

2005

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



2005 Annual Report on Traumatic Work-Related Fatalities in Michigan

A Joint Report

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Summary

This is the 5th annual report on traumatic work-related fatalities in Michigan. One hundred ten individuals died in 2005 from an acute traumatic injury at work down from 131 in 2004. The number of deaths peaked in 1999 at 182 and has been on a downward trend since (Figure 1). The rate of acute traumatic work-related fatalities in Michigan is 25% lower than the national rate (3.0 deaths/100,000 workers vs. 4.0 deaths/100,000 workers). There have been no changes in the system to track these deaths since 1992. Possible causes for the decrease would include safer working conditions, reductions in employment in more hazardous industries, or statistical variation. To determine whether this decrease in the number of deaths reflects a true downward trend or a fluctuation of small numbers can only be ascertained by further years of surveillance.

The 110 individuals who died had 107 different employers. Two employers had a fatal incident where more than one 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 on-site 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 23 deaths in Construction (NAICS 23), 16 deaths in Agriculture, Forestry, Fishing and Hunting (NAICS 11), 14 deaths in Transportation and Warehousing (NAICS 48-49) and 14 deaths in Manufacturing (NAICS 31-33). The largest change in deaths occurred in the Construction classification where the number of deaths was down from 32 in 2004.

The ranking of industries by *risk* of death differed from the ranking of industries by the largest number of deaths. Mining (NAICS 21) had the highest annual average incidence rate (29.9 deaths per 100,000 workers), followed by Agriculture (NAICS 11) which had 20.0 deaths per 100,000 workers, Construction (NAICS 23) which had 12.0 deaths per 100,000 workers, and then Transportation and Warehousing (NAICS 48-49) which had 10.9 deaths per 100,000 workers.

The most common cause of death involved motor vehicles (24, 21.8%), followed by falls (20, 18.2%), and machine-related events (18, 16.4%). Sixteen (14.5%) individuals died as a result of a homicide and 10 (9.1%) individuals died after being struck by an object.

Most deaths occurred among men (93.6%). The average age of death was 44.6 years and ranged from 16 to 82. Of those individuals who died, 83.6% were Caucasian. Fatal injuries occurred in 40 of Michigan's 83 counties, with Wayne County having the largest number of deaths, 21.

For 20 (19.0%) of the 105 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 nine deaths, alcohol in five deaths, prescribed medication in three deaths, over-the-counter medicine in two deaths, and an illegal drug and alcohol in one death. An additional three individuals died from a drug overdose at work.

The largest number of fatal work-related traumatic events occurred on a Friday (23, 21.1%) followed by Tuesday (19, 17.4%), then Monday (18, 16.5%) and Wednesday (14, 12.8%). July was the most common month (16, 14.5%) and 8:00 a.m. - 11:59 a.m. was the most common time of the day (37, 34.9%) for the occurrence of traumatic incidents.

MIOSHA staff investigated 37 of the deaths at 37 employers. The police investigated 39 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 39 different employers. Seven of the deaths (5 different employers) were investigated by Federal agencies (National Transportation Safety Board and Mine Safety and Health Administration). The remaining 27 work-related fatalities (26 employers) were not investigated by any regulatory agency as to cause of death other than by the police to exclude a homicide or suicide.

Although acute work-related traumatic fatalities represent only a small percentage of the approximately 87,000 deaths that occur annually in Michigan, work-related traumatic fatalities are preventable. The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to take action to prevent them despite their relatively small number. 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. We are very pleased to see the decrease in deaths in 2005 and plan to further investigate the cause for this decrease in hope of identifying factors that can further reduce the number of deaths in the future.

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, Wayne State University Department of Fundamental and Applied Sciences, 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 threefold: 1) identify types of industries and work situations where workers are dying from acute traumatic incidents, 2) identify the underlying causes of the work-related fatality, and 3) formulate and disseminate prevention strategies to reduce 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 is an important part of both the NIOSH and MIFACE program.

Methods

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

Any person who dies from a work-related injury that occurs while performing his/her job is included in the MIFACE program. Deaths from natural causes, such as heart attacks that occur at work, are not included. Suicides are included, following the protocol established by the NIOSH FACE program as well as that of the United States Department of Labor, Bureau of Labor Statistics (BLS), which collects the official statistics of work-related deaths in all states.

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 2000 Standard Occupational Classification (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.

The 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.

Results

There were 110 acute traumatic work-related fatalities in 2005. One hundred nine (99.1%) of the 110 work-related traumatic incidents occurred in 2005. One individual was injured in a motor vehicle event in 2004 and died from complications of the injuries in 2005. The number of deaths per year in Michigan since 1992 is shown in Figure 1.

Demographics

The demographic characteristics of all workers fatally injured on the job in 2005 are shown in Table 1.

Gender

One hundred three (93.6%) of the individuals who died were men and 7 (6.4%) were women.

Race/Ethnicity

Ninety-two (83.6%) individuals who died were identified as Caucasian on their death certificate, 12 (10.9%) were identified as African-American, and 6 (5.5%) were identified as Hispanic. Two of the seven women were identified as Caucasian on their death certificates and their ethnicity was identified as Hispanic. Eighty-seven (84.5%) men were identified as Caucasian, 12 (11.7%)

men were identified as African-American, and 4 (1.9%) men were identified as Hispanic for both their race and 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 16 to 82, with one death in a youth (age 16) and six deaths in individuals 70+ years old. The average age was 44.6 years, up slightly from 44.3 years in 2004. One hundred three (93.6%) deaths occurred in individuals between the ages of 18-69.

The 16-year-old youth died when the car he was assisting in the removal of an engine and transmission from fell from the forks supporting it and landed on his chest.

Three individuals with ages ranging from 70 to 82 who died from acute work-related events were farm owner/operators. One individual was a forklift driver employed in Manufacturing (NAICS 31-33). One individual was a vehicle porter employed in Retail Trade (NAICS 44-45). One individual was a commercial pilot employed in Transportation and Warehousing (NAICS 48-49).

The majority of deaths in Construction (NAICS 23) occurred between the ages of 30-39 (8, 34.8%). Ages 20-29, 40-49, and 50-59 had 4 (17.4%) deaths each. In Transportation and Warehousing (NAICS 48-49), more than one-third (5, 35.7%) of the deaths occurred between the ages of 30-39. Nearly one-half of the 16 deaths (7, 43.8%) in Agriculture, Forestry, Fishing and Hunting (NAICS 11) occurred between the ages of 60-82. In Manufacturing (NAICS 31-33), almost one-half of the 14 deaths occurred between the ages of 50-59 (6, 42.9%).

Marital Status

Fifty-seven (51.8%) individuals who died from traumatic incidents were married, 30 (27.3%) were never married, 19 (17.3%) were divorced, and 4 (3.6%) were widowed.

Educational Level

Table 1 shows the distribution of educational level and Table 3 shows the distribution of educational level by industry. Overall, 14 individuals (12.7%) had not completed high school, 49 (44.5%) completed high school and received a high school diploma, 41 (37.3%) completed one to four years of college, and 6 (5.5%) had over five years of college.

Within industries having 14 or more deaths, the most common education level among individuals who died was completing high school but no college. All of the deaths in Information (NAICS 51), Real Estate and Rental and Leasing (NAICS 53), and Accommodation and Food Services (NAICS 72) occurred within this educational level. Two-thirds (6 of 9, 66.7%) of the individuals employed in Retail Trade (NAICS 44-45) who died had received their high school diploma but had not attended college.

All of the individuals in Utilities (NAICS 22), Professional, Scientific, and Technical Services (NAICS 54), and Public Administration (NAICS 92) had attended college for one to four years. Mining (NAICS 21), Educational Services (NAICS 61), Wholesale Trade (NAICS 42), Administrative and Support and Waste Management and Remediation Services (NAICS 56), and Arts, Entertainment and Recreation (NAICS 71) industry classifications had 50% or more of the individuals who died attend one to four years of college.

Only 6 (5.5%) of the 110 individuals who died in 2005 attended college at a post-graduate level. Two individuals had been employed in the Manufacturing (NAICS 31-33) classification. Agriculture, Forestry, Fishing and Hunting (NAICS 11), Construction (NAICS 23), Transportation and Warehousing (NAICS 48-49), and Administrative and Support and Waste Management and Remediation Services (NAICS 56) each had one individual who had attended college at a post-graduate level.

Among individuals who did not complete high school, over one-third (5 of 14, 35.7%) of the deaths within this educational level occurred in the Construction industry and 4 (28.6%) of the 14 deaths occurred within the Agriculture, Forestry, Fishing and Hunting industry. Within Construction, these five individuals accounted for nearly one-quarter (5 of 23, 21.7%) of the construction-related fatalities in 2005. Agriculture reflected similar numbers as Construction; one-quarter (4 of 16, 25.0%) of the individuals who died in the Agricultural industry did not complete high school. Although the number of deaths was low, Other Services (except Public Administration) (NAICS 81) and Wholesale Trade (NAICS 42) had the highest proportion of deaths within this educational level (2 of 3 deaths, 66.7% and 1 of 2 deaths, 50.0%, respectively). The 16-year-old youth who died had worked in Wholesale Trade.

Drug/Alcohol/Medication Use

Ninety-one (84.3%) of the 108 non-suicide cases are known to have had an alcohol screen performed after death. Seven individuals (7.7%) had measurable blood alcohol levels; the levels were 0.181%, 0.16%, 0.12%, 0.10%, 0.06%, 0.023%, and 0.005%.

Eighty-seven (80.6%) of the 108 non-suicide cases had a drug screen performed after death. Ten individuals (10.3%) tested positive for illegal drugs; four individuals tested positive for both marijuana and a marijuana metabolite, two individuals tested positive for marijuana, one individual tested positive for cannabinoids and one individual tested positive for a marijuana metabolite in their urine. One individual tested positive for both cocaine and a cocaine metabolite and one individual tested positive for a cocaine metabolite. One of these 10 individuals also had a measurable blood alcohol level (0.10%). Two additional individuals tested positive for illegal drugs: both of these individuals died due to a drug overdose.

Among the non-suicide cases, 22 (20.4%) individuals tested positive for metabolites of medication (prescription and over-the-counter). Caffeine, nicotine, and cotinine (a metabolite of nicotine) were excluded from this analysis. After reviewing the type of medications found, we concluded that for five of the deaths, medications might have been a factor in the death. The prescription medications in the deaths were: doxylamine, oxazepam, and tramadol. Two over-the-counter medications found may have contributed to the death: diphenhydramine and

norpropoxyphene. For one death, medication was the cause; the individual died from an overdose of codeine that had been abused or obtained illegally.

Among the non-suicide deaths, a total of 21 individuals had measurable levels of alcohol, illegal drugs, or medications in their system at the time of their death and the alcohol, illegal drug and medication levels may have been a risk factor for the occurrence of the injury. One of the 21 individuals had a very low blood alcohol level (0.005%) and was not included in the final analysis. One of the 20 individuals had an overlap of an illegal drug and alcohol in their body fluid at the time of his death. An additional three individuals died due to a drug overdose.

Work-Related Event Details

Day of Injury

Table 4 shows the day of injury by industry. Overall, the largest number of work-related fatal injuries occurred on a Friday (23, 21.1%). Tuesday had the next highest number of work-related fatal injuries (19, 17.4%). Monday had 18 (16.5%) fatal injuries, Thursday had 16 (14.7%), Wednesday had 14 (12.8%), Saturday had 12 (11.0%), and Sunday had 7 (6.4%) fatal injuries. The day of injury was unknown for one individual in Manufacturing.

In the Construction industry, Monday had the highest number of work-related injuries (6, 26.1%), followed by Tuesday (5, 21.7%), and then Wednesday and Friday (4 each, 17.4%). In Manufacturing, Friday was the weekday where most fatal injuries occurred (5, 38.5%), followed by Thursday (3, 23.1%), and then Monday and Tuesday (2 each, 15.4%). Most work-related fatal injuries in the Transportation and Warehousing industry occurred on Friday (5, 31.3%), followed by Monday and Wednesday (3 each, 21.4%). In Agriculture, Saturday was the day when the highest number of fatal injuries occurred (5, 31.3%), followed by Tuesday and Thursday (3 each, 18.8%).

Monday was the day of the week when the most work-related homicides occurred (4, 25.0%), followed by Sunday and Tuesday (3 each, 18.8%).

Month of Injury

Table 5 shows the month of injury by industry. July had the highest number of injuries resulting in fatalities with 16 (14.5%), followed by February (15, 13.6%), and September (12, 10.9%). January had 10 (9.1%) fatal injuries and followed by May and November (9 each, 8.2%).

Of the 23 deaths in the Construction industry, September had the highest number of incidents (5, 21.7%) followed by July (4, 17.4%), and then August and December (3 each, 13.0%). Slightly more than one-half of the Manufacturing work-related fatal injuries occurred in the winter season of December, January and February (8 total, 57.1%). Five of the eight deaths occurred in February. July was the most likely month for a fatal injury (4, 28.6%) in the Transportation and Warehousing industry, followed by May (3, 21.4%). In the Agricultural industry, June was the most likely month for a fatal injury (4, 25.0%), followed by September and October (3 each, 18.8%).

Table 6 shows the means of death by the month the injury occurred. Motor vehicle fatalities occurred most often in July (5, 20.8%), followed by January, February, and November (3 each, 12.5%). September was the month that most fall-related injuries occurred (4, 20.0%), followed by May and July (3 each, 15.0%). Machine-related fatal injuries occurred most often in May (4, 22.2%), followed by February and July (3 each, 16.7%). September was the month most homicides occurred (3, 18.6%) followed by January, April, and October (2 each, 12.5%).

Time of Injury

The time of the injury could be placed within a 4-hour time period in 106 of the 110 (96.4%) 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 by industry. Overall, 37 (34.9%) fatal injuries occurred between 8:00 a.m. - 11:59 a.m., 21 (19.8%) occurred between 12:00 p.m. - 3:59 p.m., 20 (18.9%) occurred between 4:00 p.m. - 7:59 p.m., 11 (10.4%) occurred between 4:00 a.m. - 7:59 a.m., 9 (8.5%) occurred between 12:00 a.m. - 3:59 a.m., and 8 (7.5%) fatal incidents occurred between 8:00 p.m. - 11:59 p.m.

Within Construction, 17 (73.9%) of the 23 work-related fatal injuries occurred between the traditional daytime work hours of 8:00 a.m. - 11:59 a.m. and 12:00 p.m. - 3:59 p.m. Nine (39.1%) deaths occurred between the hours of 8:00 a.m. - 12:00 p.m. and 8 (34.8%) deaths occurred between 12:00 p.m. - 3:59 p.m. The morning work hours of 8:00 a.m. - 11:59 a.m. were when most fatal injuries (with a known time of injury) occurred in Manufacturing (6, 46.2%), and Transportation and Warehousing (5, 38.5%). Late afternoon/early evening, between 4:00 p.m. - 7:59 p.m. was the most common time period for a fatal injury to occur in Agriculture (6, 37.5%) followed closely by 8:00 a.m. - 11:59 a.m. (5, 31.3%).

Most homicides with a known time of injury (4, 30.8%) occurred in the morning hours of 8:00 a.m. - 11:59 a.m., followed by 12:00 a.m. - 3:59 a.m. (3, 23.1%).

Place of Death

For 48 (43.6%) individuals, the place of death was at the scene of the traumatic incident. For 62 (56.4%) individuals, the death occurred in the hospital.

Geographic Distribution

Table 8 and Figure 3 show the county in which the decedent worked where he/she was fatally injured. Forty (48.2%) of the 83 Michigan counties had a traumatic fatal work-related injury occur. The most common locations of fatal injuries were: Wayne county (21, 19.1%) and Kent county (10, 9.1%), Oakland county (8, 7.3%), Berrien county (6, 5.4%), followed by Calhoun, Genesee and Washtenaw counties (5 each, 4.5%). Five counties had 3 fatal injuries, 7 counties had 2 fatal injuries, and 21 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 2005 and Table 10 shows Michigan's annual incidence rate by industry sector for the years 2001-2005. Table 11 compares the incident rate by industry sector in Michigan to United States incident rate by industry sector for 2005.

Mining (NAICS 21), although having only two work-related fatalities had the highest incident rate (29.9/100,000 workers) in Michigan in 2005. Agriculture, Forestry, Fishing and Hunting (NAICS 11) was next with an incident rate of 20.0/100,000 workers. The incident rate for Construction (NAICS 23) was 12.0/100,000 workers, followed by Transportation and Warehousing (NAICS 48-49) with an incident rate of 10.9/100,000 workers. Although both Manufacturing (NAICS 31-33) and Transportation and Warehousing (NAICS 48-49) had the same number of deaths (14), the incident rate for Manufacturing was much lower (2.1/100,000 workers) than Transportation and Warehousing because more individuals were employed in the Manufacturing industry.

The number of deaths occurring in Construction declined from 32 in 2004 to 23 in 2005, a decrease of 28%. In 2005, within Construction, 14 of the 23 (60.9%) deaths occurred in the Special Trade Contractors classification. In 2004, 24 deaths occurred in the Special Trade Contractors classification.

There was a decline in the number of deaths in the Transportation and Warehousing classification from 2004. In 2005 there were 14 deaths compared to 17 work-related deaths in 2004. Four individuals working in Truck Transportation died in 2005 compared to six individuals in 2004. There was an increase in the number of deaths in Support Activities for Transportation (five deaths in 2005 compared to three deaths in 2004). Rail Transportation was not represented in 2005; two deaths occurred in this classification in 2004.

Agriculture, Forestry, Fishing and Hunting had 16 deaths in 2005 compared to 15 deaths in 2004. Twelve (60.0%) of the 16 deaths occurred among individuals who were in Crop Production. Four (40.0%) deaths occurred among individuals in Animal Production.

Manufacturing had 5 fewer deaths in 2005 (14 deaths in 2005 compared to 19 deaths in 2004). The highest number of deaths in Manufacturing occurred within Transportation Equipment Manufacturing (5, 35.7%). Fewer manufacturing industry classifications were represented in 2005; 7 classifications compared to 10 classifications in 2004. Five industry classifications were common to 2004 and 2005 and three of these classifications had a similar number of deaths. The industry classification in Manufacturing that differed the most in the number of deaths was Plastics and Rubber Products Manufacturing: three deaths in 2005 and one death in 2004.

The number of deaths that occurred in Retail Trade (NAICS 44-45) more than doubled from 2004 to 2005: nine deaths in 2005 compared to four deaths in 2004. Motor Vehicle and Parts

Dealers had four deaths in 2005 compared to one death in 2004. Food and Beverage Stores had three deaths in 2005 compared to one death in 2004.

Information (NAICS 51) did not have a work-related death in 2004 but had three deaths in 2005. Two deaths occurred in Publishing Industries (Except Internet) and one death in Motion Picture and Sound Recording Industries.

Administrative and Support and Waste Management and Remediation Services (NAICS 56) had an increase of two deaths in 2005 compared to 2004: seven deaths in 2005 compared to five deaths in 2004.

Accommodation and Food Services (NAICS 72) had a decline in the number of work-related deaths from six deaths in 2004 to three deaths in 2005. Food Services and Drinking Places had a reduction from two deaths in 2005 compared to four deaths in 2004.

Other Services (except Public Administration) (NAICS 81) also had a decline in the number of work-related deaths. The number of deaths in this industry classification declined from seven deaths in 2004 to three deaths in 2005. The decline in the number of work-related deaths was mostly attributable to a decline in the number of deaths in Repair and Maintenance (decline of two deaths) and Personal and Laundry Services (represented in 2004 but not in 2005).

Wholesale Trade (NAICS 42) and Public Administration (NAICS 92) each declined by one death compared to 2004. Wholesale Trade had two deaths and Public Administration had seven deaths. Six (85.7%) deaths in Public Administration occurred in the Justice, Public Order and Safety Activities.

No work-related deaths occurred in 2005 in the Health Care and Social Assistance (NAICS 62) industry classification. Health Care and Social Assistance had five work-related deaths in 2004.

