 and #3 were standing on the ground directing the operator. The decedent was standing on the trailer directing Coworker #1. Coworker #1 was attempting to “inch” the Go-Tract forward for a second time after having been unsuccessful in his first attempt. He was using the clutch pedal so chains located at the front of the trailer could secure it. The decedent may have tripped and fallen onto the tongue of the trailer. The Go-Tract did not stop when the operator engaged the clutch and it continued forward, striking the decedent and coming to rest against the rear of a utility truck. A coworker activated the firm’s emergency system, and emergency response was called. The decedent was declared dead at the scene. *Reference:* Investigation Report #07MI073, Industry - Utilities (22).

Construction

Cases 96-100

Case 96

63-year-old male died due to complications of being struck by in the head by a steel work beam in 1997.

Case 97

49-year-old male ironworker was struck by a falling steel ceiling header beam while he was removing a vertical 2- by 8-inch lumber support under one of the ends of the header beam. The decedent had previously installed two C10 channels to sandwich a hollow cinder block wall separating a new building addition from the existing building. After the hollow wall was partially demolished for access between the addition and the existing building, the decedent installed a continual steel plate at the base of the sandwiched wall to complete the header for the access way. On the day of the incident the decedent and the same coworker arrived at the jobsite to install steel channel on each side of the access way opening from the floor to the header. The crew unexpectedly found screwed, epoxied 2- by 8-inch lumber on the north and south door walls. The coworker pried off the north board without incident. The decedent removed the screws on the south board, twisted the board, and then used a hammer to hit the base of the board, releasing it from the wall. As the decedent turned, the header beam came down, striking him in the head and landing on his legs. His coworker ran to another person on site and asked him to call 911. The coworker returned to the decedent and attempted to move the beam with a

pole. Unable to move the beam, the coworker applied pressure to the decedent's head to control the bleeding. After calling 911, the other person on site retrieved a jack from his vehicle to raise the beam. This jack could not raise the beam, and a second jack was retrieved. Using two jacks, the beam was raised from the decedent. He was taken by emergency response to a local hospital where he died four days later. *Reference:* Investigation Report #07MI106, Industry - Construction (23).

Case 98

35-year-old male truck driver emptying his trailer load was killed when a nearby gravel trailer (Truck #1) collapsed onto his tractor cab. Both drivers worked for the same company. The equipment operator at the construction site directed the driver of Truck #1 to the location where he was to dump his load of soil. The driver backed the gravel train into position, elevated the dump box, and was in the process of emptying his load of material. The decedent backed his gravel train (Truck #2) next to Truck #1. The decedent's truck was within six feet of the passenger side of Truck #1. The decedent's tractor cab was not cab-to-cab with Truck #1 but cab-to-trailer. Truck #1 had evacuated the dirt and topsoil from his dump trailer with the exception of an accumulation of clay, which had compacted itself into the area of the dump trailer closest to the decedent's truck cab. Truck #1's telescoping cylinder buckled, and the dump trailer collapsed onto the roof of the decedent's cab and crushed it. The decedent, who was sitting in the driver's seat, died of asphyxiation and blunt-force injuries. It was postulated that the remaining clay in the dump trailer of Truck #1 might have created an unstable weight distribution within the dump box causing it to tip. *Reference:* Summary Case #168, Industry - Construction (23).

Case 99

57-year-old male, who was the supervisor/foreman and part owner of a concrete curb and gutter installation company, was struck and killed by an oncoming pick-up as he was placing a channelizer drum in the roadway. On the day of the incident, the decedent and the county road commission inspector met at the jobsite to discuss necessary repair to approximately 15 linear feet of curb near the intersection of two roadways. Discussions between the foreman and the county inspector outlined the traffic control to be used during the activity. The traffic control devices used during the duration of the original installation were still available on the site and would be reinstalled. After the arrival of the saw truck and prior to all crewmembers arriving at the site, the decedent began to install the channelizer drums to taper the southbound travel lane next to the curb where the repair work would take place. No advanced warning devices had been placed into position by the decedent to provide upcoming traffic construction notification to the northbound or southbound traffic. The decedent had placed three drums to begin the taper on the southbound lane. Walking in front of the parked saw truck he entered the southbound lane to place the fourth drum between the first tapering drum and the drum placed at the double yellow line. A pick-up truck traveling in the southbound lane struck the decedent. Emergency response was called. The decedent was transported to a local hospital where he was declared dead. *Reference:* Investigation Report #07MI169, Industry - Construction (23).

