2006

Annual Report on Traumatic Work-Related Fatalities in Michigan

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A Joint Report

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December 7, 2007

Table of Contents

Page Number

Table of Contents

Summary

This is the 6th annual report on traumatic work-related fatalities in Michigan. One hundred fifty seven individuals died in 2006 from an acute traumatic injury at work, an increase of nearly 30% from 110 work-related acute traumatic injuries in 2005. The number of deaths peaked in 1999 at 182 and had been on a downward trend until the increase this past year (Figure 1). The rate of acute traumatic work-related fatalities in Michigan is the same as the national rate of 3.9 deaths/100,000 workers). There have been no changes in the system to track these deaths since 1992.

The 157 individuals who died had 153 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 onsite investigations and summaries of Michigan Occupational Safety and Health Administration (MIOSHA) inspections are at the Michigan State University Department of Occupational and Environmental Medicine (MSU OEM) website: www.oem.msu.edu/.

Industries were classified using the North American Industry Classification System[1] (NAICS). There were 42 deaths in Construction (NAICS 23), 19 deaths in Manufacturing (NAICS 31-33), 19 deaths in Transportation and Warehousing (NAICS 48-49), 18 deaths in Agriculture, Forestry, Fishing and Hunting (NAICS 11), and 12 deaths in Administrative and Support and Waste Management (NAICS 56). The largest numerical change in the number of deaths occurred in the Construction classification where the number of deaths was up from 23 in 2005.

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 (46.2 deaths per 100,000 workers), followed by Construction (NAICS 23) which had 23.3 deaths per 100,000 workers, then Agriculture (NAICS 11) which had 22.5 deaths per 100,000 workers, and then Transportation and Warehousing (NAICS 48-49) which had 17.6 deaths per 100,000 workers.

The most common cause of death involved the individual being struck by an object (37, 23.6%), followed by motor vehicles (29, 18.5%), falls (24, 15.3%), and machine-related events (14, 8.9%). Eleven (7.0%) individuals died as a result of a homicide, 10 (6.4%) individuals died as a result of an electrocution, 8 (5.1%) individuals died as a result of an aircraft crash, and 8 (5.1%) individuals committed suicide while at work. Seven (4.5%) individuals died due to a toxic exposure, 5 of the 7 individuals were exposed to lethal levels of carbon monoxide.

Most deaths occurred among men (94.3%). The average age of death was 44.6 years and ranged from 16 to 85. Of those individuals who died, 83.4% were Caucasian. Fatal injuries occurred in 49 of Michigan's 83 counties, with Wayne County having the largest number of deaths, 27. The county of incident was unknown for one individual.

For 21 (14.2%) of the 148 non-suicide, non-overdose deaths, illegal drugs, alcohol, prescribed medications, or over-the-counter medications may have contributed to the individual's death. Illegal drugs may have been a factor in 11 of these deaths. Although a total of 13 individuals tested positive for alcohol in their bloodstream at the time of their death, alcohol levels were not above 0.08% in 6 deaths (not including the individual testing positive for both illegal drugs and alcohol).

Prescribed medication not in combination with other substances may have been a factor in three deaths. Over-the-counter medicine may have been a factor in one death.

MIOSHA staff investigated 52 of the deaths at 52 employers. The police investigated 50 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 50 different employers. Twelve of the deaths (10 different employers) were investigated by Federal agencies (National Transportation Safety Board (NTSB), Mine Safety and Health Administration (MSHA) and the Federal Railroad Administration (RR)). The remaining 43 work-related fatalities (41 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 86,000 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 work is needed to understand the 30% increase in deaths from 2005 to 2006, including the 83% increase in construction deaths (42 vs. 23). 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.

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) State of Michigan Traffic Crash Report, (3) County Clerks, (4) Medical Examiners, (5) Michigan State University County Extension Offices, (6) Newspaper articles, and (7) Emergency Service Providers, including Fire Departments.