Table 11 compares the incident rate by industry in Michigan to national rates for 2005. Several industrial sectors had higher fatality rates when compared to United States fatality rates. The incident rate for the Mining industry (2 deaths, 29.9/100,000) exceeded the national fatality rate for Mining (25.6/100,000), as did Utilities (1 death, 4.9/100,000 vs. 3.6/100,000), Information (3 deaths, 4.4/100,000 vs. 2.1/100,000), Financial Activities (1 death, 1.8/100,000 vs. 1.0/100,000), Construction (23 deaths, 12.0/100,00 vs. 11.0/100,000) and Government (7 deaths, 2.8/100,000 vs. 2.4/100,000). Several Michigan industries had notably lower fatality rates compared to the United States fatality rates: Agriculture (16 deaths, 20.0/100,000 vs. 32.5/100,000), Wholesale Trade (2 deaths, 1.2/100,000 vs. 4.4/100,000), Transportation and Warehousing (14 deaths, 10.0/100,000 vs. 17.6/100,000), and Professional and Business Services (8 deaths, 1.5/100,000 vs. 3.5/100,000). The overall fatality rate in Michigan for 2005 was 3.0/100,000 vs. 4.0/100,000 for the United States.

Means of Death by Industry Sector

Table 12 shows the means of death by industry sector. Within Construction, 14 (60.9%) of the 23 construction-related deaths were as a result of a fall from a height. In 2004, 12 (37.5%) of the 32 work-related deaths in Construction were a result of a fall from a height. Four (17.4%) workers

in Construction died as a result of contact with electrical current, 3 (13.0%) individuals died as result of being struck by an object (excavation wall cave-in), and 2 (8.7%) individuals were killed as a result of a motor vehicle accident.

In Manufacturing, an aircraft crash killed 3 (21.4%) individuals, a drug overdose killed 3 (21.4%) individuals, and machine-related incidents killed 3 (21.4%) individuals. Two (14.3%) individuals were killed as a result of a fall from a height. One (0.7%) individual died as a result of drowning in a vat filled with cherries/brine solution, a coworker killed 1 (0.7%) individual, and 1 (0.7%) individual died when he experienced an asthma attack triggered by isocyanates in his workplace.

Five (35.7%) of the 14 deaths in Transportation and Warehousing involved motor vehicles. Three (20.0%) individuals died in aircraft incidents. Three (20.0%) individuals died in machine-related events (crushed between a derailed railroad car and stationary concrete column, run over by the wheels of a sliding chassis trailer, crushed by a forklift mast). Two (13.3%) individuals died as a result of a homicide at work. One (7.1%) individual died as a result of being struck by an object (SUV fell on top of him while he was under it).

In Agriculture, Forestry, Fishing and Hunting machine-related events accounted for 8 (50.0%) of the 16 deaths: 5 of the 8 machine-related incidents involved tractors. In three incidents the tractor overturned to the side pinning the operator and in two incidents the tractor ran over the individual. The remaining fatal machine-related events involved an individual who was run over by a hay wagon, an individual who was run over by a semi tractor/trailer that he had parked on a hill, and an individual who was pinned by a forklift attachment. Three individuals died as a result of a fall from a height and two individuals were struck by an object (bale of hay, tree limb). Two individuals died as a result of a motor vehicle incident; one individual died when the pickup truck he was driving while enroute to a field was struck by another vehicle and one individual was killed when the van used to transport him and his fellow coworkers to a field was struck by another vehicle. One individual committed suicide.

Occupations

Table 13 and Figure 4 shows the distribution of occupational categories. The occupational category with the highest number of work-related deaths was Management Occupations (11-0000) accounting for 27 (24.5%) of the 110 work-related deaths in Michigan in 2005. This represents an increase of seven deaths from 2004. Within this major grouping, Farmers and Ranchers (11-9012) accounted for 13 (48.1%) of the 27 of the work-related deaths.

Transportation and Material Moving Occupations (53-0000) accounted for 26 (23.6%) deaths. Within this occupation category, Truck Drivers, Heavy and Tractor-Trailer (53-3032) accounted for 9 (34.6%) of the 26 deaths. Industrial Truck and Tractor Operators (53-7051) accounted for 4 (15.4%) of the 26 deaths.

Construction and Extraction Occupations (47-0000) had 19 (17.3%) work-related deaths, down from 28 in 2004. Construction Trade Workers (47-2000) accounted for 16 (84.2%) of the 19 deaths. Roofers (47-2181) accounted for 5 (26.3%) deaths. Three (15.8%) deaths each occurred

in the following construction trade workers: brickmasons/blockmasons (47-2021), carpenters (47-2031), and construction laborers (47-2061).

Protective Services (33-0000) occupations had 8 (7.3%) deaths. Five (62.5%) Police and Sheriff's Patrol Officers (33-3051), 2 (25.0%) fire fighters (33-2011), and 1 (12.5%) security guard (33-9032) died in 2005.

Decedent's Activity at the Time of the Fatality

The activity of the decedent at the time of the fatality was identified for the 90 (97.8%) of the 92 non-homicide/non-suicide related deaths. The individual was the operator in 53 (58.9%) incidents or a coworker directly involved in the work activity in 30 (33.3%) incidents. Four (4.4%) individuals were killed in two incidents while they were passengers in a car (one individual) or a plane (three individuals). Two (2.2%) individuals were identified as bystanders. In 1 (1.1%) incident, the decedent was identified as a maintenance worker. The activity of the decedent was unknown for two incidents.

In 34 (31.8%) of the fatal incidents, the individual who died was working indoors. The individual was working outdoors in 73 (68.2%) incidents. The location of the decedent was unknown for three incidents.

The decedent was working alone in 58 (57.4%) incidents and working with a coworker in 43 (42.6%) incidents. Whether the decedent was working alone or with a coworker could not be identified in nine incidents.

For the 16 homicide incidents, 8 (66.7%) victims were working alone, and 4 (33.3%) victims were working with a coworker. Working alone or with a coworker could not be determined in four homicide cases.

Working Status of Decedent

One hundred seven employers were associated with the 110 individuals who died on the job in 2005. Two employers had a fatal incident where more than one person died during the incident.

Sixty-nine (66.3%) individuals were identified as employees. Twenty-seven (26.0%) individuals were identified as either self-employed or the business owner. Seven (6.7%) individuals were identified as contract/temporary employees. One (1.0%) individual was a volunteer fireman. Employer status, i.e. self-employed, employee, or temporary could not be established for six individuals.

Means of Work-Related Death

Table 14 summarizes the 110 work-related fatalities by means of death and number of fatal incidents (106). Motor vehicle events accounted for 24 (21.8%) of all work-related deaths in Michigan in 2005, followed by falls (20, 18.2%), and machine-related deaths (18, 16.4%). Sixteen (14.5%) homicides occurred at work. An object striking an individual occurred in 10

(9.1%) incidents. Six (5.5%) individuals died as a result of an aircraft crash. Four (3.6%) individuals were electrocuted. Four (3.6%) individuals were killed as a result of a fire or explosion. Three (2.7%) individuals died due to a drug overdose. Two (1.8%) individuals died as a result of a toxic exposure. Two (1.8%) individuals committed suicide. One (0.9%) individual died as a result of drowning.

Aircraft

There were six individuals fatally injured in three aircraft-related incidents. Two incidents involved a twin-engine airplane. One plane carried four individuals and hit a stand of trees while in flight. One plane was carrying only the pilot and the plane crashed into the ground. One individual was piloting a helicopter; he lost control while in flight and crashed.

Electrocution

Four individuals were electrocuted. Three of the deaths involved contact with energized overhead lines; one individual was electrocuted when he was holding a 4800-volt line, one individual was electrocuted while standing on a chain in a raised bucket; a piece of chain hanging from the bucket contacted a 40,000-volt line, and one individual was electrocuted when a raised boom crane chain he was holding contacted a 13,200-volt power line. One individual contacted 120 volts while applying an encapsulant in a humid tunnel-like space. The decedent's work area was dry in three incidents and wet in one incident.

Explosions/Burns

Four individuals died as a result of fire or explosion. One individual was a firefighter who became disoriented while trying to locate the source of a fire and ran out of air. One individual died of injuries sustained while pumping methane fuel from one container to another at a racetrack. Two individuals were moving parts into a pole barn and tipped over a parts washer containing gasoline. The gasoline vapors migrated to a nearby torpedo heater and ignited, trapping the individuals in the pole barn.

Falls

Falls accounted for 20 of the work-related fatalities. The reason for the fall was identified for 17 (85.0%) individuals. Nine (52.9%) individuals slipped or tripped which contributed to their fall. Four (23.5%) incidents involved the structure the decedent was using collapsing or giving way. Two (11.8%) individuals fell due to medical conditions: seizure and possible heart attack. One (5.9%) individual fell because the hay bales he was standing on were unstable. One (5.9%) individual fell when he walked off the edge of a platform.

The distance the worker fell was identified in 16 (80.0%) of the 20 falls. Seven (43.8%) individuals fell less than 10 feet. Five (31.3%) incidents had falls between 10-20 feet. Four (25.0%) individuals fell between 21- 50 feet.

The surface location from which the worker fell was identified for 19 (95.0%) of the 20 falls. Individuals fell from a roof in 5 (26.3%) incidents: an unguarded roof edge in 4 (21.1%) incidents and through a hole in the roof in 1 (5.3%) incident. Five (26.3%) individuals fell from a scaffold or ladder: 4 (21.1%) ladder incidents and 1 (5.3%) scaffold incident. Two (10.5%) incidents involved a fall from structural steel. Two (10.5%) fall incidents occurred while the decedent was standing on the floor. One (5.3%) individual each fell from the following locations: an unguarded platform edge, a pickup truck, floor boards above a newly poured basement, a metal folding chair seat, and a loading dock edge.

The surface to which the worker fell was identified for 16 (80%) of the 20 falls. Nine (56.3%) individuals fell to a concrete, rock or asphalt surface. Two (12.5%) individuals fell to packed dirt. Other surfaces to which the decedent fell were: wood, tiled floor, fence post, compacted material, and hard packed snow and ice.

The condition of the work surface the decedent fell from was known in 15 (75%) of the 20 falls. The decedent fell from a dry working surface in 11 incidents; one of the dry working surfaces was also described as cluttered. Two (13.3%) individuals fell from a working surface that was frost-/snow-covered. One (6.7%) work surface condition was wet. One (6.7%) work surface not properly secured (bale of hay).

Twelve (63.2%) of the 19 fall events occurred while individuals were working on construction activities: one fall event could not be classified due to lack of information as to the location of the incident. Seven (36.8%) falls occurred during commercial construction activities and 5 (26.3%) during residential construction activities. Three (15.8%) fall incidents occurred on a farm. Two (10.5%) falls occurred at manufacturing facilities. One (5.3%) fall occurred while installing equipment on a roof of a commercial building. One (5.3%) fall event occurred in a cafeteria at an airport.

Homicides

There were 16 work-related homicides, a decrease of 6 homicides from 2004. Twelve (75.0%) homicide victims were men and 4 (25.0%) victims were women.

Six (37.5%) of the 16 individuals worked in Retail Trade. Two (12.5%) victims worked in the Transportation and Warehousing industry. One (6.3%) individual each died as a result of a homicide in the following industries: Manufacturing; Information; Real Estate and Rental and Leasing; Professional, Scientific and Technical Services; Educational Services; Arts, Entertainment and Recreation; Accommodation and Food Services; and Public Administration.

Nine (56.3%) work-related homicide victims were Caucasian, 6 (37.5%) individuals were African-American, and 1 (6.3%) individual was Hispanic. One woman identified as Caucasian on her death certificate was of Hispanic ethnicity. Six (46.2%) of the 13 work-related fatalities among African-Americans were homicides. Among women, homicide was the most frequent cause of a work-related death (4 of 7, 57.1%).

A gun was the cause of death in 12 (75.0%) homicides. Two (12.5%) individuals died as a result of being stabbed by a knife. One (6.3%) individual died after chasing an intruder while on foot; the exertion directly led to his heart attack and his subsequent death. One (6.3%) individual died from cranial-cerebral injuries when attacked by an intruder.

Machine-Related Deaths

There were 18 machine-related fatalities. The leading cause of a machine-related death was the overturning of a machine causing the operator to be pinned within or under the machine. Five (27.8%) individuals were killed when they were pinned in or under the overturned machine: three individuals in Agriculture, Forestry, Fishing and Hunting; one individual in Mining; and one individual in Arts, Entertainment and Recreation. Four (22.2%) individuals were crushed in/by the machine: two individuals in Transportation, one individual in Mining, and one individual in Manufacturing. Four (22.2%) individuals who worked in Agriculture were killed when the machine ran over them. Four (22.2%) individuals died when they were caught between the machine and another object; one individual in Agriculture was caught between a forklift component and the floor, one individual in Manufacturing was caught between a forklift and a dumpster, one individual in Transportation was caught between a railroad car and a stationary concrete column, and one individual in Administrative and Support and Waste Management and Remediation Services was killed when he was pinned by the handles of a motorized spreader and a van roof. One (5.6%) individual in Manufacturing was killed when the pressurized molding machine he was operating exploded and the machine lid struck him.

Motor Vehicle Related Deaths

There were 24 motor vehicle related fatalities in 2005, all single fatality incidents. In two incidents, the decedent was a pedestrian. In three incidents, the decedent was a passenger.

Work-related deaths involving motor vehicles usually were 2-unit incidents (11, 45.8%) followed by single-unit incidents (10, 41.7%). A 3-unit incident, 4-unit incident, and 6-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 type of crash was identified as single motor vehicle in 11 (45.8%) incidents, 5 (20.8%) rear-end incidents, 4 (16.7%) angle incidents, 3 (12.5%) head-on incidents, and 1 (4.2%) head-on, left turn 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.

The majority of crashes occurred during daylight hours (20, 69.2%). Two (8.7%) incidents occurred at night; one nighttime crash occurred on a road that was lit and one nighttime crash occurred on an unlit road. One (4.3%) crash occurred at dusk. The responding police agency did not complete the “light” box on the UD-10 for one incident, although the time of the incident indicated it was nighttime.

The weather was clear in 10 (43.5%) incidents, snow/blowing snow in 6 (26.1%) incidents, cloudy in 4 (17.4%) incidents, foggy in 2 (8.7%) incidents, and raining in 1 (4.3%) incident. The responding police agency did not complete the “weather” box on the UD-10 for one incident.

Most crashes occurred primarily on 2-lane roads (18, 75.0%). Three (12.5%) crashes occurred on 4-lane roadways, 2 (8.3%) crashes occurred on 3-lane roadways, and 1 (4.2%) crash occurred on a single-lane road. In 14 (58.3%) of the 24 incidents, the roadway was dry. Roadway surface conditions may have been a factor in nearly half (10 of 24, 41.7%) incidents. The roadway surface was icy in 5 (20.8%) incidents, wet in 3 (12.5%) incidents, snowy in 1 (4.2%) incident, and slushy in 1 (4.2%) incident.

Excluding the two pedestrian deaths, the speed limit was 55 miles per hour (mph) in 9 (42.9%) incidents, 70 mph in 6 (28.6%) incidents, and 45 mph in 3 (14.3%) incidents. One (4.8%) incident each occurred at the following speed limits: 65 mph, 35 mph, and 25 mph. The speed limit was unknown for one incident. Excluding the pedestrian deaths, the posting of speed limit signs was known for 20 (90.9%) of the 22 roads where a death occurred: posted on 15 (75.0%) roads and not posted on 5 (25.0%) roads. For two incidents, the posting of speed limit signs is unknown. One pedestrian death occurred within a road construction zone; speed limits and signage are unknown. For one pedestrian death (struck on side of highway), the speed limit was 70 miles per hour and speed limit signs were posted.

Restraint system use (seat belt/shoulder harness) was identified by the responding police agency for all of the individuals who died. The use of a restraint system was not applicable for four individuals (two pedestrians, one motorcyclist, and a driver of a military ambulance not equipped with a restraint system). Eleven (55.0%) individuals were not wearing a seat belt/shoulder harness at the time of the fatal injury; 5 (45.5%) individuals were ejected from their vehicle and 5 (45.5%) individuals were trapped within their vehicle. For one individual who was not wearing a restraint system, it is unknown if the individual was ejected at the time of the crash or attempted to jump free of the vehicle prior to the crash. Nine (45.0%) individuals were wearing a shoulder and seat belt at the time of the fatal injury.

The presence or absence of airbags in the vehicle was identified for 20 (95.2%) vehicles. The presence or absence of an airbag was not applicable in three incidents (pedestrians and motorcyclist) and was unknown for one vehicle. An airbag was present in 11 (55.0%) of the vehicles involved in fatal incidents; 9 (45.0%) vehicles were not equipped with an airbag. The airbag deployed at the time of the crash in 5 (45.5%) of the 11 vehicles with an airbag, and did not deploy in 6 (54.5%) vehicles.

The decedent was the driver of the vehicle in 19 (79.2%) of the 24 incidents. The driver’s condition was indicated by the responding enforcement agency as appearing normal in 10 (52.6%) incidents. The condition of one driver may have contributed to his death; he was described by the responding enforcement agency as using a cell phone. The driver’s condition was indicated as unknown in 8 (42.1%) incidents.

For five incidents, the decedent was not driving the vehicle. Both drivers who struck pedestrians were described by the responding police agency as “had been drinking.” The condition of the drivers of the vehicles in which the passengers were killed was described as normal.

The type of vehicle involved in the fatal injury could be identified in all 24 incidents. A passenger car was the vehicle being used in 6 (25.0%) incidents. The following vehicles had 4 (16.7%) incidents each: truck/bus, pickup truck, and a van. A police car was involved in 3 (12.5%) incidents. A military ambulance, a motorcycle, and a school bus were involved in 1 (4.2%) incident each.

The investigating enforcement agency records whether the driver action(s) contributed to the crash (hazardous action). Hazardous action taken by the driver of the vehicle involved in the incident was identified in 18 (94.7%) of the 19 incidents where the driver was a decedent. In 5 of the 18 (27.8%) crashes, no hazardous action was noted on the UD-10. In 8 (44.4%) of the 18 crashes, the driver of the vehicle was driving too fast. The driver was unable to stop in an assured clear distance in 2 (11.1%) incidents. In 2 (11.1%) incidents, the hazardous action was described as “Other.” The driver disregarded a traffic signal in 1 (5.6%) incident. The responding police agency identified the hazardous action as unknown for one driver.

The hazardous action of both drivers that struck a pedestrian was identified as careless/negligent. For two drivers of a vehicle where a passenger was killed, the driver hazardous action was described as none or speed too fast. The hazardous action information was not completed on the State of Michigan Traffic Crash Report for one driver.

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 (12.5%) non-collisions occurred; the vehicle overturned in all of the incidents. Fourteen (58.3%) collisions with a non-fixed object occurred. Eleven (78.6%) of the 14 collisions with a non-fixed object involved a collision with a moving motor vehicle in transport. Two (14.3%) non-fixed object collisions involved a vehicle striking a pedestrian (decedent). The remaining non-fixed object collision occurred when the vehicle’s driver collided with a railroad train. Collisions with a fixed object occurred in 7 (29.2%) of the 24 motor vehicle work-related incidents: median barrier (2, 28.6%), tree (2, 28.6%), luminary/light support (1, 14.3%), snow bank (1, 14.3%), and an embankment (1, 14.3%).

Struck By

Ten individuals were fatally injured when an object struck them. A trench/excavation incident killed 3 workers; 2 workers were killed when buried under a trench wall that had collapsed and 1 worker was killed when frozen soil that had been excavated from the trench rolled into the trench and struck him. Two individuals were killed when hay bales struck them. Two individuals were killed when automobiles fell on them while they were under the vehicle. A cement slab struck one individual, a tree limb struck one individual, and one individual was struck by an overhead door that fell onto him.

Suicides

Two individuals committed suicide while at their workplace from self-inflicted gunshot wounds.

Toxic Exposures

Two individuals died due to a toxic exposure while working. One individual experienced a fatal asthma attack that was triggered by isocyanate exposure. One individual died when he was overexposed to chlorine fumes while cleaning a home.

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 only one Manufacturing employer, whose work activity was considered in-scope for a MIOSHA inspection, had a work-related fatality prior to 2005. Two additional employers, a Public Administration employer and a Mining employer also had previous work-related fatalities. The Public Administration employer had five fatalities since 1920. The Mining employer had an employee struck by a front-end loader in 1999.

Of the 110 work-related fatalities at 107 employers in 2005, MIOSHA personnel conducted an on-site investigation for 37 (33.6%) fatalities. The MIOSHA investigations determined that 1 of these 37 work-related fatalities was out-of-scope (drug overdose). MIOSHA conducted an investigation at 36 (33.6%) of the 107 employers; all MIOSHA inspected employers had a single work-related fatality occur.