Case 100

53-year-old male pipe fitter and project foreman for a mechanical contractor died when a storm sewer pipe and inflatable plug dislodged and struck him in his chest and abdomen causing fatal injuries. The three-person crew was in a county park's lift station to replace two pumps. The decedent and Coworker #1 descended to the bottom of a manhole to install a mechanical plug

into a 26-inch diameter storm sewer pipe that drained into the lift station. After the plug was inflated, the water stopped flowing into the station. Coworker #2 was at the top of the 10- by 10-foot manhole monitoring the work. The decedent and Coworker #1 installed a pump base anchor in the floor directly in front of the mechanical plug they had installed in the sewer line. No blocking or bracing was installed in front of the plug. While the decedent and Coworker #1 were drilling anchor holes in the floor, the wall, the sewer pipe and the plug exploded into the manhole, striking both employees. The decedent was knocked unconscious and Coworker #1 was thrown across the lift station. Coworkers #1 and #2 lifted the decedent to the second level of the lift station and started CPR. When emergency response arrived, they extricated the decedent from the second level and transported him to a local hospital where he later died. *Reference:* Investigation Report #07MI024, Industry - Construction (23).

Manufacturing Cases 101-102

Case 101

46-year-old female finish “floor man” died when several 29-foot long steel bars landed on her back while she was leaning over bar stock and reaching in to turn off a pneumatic valve connected to the air hose and to banding equipment. In the normal operation, the steel bars rolled off the machine and down an incline against “fingers”. The “fingers” drop, which allowed the bars to drop into a j-shaped holder (horn). When 50 bars were in the horn, the decedent strapped them to a spreader suspended under a crane and raised the bars out of the horn. A pneumatic tension tool was used to tighten the metal strapping and a pneumatic clamp tool was used to secure the straps. After the bars were secured, the decedent activated the next machine cycle by hitting a reset button to start the next set of 50 bars feeding into the horn. During the fatal incident, the male coupler for an air hose connection to the pneumatic tension tool had broken and the airline was snaking back and forth across the floor. To shut off the tension tool’s air supply, the decedent had bent and reached over 10 bars already in the horn to access an air valve. The air valve was located six inches above the floor. The 10 pieces of steel covered a surface area 13 inches wide plus and an additional 18 inches to the machine and valve. While reaching in, the machine cycled and dropped three steel bars onto the decedent’s back. Another plant employee found the decedent. While employees attempted to remove the bars from the decedent’s back, 911 was called. Emergency responders arrived and began resuscitative efforts. The decedent was transported to a local hospital where she was declared dead. *Reference:* Summary Case #170, Industry - Manufacturing (31-33).

Case 102

54-year-old male machine operator was killed when a nine-foot steel beam weighing 2,500 pounds rolled onto a cart causing the cart to tip, which then caused the beam to fall onto his lower extremities. The beam had been measured on an inspection table. After the beam measurements were taken, the decedent and another coworker moved the beam using a two-ton overhead hoist to transport it to a homemade plastic cart. The beam chock was hitched with one nylon sling. The cart was 30 inches by 40 inches and had two 4-inch by 4-inch wood blocks securely attached to ensure the surface was level. The cart was rated for a 1,800-pound load. When the decedent and his coworker lifted the beam from the inspection table, they realized that the sling was placed too far toward one end of the beam. While on the cart, the decedent unhooked the nylon sling from the hoist hook and tried to reposition the sling to the middle of the beam. The decedent’s coworker was returning measurement tools into a nearby cabinet. The