MIFACE has adopted the United States Department of Labor, Bureau of Labor Statistics (BLS), Census of Fatal Occupational Injuries[2] (CFOI) definitions of traumatic injury, work relationship, and work. BLS collects the official statistics of work-related deaths in all states. A traumatic injury is any unintentional or intentional wound or damage to the body resulting from acute exposure to energy--such as heat or electricity or kinetic energy from a crash--or from the absence of such essentials as heat or oxygen caused by a specific event, incident, or series of events within a single workday or shift. A work relationship exists if an event or exposure results in the fatal injury or illness of a person: (1) ON the employer's premises and the person was there to work; or (2) OFF the employer's premises and the person was there to work, or the event or exposure was related to the person's work or status as an employee. The employer's premises include buildings, grounds, parking lots, and other facilities and property used in the conduct of business. Work is defined as duties, activities, or tasks that produce a product or result; that are done in exchange for money, goods, services, profit, or benefit; and, that are legal activities in the United States. Fatalities to volunteer workers who are exposed to the same work hazards and perform the same duties or functions as paid employees and that meet the CFOI work relationship criteria are IN scope. Deaths from natural causes, such as heart attacks that occur at work, are not included. Suicides are included, following the protocol established by the NIOSH FACE program as well as that of BLS.

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

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

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

For the remaining work-related fatalities, including agricultural fatalities, MIFACE initiates contact with employers or farm family members to request permission for an on-site investigation. Employer participation in the MIFACE program is voluntary and is unrelated to any regulatory or enforcement procedures. It is important to note that MIFACE investigators do not enforce

compliance with MIOSHA rules and regulations and do not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE with employer agreement, accompanies the MIOSHA compliance officer. MIFACE also interviews the compliance officers about their investigations.

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

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

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

The 2000 Standard Occupational Classification[3] (SOC) system is used to categorize occupations of the individuals who died. The 2000 SOC is divided into 23 major groups, which are sometimes called "job families." The "job families" group individuals according to the nature of the work performed, placing all people who work together into the same group regardless of their skill level. The 23 "job families" are further subdivided using a 6-digit structure for its 821 detailed occupations within those groups.

Results

There were 157 acute traumatic work-related fatalities in 2006. One hundred fifty five (98.7%) of the 157 work-related traumatic incidents occurred in 2006. One individual was injured in a fall down steel steps in a manufacturing facility from an unknown height in 2002, and one individual sustained a head injury after falling from the back of a truck in a packing facility's parking lot in 1984. These two individuals died from complications of their injuries in 2006. The number of deaths per year in Michigan since 1992 is shown in Figure 1.

Demographics

The demographic characteristics of all workers who died from a work-related acute traumatic injury in 2006 are shown in Table 1.

Gender

One hundred forty eight (94.3%) of the individuals who died were men and 9 (5.7%) were women.

Race/Ethnicity

One hundred thirty one (83.4%) individuals who died were identified as Caucasian on their death certificate, 17 (10.8%) were identified as African-American, 6 (3.8%) were identified as Asian/Pacific Islander and 3 (1.9%) were identified as Hispanic. One hundred twenty three (78.3%) men were identified as Caucasian, 17 (10.8%) men were identified as African-American, and 3 (1.9%) men were identified as Hispanic for both their race and ethnicity. Eight (6.1%) women were identified as Caucasian and one (16.7%) woman was identified as Asian/Pacific Islander.

Twelve individuals were identified as Hispanic for their ethnicity. Two women were identified as Caucasian on their death certificate were identified as Hispanic, seven men who were identified as Caucasian on their death certificate were identified as Hispanic, and three 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 85, with one death in a youth (age 16) and seven deaths in individuals 70+ years old. The average age was 44.6 years, which was the same as 2005. One hundred forty nine (94.9%) deaths occurred in individuals between the ages of 18-69.

Individuals 40-49 years of age had the greatest number of deaths (52, 33.1%), followed by individuals in the age group of 50-59 years of age (38, 24.2%). These middle-aged workers comprised over 50% of the work-related acute traumatic deaths.

The 16-year-old youth died while volunteering as a member of a church youth group renovating the church's youth group pastor's home. The ladder the decedent was helping to move contacted an energized overhead power line.

Three of the seven individuals with ages ranging from 70 to 85 who died from acute work-related events worked in Agriculture (NAICS 11). Two of the three individuals were farm owner/operators and one individual was a volunteer lumberjack felling trees at a camp. One individual was a volunteer construction worker building an addition to his church (NAICS 23). One individual was a security guard contracted by a church (NAICS 56). Two individuals worked in Retail Trade (NAICS 44-45); one individual died as a result of a homicide and one individual was a vehicle porter who was driving a vehicle from one location to another when the vehicle he was driving struck a semi-tractor trailer.