The IMIS database identified that 20 (55.6%) of the 36 employers had a previous MIOSHA Occupational Health, General Industry Safety or Construction Safety compliance investigation. If conditions warrant, a company can receive multiple citations as a result of a MIOSHA inspection. One company had previously received one Occupational Health inspection and six to ten Construction Safety inspections; the company received citations as a result of the inspections.

Four (20.0%) companies had received an Occupational Health inspection; these four companies had previously been inspected one to five times. Citations were issued to three of the companies during these inspections; one company received citations categorized as Serious and Other-than-Serious, one company received citations categorized as Serious and Repeat, and one company received citations categorized as Other-than-Serious.

Five (25.0%) companies had received a General Industry Safety inspection. All of the five companies had previously been inspected one to five times and had received citations as a result of the compliance inspections. Four companies received citations classified as Serious and Other-than-Serious and one company received citations classified as Serious, Repeat, and Other-than-Serious.

Twelve (60.0%) companies were identified as previously receiving a compliance inspection from the MIOSHA Construction Safety division. Nine (75%) of the 12 companies had previously been inspected one to five times and 3 (25.0%) companies had been inspected six to ten times. Eleven (91.7%) of the companies had received citations as a result of one of the compliance inspections. Ten companies received citations classified as Serious and Other-than-Serious and one company received a citation classified as Other-than-Serious.

For 2005, MIFACE requested, received permission, and conducted a work-related fatality investigation at 19 facilities. Copies of MIFACE reports and summaries of MIOSHA inspections are available on the MSU OEM web site. Select on 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 Hispanic worker fatalities 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 six deaths of Hispanic workers in Michigan in 2005. Using the United States Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2005, this was a rate of 2.43 per 100,000 for 16-65 year old Hispanics as compared to a rate of 1.72 per 100,000 for 16-65 year old Caucasians and 1.4 per 100,000 for 16-65 year old African-Americans.

In 2005, three Hispanics died in the Construction-related incidents (fall from ladder, electrocution, fall through hole in roof), two Hispanics died in Manufacturing-related incidents (drowning, homicide at work), and one Hispanic died in an Agricultural-related (motor vehicle) fatality. Two Construction companies and one Manufacturing company agreed to participate in the MIFACE research program. Two companies declined and MIFACE did not contact one company (homicide).

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 110 acute traumatic work-related deaths in 2005 is included in Appendix I. Table 15 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).

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 110 deaths in 2005.

Discussion

There were 110 acute traumatic work-related fatalities in Michigan in the year 2005. One incident in 2004 resulted in a death in 2005. The major sources for identifying acute 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 2.1 acute traumatic work-related fatalities per week although the deaths were not evenly distributed throughout the year. July was the most common month for the occurrence of a fatal traumatic injury (16 incidents) and February was the second most common month (15 incidents).

Individuals who died from an acute traumatic work-related fatality were most likely to be men (94%), white (83%), married (52%) and had at least a high school education (45%). The average age of death was almost 45 but ranged from 16 to 82, with 1 individual less than 18 years of age and 9 individuals 65-82 years old.

The largest number of deaths occurred in Construction (23, 20.9%). Mining (2, 1.8%) and Agriculture (16, 14.5%) had a higher *risk* of acute traumatic work-related fatalities. The rate in Mining was 29.9 deaths per 100,000 workers and in Agriculture the incidence rate was 20.0 deaths per 100,000 workers as compared to 12.0 deaths per 100,000 workers in Construction (Table 9) and 10.9 deaths per 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.

Illegal drugs and/or alcohol were found on autopsy in approximately 19% of acute work-related fatalities. For 20 of the non-suicide deaths, illegal drugs, alcohol or prescribed medications may have contributed to the individual's death: illegal drugs in 9 deaths, alcohol in 5 deaths, prescribed medication in 3 deaths, over-the-counter medicine in 2 deaths, and an illegal drug and alcohol in 1 death. An additional 3 individuals died from a drug overdose.

MIOSHA staff investigated 37 of the deaths at 37 employers. One of the deaths investigated by MIOSHA was determined to be out of scope because the individual died from a drug overdose. The police investigated 39 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 39 different employers. Seven of the deaths (5 different employers) were investigated by Federal agencies (National Transportation Safety Board and Mine Safety and Health

Administration). The remaining 27 work-related fatalities (26 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. MIFACE attempted to investigate 16 of the 27 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 10 of the 16 employers. Two employers are interested in participating, but have asked to MIFACE to conduct a site visit in the future.

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 one-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 21 fewer deaths in 2005 than in 2004. Construction had 9 fewer deaths in 2005 compared to 2004. Retail Trade had a significant increase in the number of deaths (9 in 2005 and 4 in 2004). The number of deaths decreased in Other Services (except Public Administration) by 4 deaths (3 in 2005 and 7 in 2004). In Administrative and Support and Waste Management and Remedial Service the number of deaths rose to 7 in 2005 compared to 5 in 2004. In 2005, Information was a new industry classification that experienced work-related deaths. Health Care and Social Services did not experience any work-related deaths.

This latest decline in work-related fatalities in Michigan is consistent with the decline in deaths since 1999. The number of deaths in 2005 was the lowest number of deaths since accurate tracking of the number of deaths began in 1992 (Figure 1). 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. Each of the 110 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.

Michigan's rate of acute traumatic work-related fatalities is 25% lower than the National rate. 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

1. North American Industry Classification System (NAICS), 2002. Executive Office of the President, United States Office of Management and Budget. Lanham, MD: Bernan Press. Internet Address: www.census.gov/naics
2. *Standard Occupational Classification Manual: 2000*. U.S. Office of Management and Budget. Lanham, MD: Bernan Press; and Springfield, VA: National Technical Information Service. Internet Address: www.census.gov/hhes/www/occupation.html

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**Table 1. Demographic Characteristics of Acute Traumatic
Work-Related Fatalities, Michigan 2005**

Demographic Characteristic		Number of Deaths	Percent
<u>Sex</u>			
	Male	103	93.6
	Female	7	6.4
<u>Race</u>			
	White	91	82.7
	Black	13	11.8
	Hispanic	6	5.5
<u>Age</u>			
	<20	4	3.6
	20-29	15	13.6
	30-39	24	21.8
	40-49	24	21.8
	50-59	26	23.6
	60-69	11	10.0
	70-79	4	3.6
	80-89	2	1.8
<u>Marital Status</u>			
	Never Married	30	27.3
	Married	57	51.8
	Divorced	19	17.3
	Widowed	4	3.6
<u>Education</u>			
	Less than High School	14	12.7
	High School graduate	49	44.5
	Some College 1-4	41	37.3
	Post College 5+	6	5.5
Total		110	

Table 2. Number of Acute Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2005

Industry Sector (NAICS Code)	Age								Total
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	
Agriculture, Forestry, Fishing and Hunting (11)	0	2	0	4	3	4	1	2	16
Mining (21)	0	1	0	1	0	0	0	0	2
Utilities (22)	0	0	0	0	1	0	0	0	1
Construction (23)	0	4	8	4	4	3	0	0	23
Manufacturing (31-33)	1	1	3	2	6	0	1	0	14
Wholesale Trade (42)	1	0	0	0	1	0	0	0	2
Retail Trade (44-45)	0	0	2	2	3	1	1	0	9
Transportation and Warehousing (48-49)	0	2	5	2	3	1	1	0	14
Information (51)	0	0	1	1	1	0	0	0	3
Real Estate and Rental and Leasing (53)	0	0	0	1	0	0	0	0	1
Professional, Scientific, and Technical Services (54)	0	0	0	0	1	0	0	0	1
Administrative and Support and Waste Management and Remediation Services (56)	1	1	3	0	1	1	0	0	7
Educational Services (61)	0	0	0	0	1	1	0	0	2
Arts, Entertainment and Recreation (71)	1	0	0	2	0	0	0	0	3
Accommodation and Food Services (72)	0	0	0	2	0	0	0	0	2
Other Services (except Public Administration) (81)	0	1	1	0	1	0	0	0	3
Public Administration (92)	0	3	1	3	0	0	0	0	7
Total	4	15	24	24	26	11	4	2	110

Table 3. Number and Percent of Acute Traumatic Work-Related Fatalities by Education Level and Industry Sector, Michigan 2005

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)	4	(25.0)	6	(37.5)	5	(31.3)	1	(6.2)
Mining (21)	0	--	1	(50.0)	1	(50.0)	0	--
Utilities (22)	0	--	0	--	1	(100.0)	0	--
Construction (23)	5	(21.7)	13	(56.5)	4	(17.4)	1	(4.3)
Manufacturing (31-33)	2	(14.3)	6	(42.9)	4	(28.6)	2	(14.3)
Wholesale Trade (42)	1	(50.0)	0	--	1	(50.0)	0	--
Retail Trade (44-45)	0	--	6	(66.7)	3	(33.3)	0	--
Transportation and Warehousing (48-49)	0	--	7	(50.0)	6	(42.9)	1	(7.1)
Information (51)	0	--	3	(100.0)	0	--	0	--
Real Estate and Rental and Leasing (53)	0	--	1	(100.0)	0	--	0	--
Professional, Scientific, and Technical Services (54)	0	--	0	--	1	(100.0)	0	--
Administrative and Support and Waste Management and Remediation Services (56)	0	--	2	(28.6)	4	(57.1)	1	(14.3)
Educational Services (61)	0	--	1	(50.0)	1	(50.0)	0	--
Arts, Entertainment and Recreation (71)	0	--	1	(33.7)	2	(66.7)	0	--
Accommodation and Food Services (72)	0	--	2	(100.0)	0	--	0	--
Other Services (except Public Administration) (81)	2	(66.7)	0	--	1	(33.3)	0	--
Public Administration (92)	0	--	0	--	7	(100.0)	0	--
Total	14	(12.7)	49	(44.5)	41	(37.3)	6	(5.5)

Table 4. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths, by Industry Sector*, and for Homicides Separately, by Day of the Week, Michigan 2005

Day of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Agricultural Deaths (NAICS 11)		Transportation /Warehousing Deaths (NAICS 48-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sunday	7	(6.4)	0	--	0	--	1	(6.3)	0	--	3	(18.8)
Monday	18	(16.5)	6	(26.1)	2	(15.4)	1	(6.3)	3	(21.4)	4	(25.0)
Tuesday	19	(17.4)	5	(21.7)	2	(15.4)	3	(18.8)	2	(14.3)	3	(18.8)
Wednesday	14	(12.8)	4	(17.4)	0	--	1	(6.3)	3	(21.4)	2	(12.5)
Thursday	16	(14.7)	2	(8.7)	3	(23.1)	3	(18.8)	1	(7.1)	1	(6.3)
Friday	23	(21.1)	4	(17.4)	5	(38.5)	2	(12.5)	5	(35.7)	1	(6.3)
Saturday	12	(11.0)	2	(8.7)	1	(7.7)	5	(31.3)	0	--	2	(12.5)
Total	109**		23		13**		16		14		16	

* Only industries with 14 or more deaths are included in the table.

** Day of injury was unknown for one individual.

**Table 5. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths;
by Industry Sector*, and for Homicides Separately, by Month of Injury, Michigan 2005**

Month of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Agricultural Deaths (NAICS 11)		Transportation /Warehousing Deaths (NAICS 48-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	10	(9.1)	1	(4.3)	2	(14.3)	1	(6.3)	0	--	2	(12.5)
February	15	(13.6)	1	(4.3)	5	(35.7)	1	(6.3)	1	(7.1)	1	(6.3)
March	5	(4.5)	1	(4.3)	0	--	2	(12.5)	0	--	1	(6.3)
April	7	(6.4)	1	(4.3)	0	--	0	--	2	(14.3)	2	(12.5)
May	9	(8.2)	2	(8.7)	1	(7.1)	0	--	3	(21.4)	1	(6.3)
June	8	(7.3)	1	(4.3)	1	(7.1)	4	(25.0)	2	(14.3)	1	(6.3)
July	16	(14.5)	4	(17.4)	1	(7.1)	0	--	4	(28.6)	0	--
August	8	(7.3)	3	(13.0)	0	--	1	(6.3)	1	(7.1)	1	(6.3)
September	12	(10.9)	5	(21.7)	1	(7.1)	3	(18.8)	2	(14.3)	3	(18.8)
October	4	(3.6)	0	--	0	--	3	(18.8)	0	--	2	(12.5)
November	9	(8.2)	1	(4.3)	2	(14.3)	0	--	0	--	1	(6.3)
December	7	(6.4)	3	(13.0)	1	(7.1)	0	--	0	--	1	(6.3)
Total	110		23		14		16		14		16	

* Only industries with 14 or more deaths are included in the table.

**Table 6. Number of Acute Traumatic Work-Related Fatalities by Means of Death
and Month of Injury, Michigan 2005**

Means of Death	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Aircraft		4					1				1		6
Drowning							1						1
Drug Overdose	2					1							3
Electrocution							2		2				4
Fire/Explosion	1	2					1						4
Fall	1	2		1	3	1	3	2	4		1	2	20
Homicide	2	1	1	2	1	1		1	3	2	1	1	16
Machine		3		2	4	2	3	1	1		2		18
Motor Vehicles	3	3	2	1		1	5	1	1	2	3	2	24
Struck By			2	1	1	1		2	1		1	1	10
Suicide						1		1					2
Toxic Exposure	1											1	2
Total	10	15	5	7	9	8	16	8	12	4	9	7	110

Table 7. Number and Percent of Acute Traumatic Work-Related Fatalities for all Deaths; by Industry Sector*, and for Homicides Separately, by 4-Hour Time Period of Injury, Michigan 2005

Time of Day	All Deaths		Construction Deaths (NAICS 23)	Manufacturing Deaths (NAICS 31-33)	Agricultural Deaths (NAICS 11)	Transportation /Warehousing Deaths (NAICS 48-49)	Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12:00 a.m.-3:59 a.m.	9	(8.5)	0	--	1	(7.7)	0	--
4:00 a.m.-7:59 a.m.	11	(10.4)	1	(4.3)	3	(23.1)	1	(6.3)
8:00 a.m.-11:59 a.m.	37	(34.9)	9	(39.1)	6	(46.2)	5	(38.5)
12:00 p.m.-3:59 p.m.	21	(19.8)	8	(34.8)	1	(7.7)	3	(23.1)
4:00 p.m.-7:59 p.m.	20	(18.9)	5	(21.7)	2	(15.4)	6	(37.5)
8:00 p.m.-11:59 p.m.	8	(7.5)	0	--	0	--	1	(7.7)
Total	106**		23		13⁺		13⁺⁺⁺	

* Only industries with 14 or more deaths are included in the table.

** Time of injury was unknown for four individuals.

⁺ Time of injury was unknown for one individual.

⁺⁺ Time of injury was unknown for three individuals.

⁺⁺⁺ One individual was a homicide victim.

**Table 8. Number and Percent of Acute Traumatic Work-Related Fatalities
By County of Injury, Michigan 2005**

County	Number	Percent	County	Number	Percent
Alcona	0	--	Lake	0	--
Alger	0	--	Lapeer	0	--
Allegan	1	(0.9)	Leelanau	0	--
Alpena	0	--	Lenawee	0	--
Antrim	0	--	Livingston	1	(0.9)
Arenac	1	(0.9)	Luce	0	--
Baraga	0	--	Mackinac	0	--
Barry	2	(1.8)	Macomb	2	(1.8)
Bay	0	--	Manistee	0	--
Benzie	0	--	Marquette	1	(0.9)
Berrien	6	(5.5)	Mason	0	--
Branch	1	(0.9)	Mecosta	0	--
Calhoun	5	(4.5)	Menominee	0	--
Cass	1	(0.9)	Midland	1	(0.9)
Charlevoix	0	--	Missaukee	0	--
Cheboygan	0	--	Monroe	1	(0.9)
Chippewa	1	(0.9)	Montcalm	1	(0.9)
Clare	0	--	Montmorency	0	--
Clinton	1	(0.9)	Muskegon	0	--
Crawford	0	--	Newaygo	0	--
Delta	0	--	Oakland	8	(7.3)
Dickinson	1	(0.9)	Oceana	1	(0.9)
Eaton	2	(1.8)	Ogemaw	0	--
Emmet	1	(0.9)	Ontonagon	0	--
Genesee	5	(4.5)	Osceola	0	--
Gladwin	1	(0.9)	Oscoda	0	--
Gogebic	0	--	Otsego	1	(0.9)
Grand Traverse	3	(2.7)	Ottawa	2	(1.8)
Gratiot	1	(0.9)	Presque Isle	0	--
Hillsdale	0	--	Roscommon	1	(0.9)
Houghton	0	--	Saginaw	1	(0.9)
Huron	0	--	St. Clair	2	(1.8)
Ingham	3	(2.7)	St. Joseph	0	--
Ionia	2	(1.8)	Sanilac	3	(2.7)
Iosco	0	--	Schoolcraft	0	--
Iron	1	(0.9)	Shiawassee	1	(0.9)
Isabella	0	--	Tuscola	0	--
Jackson	3	(2.7)	Van Buren	2	(1.8)
Kalamazoo	3	(2.7)	Washtenaw	5	(4.5)
Kalkaska	0	--	Wayne	21	(19.1)
Kent	10	(9.1)	Wexford	0	--
Keweenaw	0	--			

**Table 9. Number and Rate of Acute Traumatic Work-Related Fatalities
by Industry Sector, Michigan 2005**

Industry Sector (NAICS Code)	Number Of Deaths	Percent	Number Of Employees*	2005 Michigan Rate^a
Agriculture, Forestry, Fishing and Hunting (11)	16	14.5	79,883	20.0
Crop Production (111)	12	10.9	50,170	23.9
Animal Production (112)	4	3.6	29,713	13.5
Mining (21)	2	1.8	6,700	29.9
Mining (except Oil and Gas) (212)	1	0.9	4,500	22.2
Support Activities for Mining (213)	1	0.9	**	
Utilities (22)	1	0.9	20,600	4.9
Utilities (Electric Power Generation (221)	1	0.9	**	
Construction (23)	23	20.9	191,400	12.0
Construction of Buildings (236)	3	2.7	46,400	6.5
Heavy and Civil Engineering Construction (237)	5	4.5	18,500	27.0
Specialty Trade Contractors (238)	14	12.7	126,400	11.1
Unknown Construction Activity	1	0.9	**	
Manufacturing (31-33)	14	12.7	678,800	2.1
Food Manufacturing (311)	2	1.8	33,400	6.0
Beverage and Tobacco Product Manufacturing (312)	1	0.9	**	
Paper Manufacturing (322)	1	0.9	14,900	6.7
Chemical Manufacturing (325)	1	0.9	30,100	3.3
Plastics and Rubber Products Manufacturing (326)	3	2.7	42,400	7.1
Machinery Manufacturing (333)	1	0.9	75,000	1.3
Transportation Equipment Manufacturing (336)	5	4.5	239,100	2.1
Wholesale Trade (42)	2	1.8	170,300	1.2
Merchant Wholesalers, Durable Goods (423)	1	0.9	96,500	1.0
Merchant Wholesalers, Nondurable Goods (424)	1	0.9	49,600	2.0
Retail Trade (44-45)	9	8.2	505,700	1.8
Motor Vehicle and Parts Dealers (441)	4	3.6	61,200	6.5
Food and Beverage Stores (445)	3	2.7	85,700	3.5
Health and Personal Care Stores (446)	1	0.9	33,300	3.0
General Merchandise Stores (452)	1	0.9	112,900	0.9
Transportation and Warehousing (48-49)	14	12.7	127,900	10.9
Air Transportation (481)	3	2.7	15,200	19.7
Truck Transportation (484)	4	3.6	37,600	10.6
Transit and Ground Passenger Transportation (485)	2	1.8	**	
Support Activities for Transportation (488)	5	4.5	**	
Information (51)	3	2.7	67,500	4.4
Publishing Industries (Except Internet) (511)	2	1.8	24,600	8.1

Industry Sector (NAICS Code)	Number Of Deaths	Percent	Number Of Employees*	2005 Michigan Rate ^a
Motion Picture and Sound Recording Industries (512)	1	0.9	**	
Real Estate and Rental and Leasing (53)	1	0.9	56,100	1.8
Rental and Leasing Services (532)	1	0.9	17,900	5.6
Professional, Scientific, and Technical Services (54)	1	0.9	246,400	0.4
Other Accounting Services (541)	1	0.9	15,600	6.4
Administrative and Support and Waste Management (56)	7	6.4	279,400	2.5
Administrative and Support Services (561)	6	5.4	268,200	2.2
Waste Management and Remediation Services (562)	1	0.9	**	
Educational Services (61)	2	1.8	436,800	0.5
Educational Services (611)	2	1.8	436,800	0.5
Arts, Entertainment, and Recreation (71)	3	2.7	62,900	4.8
Performing Arts, Spectator Sports, and Related Industries (711)	1	0.9	9,300	10.8
Amusement, Gambling, and Recreation Industries (713)	2	1.8	49,600	4.0
Accommodation and Food Services (72)	2	1.8	341,800	0.6
Food Services and Drinking Places (722)	2	1.8	307,300	0.7
Other Services (except Public Administration) (81)	3	2.7	178,500	1.7
Repair and Maintenance (811)	2	1.8	41,600	4.8
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	1	0.9	95,500	1.0
Public Administration (92)	7	6.4	250,400	2.8
Justice, Public Order, and Safety Activities (922)	6	5.5	**	
National Security and International Affairs (928)	1	0.9	**	
Total	110		3,701,083	3.0

* Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. For all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2005:

<http://www.michlmi.org/LMI/lmadata/cesdata/AET/micaet05.htm>, August 28, 2006.