coworker observed the decedent attempting to roll the beam onto on its flat side for another type of measurement and asked the decedent if he needed any help. The decedent indicated he did not require any help. The beam was not centered on the cart. When the decedent attempted to roll the beam to its flat side, the cart's rear wheels came off of the ground and the beam began to slide off the cart. As the table tilted, the beam fell and landed on the decedent's lower extremities and crushed him. Coworkers reattached the sling to the beam to lift it from the decedent and called 911. The decedent was transported to a local hospital where he was declared dead. *Reference:* Summary Case #160, Industry - Manufacturing (31-33).

Transportation & Warehousing Cases 103-106

Case 103

65-year-old male truck company owner was killed after being engulfed by corn in an 11,000-bushel silo. The decedent was contracted to unload the grain and transport it to a local elevator. It appeared that the decedent climbed to the top of the silo to clear ice from the bin and "iced up" corn inside the grain bin. The auger was running. The bin was approximately 85 percent full. He was not wearing a harness. It is unknown if he was standing on the iced up grain or if he fell onto the grain.

Case 104

18-year-old male wing walker/guide person working at an airport was killed when he was struck by a 65,000-pound Equi-Tech push back tractor tug. The rear counterweight area of the tug was eight feet wide and approximately 4-1/2 feet tall. The rear base of the tug was approximately 11 inches from the ground. The engine hood was on top of the center of the counterweight. The tug was equipped with a back-up alarm of unknown decibel level. The tug's driver and passenger side view mirrors were located 5-1/2 feet above the ground and measured 6-1/2 inches wide and 10 inches in length. The mirrors did not extend beyond the width of the tug's rear counterweight. The decedent was part of a three-person crew including the tug operator, the decedent and another wing walker that had pushed an attached aircraft from the airport terminal to the taxi area. The decedent, with the assistance of the tug operator, uncoupled the aircraft. After the aircraft was uncoupled, the decedent walked to the right wing walker's location and indicated that the aircraft was successfully uncoupled. The aircraft moved away. The decedent walked to the driver's side of the tug and handed his guide wand (flashlight with a red cone attached) and communication headset to the tug operator. The decedent then walked toward the airport terminal. As the tug began to move in reverse at an angle towards the airport, the decedent walked behind it and was struck and run over by the right side of the tug. The police report states they heard music emanating from the decedent's iPod. The music was loud enough to be heard by the officers from four feet away. The decedent was wearing a fluorescent safety vest. *Reference:* Summary Case #161, Industry - Transportation and Warehousing (48-49).

Case 105

34-year-old male warehouse clerk/forklift driver at a regional warehouse and transshipment area for a supermarket and general merchandise firm was killed when a powered industrial truck (PIT#1) with elevated forks struck a rack. PIT #1 tipped over on top of him after he had jumped from the operator driver's seat of PIT #2, which he was driving. Both operators were driving Raymond High Reach trucks with overhead protection structures. The incident occurred in an 8-foot wide, 200-foot long aisle-way that ran east to west where it intersected with an entrance

between two racks. The width of the entrance between the racks was approximately 11.5 feet. The racks were 12 feet 7 inches tall, and were located on both sides of the aisle. The operator of PIT #1 had deposited a pallet load and was traveling eastbound in reverse (trailing) back to the aisle entranceway with the forks elevated about 12 feet above the floor. He had traveled approximately 150 feet with the forks elevated. As PIT #1 was coming down the aisle towards the entranceway, PIT #2 carrying a pallet of produce entered the aisle traveling westbound in trail mode. The driver of PIT #1 turned towards an inter rack tunnel with his forks still elevated up and struck the lower portion of the tunnel rack. PIT #1 fell to the south as its back loader extender struck the rack. The decedent saw that PIT #1 was tipping and attempted to jump from his protected driver area to escape injury. The forks of PIT #1 landed on top of him. PIT #1 operator jumped to safety. Upon seeing the decedent pinned by the forks of PIT #1, the operator of PIT #1 used PIT #2 to lift PIT #1 from the decedent. A coworker heard a noise. When he arrived at the incident scene, he saw PIT #1 on top of the decedent. This employee ran to nearest emergency phone, which did not work. The coworker visited four more phones before finding one that was operational. The coworker announced on the warehouse public address system that there was an emergency in the area. *Reference: Summary Case #169, Industry - Transportation and Warehousing (48-49).*