One-third of the deaths in Construction (NAICS 23) occurred between the ages of 40-49 (14, 33.3%). Within Construction, ages 20-29 and 50-59 had 9 (21.4%) deaths each. Similar to Construction, greater than one-third (7, 36.8%) of deaths in Manufacturing (NAICS 31-33) were

among individuals 40-49 years of age. Contrasting with Construction and Manufacturing, Transportation and Warehousing (NAICS 48-49) had more than one-third (7, 36.8%) of the deaths were among those aged 50-59. For the first time, in Agriculture, Forestry, Fishing and Hunting (NAICS 11), the majority of the deaths occurred between the ages of 40-49 (5, 27.8%), rather than in the older age ranges.

Marital Status

Ninety-six (61.5%) individuals who died from traumatic incidents were married, 37 (23.7%) were never married, 22 (14.1%) were divorced, and 1 (0.6%) was widowed. Marital status was unknown for one individual.

Educational Level

Table 1 shows the distribution of educational level and Table 3 shows the distribution of educational level by industry. Overall, 20 individuals (12.8%) had not completed high school, 74 (47.4%) completed high school and received a high school diploma, 52 (33.3%) completed one to four years of college, and 10 (6.4%) had over five years of college. The educational level for one individual was unknown.

Within industries having 18 or more deaths, the most common education level among individuals who died was completing high school but no college. Within Transportation and Warehousing (NAICS 48-49), over one-half (11, 57.9%) of the individuals who died completed high school but did not attend college. One half of the individuals employed in Construction (NAICS 23) (21, 50.0%) and Agriculture, Forestry, Fishing and Hunting (NAICS 11) (9, 50.0%) who died had received their high school diploma but had not attended college.

Sixty-two (39.7%) of the individual who died had attended college. In Construction, 11 (26.2%) individuals had attended college 1-4 years. Educational Services (NAICS 61) and Accommodation and Food Services (NAICS 72) each had 3 (75.0%) individuals who had attended college 1-4 years. Seven (338.9%) individuals working in Agriculture (NAICS 11) had attended college; 6 individuals for 1-4 years and one individual had received post-graduate education.

All of the individuals in Real Estate and Rental and Leasing (NAICS 53) had attended college for 1-4 years. Seven (36.8%) individuals in Transportation and Warehousing (NAICS 48-49) had attended college 1-4 years. Two (40.0%) individuals working in Public Administration (NAICS 92) had attended 1-4 years of college and three (75.0%) individuals had post-graduate education. All of the individuals in Professional, Scientific, and Technical Services (54) had received post-graduate education.

Twenty individuals who died in 2006 as a result of a work-related traumatic injury had not completed high school. Ten (50%) of these 20 individuals worked in Construction (NAICS 23) and accounted for nearly one-quarter of the construction work-related deaths (10, 23.8%). One of the deaths involved the 16-year-old youth. In Retail Trade (NAICS 44-45), three individuals (30.0%) who had not completed high school died in 2006. Agriculture (NAICS 11) and Administrative and Support and Waste Management and Remediation Services (NAICS 56) each had 2 individuals die who had not completed high school.

Drug/Alcohol/Medication Use

One hundred eleven (74.5%) of the 148 non-suicide, non-overdose cases are known to have had an alcohol screen performed after death. Thirteen individuals (11.7%) had measurable blood alcohol levels at the time of the their death. Seven individuals had blood alcohol levels near, at, or above 0.08%. One individual had a blood alcohol level of 0.077% and his urine also tested positive 0.148%. One individual had a blood alcohol level of 0.08%. Five individuals had blood alcohol levels above 0.08%; the blood alcohol levels were 0.15%, 0.16%, 0.161%, 0.17%, and 0.18%. Six individuals tested positive for alcohol, but at levels below that associated with impairment. One individual had a blood alcohol level of 0.02%, one individual had a blood alcohol level of 0.03%, one individual had a blood alcohol level of 0.037%, two individuals had blood alcohol levels of 0.06%, and one individual tested positive for alcohol in his urine (0.01%)

One hundred five (70.9%) of the 148 of the non-suicide, non-overdose cases had a drug screen performed after death. Eleven individuals (10.5%) tested positive for illegal drugs; four individuals tested positive for marijuana and the marijuana metabolite, one individual tested positive for the marijuana metabolite, and one individual tested positive for cannabinoids. Two individuals tested positive for cocaine, cocaine metabolite, and opiate/morphine. One individual tested positive for cocaine, cocaine metabolite, and prescription medication. One individual tested positive for cocaine, cocaine metabolite, prescription medication, and an over-the-counter medication. One individual tested positive for a cocaine metabolite and prescription medication. One additional individual tested positive for illegal drugs, prescription medication, and alcohol (0.02%) and died due to a drug overdose.