** No Data provided on IES report.

^a Rates calculated per 100,000 workers.

**Table 10. Number and Rate of Acute Traumatic Work-Related Fatalities
by Industry Sector, by Year, Michigan 2001-2005**

Industry Sector* (NAICS Code)	2001		2002		2003		2004		2005	
	#	Rate ^a	#	Rate	#	Rate	#	Rate	#	Rate
Agriculture, Forestry, Fishing and Hunting (11)	18	22.5	15	18.8	32	40.1	15	18.8	16	20.0
Mining (21)	--	--	2	29.0	4	62.5	2	31.3	2	29.9
Utilities (22)	3	--	1	--	2	9.8	--	--	1	4.9
Construction (23)	37	18.0	36	18.0	34	17.9	32	16.8	23	12.0
Manufacturing (31-33)	27	3.3	20	2.6	10	1.4	19	2.7	14	2.1
Wholesale Trade (42)	9	5.0	2	1.1	2	1.2	5	2.9	2	1.8
Retail Trade (44-45)	8	1.5	13	2.4	12	2.3	4	0.8	9	8.2
Transportation and Warehousing (48-49)	21	15.9	7	5.5	18	14.4	17	16.4	14	10.9
Information (51)	4	5.3	3	4.1	--	--	--	--	3	4.4
Finance and Insurance (52)	2	1.3	1	0.6	2	1.2	--	--	--	--
Real Estate and Rental and Leasing (53)	--	--	2	3.6	--	--	1	1.8	1	1.8
Professional, Scientific, and Technical Services (54)	5	1.9	4	1.6	3	0.5	1	0.3	1	0.4
Administrative and Support and Waste Management and Remediation Services (56)	12	4.4	11	4.1	3	1.1	5	1.9	7	2.5
Educational Services (61)	2	0.6	2	0.5	2	0.5	2	0.5	2	0.5
Health Care and Social Assistance (62)	7	1.2	3	0.6	5	1.0	5	1.0	--	--
Arts, Entertainment and Recreation (71)	6	9.8	4	6.5	7	11.2	3	4.8	3	4.8
Accommodation and Food Services (72)	3	0.9	8	2.4	6	1.8	5	1.5	2	0.6
Other Services (except Public Administration) (81)	6	3.4	5	2.9	6	3.5	7	3.9	3	1.7
Public Administration (92)	7	3.3	10	3.9	4	1.6	8	3.2	7	2.8
Total	174	3.5	149⁺	3.0	152	3.3	131	3.1	110	3.0

* Source of employment data: For Agriculture: USDA, National Agricultural Statistics Service, 1997 Census of Agriculture, AC97-A-51, March 1999 and 2002 Census of Agriculture, AC-02-A-51, June 2004. For all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Years: 2001-2005:

<http://www.milmi.org/cgi/dataanalysis/AreaSelection.asp?tableName=Ces>

^a Rates calculated per 100,000 workers.

⁺ NAICS unknown for two individuals.

Table 11. Number and Rate of Acute Traumatic Work-Related Fatalities by Industry Sector, Michigan Rates Compared to US Rates, Michigan 2005

Industry Sector* (NAICS Code)	Number of Fatalities	2005 Michigan Rate	2005 US Rate**
Agriculture, Forestry, Fishing and Hunting (11)	16	20.0	32.5
Mining (21)	2	29.9	25.6
Construction (23)	23	12.0	11.0
Manufacturing (31-33)	14	2.1	2.4
Utilities (22)	1	4.9	3.6
Wholesale Trade (42)	2	1.2	4.4
Retail Trade (44-45)	9	1.8	2.4
Transportation and Warehousing (48-49)	14	10.9	17.6
Leisure and Hospitality (71, 72)	5	1.2	1.8
Information (51)	3	4.4	2.1
Educational and Health Services (61, 62)	2	0.5	0.8
Other Services (except Public Administration) (81)	3	1.7	3.0
Financial Activities (52, 53)	1	1.8	1.0
Government (92)	7	2.8	2.4
Professional and Business Services (54 56)	8	1.5	3.5
Total	110	3.0	4.0

* Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. For all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2005. Internet Address:

<http://www.michlmi.org/LMI/lmadata/cesdata/AET/micaet05.htm>, August 28, 2006.

**Bureau of Labor Statistics News, United States Department of Labor, USDL 06-1364, Release Date August 10, 2006.

Internet Address: <http://www.bls.gov/news.release/pdf/cfoi.pdf>

**Table 12. Number of Acute Traumatic Work-Related Fatalities by Means of Death
and Industry Sector, Michigan 2005**

Industry Sector (NAICS Code)	Aircraft	Drowning	Drug Overdose	Electrocution	Fall	Fire/ Explosion	Homicide	Machine	Motor Vehicles	Struck by	Suicide	Toxic Exposure	Total
Agriculture, Forestry, Fishing and Hunting (11)					3			8	2	2	1		16
Mining (21)								2					2
Utilities (22)									1				1
Construction (23)				4	14				2	3			23
Manufacturing (31-33)	3	1	3		2		1	3				1	14
Wholesale Trade (42)									1	1			2
Retail Trade (44-45)							6		3				9
Transportation and Warehousing (48-49)	3						2	3	5	1			14
Information (51)							1		2				3
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	2	3		1	7
Educational Services (61)							1		1				2
Arts, Entertainment and Recreation (71)						1	1	1					3
Accommodation and Food Services (72)					1		1						2
Other Services (except Public Administration) (81)						2			1				3
Public Administration (92)						1	1		4		1		7
Total	6	1	3	4	20	4	16	18	24	10	2	2	110

**Table 13. Number and Percent of Acute Traumatic Work-Related Fatalities
by Occupation, Michigan 2005**

Standard Occupational Classification (SOC)	Occupation	Number of Workers	Percent
11	Management Occupations	27	24.5
11-1000	Top Executives		
11-1011	Chief Executives	1	0.9
11-1021	General and Operations Managers	3	2.7
11-2000	Advertising, Marketing, Promotions, Public Relations, and Sales Managers		
11-2022	Sales Managers	2	1.8
11-9000	Other Management Occupations		
11-9012	Farmers and Ranchers	13	11.8
11-9021	Construction Manager	3	2.7
11-9199	Managers, All Other	5	4.5
13	Business and Financial Operations Occupations	2	1.8
13-1000	Business Operations Specialists		
13-1199	Business Operations Specialists, All Other	1	0.9
13-2000	Financial Specialists		
13-2011	Accountants and Auditors	1	0.9
17	Architecture and Engineering Occupations	1	0.9
17-2000	Engineers		
17-2199	Engineers, All Other	1	0.9
25	Education, Training, and Library Occupations	1	0.9
25-1000	Postsecondary Teachers		
25-1199	Postsecondary Teachers, All Other	1	0.9
27	Arts, Design, Entertainment, Sports and Media Occupations	2	1.8
27-2000	Entertainers and Performers, Sports and Related Workers		
27-2099	Entertainers and Performers, Sports and Related Workers, Other	1	0.9
27-4000	Media and Communication Equipment Workers		
27-4014	Sound Engineering Technicians	1	0.9
33	Protective Services Occupations	8	7.3
33-2000	Fire Fighting and Prevention Workers		
33-2011	Fire Fighters	2	1.8
33-3000	Law Enforcement Workers		
33-3051	Police and Sheriff's Patrol Officers	5	4.5

Standard Occupational Classification (SOC)	Occupation	Number of Workers	Percent
33-9000	Other Protective Service Workers		
33-9032	Security Guards	1	0.9
35	Food Preparation and Serving Related Occupations	1	0.9
35-2000	Cooks and Food Preparation Workers		
35-2012	Cooks, Institution and Cafeteria	1	0.9
37	Building and Grounds Cleaning and Maintenance Occupations	5	4.5
37-1000	Supervisors, Building and Grounds Cleaning and Maintenance Workers		
37-1011	First-Line Supervisors/Managers of Housekeeping and Janitorial Workers	1	0.9
37-2000	Building Cleaning and Pest Control Workers		
37-2012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	1	0.9
37-3000	Grounds Maintenance Workers		
37-3011	Landscaping and Groundskeeping Workers	2	1.8
37-3013	Tree Trimmers and Pruners	1	0.9
41	Sales and Related Occupations	6	5.5
41-2000	Retail Sales Workers		
41-2011	Cashiers	1	0.9
41-2031	Retail Salespersons	2	1.8
41-3000	Sales Representatives, Services		
41-3041	Travel Agents	1	0.9
41-9000	Other Sales and Related Workers		
41-9091	Door-To-Door Sales Workers, News and Street Vendors, and Related Workers	1	0.9
41-9099	Sales and Related Workers, All Other	1	0.9
43	Office and Administrative Support Occupations	1	0.9
43-9000	Other Office and Administrative Support Workers		
43-9199	Other Office and Administrative Support Workers, All Other	1	0.9
45	Farming, Fishing, and Forestry Occupations	2	1.8
45-2000	Agricultural Workers		
45-2041	Graders and Sorters, Agricultural Products	1	0.9
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	1	0.9
47	Construction and Extraction Occupations	19	17.3
47-2000	Construction Trades Workers		
47-2021	Brickmasons and Blockmasons	3	2.7
47-2031	Carpenters	3	2.7
47-2061	Construction Laborers	3	2.7
47-2152	Plumbers, Pipefitters, and Steamfitters	1	0.9

Standard Occupational Classification (SOC)	Occupation	Number of Workers	Percent
47-2181	Roofers	5	4.5
47-2221	Structural Iron and Steel Workers	1	0.9
47-4000	Other Construction and Related Workers		
47-4041	Hazardous Materials Removal Workers	1	0.9
47-4051	Highway Maintenance Workers	1	0.9
47-5000	Extraction Workers		
47-5049	Mining Machine Operators, All Others	1	0.9
49	Installation, Maintenance, and Repair Occupations	6	5.5
49-2000	Electrical and Electronic Equipment Mechanics, Installers, and Repairers		
49-2094	Electrical	1	0.9
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers		
49-3021	Automotive Body and Related Repairers	1	0.9
49-3023	Automotive Service Technicians and Mechanics	1	0.9
49-9000	Other Installation, Maintenance and Repair Occupations		
49-9051	Electrical Power-line Installers and Repairers	1	0.9
49-9099	Installation, Maintenance, and Repair Workers, All Other	2	1.8
51	Production Operations	3	2.7
51-2000	Assemblers and Fabricators		
51-2099	Assemblers and Fabricators, All Other	1	0.9
51-9000	Other Production Occupations		
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	1	0.9
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1	0.9
53	Transportation and Material Moving Occupations	26	23.6
53-1000	Supervisors, Transportation and Material Moving Workers		
53-1021	First Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand	1	0.9
53-2000	Air Transportation Workers		
53-2011	Airplane Pilots, Copilots and Flight Engineers	1	0.9
53-2012	Commercial Pilots	1	0.9
53-3000	Motor Vehicle Operators		
53-3022	Bus Drivers, School	1	0.9
53-3031	Driver/Sales Workers	1	0.9
53-3032	Truck Drivers, Heavy and Tractor-Trailer	9	8.2
53-3033	Truck Drivers, Light or Delivery Services	2	1.8
53-3041	Taxi Drivers and Chauffeurs	2	1.8
53-3099	Motor Vehicle Operators, All Other	1	0.9

Standard Occupational Classification (SOC)	Occupation	Number of Workers	Percent
53-4000	Rail Transportation Workers		
53-4021	Railroad Brake, Signal, and Switch Operators	1	0.9
53-7000	Material Moving Workers		
53-7032	Excavating and Loading Machine and Dragline Operators	1	0.9
53-7051	Industrial Truck and Tractor Operators	4	3.6
53-7062	Laborers and Freight, Stock and Material Movers, Hand	1	0.9
Total		110	

Table 14. Number and Percent of Acute Traumatic Work-Related Fatalities by Means of Death, Michigan 2005

Means of Death	Number of Deaths	Percent
Aircraft	6 (3)*	5.5
Drowning	1	0.9
Drug Overdose	3	2.7
Electrocution	4	3.6
Fall	20	18.2
Fire or Explosion	4 (3)	3.6
Homicide	16	14.5
Machine-Related	18	16.4
Motor Vehicles	24	21.8
Struck By	10	9.1
Suicide	2	1.8
Toxic Exposure	2	1.8
Total	110 (106)	

* Number in parentheses is the number of incidents.

**Table 15. Narrative Case Number by Means of Death and
Industry Sector, Michigan 2005**

Industry Sector (NAICS Code)	Narrative Case Number
Agriculture, Forestry, Fishing and Hunting (11)	
Fall	18-20
Machine-Related	59-66
Motor Vehicle-Related	73, 74
Struck By	101,102
Suicide	108
Mining (21)	
Machine-Related	55, 56
Utilities (22)	
Motor Vehicle-Related	75
Construction (23)	
Electrocution	11-14
Fall	21-34
Motor Vehicle-Related	76, 77
Struck By	104-106
Manufacturing (31-33)	
Aircraft	1-3
Drowning	7
Drug Overdose	8-10
Fall	15, 16
Homicide	41
Machine-Related	67-69
Toxic Exposure	109
Wholesale Trade (42)	
Motor Vehicle-Related	78
Struck By	103
Retail Trade (44-45)	
Homicide	49-54
Motor Vehicle-Related	85-87

Industry Sector (NAICS Code)	Narrative Case Number
Transportation and Warehousing (48-49)	
Aircraft	4-6
Homicide	47, 48
Machine-Related	70-72
Motor Vehicle-Related	88-92
Struck By	97
Information (51)	
Homicide	39
Motor Vehicle-Related	79, 80
Real Estate and Rental and Leasing (53)	
Homicide	46
Professional, Scientific, and Technical Services (54)	
Homicide	43
Administrative and Support and Waste Management and Remediation Services (56)	
Machine-Related	57
Motor Vehicle-Related	81, 82
Struck By	98-100
Toxic Exposure	110
Educational Services (61)	
Homicide	40
Motor Vehicle	83
Arts, Entertainment, and Recreation (71)	
Fire/Explosion	36
Homicide	44
Machine-Related	58
Accommodation and Food Services (72)	
Fall	17
Homicide	45
Other Services (except Public Administration) (81)	
Fire/Explosion	37, 38
Motor Vehicle-Related	84

Industry Sector (NAICS Code)	Narrative Case Number
Public Administration (92)	
Fire/Explosion	35
Homicide	42
Motor Vehicle-Related	93-96
Suicide	107

Figure 1. Annual Number of Acute Traumatic Work-Related Fatalities, Michigan

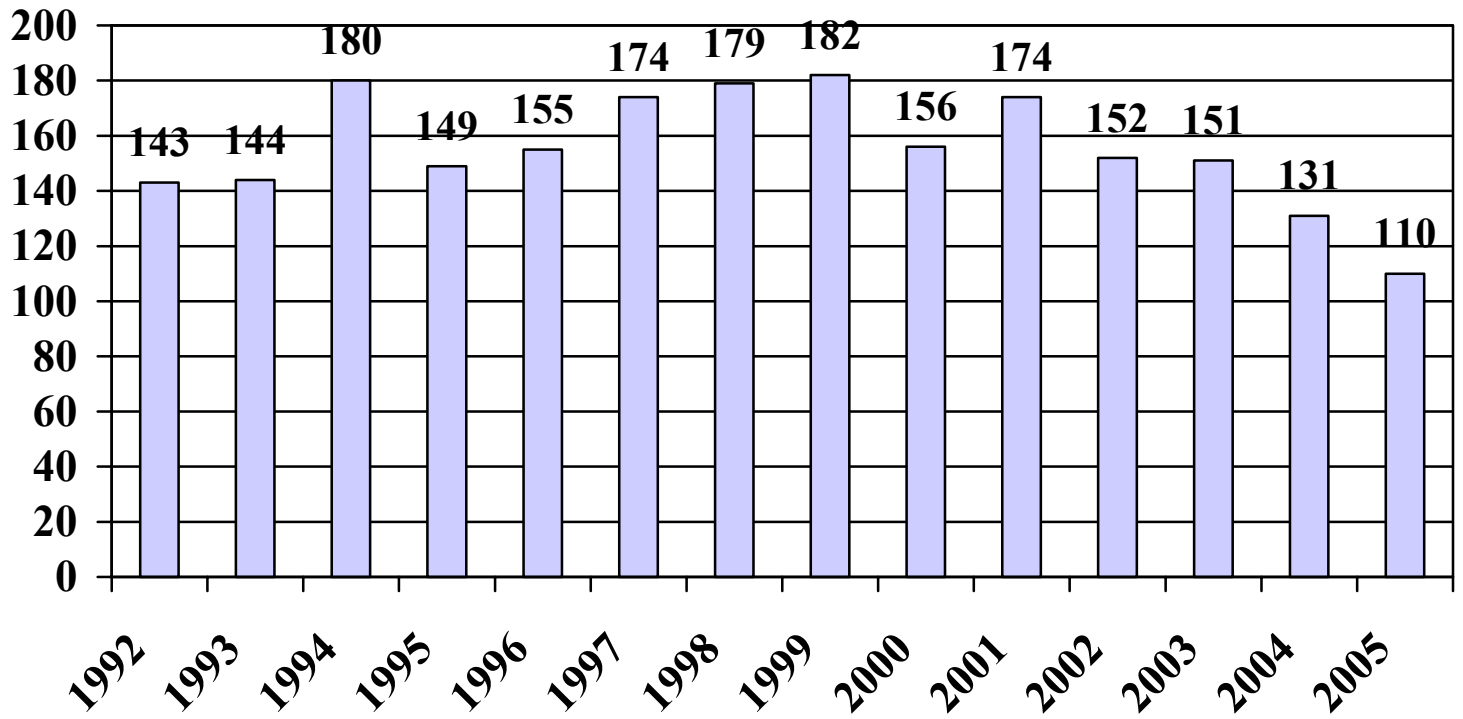


Figure 2. Age Distribution of 110 Acute Traumatic Work-Related Fatalities, Michigan 2005