Case 106

38-year-old male lift truck driver in a frozen food distribution center was killed when several tons of frozen food that had been stored on racks fell onto him when the racks collapsed. The decedent had been working unsupervised as he was placing and removing frozen products weighing 5,000 to 6,000 pounds onto a rack system in a subzero freezer using a powered industrial truck. Employee A was working on the archway of the freezer door and found he needed a hammer. As he walked to the shop to obtain one, the decedent drove the forklift into the freezer area. The decedent had deposited his load. With the forks elevated, it appeared that as he attempted to turn and back out, he clipped a rack edge. As the racks began to fall, it appears he exited the forklift in the path of the falling frozen foods. Employee A, after returning from the shop, opened the freezer door and pulled back the freezer curtains. He noticed that the rack and some boxes had fallen. He called out for the decedent. When he did not get a response, he called for the Dock Supervisor and went to the office to report what had seen. The forklift was found leaning against the racks with the forks elevated. Emergency response was called. It took paramedics about two minutes from the time of the 911 call to arrive at the firm to assist in recovering the deceased. Emergency response personnel and the decedent's coworkers began to dig through the pallets/product located four to five feet away from his forklift. They found him under approximately 40,000 pounds of frozen product (food and pallets). After finding him, emergency response transported the decedent to a local hospital where he was declared dead. *Reference: Summary Case #165, Industry - Transportation and Warehousing (48-49).*

Case 107

41-year-old male self-employed landscaper was killed when a falling tree struck him. The decedent was a member of a three-person work crew. One of the decedent's coworkers was using a front end loader to push down trees while the decedent and his other coworker were using chainsaws to cut the trees into six to seven foot lengths so that the trees could be easily stacked. The coworker operating the front-end loader indicated that he saw the decedent on the far side of the trees that had been knocked down, and that he was cutting them with his chain saw. The driver indicated that he had another tree he wanted to push down. He knocked the tree down, and

then could no longer see the decedent. He noted the chainsaw next to the tree he had just knocked down. Using the front-end loader, he pushed the tree away from the saw and saw the decedent lying on the ground. Exiting the loader, he called for the other coworker and rendered first aid. The decedent was declared dead at the scene. (Administrative & Support & Waste Management & Remediation)

Case 108

58-year-old female bus driver was killed walking back to her public school bus when she was struck by another bus leaving the parking area to start the morning student pick-up. The school buses were parked in two rows that ran north-south in the center of the parking lot located on the west side of the office/bus garage building. The spaces on the east side row of parked buses angled to the southeast (slanted to the right). The west side row of parked buses angled to the northwest. Several overhead lights in the parking lot were out of order. The decedent, after starting her bus, walked to the office to get a cup of coffee. After getting her coffee, she walked back to her bus with her head down. She was wearing dark clothing. The driver of a 1997 International school bus pulled her bus out of the parking spot and struck the decedent with the side of the bus. The decedent was knocked to the ground and then run over with the driver's side rear wheels. The MIOSHA compliance officer noted that the 1997 International bus had been parked in a southeasterly-angled parking spot and had pulled out of the space turning left against the direction of the angle parking. This caused the bus driver to make a large swinging turn out of the parking space to prevent the back of the bus from striking buses parked next to it. The responding police department indicated that the 1997 International bus's windows were frosted over. The bus driver had cleared the windshield but not the driver's side window. *Reference:* Summary Case #173, Industry - Education (61).