Among the non-suicide, non-overdose cases, 26 (24.8%) 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 four of the deaths, medications not in combination with other substances might have been a factor in the death. The prescription medications in these deaths were: fentanyl and propoxyphene. The over-the-counter medication that may have contributed to the death was dextromethorphan.

Among the non-suicide, non-overdose deaths, a total of 21 individuals had alcohol, illegal drugs, prescription, or over-the counter medications in their system at levels that may have been a risk factor for the occurrence of the traumatic injury.

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 Wednesday (32, 20.8%). Monday had the next highest number of work-related fatal injuries (26, 16.9%). Thursday had 24 (15.6%) fatal injuries, Tuesday and Friday had 22 (14.3%), Sunday had 15 (9.7%), and Saturday had 13 (8.4%). The day of injury was unknown for one individual who worked in Construction (NAICS 23), one individual who worked in Manufacturing (NAICS 31-33), and one individual who worked in Wholesale Trade (NAICS 42).

In the Construction industry, Wednesday had the highest number of work-related injuries (12, 29.3%), followed by Tuesday and Friday (7 each, 17.1%), and then Monday (6, 14.6%). In Manufacturing, Monday and Tuesday were the weekdays when most fatal injuries occurred (5, 27.8%), followed by Wednesday (4, 22.2%) and Thursday (2, 11.1%). Work-related fatal injuries in the Transportation and Warehousing industry were evenly distributed throughout the week: Tuesday had 4 (22.2%) fatal incidents, Sunday and Thursday had 3 (16.7%) fatal incidents, and Monday, Wednesday, Friday, and Saturday had 2 (11.1%) fatal incidents. In Agriculture, Wednesday was the day when the highest number of fatal injuries occurred (5, 27.8%), followed by Friday (4, 22.2%), Sunday (3, 16.7), and Tuesday and Thursday (2 each, 11.1%).

Thursday was the day of the week when the most work-related homicides occurred (3, 27.3%), followed by Monday, Friday, and Saturday (2 each, 18.2%).

Month of Injury

Table 5 shows the month of injury by industry. August had the highest number of injuries resulting in fatalities with 22 (14.2%), followed by May and October (16 each, 10.3%), and November (15, 9.7%). April and June had 14 (9.0%) fatal injuries each, followed by February (13, 8.4%), July (12, 7.7%), and September and December (11 each, 7.1%). Of the 42 deaths in the Construction industry, October had the highest number of incidents (7, 16.7%), followed by May, August, and December (5 each, 11.9%), and April and September (4 each, 9.5%). Nearly one-half of the Manufacturing work-related fatal injuries occurred in August (8, 44.4%). June, August, and December were the most likely months for a fatal injury (3 each, 16.7%) in the Transportation and Warehousing industry, followed by February, May, and November (2 each, 11.1%). In the Agricultural industry, June, October, and December were the most likely months for a fatal injury (3 each, 16.7%), followed by January, May, and July (2 each, 11.1%).

Table 6 shows the means of death by the month the injury occurred. Struck by incidents occurred most often in February and August (5 each, 13.5%), followed by March, May, and June (4 each, 10.8%). Motor vehicle fatalities occurred most often in April, May, and June (4 each, 13.8%), followed by February, September, and November (3 each, 10.3%). October was the month that most fall-related injuries occurred (4, 18.2%). Seven months (February, April through July, September, and November) each had 2 (9.1%) fatal fall-related incidents. Machine-related fatal injuries occurred most often in August (4, 28.6%), followed by May, September, and December (2 each, 14.3%).

July, August, September, and November were the months most homicides occurred (2 each, 18.2%).