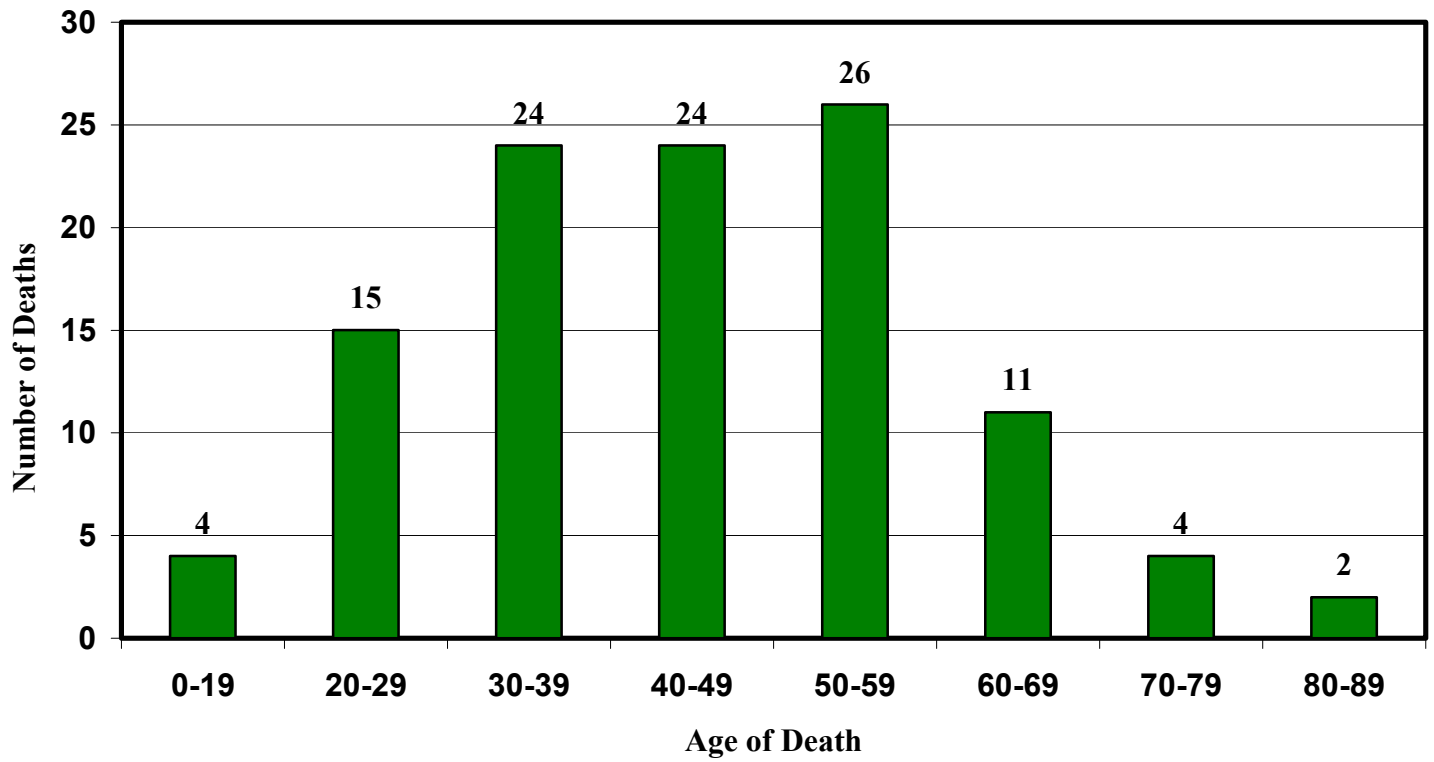
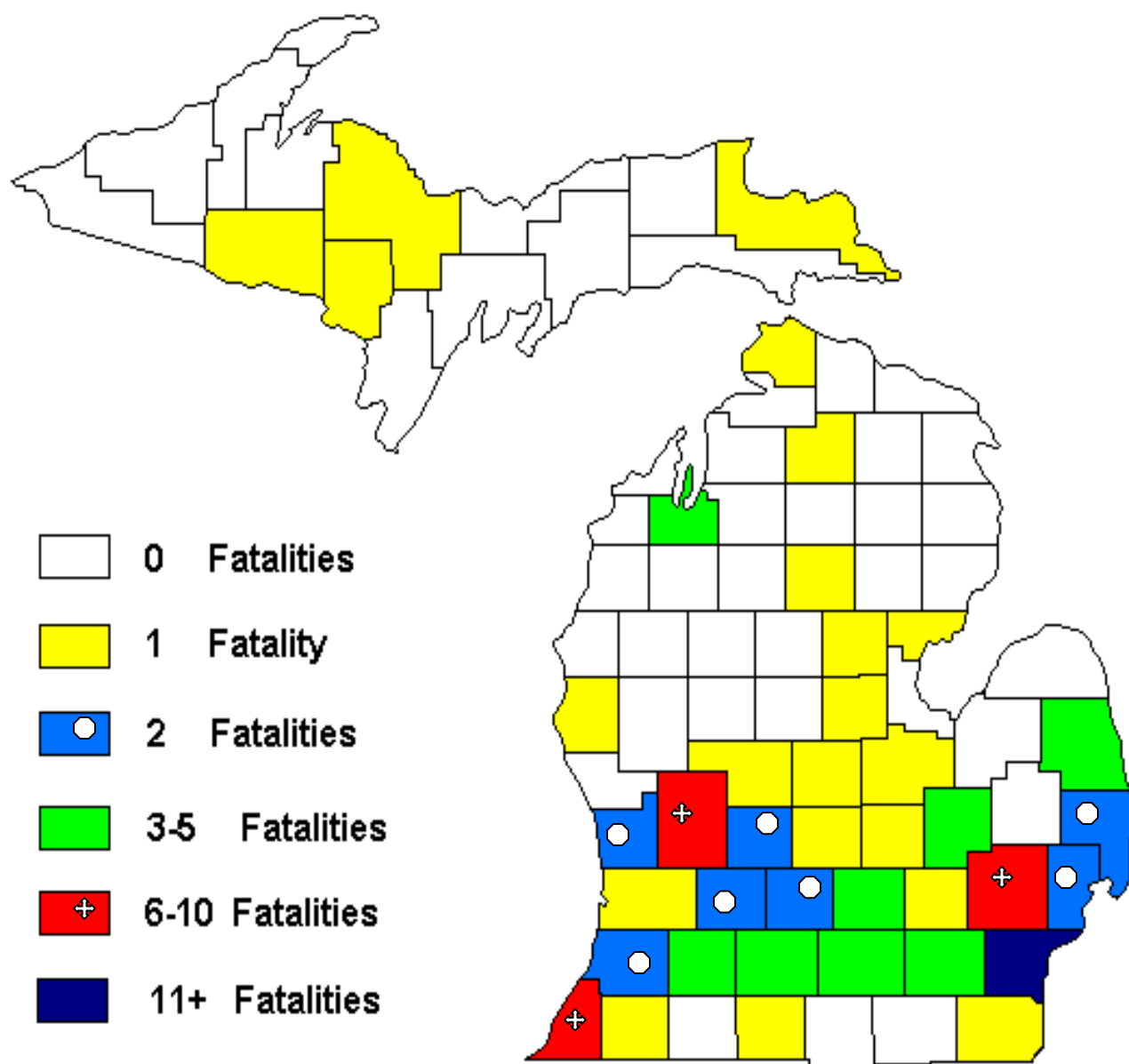
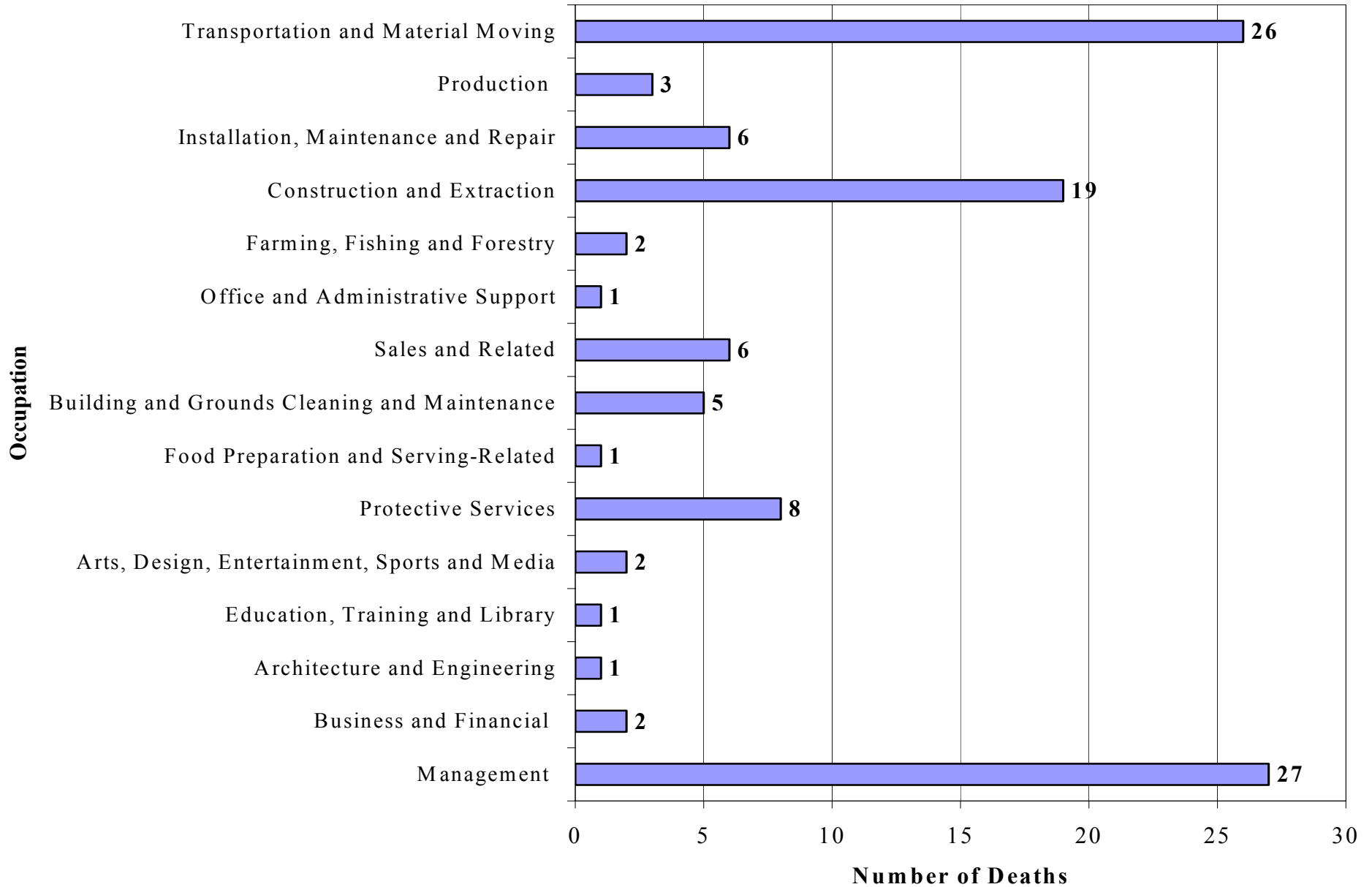


Figure 3. County Distribution of 110 Acute Traumatic Work-Related Fatalities By County of Injury, Michigan 2005



**Figure 4. Acute Traumatic Work-Related Fatalities by Occupation,
Michigan 2005**



APPENDIX I

Acute Traumatic Work-Related Fatality Case Narratives, Michigan 2005

AIRCRAFT (6)

Case 1 Case 2 Case 3 Case 4	41-year-old male company president, 49-year-old male company vice-president, 51-year-old male company vice-president of operations, and the 71-year-old male commercial pilot were killed when the 1970 twin-engine Beech BE-58 Baron airplane in which they were flying crashed into a stand of trees. According to the National Transportation Safety Board, ground fog was present in the area of the crash site; however, the airplane was in visual meteorological conditions at its cruise altitude prior to the time of the crash. Witnesses reported hearing an airplane at low altitude, but because of the fog could not see the plane descending or its impact with the terrain. The plane impacted the terrain in a grove of trees in a small valley with about a ten-degree upslope. The plane first hit a 75-100 foot oak tree that was over three feet in diameter at its base, then continued and impacted the rising slope about thirty feet southeast of the base of the tree. It is unknown why the plane began to lose altitude prior to impact.
Case 5	56-year-old male manager of an aviation firm was killed when he was flying a helicopter that collided with the ground after losing control while in the traffic pattern at an airport. The amateur built gyrocopter was substantially damaged. The 14 Code of Federal Regulations Part 91 solo instructional flight was operating in visual meteorological conditions without a flight plan. The local flight originated from the incident airport shortly before the crash. Witnesses stated that they heard the engine make a strange noise. The witnesses stated they looked out over the airfield and observed one of the propellers bend upward on the helicopter. Then the helicopter pointed toward the ground and crashed.
Case 6	30-year-old male commercial pilot was killed when the twin engine Aero Commander 500B plane he was piloting was destroyed on impact with the ground during a non-precision approach to the airport. The decedent was delivering banking and medical packages. Weather conditions just prior to the crash indicated light snow and fog with wind speeds between 6 and 10 mph. Night instrument meteorological conditions prevailed at the time of the incident.

DROWNING (1)

Case 7	38-year-old female quality control operator fell into a brine tank being filled with cherries and drowned. She was the house supervisor responsible for supervising the loading station employees, monitoring the incoming levels of cherries into the brine tank and recirculation of excess brine from the tank back to the loading station, as well as moving cherry/brine supply and brine recirculation hoses when the tank was full. During the cherry brining process, sulfur dioxide (SO ₂) is released. Each cherry holding tank has two access ports each covered with a wood cover. One port contained a 4-inch cherry/brine supply hose and a 2-inch brine recirculation hose. The other port contained another 2-inch recirculation hose. Her fall into the cherry holding tank was unwitnessed. It appears she rotated the cover on the port with the one 2-inch recirculation hose, and using an overhead portable utility light, was kneeling on the deck when she fell into the tank. Employees found her floating in the tank, and after one unsuccessful rescue attempt due to the SO ₂ /brine fumes, were able to pull her out of the tank. They took her to fresh air, initiated CPR and called 911. Emergency response arrived and took her by ambulance to a local hospital where she was pronounced dead. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI066.
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DRUG OVERDOSE (3)

Case 8	25-year-old male material handler was found dead on the company's warehouse floor. The decedent was working alone at a warehouse and was utilizing a propane fueled lift truck to organize warehouse stock. At 9:00 a.m., he called the company office with his cell phone and talked to a company representative. At 3:30 p.m., another employee, a truck driver, arrived at the warehouse to pick up some supplies and found the forklift running and the decedent lying unresponsive on the floor approximately 15 feet from the lift truck. The forklift engine was shut off after discovery of the decedent. Emergency, Fire Department and Sheriff Department personnel responded to the scene and found the decedent in rigor. The carbon monoxide (CO) level was 77 parts per million upon entry of the Fire Department personnel. Upon discovery of the decedent, police checked his cell phone records and found the decedent had not answered any calls after 9:15 a.m. An emergency room physician was contacted and pronounced him dead at the scene. CO poisoning did not contribute to the cause of death. The decedent had a history of methamphetamine and oxycontin abuse. He died of a drug overdose. MIOSHA conducted an investigation and determined that it was not work-related; therefore no violations associated with the incident were issued. MIOSHA conducted a brief review of the company's safety and health program elements and issued one citation. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 101.
Case 9	53-year-old male hi-lo driver died from an acute codeine overdose.
Case 10	52-year-old male quality operator died from a heroin overdose.

ELECTROCUTION (4)

Case 11	36-year-old male Hispanic brick mason was electrocuted when attempting to insert a 20-foot 2-inch rerod down through a grouted brick wall he and his coworkers had constructed. The rerod contacted an energized, primary 4,800-volt single-phase power line. Emergency personnel arrived shortly thereafter and transported the decedent to a hospital where he was pronounced dead. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and the select Fatality Investigation Reports. Scroll down the list to Report #05MI065.
Case 12	32-year-old male asbestos abatement worker was electrocuted by a 120-volt energized source. He was working in a tunnel-like space approximately four feet high applying encapsulant with electrical spray equipment to surfaces from which asbestos had been removed. While kneeling on vinyl sheeting he simultaneously touched the housing of the spray equipment and a metal pipe in the space. The worker became a path to ground for the 120-volt current. The air in the space was humid from the spraying and he was wearing protective covering that caused him to sweat. The equipment was not attached to a ground fault circuit interrupter. A fellow worker received an electric shock when he touched his partner, who had collapsed. CPR was administered to the decedent at the site, and he was subsequently transported to a hospital. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 92.
Case 13	43-year-old male roofer was electrocuted when he and another person were attempting to free discarded steel joists from weeds and vegetation near a chain-link fence at the edge of an equipment storage yard. The owner of the property had given them permission to remove them and sell them as scrap. The steel joists were approximately 39 feet long. The men were going to cut the joists into smaller pieces and then take them to the junkyard. They had secured a metal boom crane cable around the steel joists to lift them from the overgrown vegetation. They did not have the property owner's permission to use the boom crane. It had an expired license and had not been used for several years. It was necessary for them to find a charged battery to start it. The decedent's coworker was operating the boom crane they were using to raise the steel joists while the decedent was holding onto the steel joists to guide them. The boom crane operator indicated the steel load he was lifting was swinging and accidentally hit an overhead energized power line. A huge spark erupted when the cable contacted the energized line. The cable broke. A surge of electricity was sent through the cable and through the steel joists the decedent was guiding. When the boom cable broke, the decedent was freed. After the worker operating the boom saw the spark, he called to the decedent. Receiving no answer, he went to him and could get no response. 911 was called. The cause of death stated on the medical examiner's report was electrocution. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 94.

Case 14	<p>25-year-old male lineman was electrocuted when he contacted a chain that had been energized with 40,000 volts. The decedent was a member of an eight-person crew; the decedent and one coworker were in the south bucket truck, two coworkers were in the north bucket truck, one coworker was acting as the ground man, and three coworkers were material handlers. The decedent and his coworker began to remove south grounding/bonding conductors from the phase conductors on the tower. The coworkers in the north truck removed the north grounds, the phase grounds, and the conductor end of the tower to conductor ground. All of the grounds up to this point were handled and removed using “hot sticks”. The decedent told one of the workers in the north truck that he would remove the “cold-end”/tower end of the ground. The north truck operator held the free end of the ground conductor “clear” from the phase jumpers that now had approximately 40 kV induced onto them from the parallel running 345 kV energized conductors approximately 42 feet to the east. The decedent maneuvered the bucket through the opening between the insulators of the bottom west crossarm and the phase jumpers to approach the connection of the ground conductor to the tower crossarm approximately one foot to the east of the insulator attachments. As he approached the desired location, a ground man saw that a chain was hanging approximately two to three feet from the decedent’s truck. The ground man whistled to get the attention of the truck operators. One of the workers in the north truck acknowledged the ground man. The ground man told the north man that the decedent’s chain was hanging. The worker in the north truck got the decedent’s attention by yelling to him. The decedent stopped the progress of the truck. The decedent looked back and down in the direction of the chain, appearing to understand the warning being given to him by his coworker. The chain was in contact with the phase conductor jumpers. The decedent was standing on the remainder of the chain that was coiled in the floor of the bucket. The decedent reached out and grabbed the ground conductor. The decedent grabbed the personal protective grounding cable with his left hand approximately 18 inches below the clamp with the assumption that he would use his right hand to loosen the clamp. Grabbing the cable became the second point of contact. Induced current traveled from his leg to his left hand. He contracted to a position of embracing the cable with both hands. Once the decedent grabbed the ground he became the path between the energized phase conductor and ground. After the coworker who was working with decedent in the bucket requested verbal assistance, he grabbed the decedent by the webbing of his harness and yanked him free from the ground conductor. He then brought the bucket to the ground and he and his coworkers removed the decedent from the bucket. Two employees performed CPR on decedent until paramedics arrived and transported him to the hospital. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 111.</p>
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FALLS (20)

Case 15	<p>53-year-old male laborer died after stepping off a second floor platform edge and falling 12 feet to the concrete floor below. The decedent was a member of a four-person crew that was moving office chairs from a second floor office to the first floor warehouse area. The upstairs office door opened onto a platform, which had stairs that accessed the platform from the first floor. The platform was 40 inches as measured out from the office wall, about 7 ½ feet long, and 12 feet above the first floor. The platform had a removable standard barrier section. The removable section was about 7 feet 2 inches long and 34 inches high. The stairs that accessed the platform from the lower floor were on the south end of the platform, the removable standard barrier was on the east side of the platform and the office door was on the west side of the platform. The employees were loading office chairs into a poly pallet with sides called a Ropak. The pallet was about 47 ½ inches long, about 45 inches wide and 34 inches high. A forklift set the Ropak onto the platform through the removable section of the standard barrier. The Ropak was placed so that the 45-inch wide front of the Ropak was against the second floor office doorway. A supervisor instructed the workers emptying the office of furniture not to step outside onto the platform. The Ropak that the decedent was loading at the time of the incident was placed on an angle on the platform leaving about a one-foot opening between the Ropak and the north side of the doorway. The decedent, carrying a chair, stepped outside of the office door onto the north side of the Ropak where he stepped off the edge of the platform. He lost his balance and fell approximately 12 feet to the concrete floor below, landing on his back and shoulders. 911 was called. He was taken to a local hospital and declared dead later that day. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 104.</p>
Case 16	<p>74-year-old male forklift driver was killed as a result of a fall. The cause of the fall is unknown. He was placing hydraulic oil into a diesel power unit that was 52 inches high. After falling and striking the back of his head, the decedent got up from the floor, moved a nearby forklift, and then noticed he had blood on the back of his head. He found his son and upon noticing the extent of injury, his son took him to a nearby emergency medical clinic. The decedent was transported to a local hospital where he died five days later.</p>
Case 17	<p>44-year-old male dishwasher had a seizure while at work which resulted in him falling and hitting his head on the floor. His cause of death was listed as blunt force head trauma. He died four days after surgery was performed for head trauma.</p>
Case 18	<p>63-year-old male farmer died from an apparent fall from a ladder in his barn. He appeared to be climbing up to or descending from a hayloft using a ladder that was tied off at the top. The ladder base slipped and tilted to one side. The decedent fell to the concrete floor of the hay barn, striking his head. He fell next to a forklift and a pile of hay. He was pronounced dead at the scene.</p>