Other Services

Cases 109-110

Case 109

62-year-old male owner of an automobile repair shop died when an automobile fell on top of him. The decedent was working alone at his shop and was underneath the rear portion of an automobile when the automobile became dislodged from the support stands and fell onto him. He was found sometime later by an acquaintance, who then called 911. A jack stand, which was supporting the right rear of the vehicle, was found tipped over next to the car.

Case 110

26-year-old male sales manager/certified mechanic of a retail automotive parts supplier was killed when the van he was servicing fell onto him. The decedent worked at the retail supplier, but also was an independent contractor who owned an automotive repair business. The leasing company that owned the firm's fleet delivery vans had hired him to perform service on these vehicles. The decedent was in the parking lot behind his employer's business performing mechanical work on one of the vans. He had elevated the van by driving the front wheels up onto the curb to raise the front high enough to crawl under it. Apparently, while under the van near the right front tire, the van rolled back off the curb and pinned him under the tire. A passerby saw the decedent under the van and ran into the employer's business. The passerby and one of the decedent's coworkers pushed the van until the tire was off the decedent. Emergency response arrived and the decedent was declared dead at the scene. *Reference:* Summary Case #166, Industry - Other Services (81).

Suicide (6)

Case 111

30-year-old male installer for a plumbing/heating business died by a self-inflicted hanging. (Construction)

Manufacturing

Cases 112-113

Case 112

35-year-old automotive financial analyst died by jumping from the tenth floor of the building where he worked. (

Case 113

53-year-old male maintenance mechanic died due to a self-inflicted gunshot wound.

Case 114

50-year-old male operations manager died due to a self-inflicted gunshot wound. (Retail Trade)

Other Services

Cases 115-116

Case 115

45-year-old male auto garage owner died due to a self-inflicted gunshot wound.

Case 116

37-year-old male tattoo artist/tattoo parlor owner died due to a self-inflicted gunshot wound.

Toxic Exposure (4)

Case 117

57-year-old male self-employed home improvement contractor died due to a chemical inhalation injury. The decedent was working in a bathroom and inhaled muriatic acid fumes while cleaning the ceramic tiles. He developed difficulty breathing and drove himself to the hospital, where he died approximately two hours later. (Construction)

Case 118

80-year-old male working at a grain elevator died from complications after inhaling ammonia. The decedent was one of three employees filling an anhydrous ammonia tank on a trailer from a main tank of anhydrous ammonia. The trailer was moved forward and caused the line to break resulting in the release of anhydrous ammonia. (Wholesale Trade)

Case 119

55-year-old male self-employed carpet layer died from carbon monoxide poisoning after he fell asleep in his work van that was left running in a parking lot. The decedent had called home stating to a family member that he was too intoxicated to drive. The decedent was found four days later between the seats of the work van. The decedent's postmortem blood carbon monoxide screen showed a carboxyhemoglobin of 77.0% and blood ethanol of 0.22%. (Administrative & Support & Waste Management & Remediation Services)

Case 120

52-year-old female laborer who worked in a nursing home died due to complications from an asthma attack that was triggered by chlorine fumes in the laundry area. The decedent had a history of asthma. When she and her coworkers arrived at work, they could smell a strong odor of bleach in the laundry room. The washing machines each had a 2-1/2 gallon container of bleach that automatically dispensed an amount of bleach similar to an amount used in a residential setting into the washing machine. Bleach was dispensed into the washing machine only when the washing machine lid was open. It appears someone was going to start a load of clothes and did not shut the lid. Maintenance personnel indicated there were no leaks in the system or spills of bleach on the floor at the time of the incident. Upon arrival at the laundry room, her coworkers asked if she was bothered or could smell the bleach. The decedent stated she was not bothered and that she couldn't smell the bleach. The decedent then complained of shortness of breath. She later started to cough and left the laundry room and walked to a nearby bathroom. When she did not come out of the bathroom, fellow employees went into the bathroom and found her lying on the floor and not breathing. A coworker began CPR and another coworker left to alert the nursing staff that then continued the resuscitative efforts until EMS arrived. EMS personnel took the decedent to a local hospital where she died several days later. (Health Care and Social Assistance)