Time of Injury

The time of the injury could be placed within a 4-hour time period in 142 of the 157 (90.4%) 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, 42 (29.6%) fatal injuries occurred between 12:00 p.m. - 3:59 p.m., 38 (26.8%) occurred between 8:00 a.m. - 11:59 a.m., 22 (15.5%) occurred between 4:00 p.m. - 7:59 p.m., 21 (14.8%) occurred between 4:00 a.m. - 7:59 a.m., 10 (7.0%) occurred between 12:00 a.m. - 3:59 a.m., and 9 (6.3%) fatal incidents occurred between 8:00 p.m. - 11:59 p.m.

Within Construction, 18 (43.9%) of the 41 fatal injuries with a known time of injury occurred between the work hours of 12:00 p.m. – 3:59 p.m. and 11 (26.8%) occurred between 8:00 a.m. – 11:59 a.m. Five (12.2%) fatal injuries occurred between the hours of 4:00 p.m. – 7:59 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 (5, 29.4%), followed by the time periods of 4:00 a.m. – 7:59 a.m. and 4:00 p.m. – 7:59 p.m., which had 4 (23.5%) each. In the Transportation and Warehousing industry, 6 (35.3%) fatal injuries occurred in the time period of 4:00 a.m. – 7:59 a.m., 4 (23.5%) fatal injuries occurred between 8:00 a.m. – 11:59 a.m., and 3 (17.6%) fatal injuries occurred between 12:00 a.m. – 3:59 a.m. Nearly one-half of the fatal injuries (with a known time of injury) occurred between 12:00 p.m. – 3:59 p.m. in Agriculture (8, 47.1%).

Most homicides with a known time of injury (3, 37.5%) occurred in the morning hours of 12:00 a.m. – 3:59 a.m., followed by 4:00 p.m.- 7:59 p.m. (2, 25.0%).

Place of Death

For 80 (51.0%) individuals, the place of death was at the scene of the traumatic incident. For 75 (47.8%) individuals, the place of death was the hospital, and for 2 individuals, the place of death was identified as a home (1.3%).

Geographic Distribution

Table 8 and Figure 3 show the county in which the decedent worked where he/she was fatally injured. Forty-nine (59.0%) of the 83 Michigan counties had a traumatic fatal work-related injury occur in 2006. The southeast Michigan counties of Wayne, Oakland, Macomb, and Washtenaw accounted for 42% of the fatal work-related injuries in 2006. Wayne County accounted for 27 (17.3%) work-related fatal injuries, Oakland County had 15 (9.6%) fatal injures, and Macomb and Washtenaw counties each had 12 (7.7%) fatal injures. Kent County had the next highest number of fatal injuries (7, 4.5%). Two counties had 5 fatal injuries, four counties had 4 fatal injuries, five counties had 3 fatal injuries, nine counties had 2 fatal injuries, and 24 counties had 1 fatal injury. The county of injury was unknown for one individual.

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 2006. Table 10 compares the incident rate by industry sector in Michigan to United States incident rate by industry sector for 2006.

The number of deaths occurring in Construction increased from 23 in 2005 to 42 in 2006, an increase of nearly 83%. The most significant statistical increase (nearly 200%) in the number of deaths occurred in Construction of Buildings (NAICS 236) classification; the number of deaths increased from 3 (13.4%) in 2005 to 8 (19.0%) in 2006. Although the number of deaths increased for both Heavy and Civil Engineering Construction (NAICS 237) and Specialty Trade Contractors (NAICS 238), (5 deaths in 2005 to 9 deaths in 2006, 14 deaths in 2005 to 24 deaths in 2006, respectively) statistically, the increased number of deaths represented the nearly same percentage of the total number of deaths in Construction (5, (21.7%) in 2005 and 9 (21.4%) in 2006, 14 (60.9%) in 2005 and 24 (57.1%) in 2006).

Three industry sectors, Manufacturing (NAICS 31-33), Transportation and Warehousing (NAICS 48-49) and Administrative and Support and Waste Management and Remediation (NAICS 56) had 5 more fatal work-related injuries compared to 2005. The number of deaths increased from 14 in 2005 to 19 in 2006 in Manufacturing and Transportation and Warehousing. In Administrative and Support and Waste Management and Remediation, the number of deaths increased from 7 in 2005 to 12 deaths in 2006.

The highest number of deaths in Manufacturing occurred within Transportation Equipment Manufacturing (5, 26.3%), followed by Non-metallic Mineral Product Manufacturing (NAICS 327) (4, 21.1%). It should be noted that three of the four deaths in NAICS 327 occurred when three individuals who worked for the same company died in an airplane crash.