Case 19	50-year-old male farmer died from injuries sustained in a fall from a pickup truck while loading the truck with hay bales. He had backed his pickup up to the hay wagon. A coworker was throwing bales of hay to the decedent from a hay wagon and the decedent was stacking them into his truck. The decedent had placed a bale on the back of the truck partially on the rail of the truck bed and partially overhanging. The decedent then reached over to grab a bale of hay and stepped onto the unstable bale. The bale of hay slipped off the truck and fell to the ground along with the decedent who landed on his head. He fell approximately seven feet. He died approximately four weeks later from complications of the fall.
Case 20	82-year-old male farmer died after falling off of the loading dock at his farm. He sustained a spinal cord injury and died three days later from cardiovascular failure.
General Construction	
Case 21	64-year-old male brick mason died after falling from a scaffold on which he and his partner were working. They were putting brick on the front of a new residence above the garage door. He was working on the level lower than his partner and throwing shovelfuls of mortar up into a bucket for his partner to use. The scaffold planks on which he was standing were approximately 6 feet off the ground. There was no X-brace assembled behind him. He fell off the scaffold to the concrete driveway striking his head. He was taken to the hospital where he died several hours later. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 98.
Case 22	38-year-old male carpenter died after jumping from an unsecured ladder that was moved sideways by a gust of wind. The company's jobsite foreman instructed the decedent and two coworkers to work on the siding on the west side of the house. The decedent and one of the coworkers positioned their 30-foot fiberglass extension ladders on a walk out deck from the 2 nd floor. The deck dimensions were 16 feet by 20 feet. The deck was constructed seven feet above grade and was unguarded on all sides. The decedent and his coworker erected their ladders side-by-side and leaned them against the side of the house. The remaining coworker stayed on the ground as a saw man, handling material to the decedent and his coworker. Both the decedent and his coworker were working approximately 15 feet high on their respective ladders. Both ladders had the ladder feet supported by a piece of plywood adhered to the deck to prevent the ladders from sliding away from the house. At approximately 8:30 a.m., the decedent and his coworker were attaching wood nailers for a soffit screen when a gust of wind (36 mph) from an approaching thunderstorm blew the top of the decedent's ladder sideways (south) along the fascia board. As the ladder was falling, the decedent jumped to the deck approximately 15 feet below and landed at the unguarded deck edge. He then fell ten more feet into a concrete basement well. Coworkers called 911 and the decedent was transported to a local hospital where he was pronounced dead.

Case 23	<p>49-year-old male satellite service business owner died after landing on a concrete sidewalk. He had apparently fallen from a two-story roof. The decedent was servicing a satellite dish on top of a commercial establishment. A double extension 20-foot ladder was placed on the sidewalk and the ladder extended to the edge of the roofline of the building. There were no witnesses, so the exact cause of his fall is unknown. According to the police report, he may have been trying to descend from the roof or he may have been retrieving wires when he fell. He was found facedown by a passerby who called for emergency response. The decedent was declared dead at the scene.</p>
Case 24	<p>31-year-old male construction worker died due to injuries sustained when he fell approximately 15 feet when trusses collapsed during a building construction operation. The decedent was a member of a 9-person crew. The decedent had been setting trusses all morning on the day of the incident and had been working after lunch for approximately one-half hour. The trusses were set by using a crane to swing the truss and set it on the wall. After nailing the truss to the blocks that were nailed on the top plate, the decedent and coworker #1 would then move inside the truss about 10 feet and install blocking. At the same time, coworkers #2 and #3 would install blocking along the top. When the truss was secured, coworker #1 would go back to the west wall and signal the crane to let off the load. Coworkers #2 and #3 would unhook the lifting device and call all clear. Coworker #1 would signal the crane to lift out. At the time of the incident, coworker #1 was working on the west top plate and the decedent was working on the east wall plate, approximately 14 feet above the concrete, anchoring the trusses as they were set. Coworker #2 was working from an elevated JLG work platform and coworker #3 was working from an elevated rough terrain forklift platform installing 27-inch long braces on the top chord of the trusses. When coworkers #2 and #3 finished installing the bracing on the top chord, they climbed out of their lifts and assisted coworker #1 and the decedent who were installing bracing on the inside of the bottom chords. The owner was working inside the trusses installing bracing also. The owner saw the top chord of a truss deflect approximately 10 inches from 10 feet away from the west wall. He asked coworker #1 if either of the lifts were against the trusses, to which the answer was no. He then saw two more trusses deflect the same way the first one had. Within three seconds of the second truss deflection, he heard a loud cracking noise. It appeared to coworker #1 that some of the trusses that they had set that morning dropped straight down from the east side, off of the 2-x 8-inch wood wall. Then the remaining trusses began to fall in a domino effect, falling toward the north where the other trusses had dropped off the wall. During this time, the decedent was standing on the trusses, between the last and the next to last truss. When the trusses fell, the decedent fell approximately 15 feet to the concrete below. He struck his head on the concrete. 911 was called and the decedent was taken to a local hospital and then transferred to another hospital where he died the next day. A urine drug screen revealed the presence of cannabinoids. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 108.</p>

Case 25	<p>69-year-old male construction contractor died from complications of a fall. The decedent was standing on the seat of a steel folding chair and fell, striking his head on a tile floor. The decedent was performing “punch-list” tasks for a recently renovated building. One of the tasks was to install light bulbs in a range hood. He could not reach the light bulb socket while standing on the floor. He had not brought a ladder with him. Finding a folding chair nearby, he moved it to the incident site. Holding a light bulb that was protected by a globe in one hand, he stood on the open folding chair. Before he could screw in the light bulb, he fell from the chair seat. The event was unwitnessed. A building employee working inside the building heard a crash and investigated, but did not see the decedent. Approximately 10 minutes later, he heard someone yelling for help (the decedent), and he again went to investigate. The decedent had moved to a nearby wall and was found sitting against the wall by the building employee. This employee called to an employee outside, and asked for assistance. One of the building’s employees called 911. The decedent was taken by ambulance to a nearby hospital and then airlifted to another hospital where he died approximately three weeks after the injury. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI088.</p>
Case 26	<p>48-year-old male builder was fatally injured when he fell approximately 15 feet onto cement striking his head. The decedent was walking across two 2-inch x 10-inch x12-foot planks over the top of a cement foundation of a new home he was constructing. The planks were being used for the first floor rafter boards. While the decedent was walking across the planks, both planks broke and he fell into the basement. He was taken to a local hospital where he died four days after the incident. MIOSHA did not conduct a compliance investigation and therefore did not issue citations. An investigation was not conducted because it was determined there was no employer/employee relationship. The decedent was the sole owner and only employee of his company. The summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 102.</p>
Case 27	<p>38-year-old male self-employed carpenter died as a result of complications from a shoulder injury sustained at work. He fell with a piece of concrete. He went to an urgent care clinic and was sent home. After several days of discomfort, he went to the hospital. He died several days later from necrotizing fascitis.</p>

Case 28	<p>27-year-old male construction laborer died after falling approximately 15 feet from a ladder and landing on a gatepost. The decedent was removing aluminum siding from the west side of a house while standing on an aluminum ladder. The ladder was positioned over a gate and fence of a neighboring home. It appears that while he was removing the siding, he lost his balance and fell. One of his coworkers was removing debris to the dumpster on east side of the home. Hearing the decedent moan, he returned to the decedent's work location and found the decedent's midsection folded over the gate. The decedent's head and legs were not touching the ground. His midsection was lying across the end cap of the gate, which was about two inches higher than the gate's top bar. He was also lying across a small nut and bolt that was about one inch above the top bar. The ladder the decedent on working was standing against the house. The decedent rolled off the gate and landed on the ground. The decedent told his coworker to call 911. His coworker panicked and began to yell for help. A neighbor heard the calls for help and called 911. Several neighbors (nurse and a massage therapist) began CPR. Emergency response arrived and the decedent was transported to a local hospital where he was declared dead.</p>
Roofing	
Case 29	<p>33-year-old male roofer died after falling forty feet onto ice and hard-packed snow. He fell from the roof of an apartment structure he was working on. He and three co-workers, none of whom witnessed the incident, had returned from lunch and were starting to work in their designated work areas. The decedent was raised to the roof by means of a rough terrain forklift. He was wearing a full body harness, but was not tied off as he walked back to his area. The roof was covered with hard-packed snow and ice. The pitch was 8 to 12. He was taken to a nearby hospital where he was pronounced dead. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 96.</p>
Case 30	<p>36-year-old male ironworker died after tripping on an angle brace/bolt head, losing his balance, and falling 22-28 feet from a pre-engineered structural steel building roof purlin to the ground below. The decedent was a member of a four-person crew. One coworker had been sent for gas to fill up the welder. The other workers, including the decedent, were preparing to shake out roof decking. The workers were on the roof moving roof panels towards the center of the roof. The decedent, who was not wearing fall protection, was making up piles of sheets and his two coworkers were pushing roof sheets across the building. After finishing the bottom bundle, they went to the top bundle. His two coworkers pushed the first bundle of top sheets. One of the coworkers walked down the roof to cross at the bottom of the building on the scaffolding. When he got back to the top of the building to push another pile of sheets, he found that the decedent and his other coworker had already pushed the pile of sheets. The decedent was walking toward the edge of the building along one of the steel purlins when it appeared that his foot hit one of the bolts that had come through the side of the purlin. He lost his footing. He fell forward and tried to catch himself on the cross piece and the brace rod to break his fall. He was unable to catch himself and he fell face-first 22-28 feet to the ground.</p>

Case 31	<p>30-year-old male roofer died when he fell approximately 50 feet from the roof of a school to the concrete floor below. The incident occurred during the roofing of a new auditorium of a high school. The decedent was a member of a 5-person crew. The foreman assigned one crewmember as a “ground man”. The ground man’s duties were to keep other people out of the area where they would be exposed to falling debris. One crewmember was sent to fill a generator on a lower roof. The decedent, coworker #1, and the foreman set up the roof access ladder and took appropriate tools to the 99-foot by 43-foot upper roof to begin work. There were six areas of the roof where no roofing material had been installed leaving the metal decking exposed. These were to have 90 1/2”x 48” sections of decking cut and removed and smoke catchers installed over the openings. The smoke catchers were positioned adjacent to each of the areas. The foreman assigned coworker #1 to ensure the metal deck pieces were not going to fall. The decedent was assigned the safety monitoring duties. The incident occurred on the first hole that was cut. The foreman started cutting and had two sides cut when he needed a new blade. The foreman stepped away and set the saw on the roof deck and began removing the old blade from the saw at the same time he asked the decedent to hand him the blade. The decedent turned to retrieve the blade, which was lying on the roof deck behind him. He turned back around with the blade and the foreman reached out for the blade in the direction of the decedent. The decedent stepped forward a few steps onto the partially cut metal deck and fell through the partially cut decking approximately 49 feet to the concrete below. The company had a specific safety plan, including provisions for fall protection for the work at the school. The decedent had attended a management/union sponsored safety training program. The ground man was looking up and saw the decedent fall through the partially cut decking. 911 was called and the decedent was declared dead at the scene. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 112.</p>
Case 32	<p>62-year-old male roofer was assisting another individual who was conducting roofing work. The decedent's coworker went down a ladder to gather materials for the roofing work. He looked up and saw the decedent fall from the roof. The decedent was transported to the hospital and died the following day from injuries sustained in the fall.</p>
Case 33	<p>55-year-old male self-employed builder died of injuries sustained from a fall from an extension ladder. The decedent was attempting to access the roof to clean off ice and snow by climbing up the ladder. It appears that he was approximately four feet up on the ladder when he fell from the ladder and struck his head on the ground below.</p>

Case 34	<p>41-year-old male roofer slid down and fell approximately 40 feet from the roof of a building he had been working on. He died from his injuries three days later in a hospital. The decedent was the foreman of the roofing crew. The day was hot and muggy with heavy dew. According to one of the crew, the decedent complained of the heat and indicated he was going to sit in the shade. No one could see him from where they were working, so no one saw him fall. He moved to a shaded portion of the roof. The surface was plywood sheathing and the pitch was 6/12. Apparently he slipped on the plywood surface, slippery with dew, slid approximately 20 feet down the roof to the edge of the roofline, then fell approximately 40 feet to the ground. An officer on the scene noted scuffmarks in the dew on the shady portion of the roof surface above the location where the decedent was found. He was transported to a hospital by emergency personnel then airlifted to a second hospital where he died three days later. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 95.</p>
FIRE/EXPLOSION (4)	
Case 35	<p>39-year-old male career firefighter died after he ran out of air, became disoriented, and then collapsed at a residential structure fire. The decedent and a firefighter entered into the structure with a hand line to search for and extinguish the fire. While searching in the basement, the decedent removed his regulator for one to two minutes to see if he could distinguish the location and cause of the fire by smell. While searching on the main floor of the structure, the fire fighter's low air alarm sounded and the decedent directed the fire fighter to exit and have another firefighter working outside take his place. The decedent and the second firefighter went to the second floor without the hand line to continue searching for the fire. Within a couple of minutes, the decedent's low air alarm started sounding. The decedent and the firefighter became disoriented and could not find their way out of the structure. The decedent made repeated calls over his radio for assistance but he was not on the proper frequency channel. The second firefighter "buddy breathed" with the decedent until the decedent became unresponsive. The second fire fighter was low on air and exited. The fire intensified and had to be knocked down before the decedent could be recovered. For a full report of this incident, please visit the NIOSH Fire Fighter Fatality Investigation and Prevention Program, www.cdc.gov/niosh/fire. Scroll down and click on the "Career Captain Dies After Running Out of Air at a Residential Structure Fire – Michigan" report.</p>
Case 36	<p>49-year-old male wholesale buyer for an auto dealer died of injuries from a fuel explosion. The accident occurred at a motor speedway inside a fuel shed housing plastic methane gas barrels. The building also contained additional gasoline and propane tanks used to dispense fuel to racecars. The decedent was pumping methane fuel into a metal gas can when a spark caused an explosion that set off a methane tank. The explosion engulfed the building and the decedent stumbled out on fire. A witness wrapped a towel around the decedent's face to protect the decedent's airways before paramedics took over. The decedent was driven to the local hospital. He was subsequently airlifted to a second hospital due to the severity of his burns where he died from his injuries.</p>

Case 37 Case 38	52-year-old male automotive restorer and his 32-year-old male coworker died in a pole barn fire. Both individuals were members of the 4-person crew that was moving tools and supplies into the pole barn. The barn was used for general automotive repair and tool storage. While moving tools, the crew tipped over a parts washer containing a gasoline solvent near a torpedo heater. When the vapors hit the air they ignited. Two of their coworkers were able to escape. The decedent individuals were found on the other side of the barn next to a locked door. Both individuals died from smoke inhalation. Toxicological tests indicated that both individuals had measurable blood alcohol levels at the time of their death.
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HOMICIDE (16)

Case 39	36-year-old male musician was found shot in his music studio, an apparent victim of a robbery. He sustained multiple gunshot wounds.
Case 40	60-year-old female professor was killed by blunt force injury to the head and strangulation.
Case 41	36-year-old female employee of a paper company died after being shot by another employee. She was attempting to defuse a tense situation between a supervisor and a coworker by translating English into Spanish for the supervisor. Her coworker fired a handgun, killing her and wounding the supervisor.
Case 42	44-year-old male police officer was killed by multiple shotgun wounds. The decedent had gone to a residence to question a possible homicide suspect.
Case 43	57-year-old female bookkeeper/personal assistant was killed by multiple gunshot wounds outside of the residence where she worked as a bookkeeper.
Case 44	41-year-old male maintenance manager at a bowling alley was killed by multiple gunshot wounds during a robbery attempt.
Case 45	40-year-old male club owner died of multiple gunshot wounds. He was killed by gunshots fired through the door of his after-hours club after an argument with a patron.
Case 46	45-year-old male owner of a video store was killed by multiple gunshot wounds during a robbery attempt of his store.
Case 47	66-year-old male cab driver was found locked in the trunk of his cab. He was pronounced dead due to multiple stab wounds to the neck.
Case 48	52-year-old male cab driver was shot several times. It appears he was attempting to drive away from his assailant and crashed through a fence along a freeway service drive.

Retail Trade

Case 49	53-year-old male stocker/clerk was working at a convenience store when he was killed by a gunshot wound to the abdomen. Another employee had been playing off and on during the day with a handgun located under the cashier's desk and had apparently even pointed it at other employees and the victim. The fellow employee pointed it towards the victim and pulled the trigger, apparently thinking it was not loaded.
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Case 50	39-year-old male automobile dealer was killed by a single gunshot wound while he was sitting in his pickup truck at his dealership.
Case 51	52-year-old female manager of a retail store was killed after a single stab wound to the chest with a knife during a robbery attempt.
Case 52	33-year-old male store clerk at a grocery store was killed by a single gunshot wound to the head during a robbery attempt. He was under the influence of cocaine at the time of his death.
Case 53	46-year-old male produce storeowner died from a heart attack after chasing a robber from his store. The decedent and his coworker had opened the store and were in the front of the store preparing it for opening. The decedent's coworker went to the back of the store and noticed the intruder who was attempting to steal some produce. The decedent chased the intruder from the store on foot. The intruder left the site in a car. The decedent went into a nearby business to write down the license plate of the car and had a heart attack
Case 54	58-year-old male "dollar store" storeowner was killed by multiple gunshot wounds during a robbery attempt.
MACHINE-RELATED (18)	
Case 55	49-year-old male excavating company owner died when the excavator he was using overturned into a gravel pit pond. He was a member of a three-person crew on the site that was digging exploratory holes to test soil. While backfilling one hole that contained stone, his coworkers took a pickup truck to another area of the gravel pit. After completing the backfilling of the exploratory hole, he began to drive the excavator to the other side of the gravel pit to dig another hole. He drove the excavator along the 20-degree sloped bank to the water with the bucket elevated and the excavator's cab door facing the pond. Frost was approximately four inches deep. As he was traveling, the bank broke causing the excavator to tip over into the mud and water. He was trapped in the cab in the mud and water. His coworkers returned and found him. His coworker was able to grab his coat but was unable to move him due to the suction of the mud. Coworker #1 called 911 while Coworker #2 called for wreckers to help lift the excavator from the mud. Emergency response arrived, and after approximately an hour, the excavator was raised and the decedent taken to a local hospital. He was declared dead at the hospital. Toxicological tests indicated that the decedent had a measurable blood alcohol level at the time of his death. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI024.