In Transportation and Warehousing, there was a dramatic increase in the number of deaths in Truck Transportation (NAICS 484); in 2005, there were 4 deaths and in 2006 there were 12 deaths. Conversely, Support Activities for Transportation (NAICS 488) had a decrease of 3 deaths from 2005 (5 in 2005 to 2 deaths in 2006). Rail Transportation (NAICS482) was not represented in 2005; one death occurred in this classification in 2006.

Other industry sectors showing an increase in the number of deaths compared to 2005 including Wholesale Trade (NAICS 42) and Accommodation and Food Services (NAICS 72) - 4 deaths, Other Services (except Public Administration (NAICS 81) - 3 deaths, Agriculture, Forestry, Fishing, and Hunting (NAICS 11) – 2 deaths, and Educational Services (NAICS 61) - 2 deaths. Mining (NAICS 21), Retail Trade (NAICS 44-45), and Professional, Scientific and Technical Services (NAICS 54) all had an increase of 1 death from 2005 to 2006.

In Agriculture, although the number of deaths in Crop and Animal Production declined from 16 in 2005 to 13 in 2006, there was an increase of 5 deaths in the Forestry and Logging and its Support Activities (113) classification in 2006. There were no deaths in NAICS 113 in 2005.

There was a decline in the number of deaths in 2006 from 2005 in the following industry sectors: Arts, Entertainment, and Recreation (NAICS 71) and Public Administration (NAICS 92) each had 2 fewer number of individuals die. Information (NAICS 51) had three deaths in 2005 and no deaths occurred in this industry sector in 2006. Health Care and Social Assistance (NAICS 62) had six deaths in 2006 and was not represented in 2005. The number of deaths in Real Estate and Rental and Leasing (NAICS 53) stayed the same.

Mining (NAICS 21), although having only three work-related fatalities had the highest incident rate (46.2/100,000 workers) in Michigan in 2006. Construction (NAICS 23) was next with an incident rate of 23.3/100,000 workers, followed by Agriculture, Forestry, Fishing and Hunting (NAICS 11) with an incident rate of 22.5/100,000 workers. Transportation and Warehousing (NAICS 48-49) had an incident rate of 17.6/100,000 workers. Although both Manufacturing (NAICS 31-33) and Transportation and Warehousing (NAICS 48-49) had the same number of deaths (19), the incident rate for Manufacturing was much lower (2.9/100,000 workers) than Transportation and Warehousing because more individuals were employed in the Manufacturing industry.

Table 10 compares the incident rate by industry in Michigan to national rates for 2006. Several industrial sectors had higher fatality rates when compared to United States fatality rates. The incident rate for the Mining industry (3 deaths, 46.2/100,000) exceeded the national fatality rate for Mining (27.8/100,000), as did Construction (42 deaths, 23.3/100,00 vs. 10.8/100,000), Transportation and Warehousing (19 deaths, 17.6/100,000 vs. 16.3/100,000), Professional and Business Services (14 deaths, 4.3/100,000 vs. 3.1/100,000), Other Services (5 deaths, 2.8/100,000 vs. 2.5/100,000(, and Manufacturing (19 deaths, 2.9/100,000 vs. 2.7/100,000). Several Michigan industries had notably lower fatality rates compared to the United States fatality rates: Agriculture (18 deaths, 22.5/100,000 vs. 29.6/100,000), Wholesale Trade (6 deaths, 3.5/100,000 vs. 4.8/100,000), and Leisure and Hospitality (5 deaths, 1.2/100,000 vs. 2.2/100,000). The overall fatality rate in Michigan for 2006 was 3.9/100,000, the same rate as the United States fatality rate.

Means of Death by Industry Sector

Table 11 shows the means of death by industry sector. Within Construction, a similar number of individuals were killed as a result of a fall from a height (13 in 2006 and 14 in 2005). The percentage of death by this cause decreased dramatically in 2006; 31.0% of the 42 Construction-related deaths were as a result of a fall from a height compared to 2005, when 60.9% of the 23 work-related deaths in Construction were a result of a fall from a height. A significant increase in the number of deaths due to a struck by incident occurred in 2006. Ten (23.8%) workers in Construction died as a result of a struck by incident compared to 3 (13.0%) in 2005. Electrocution and motor vehicles were each the cause of 5 (11.9%) deaths. Machines were the cause of death for 3 (7.1%) individuals. Fire/Explosion was the cause of death for two (4.8%) individuals and for two (4.8%) individuals the cause of death was a toxic exposure (methylene chloride and carbon monoxide). One (2.4%) individual died as a result of drowning and 1(2.4%) individual died of a self-inflicted injury.