Case 56	<p>28-year-old male assistant plant manager for an iron ore mining company was killed when he was pinned between a cooler frame and a cooler pallet dump arm. The Mine Safety and Health Administration (MSHA) description of the incident is as follows: Coworker #1 received a stuck cooler pallet alarm in the control room and instructed the decedent to check out the stuck cooler pallet on unit 4. He and coworker #2 went to the cooler dump point. Coworker #1 switched the unit 4 cooler control from automatic to manual in the control room. He tried to start the cooler by giving the cooler drive start commands 22 times in a 3 minute and 28 second time frame. During this time frame, the decedent tried to position a port-a-power cylinder jack at the middle of the arm, but it would not fit. The decedent handed the port-a-power to coworker #2 and told him to place the port-a-power at the end of the dump arm. Before coworker #2 could position the port-a-power under the dump arm, the cooler pallet suddenly broke free, causing the dump arm to move. Coworker #2 heard the decedent yell and saw him pinned between the cooler pallet dump arm and the cooler structure. Coworker #2 called for help over the 2-way radio. The plant coordinator heard the call for help and went to the unit 4 cooler area. When the coordinator arrived, he instructed coworker #1 to call for emergency medical assistance. The coordinator was unable to release the decedent with the port-a-power so he used a come-along to pull the cooler dump arm to free him. Company first responders attempted CPR until emergency medical personnel arrived. The decedent was transported to a local hospital where he was pronounced dead. The full MSHA report may be found at www.msha.gov/FATALS/2005/FTL05m33.asp.</p>
Case 57	<p>36-year-old male lawn technician was killed while unloading a motorized gas-powered, ride-on, granular fertilizer spreader from the back of an extended van. He was pinned between the handles on the spreader and the interior roof of the van. The ride-on spreader had four rubber tires, a riding platform consisting of metal slats and wheels, and an adjustable handle with a throttle control and brake. After starting the spreader and placing it into reverse, and while standing on the van floor, the decedent may have somehow unintentionally hit the throttle. Or, while he was backing the machine out, he was unaware of his location in relation to the upper doorjamb. He struck the doorjamb with his back. The machine continued to move in reverse. The spreader handles, which had been released, moved upward and pinned him against the interior roof with his feet suspended in the air. The right wheel of the riding platform slipped off the inside of the right ramp and the left rear wheel remained inside the van. The homeowner first saw the lawn care van in the street in front of her home approximately 9:00 a.m. She left approximately one hour later to run some errands and saw the decedent leaning over the machine but thought he was working on it. When she returned approximately one hour later, she saw that the van had not been moved and the decedent had not moved and was pinned between the roof of the van and the spreader handles. She called 911. Emergency response arrived and transported the decedent to a local hospital where he was declared dead. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI046.</p>

Case 58	19-year-old male golf course worker died after being pinned under an overturned tee box mower. The oval tee box was on a plateau with three gently sloping sides except for the east-side bank, which dropped off 19 feet with a 49-degree slope into trees. The decedent had made three passes in a diagonal motion across the tee box, turning at the edge of the tee green on the collar (longer grass area) after each pass. When he reached the collar area, he raised the reels, turned the mower, and then engaged the reels down. After this third cut, the incident occurred. The back wheel of the mower went over the edge of the collar, and the mower began to slide down the slope. The mower hit a small tree and the mower overturned. The mower came to rest at the base of the slope against some trees on top of the decedent. A coworker found him under the mower. 911 was called and emergency personnel arrived. They pronounced him dead at the scene.
Agriculture	
Case 59	82-year-old male farmer was pinned under the left rear wheel of the John Deere 300-B industrial tractor-loader with backhoe. He was in the process of loading lime into a spreader so it could be distributed on his fields. He left the loader bucket in the air, and had not placed the tractor-loader in park. The engine was idling. It is presumed that as he was trying to exit or enter the tractor-loader, it began to roll down a slight incline and he was pinned under the left rear wheel. Neighbors who heard the tractor-loader idling looked out their window with binoculars and saw the decedent under the left rear tractor wheel. They called 911. When emergency response arrived, he was declared dead at the scene. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and the select Fatality Investigation Reports. Scroll down the list to Report #05MI064.
Case 60	70-year-old female farmer and her spouse were grinding corn at their farm. The decedent's husband positioned the tractor and "mix-all" farm trailer near a corncrib. They were using a trailer and conveyor system attached to a tractor. The decedent was standing near the corncrib. The tractor was left running so the PTO could power the grinder. Her husband went to get something from the barn and the decedent was standing alongside the tractor when it apparently lurched forward. The decedent was struck by the trailer's swing arm or the trailer itself as the tractor rolled forward knocking her to the ground. She was subsequently run over by the tractor. The tractor continued its forward travel and knocked over a large tank of diesel fuel. It is unknown if the tractor was left in gear and the brake failed or if the tractor accidentally slipped into gear.
Case 61	58-year-old male farmer died when the tractor he was operating rolled over onto him. The decedent was operating a tractor going south on his property between a bean field and his driveway when he hit a stump that was hidden under some weeds in the brush. This caused the decedent to lose control of the tractor, which flipped over, trapping him underneath. When he did not come home, his wife went to look for him. The decedent was pinned to the ground under the tractor and died from injuries sustained from the accident. The tractor was not equipped with a ROPS.

Case 62	<p>43-year-old male part-time farmer died from asphyxiation and compression by the overturned tractor that he was operating. The incident occurred in an area along a dirt roadway on private property. The roadway was in poor condition due to the soft ground conditions caused by the weather and tractor use. The roadway led from the barn area of the decedent's home to a field where the cows were kept. Along the roadway were two deep tire ruts approximately six inches deep. There was a large dip in the roadway where the field began. The tractor was equipped with an implement in the rear that resembled a forklift that was used for carrying the roll of hay. The decedent had been transporting a large roll of hay from a barn to the field for the cows. As the decedent was transporting the hay to the field he attempted to drive the tractor outside the deep ruts in the road. According to the police investigation, the tractor tires entered the ruts, which may have caused the tractor to bounce or lose control. The tractor would have hit the dip in the roadway just beyond the point where it went into the ruts. The hay roll apparently fell from the back of the tractor near the location of the dip. This would have caused a weight imbalance. These factors may have caused the tractor to "barrel roll" 180 degrees, trapping the decedent underneath the tractor seat. The tractor was not equipped with a rollover protection structure (ROPS).</p>
Case 63	<p>29-year-old male truck driver/farm hand was killed when he was attempting to stop a tractor-trailer loaded with corn that was rolling away from him. The decedent had parked the vehicle at the top of a small grade in a field. He did not set the parking brakes. He tried to run to the moving vehicle and climb aboard it to stop it. It appears he slipped or fell off the vehicle and was run over by it as it rolled down the grade. Inspection of the trailer at its final point of rest showed that the brake pads were not activated and not in contact with the brake drum of the right hand rear dual wheels. The brake controls were not activated in the cab. After moving the vehicle, the responding police agency parked the tractor-trailer on a similar incline and set the parking brakes. All brake shoes were in contact with the brake drum. The responding police agency did not note any air leaks or problems with the brakes holding the vehicle on the grade.</p>
Case 64	<p>46-year-old male farmer was killed when the tractor he was driving rolled over onto him. The decedent and a family member were cutting trees in a wooded area. The decedent, who was allergic to bees, was stung. He had not brought his "bee sting kit" with him. The family member asked if he could take the decedent home and the decedent said no. He climbed on the tractor and headed for home. On his way home, the tractor went off the side of the road. The decedent's right foot was found under wedged under the brake pedal, and the right rear tire was on his chest. The cause of death was positional asphyxia.</p>
Case 65	<p>66-year-old male farmer died from a crush injury to his chest. He was found pinned underneath a homemade forklift assembly, which weighed over 500 pounds. It is presumed that he was pulling it back into the barn when it got caught on a crack in the cement. He then fell to the ground along with the assembly, which tipped over on top of him. He was trapped for an unknown amount of time before a family member found him. He was pronounced dead at a local hospital.</p>

Case 66	<p>54-year-old male farmer was killed when he fell from and was run over by a hay wagon while baling hay. He was working on a hay wagon when the bales began to shift. He apparently was knocked off the wagon and fell to the ground under the front axle, which appears to have run over him. His torso was then caught under the rear axle, which dragged him approximately 30 feet before the tractor stopped. The trailer counter indicated 123 bales, which was the maximum number of bales it could hold. The incident occurred on a large sloped hill with a 10-degree grade. The tractor driver stated that she noted that the load appeared to tip as she was driving down the hill. She also stated that she watched where she was going and looked back regularly to check on the decedent. The last time she looked back, she could not see him and immediately stopped the tractor. She ran to the rear of the trailer where she found him beneath the tires. She then ran to a nearby residence and called 911. The decedent was declared dead at the scene. The results of the decedent's toxicology tests indicated a blood alcohol level of 0.18%.</p>
Manufacturing	
Case 67	<p>52-year-old male maintenance electrician was troubleshooting a machine when the machine cycled and pinned him. The line the decedent was called to service consisted of three dial machines (rotary tables) with eight stations and three robotic arms. The robotic arms moved the parts from dial to dial and then off the line. The dial machine had a CNC 3-axis machine attached. The CNC had a parts carousel in the center and rotated to four tooling stations. A vertical wall moved by hydraulics inward toward the carousel and "jobbed" the parts, which were rotating inside a stationary protective shielding through a centered access port. The CNC machine also had tool change capabilities, including drill, tap, or reamer. A fence with a gate and mechanical latch limited access to the tooling area. There was a lockout safeguard for entry, which required the unplugging of an electrical cord fed through the gate mesh with a female plug from a male receptacle mounted on the stationary fencing. The tool change capability was not lining up properly for the tool changes, so the setup person called the maintenance supervisor for help and the decedent was dispatched to the machine. The decedent, after stepping inside the gate, closed it behind him, and reconnected the plug by reaching around the gate. The setup operator was standing outside the gate next to the control stand. The decedent stepped between the CNC and the dial to see if there was an alignment problem. He was apparently standing with the "bit" wall to his left and the solid parts carousel wall to his right, just in front of a hydraulically compressed air nipple protrusion located to his right rear. This space was about two and one-half feet wide. The CNC closed and pinned him against the dial. His coworker pushed the emergency stop button on the console and pulled the gate plug but was unable to inactivate the machine until after the decedent had been compressed. Another employee arrived, reconnected the interlock, reset the machine, and started to back out the CNC. The machine retracted from the carousel and the decedent was released. Emergency response was called and the decedent was declared dead at the scene.</p>

Case 68	<p>19-year-old male janitor was killed when he became pinned between the mast of a Hyster Model H90XLS powered industrial truck and a dumpster. The employee had successfully emptied three other garbage hoppers into the trash compacting dumpster prior to attempting to empty the fourth hopper. Each of the hoppers had slightly different release mechanisms. The fourth hopper was also larger than the other three hoppers with a measurement of 56 inches across the back, 65 inches front to back, and 48 inches from the base of the frame to the top of the hopper. The hopper release had a safety catch between the release bar and the catch, which required a manual movement to reseal the catch. The fourth hopper was approximately half full when a coworker discovered the employee. The powered industrial truck ignition key was in the “on” position, the gear selector was in drive, and the parking brake was in the released position. The mast of the powered industrial truck was approximately in the central upright position provided by the movement cylinders. The forks were just off the ground with the hopper against the trash compacting dumpster. An employee in the Fabrication building glanced out the overhead door and saw the employee pinned between the mast and the hopper. When he realized the decedent was bleeding, he ran back into the building to get the foreman. The foreman called 911. On this model of Hyster powered industrial trucks, when the engine is not running, the transmission pressure pump is not energized, which causes the pressure on the clutch plate to release. Even with the gear selector in drive or reverse, the powered industrial truck would be in a neutral mode because of there being no pressure on the clutch plate. Because no one saw the incident occur, what actually happened is subject to conjecture. Apparently the decedent dumped his load, backed the truck up, ran out of gas, got off the truck to situate the dumpster, and it moved on him as he reached for the latch to reseal the catch. The truck was situated on a three percent incline. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 100.</p>
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Case 69	<p>30-year-old male manufacturing engineer died when the prototype compression former he was operating under pressure exploded, causing the lid to break away from the base. The lid struck the decedent in the chest/head. The machine consisted of a welded table constructed of 2-inch angle iron, with a steel top and a steel counterbalance welded to the front of the table approximately 12 inches above the floor. The table measured 2 inches wide by 48 inches long by 33 ¼ inches high. There were eight welded clamp brackets on the outer edges of the table, two on the front side, two on the backside and two on each end. The backside of the table also had two welded and bolted hinges and two welded stops for the lid. The lid measured 32 inches wide by 55 ¾ inches long. The dome was 12 inches deep. Covering the bottom of the domed portion of the lid was a bladder that was secured in place. Air pressure was supplied into the dome portion through a regulator attached to the table of the machine. Air was directed from the regulator through an air hose attached to the dome of the lid. On the topside of the dome were an air gauge and a low-pressure safety relief valve, which was supposed to open at 20 psi in the event of air pressure exceeding 20 psi inside of the dome. There were three sight glasses made of ¼-inch Plexiglas in the dome for viewing the inside of the dome. The total weight of the compression former was 1000 pounds; the lid and base each weighed about 500 pounds. The decedent was experimenting with different glues to determine bonding capabilities. After installing the mold, the decedent lowered the lid onto the table and installed only two clamps to the front side of the machine. Air pressure was supplied. The pressure gauge was at 18 psi just before the explosion occurred. The decedent had leaned forward over the machine, looking into the top of the dome sight glass when the lid exploded. It struck the decedent in the chest/head area, knocking him immediately to the cement floor. It appeared that the regulator was set at 28 psi and the safety valve at 20 psi. He was pronounced dead at the scene. MIOSHA recommended that the employer develop written safe operating procedures to follow for new machines to be operated by employees. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 106.</p>
Transportation and Warehousing	
Case 70	<p>24-year-old male railroad conductor/switcher on a spur railroad was killed when he was crushed between a derailed railroad car and a stationary concrete column. He was riding on the side of the railcar. The railcar derailed as a result of a malfunction of a “dog” on the track. The “dog” was in a raised position when the car reached it instead of flat to the track. Had it been in the correct flat position, the railcar would have passed over it. The decedent could not see that the “dog” was raised from where he was riding, holding on to the side of the car. The protruding “dog” caused the railcar to derail and the decedent to be crushed. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 99.</p>

Case 71	<p>25-year-old male forklift operator was killed while operating his forklift. The decedent was working with two employees. He had just lifted and removed two pallets from a tractor-trailer parked in shipping bay #6. As he backed away from the trailer, one of the employees noticed that there was no shipping paperwork on top of the load. The decedent lowered the load, backed up and lifted the top pallet off of the lower pallet to see if there was a shipping label or other type of billing information. The shipping paperwork was on top of the first pallet, but the decedent could not see the label without dismounting the forklift. The decedent placed his left foot on the brake, stood up, and leaned forward, placing his head through the mast of the forklift to read the label. During this action, the decedent's right leg came in contact with the control levers on the right side of the steering wheel. This caused the load to drop, pinning the decedent's head in the mast, which crushed his neck and occluded his airway. The three employees ran to the dispatcher's office to contact the 911 operator. During this time the decedent remained pinned in the mast. Three to four minutes passed until another employee ran out to the forklift and lifted the mast from the decedent's neck. The police arrived, removed the decedent from the forklift, and began CPR. Emergency response personnel transported the decedent to a local hospital from which he was transported to another hospital where he died 12 days after the injury.</p>
Case 72	<p>57-year-old male mobile straddle stacker lift operator died from injuries he received from being run over by the wheels of a sliding chassis trailer. He worked for a trucking service company that served as a depot for storage and reuse of large steel ship containers filled with goods and products to be delivered to overseas destinations. He would remove the container from the truck trailer with his straddle stacker lift so the products could be unloaded. On the day of the incident he was to remove a container from the trailer chassis that was filled with products that in the past had become damaged, necessitating the return of the container to the shipper. The container was mounted on a sliding chassis trailer. The trailer could accommodate various size containers. This container was shorter than the full length of the trailer and was set toward the front of the trailer chassis near the back of the cab. Apparently the decedent decided to check the contents of the container for damage before unloading by doing a visual check from the ground surface. To do this he had to place himself between the trailer chassis wheels to reach the container doors because of the forward position of the container on the trailer chassis. The doors were open when the decedent was found. The truck driver had gone into the office to file his papers. When he returned to his truck, he pulled forward not realizing the decedent was in this area of the truck trailer chassis. The decedent was run over by the trailer chassis wheels and died as a result of internal injuries due to crushing. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 97.</p>

MOTOR VEHICLES (24)

Case 73	40-year-old male farmer was traveling between fields on a two-lane paved road with gravel shoulders in a pickup truck when he was struck and killed by another driver who ran a stop sign. The decedent's vehicle was struck at the passenger rear axle. The vehicle rolled over several times ejecting the decedent. The decedent was pinned under the vehicle. The decedent was not wearing a seatbelt/shoulder harness. It is unknown if the vehicle's airbag deployed. The driver of the vehicle that struck the decedent had a blood alcohol level of 0.13%.
Case 74	22-year-old male farm worker was killed in a two-vehicle collision. The decedent was a passenger in a van and was being transported with fellow workers between locations for blueberry operations. None of the passengers in the van were wearing seatbelts/shoulder harnesses. The vehicle was driving southbound on a freeway when it was struck by a minivan. The impact caused the van to roll over at least once, ejecting the decedent and another passenger before the vehicle came to rest on its roof against a tree. The passengers were taken to the local hospital to be treated for minor accidents. The decedent was pronounced dead at the scene due to skull and brain injuries sustained during the incident.
Case 75	56-year-old male mechanic for a utility company was killed when a tractor-trailer truck rear-ended the car he was driving. He had slowed on a two-lane highway at the intersection of a crossroad to make a left-hand turn. He was rear-ended by a tractor-trailer truck. The tractor-trailer's left side brakes began to lock approximately 25 feet prior to the right side brakes. After the right side brakes were locked, the vehicle left skid marks for approximately 200 feet down the roadway. The decedent was wearing a seatbelt/shoulder harness. The vehicle was not equipped with an airbag.
Case 76	56-year-old male construction labor was killed when he lost control of his vehicle on an icy two-lane road. At the time of the incident there was blowing snow. It appears he lost control of his vehicle, rolled the vehicle in the road median and was ejected from the vehicle. He landed in the northbound road. At the scene he was walking around. He died from complications sustained at the time of the crash 10 days later. He was not wearing a seatbelt/shoulder harness. The airbag did not deploy.

Case 77	<p>54-year-old male road construction laborer was killed when an oncoming vehicle operated by a driver who was intoxicated struck him. The decedent was a temporary worker who was hired to act as a flagman for a road construction project. The blacktop roadway was clear, dry, and in good condition. It had one westbound lane and one eastbound lane. The road crew had the required advanced warning signs. Orange construction barrels were located on both the north and south side of the roadway. A large orange road sign was located on the north side. The sign, which had seven LED lights in a horizontal pattern, was blinking on and off. The sign was also equipped with red and white reflective stickers on the east side of the trailer, which could be seen by westbound traffic. On the south side of the roadway, there was a traffic cone, a stop/slow sign and a pole that was believed to have held the stop/slow sign. The event was unwitnessed. The decedent was found laying approximately 20 to 30 feet west of the stop/slow sign location on the south shoulder. The decedent was wearing an orange reflective vest. It was unknown where the decedent was standing when the oncoming westbound vehicle struck him. Sunset was at 5:05 p.m. The decedent has spoken with a coworker at approximately 5:30 p.m. He was struck sometime after that conversation. A coworker called the police at approximately 5:45 p.m. after being notified by a motorist that a “man was down”. The decedent was declared dead at the scene. The driver who struck the decedent was apprehended and prosecuted. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 110.</p>
Case 78	<p>59-year-old male was driving a vehicle southbound, cresting a hill when he was struck and killed by vehicle #1 that was being driven northbound. The driver of vehicle #1 was adjusting the vehicle's radio when he crossed the centerline and struck the decedent's vehicle. The decedent was wearing a seatbelt/shoulder harness. The vehicle's airbag deployed.</p>
Case 79	<p>51-year-old male delivering newspapers was killed when he lost control of the pick-up truck he was driving on a bridge/overpass that was slippery and covered with snow and ice. The decedent drove off the roadway and down an embankment. After traveling down the embankment, the decedent over-corrected. This caused the truck tires to dig into the grass, causing the vehicle to roll over one complete revolution, and come to rest on its wheels. During the rollover, the decedent was ejected. The vehicle landed on top of him. He was not wearing a seatbelt/shoulder harness. The vehicle's airbag did not deploy.</p>
Case 80	<p>42-year-old male owner/operator of a newspaper delivery business was killed following a collision with an oncoming vehicle. The decedent was driving vehicle #1. He was going westbound on a two-lane, paved roadway. There was wet, slushy snow on the roadway. He drove onto the shoulder of the road. He lost control of the vehicle and spun east. Vehicle #2, a school bus, struck vehicle #1 on the passenger side. Vehicle #1 spun and landed against a tree in the ditch. The decedent was not wearing a seatbelt/shoulder harness and was entrapped in the vehicle. The vehicle was not equipped with an airbag. Toxicology tests detected the presence of cannabinoids.</p>

Case 81	38-year-old male waste management employee died from trauma injuries he sustained when the waste management truck he was driving struck a tree. The decedent was driving a refuse truck using the right steering wheel (passenger side) when a jug of water jammed the left side steering wheel (driver's side). According to the police report, the decedent could no longer steer the truck because the dominant steering wheel was the left steering wheel. He applied the brakes before either jumping or being ejected from the vehicle when it hit a tree. The decedent became wedged between the truck and the tree. He was taken to a local hospital where he underwent multiple surgeries on his pelvis and a lower leg amputation. A month later he died. There was no safety bar in the vehicle and police officers noted that the passenger side door (the side he was driving on) was held in the open position with a bungee cord. The vehicle was not equipped with either seatbelts or airbags.
Case 82	62-year-old male tour guide scheduler was killed when he could not stop the van he was driving in time to avoid striking the rear of a tractor-trailer. Both vehicles were northbound on an expressway. The tractor-trailer driver entered a "whiteout" condition with heavy, blowing snow. He noticed that traffic in the southbound lanes of the expressway were "backed up" and applied the brakes when he saw taillights in front of him. The roadway was covered with a thin layer of ice with a couple of inches of snow on top of the ice. The decedent could not stop his vehicle in time and the van drove off onto the right shoulder and then angled back towards the road and hit the truck's trailer. The decedent was trapped in the van. He was not wearing a seatbelt/shoulder harness. The vehicle's airbag deployed.
Case 83	58-year-old female school bus driver was killed when she struck standing water in her travel lane. The water caused her to lose control of the bus and strike a median wall. The bus overturned landing on the passenger side. She told the responding police the sequence of events. She was taken to a local hospital where she died from chest injuries several hours later. She was wearing a seatbelt/shoulder harness. The school bus was not equipped with an airbag.
Case 84	27-year-old male ministry volunteer coordinator was killed when he was involved in a multi-vehicle crash on an interstate highway. A dense fog advisory had been issued for the area. A total of six vehicles were involved. Vehicle #1 had stopped in the left lane due to other vehicles blocking the travel lanes. Vehicle #2, a tractor-trailer, rear-ended vehicle #1, thereby blocking the left travel lane. Vehicle #3 rear-ended vehicle #2, and remained in the left travel lane. Vehicle #4 was able to miss vehicle #2, and stopped in the right travel lane before striking another vehicle. Vehicle #5 rear-ended vehicle #4 in the right travel lane. The decedent's vehicle, vehicle #6, sideswiped vehicles #5 and #4, and finally rear-ended vehicle #2. The decedent was driving a van lent to him to pick up donations for a church mission from another city. He was on his way home. He was using his cell phone at the time of the crash. The decedent was wearing a lap/shoulder belt. The van's airbag deployed.