In Manufacturing, a machine-related event killed 7 (36.8%) individuals, 4 (21.1%) individuals were died when struck by an object, an aircraft crash killed 3 (15.8%) individuals, and 3 (15.8%) individuals died as a result of a fall from a height. One (5.3%) individual died as a result of an electrocution and 1 (5.3%) individual died as a result of a fire/explosion.

Nine (47.4%) of the 19 deaths in Transportation and Warehousing involved motor vehicles. Five (26.3%) individuals were struck by an object, and five (26.3%) individuals died as a result of a homicide. Two of the five homicide victims were cab drivers. One (5.3%) individual died as a result of fall, 1 (5.3%) individual died as a result of a machine, and 1 (5.3%) individual died of a self-inflicted injury.

Struck by incidents accounted for 11 (61.1%) of the fatal injuries in Agriculture, Forestry, Fishing, and Hunting. Two (11.1%) individuals died as a result of contact with animals and 2 (11.1%) individuals died as a result of a motor vehicle incident. One (5.6%) individual died from an electrocution, 1 (5.6%) individual died as a result of a fall, and 1(5.6) individual died from a machine-related event.

Occupations

Table 12 and Figure 4 shows the distribution of occupational categories. The occupational category was known for 153 of the 157 work-related deaths in Michigan in 2006. The occupational category with the highest number of work-related deaths was Transportation and Material Moving Occupations (53-0000) accounting for 37 (24.2%) of the work-related deaths. Within this major grouping, Motor Vehicle Operators (53-3000) accounted for 27 (73.0%) of the deaths. This represents an increase of eleven deaths from 2005. Within this 53-3000, Truck Drivers, Heavy and Tractor-Trailer (53-3032) accounted for 21 (56.8%) of the 37 deaths.

Construction and Extraction Occupations (47-0000) was the next highest occupational grouping and accounted for 30 (19.6%) of the work-related deaths. This represents an increase of eleven deaths from 2005. Construction occupations accounted for 25 (83.3%) of the 30 deaths. Within this major grouping, Construction Trade Workers (47-2000) accounted for 22 (73.3%) of the 30 work-related deaths, an increase of six deaths from 2005. Construction Laborers (47-2061) accounted for 7 (23.3%) deaths. Three (10.0%) deaths occurred to carpenters (47-2031). Two (6.7%) deaths each occurred in the following construction trade workers: operating engineers (47-2073), electricians (47-2111), and plumbers/pipefitters/steamfitters (47-2152).

Management Occupations (11-000) was the occupational category with the third highest number of work-related deaths (22, 14.4%). Farmers and Ranchers (11-9012) had 7 (31.8%) individuals die due to a work-related incident, and Managers, All Other (11-9199) had 6 (27.3%) individuals die in 2006.

Farming, Fishing, and Forestry occupations (45-0000) had 9 deaths in 2006 compared to 2 deaths in 2005. Five (55.6%) of the 9 deaths occurred in the Forest, Conservation, and Logging (45-4000) occupational code.

Protective Services (33-0000) occupations had 8 (5.3%) deaths. Five (62.5%) security guards died in 2006. Four of the 5 security guards died due to carbon monoxide poisoning and one security guard died as a result of a homicide.

Decedent's Activity at the Time of the Fatality

The activity of the decedent at the time of the fatality was identified for the 134 (97.1%) of the 138 non-homicide/non-suicide related deaths. The individual was the operator in 88 (65.7%) incidents or a coworker directly involved in the work activity in 32 (23.9%) incidents. Eight (6.0%) individuals were killed when struck by a vehicle while a working in or walking alongside an active roadway. Three (2.2%) individuals were passengers in an airplane, one (0.7%) individual was a passenger in a helicopter, one (0.7%) individual was a passenger in a truck, and one (0.7%) individual was a passenger in a car. The activity of the decedent was unknown for four incidents.

In 37 (23.9%) of the fatal incidents, the individual who died was working indoors. The individual was working outdoors in 118 (76.1%) incidents. The work location of the decedent was unknown for two incidents.