Retail Trade	
Case 85	60-year-old male auto parts technician was driving a pickup truck on a two-lane asphalt road. A double-yellow line divided the road, which was covered by slush and ice. Both road shoulders were soft. It appears the pickup crossed the centerline due to either drifting or the driver losing control. The vehicle left the roadway to the left and struck an embankment head-on. The pickup rolled over and came to a stop. The decedent was wearing his seatbelt/shoulder harness. The airbags did not deploy.
Case 86	73-year-old male vehicle porter was killed as a result of an oncoming car traveling through a stop sign striking his vehicle on the driver's side. The decedent was driving vehicle #1 from one dealership to another on a dry, two-lane asphalt road with the right-of-way. The driver of vehicle #2 approached the intersection at approximately 45 mph and did not brake. Vehicle #2 struck vehicle #1 on the driver's door. The decedent was wearing his seatbelt/shoulder harness. The vehicle's airbag deployed.
Case 87	47-year-old male business owner of a power sports store was killed while driving a motorcycle. Vehicle #1 was driving northbound, attempting to make a left turn at an intersection. The decedent was traveling southbound. When the northbound vehicle made its turn, the decedent was unable to avoid the collision.
Transportation and Warehousing	
Case 88	34-year-old male tow truck driver was killed when a car driven by an intoxicated individual left the roadway and hit him. The decedent positioned the tow truck in front of the disabled car, which had a flat tire. Both the tow truck and disabled car were on the east shoulder of the road, facing north. The tow truck beacon lights were activated. The decedent was operating a flatbed-style tow truck. He tilted the bed down and attached the cables to the car. While he was on his cell phone, he asked the customer for his keys so he could place the car's transmission into neutral. He instructed the customer to go on the passenger side of the tow truck and sit in the truck cab. It is unknown if the decedent was getting into or out of the car on the driver's side; the car door was open. A northbound car, driven by an intoxicated individual, left the roadway and struck the disabled car on the driver's rear side. The northbound car then struck the decedent and flipped over, landing on its roof several yards north of the incident scene. The disabled vehicle may have hit the tow truck causing it to overturn and enter a nearby ditch. Emergency response was called. The decedent was pronounced dead at the scene. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI045.

Case 89	43-year-old male driver for a transportation company was killed when the cab of his tractor-trailer hit another trailer in a roadway. The roadway had a concrete surface and was wet at the time of the incident. The weather conditions were dense fog. The driver of vehicle #1, which had an attached box trailer, was driving north when he had to turn around because he missed his exit. While turning around, vehicle #1's cab got stuck in the mud on the shoulder of the road with the box trailer in the roadway. The driver of vehicle #2 stopped to help the driver of vehicle #1 place warning signs north and south of the vehicle. The decedent was driving in his vehicle (vehicle #3), when he struck the rear trailer area of vehicle #2. The decedent was not wearing a seatbelt/shoulder harness. The vehicle was not equipped with an airbag.
Case 90	36-year-old male truck driver was killed when a train hit his truck. The decedent approached a railroad crossing that had neither lights nor gates. He noticed that his truck was too far forward. As he was trying to back his truck up, the trailer jackknifed and he was unable to straighten it in time to back up. He tried to pull forward across the tracks. The train hit his truck and dragged the truck about 100 yards down the track. The truck burst into flames.
Case 91	47-year-old male truck driver was killed when he was ejected from the cab of his truck when it overturned while he was attempting to exit from a freeway. Responding police noticed skid marks traveling up the entrance ramp that disappeared over the embankment. The tractor cab rolled over on its left side, and the top of the cab was crushed upon impact. The tractor-trailer left the left side of the roadway causing the tractor-trailer to jackknife and come to rest on the north side of the exit ramp and guardrail. The decedent was not wearing a seatbelt/shoulder harness. The cab was not equipped with an airbag.
Case 92	39-year-old male airport police officer was killed when the police car in which he was a passenger struck a power pole. At the time of the incident, snow covered the concrete roadway. The vehicle damage profile, crash dynamics, and other physical evidence were all consistent with the vehicle traveling at or near the posted speed limit at the time of the incident. It appears the driver lost control of the vehicle. The vehicle ran off the roadway -- rotating counterclockwise. It struck a power pole in the median, broadsiding the passenger side of the vehicle. The decedent was wearing his seatbelt/shoulder harness. The airbags did not deploy.
Public Administration	
Case 93	24-year-old male police officer was killed while in pursuit of another vehicle. Another police car sideswiped the vehicle he was a passenger in; causing the car to overturn and catch fire. The cause of death was multiple blunt force injuries. The decedent was wearing his seatbelt/shoulder harness. The vehicle's airbag deployed.
Case 94	21-year-old male police officer was killed during the pursuit of another vehicle that was driving erratically. While traveling around a curve on a two-lane road, the decedent lost control of the vehicle, and left the roadway to the right, and struck a tree. The decedent was not wearing a seatbelt/shoulder harness. The vehicle's air bag did not deploy.

Case 95	48-year-old male firefighter died due to complications arising from a motor vehicle accident that occurred in 2004. The decedent was responding to a motor vehicle accident in his privately owned vehicle when he was involved in a separate motor vehicle accident. The two-lane road conditions were icy and the weather was snow/blowing snow. He lost control of the vehicle and slid off of the highway. The vehicle then struck a snow bank and rolled over several times. He was not wearing a seatbelt/shoulder harness. The decedent's airbag did not deploy. The decedent suffered a cervical fracture and spinal cord injuries resulting in quadriplegia. The decedent died in 2005 due to complications from the quadriplegia.
Case 96	23-year-old male army reserve sergeant was killed when the military ambulance he was driving struck a cement barrier. The decedent was southbound in the right lane of a two-lane, blacktop freeway, posted at 70 mph. The roadway was dry. On the west side of the southbound right lane there was a concrete curb, six inches in height, that was bordered to the west by an asphalt shoulder. While traveling the curve, the decedent drove off the right side of the road over the curb onto the road shoulder. He overcorrected and brought the vehicle back onto the road. He then lost control, crossed the centerline, and the vehicle struck the cement median barrier. The vehicle then rolled onto its passenger side and came to rest in the right lane. The decedent was wearing a seatbelt. The ambulance was not equipped with an airbag.
STRUCK BY (10)	
Case 97	34-year-old male tow truck driver was killed when the wrecked sport utility vehicle (SUV) he was preparing to tow fell on top of him while he was under the vehicle. A SUV had left the roadway and struck a tree in a residential yard. The SUV had sustained front-end damage and both front tires were flat. The decedent arrived and pulled the SUV onto the roadway with his tow truck. He repositioned the tow truck to the front of the vehicle. The decedent lowered the boom and attached the chains. Based on the description of the lift in the police report, he performed a sling lift although his statement to the police was that he was going to perform a wheel lift. It does not appear he used the wheel lift (stinger), even as a backup means of support. The stinger was at ground level when the incident occurred. There were support timbers on the wrecker that the decedent did not use that could have been placed under the frame. After attaching the chains and raising the vehicle, the decedent positioned himself on his back approximately mid-chest under the vehicle, apparently to pop the transmission so that the rear wheels would rotate when in tow. The SUV keys were on the dash so the transmission could have been unlocked with them. There was a 4-wheel drive selector on the dash that had a neutral position that also could have been selected. When he popped the transmission, the vehicle lurched and fell, landing on the decedent across his neck and chest. 911 was called. The officers at the scene deployed the stinger in an attempt to raise the vehicle. The vehicle was eventually lifted off the decedent by firefighters using spreaders. The decedent was declared dead at the scene.

Case 98	<p>18-year-old truck driver died of multiple injuries after being crushed by a falling cement slab. The decedent was employed by a temporary agency that was contracted to supply workers to the firm where the incident occurred. The firm made pre-cast concrete columns that were loaded onto a truck and driven to a staging area and stacked. A 55-ton crane with a 4-ton lift bar was moving pre-cast cement columns that were 40 feet in length, two feet in thickness and weighed approximately 32,000 pounds. The decedent was a truck driver whose truck was positioned in the staging area. The crane operator was standing approximately two feet above the ground on a column. He was operating the crane with a wireless control pendant. The horn was sounding to indicate that the crane was in operation. The decedent was standing on the ground with the cement columns on his right when the cable holding the lift bar and cement column broke. The columns were standing on end, and as the falling cement/lift bar struck them, the columns began to fall like dominoes. One of the columns struck the decedent, forcing his head into a nearby column and landed on his legs and torso. He was pronounced dead at a local hospital. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 105.</p>
Case 99	<p>26-year-old male security guard was killed when a 60-foot overhead door section fell on him. The employer for whom the decedent worked was contracted to provide security services. The overhead door was constructed of four 60-foot long by 4-foot wide sections, each weighing approximately 4300 pounds. Two cables that were attached to a counterbalance weight lifted the sections straight up. The cables were at each end of the door. The cables were held in place by three cable clamps that were inside of a column. The decedent had opened a door for a forklift that was exiting the building and then partially closed the door. The decedent then opened the door for a pickup truck to exit. A guard outside of the door radioed that the forklift was ready to come back inside. The decedent stepped under the door to look for traffic. The clamps holding the cables had loosened and the cables slipped out of the clamps and the door fell while the decedent was standing under it. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 107.</p>

Case 100	<p>51-year-old male tree trimmer and his three coworkers were in the process of delimbing a silver maple tree that was approximately 31 inches in diameter at its base. The tree was on city property, was dead, and was deemed to be a hazard to residents. The decedent, who was the team leader, and his crew had delimbed the smaller branches and were in the process of removing the three remaining major limbs. One limb grew over the pedestrian sidewalk, one limb grew almost straight up in the air, and one limb grew over the street. The crew decided to remove the limb that grew over the pedestrian sidewalk because it was near the house. The decedent was responsible for the friction rope. The crew had successfully made three cuts to this limb. The incident occurred on the fourth cut. The decedent was standing in the street approximately 25 feet away from the tree. When the tree limb being cut struck the trunk, the vibration may have caused the limb standing almost straight up to break at a weak spot. The tree limb, which struck the decedent, was approximately 8 inches in diameter. It broke at its center section. There was a knothole that had rotted out, with a bird/squirrel nest covering it. The limb was fully barked, and it could not be ascertained during the evaluation process that there was a weakness of the limb. He was wearing all required protective equipment - hardhat, safety vest, and safety glasses. He died approximately two weeks after the incident.</p>
Case 101	<p>65-year-old male farmer died after being struck by 1200-pound rolls of hay that fell off a truck. Workers pulled him from under the rolls. He died two and a half months after the incident from complications.</p>
Case 102	<p>62-year-old male tractor-trailer driver was killed when the straw bales he was unloading from his trailer fell off the trailer and struck him. The bales weighed approximately 650 pounds apiece. It appears that while he traveled to the unloading location, the bales had become unstable. As he was removing a strap off the rear of the truck, up to 14 of the bales fell onto him.</p>

Case 103	<p>16-year-old male was killed while removing the engine and transmission from a 1977 Lincoln Town Car at a scrap metal business. The vehicle's front tires were flat and the rear tires were inflated. The scrap metal business owner lifted the front end of the vehicle about four feet above the ground with a Ford 600 farm-type tractor equipped with forks mounted to the back of the tractor. The business owner also placed two pipes standing vertically under the front of the car to help provide support. One pipe was approximately 58 inches long and two inches in diameter. The other pipe was approximately 46 inches long and three inches in diameter. The decedent and the business owner were under the vehicle cutting off the muffler with a torch. The owner had cut off one side of the muffler and handed the torch to the decedent to cut off the other side. The owner observed the decedent reach up and grab a piece of the car. The owner then noticed that the car was starting to roll backwards. The owner yelled, "Get Out" and rolled out from under the vehicle as it was falling. The decedent was unable to get out in time and he was pinned underneath the vehicle. The owner called a relative who lived nearby. The owner lifted the car with the forklift and his relative attempted to pull the decedent out from under the car. The car fell off the forks as the decedent was being pulled out and pinned his arm. The owner again lifted the car and the decedent was pulled out. The paramedics arrived and the decedent was airlifted to the hospital where he died from severe head and chest trauma. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 103.</p>
Construction	
Case 104	<p>24-year-old male worker died when he was buried under a wall of the trench he was working in. The excavation wall and part of the sidewalk next to the concrete garage floor collapsed onto him while he was attempting to attach the new PVC pipe he and his coworkers had installed that morning to the main sewer in the alley. One of the decedent's coworkers was also caught in the collapse. Two other workers on-site, neighbors who heard their calls for help, and firefighters who arrived on the scene were able to extricate the decedent's coworker (the company owner) from the excavation. He was transported to a hospital and recovered. The decedent's body was recovered from the excavation approximately 8 hours after the wall collapsed. The MIFACE investigation report of this incident can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Fatality Investigation Reports. Scroll down the list to Report #05MI084.</p>

Case 105	<p>50-year-old male construction laborer was killed when a piece of frozen soil approximately 5 to 6 feet in diameter and 16-24 inches wide broke off during a trench excavation operation, rolled into the excavation, and struck the decedent in the back. The decedent was a member of a six-person crew. The crew consisted of one excavator operator, two coworkers above the trench, and another coworker cutting pipe in a different location above the trench. The decedent and another coworker were in the trench. A trench box was not on site. At the time of the incident, the decedent was applying lubrication to a 42-inch OD concrete pipe. The trench was about 12-13 feet deep and approximately 55 feet long. The trench width ranged from 6-12 feet wide. The trench walls were not in compliance with regulations concerning the proper angle of repose. The angle of repose at the south wall was 39 degrees at the location of the excavator. The trench ran from north to south with the sewer pipe running from the north towards the south. The soil was stiff moist gray clay with some silt, a trace of sand, and gravel. Excavation operations were suspended while the decedent's coworker in the trench walked south from the pipe to check the grade and make sure the excavation was large enough to fit the next 5-foot section of pipe and still have room to set the manhole. When excavation operations resumed, the decedent's coworker was in the center of the excavation less than 15 feet from the excavator, but was almost directly under the boom of the machine and only a few feet from under the excavator bucket. The decedent was less than 20 feet from the boom and bucket. He had been standing on the concrete pipe and at some point, left the pipe and stood on the ground in front of the pipe. The excavator operator picked up a large piece of frozen earth, saw it was "teetering" in the bucket and tried to set the bucket down. As he was setting the bucket down, the piece of earth broke into two pieces. The coworker in the trench saw the section of frozen soil lying in the excavator bucket and heard the soil break. The first section of frozen soil landed on the south end of the excavation, and the other piece (the piece that struck and killed the decedent) landed on its end and rolled like a wheel down the trench line. The excavator operator sounded his horn. Someone started to yell. As the frozen earth started to roll into the trench towards him the coworker ran in between the pipe and the trench wall. The decedent was hit in the back by the rolling frozen soil and the coworker was pinned against the trench wall at shoulder level when the piece of soil "flopped back". The coworker was able to extricate himself from the piece of soil and attempted to help the decedent who was in a kneeling position against the concrete pipe. Emergency response was called. Coworkers entered the trench and placed clothing around the decedent to keep him warm while awaiting emergency response arrival. The decedent died at a local hospital. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 109.</p>
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Case 106	24-year-old male construction worker was buried when an excavation in which he was working collapsed onto him. The excavation was approximately 50 feet long, 2 feet wide, and 6 feet deep. He and his fellow workers were installing 8-inch black ductile pipe for a water main. They were attempting to maneuver a section of water pipe under two PVC pipes at the bottom of the excavation when the cave-in occurred. There was no trench box, no shoring and no proper angle of repose for the excavation. Due to a recent rainfall the soil was wet. The eastern and western sides of the excavation were close to vertical. The east side failed and caved in. Emergency medical help was delayed, because no one called 911 until several minutes after the incident occurred. Also, the new housing development was not on the mapping system for the 911 emergency call center. No one certified in CPR/First Aid was present at the site to assist. By the time help arrived, the decedent had been extricated from the cave-in. He was transported to a hospital where he was pronounced dead. The cause of death was multiple blunt force injuries. The summary and MIOSHA citations issued to the employer can be found at the MSU OEM website: www.oem.msu.edu/ . Click on MIFACE, and then select Summaries of MIOSHA inspections. Scroll down the list to Case 93.
SUICIDE (2)	
Case 107	40-year-old male police officer died of a self-inflicted gunshot wound to the head.
Case 108	46-year-old male farmer died of a self-inflicted gunshot wound to the head.
TOXIC EXPOSURE (2)	
Case 109	50-year-old male factory laborer collapsed while working at an adhesive manufacturer. The adhesives contained isocyanates, and during the course of his employment at the facility, the decedent had developed work-related asthma. The decedent worked third shift in the mixing room. On the day of his collapse, the decedent was working in a room where isocyanates were used. At approx 5:45 a.m. the decedent was observed staggering from the work area signaling that he could not breathe. He used his asthma inhaler to attempt to alleviate his shortness of breath. An employee helped the decedent to the break room where the decedent collapsed in the doorway. Fellow workers provided the decedent with oxygen. Police arrived within five minutes and breathing assistance continued. The decedent suffered a pulmonary arrest and police initiated cardiopulmonary resuscitation. An automatic external defibrillator (AED) was applied, however, it indicated not to shock the decedent. CPR was continued until EMS personnel arrived at approx 6:05 a.m. and he was transported to a local hospital. A spontaneous pulse was regained after 23 to 25 minutes of resuscitation but the decedent never regained consciousness and died in the hospital six days later. The decedent had sought medical care for shortness of breath in relation to work in July 2002, seven months after beginning work. The facility provided annual medical examinations to its employees that included physical examination, urine and blood testing and pulmonary function testing. The decedent had participated in the medical examinations provided by the company as well as seen his primary care physician and a pulmonary specialist for his asthma. Despite abnormal findings on this testing and a request from him to be removed from the exposure, he continued to be assigned to this work area.

Case 110	38-year-old male maintenance worker died due to acute pulmonary edema after exposure to chlorinated fumes. The decedent was contracted to clean a residence after a water pipe had burst and to perform necessary demolition. The decedent had been spraying bleach throughout the home. Family members found him lying face down in the kitchen area. 911 was called and he was declared dead at the scene.
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