The decedent was working alone in 87 (58.0%) incidents and working with a coworker in 63 (42.0%) incidents. Whether the decedent was working alone or with a coworker could not be identified in seven incidents.

For the 11 homicide incidents, 6 (66.7%) victims were working alone and 3 (33.3%) victims were working with a coworker. Working alone or with a coworker could not be determined in two homicide cases.

Working Status of Decedent

One-hundred-fifty-three employers were associated with the 157 individuals who died on the job in 2006. Two employers had a fatal incident where more than one person died during the incident. One hundred five (69.5%) individuals were identified as employees. Thirty-seven (24.5%) individuals were identified as either self-employed or the business owner. Six (4.0%) individuals were identified as contract/temporary employees. Three (2.0%) individuals were volunteers. Employer status, i.e. self-employed, employee, or temporary could not be established for six individuals.

Means of Work-Related Death

Table 13 summarizes the 157 work-related fatalities by means of death and number of fatal incidents (153). An object striking an individual was the cause of death for 37 (23.6%) individuals in Michigan in 2006. Motor vehicle events accounted for 29 (18.5%), followed by falls (24, 15.3%), and machine-related deaths (14, 8.9%). Eleven (7.0%) homicides occurred at work. Electrocutions occurred in 10 (6.4%) incidents. Eight (5.1%) individuals died as a result of an aircraft crash. Eight (5.1%) individuals committed suicide. Seven (4.5%) individuals died as a result of a toxic exposure. Four (2.5%) individuals were killed as a result of a fire or explosion. Two (1.3%) individuals were killed as a result of contact with an animal and 2 (1.3%) individuals drowned. One (0.6%) individual was asphyxiated.

Aircraft

There were eight individuals fatally injured in four aircraft-related incidents. Two incidents involved a single-engine airplane. One incident involved a twin-engine airplane and one incident involved a helicopter. In one incident, the pilot of the aircraft survived and his flight instructor was killed while the pilot was practicing touch and go takeoffs and landings. One plane carried four individuals and hit a stand of trees while in flight and attempting to land. One plane was carrying only the pilot when the plane crashed into the ground. Two individuals were killed in a helicopter crash.

Animals

Animals were involved in two fatal incidents. In one incident, a farm laborer was kicked and trampled by a dairy cow as it was being moved into the milking area. In the other incident, a farm owner was killed when a heifer struck him as the heifer was in an alley moving towards the loading chute to a livestock trailer.

Electrocution

Ten individuals were electrocuted. Seven (70.0%) of the deaths involved contact with energized overhead lines; four electrocutions were a result of indirect contact with the energized line and three electrocutions were a result of direct contact with the energized line. Two of the four fatal indirect contacts with an overhead line involved dump truck operators who were in contact with the truck when its elevated dump truck box contacted the overhead line; one incident involved a 4,800-volt line and the other incident involved a 7,200-volt overhead line. The third fatal indirect contact incident involved a tree trimmer who was electrocuted when the tree limb he was cutting fell onto a nearby 7,200-volt primary non-insulated power line. The limb slipped back and struck the decedent in the stomach. The electrical current carried from the power line through the branch, through the decedent, through the tree, and into the ground. The overhead line voltage was unknown for the fourth indirect contact incident. This incident involved a 16-year-old volunteer who was working with his youth pastor to re-position an aluminum ladder when the ladder contacted the overhead line. Direct contact with the energized overhead line occurred in three incidents: an individual working on a scaffold tried to prevent his fall from the scaffold by grabbing onto a 7,000-volt line located three to five feet from the scaffold, a tree trimmer contacted a 4,800-volt power line while in a tree conducting trimming activities, and a volunteer, who contacted a 4,800-volt line with his elbow while in an aerial bucket hot tapping a 4,800-volt line.

The three incidents that did not involve an overhead line were a result of direct contact with the electrical system. In one incident, an electrician contacted a 480-volt, 70-amp electrical system during troubleshooting a 10-ton bridge crane. One incident involved an electrician who contacted bus-bars energized to 7,200 Kv while walking on the steel structure of a new, non-energized electrical substation. The third incident involved an electrician who contacted 12,447 volts when working in a switchgear cubicle installing the control wiring for a new generator building.

Explosions/Burns

Four individuals died as a result of fire or explosion. One individual was cutting pipes with a spark-producing power saw while working on top of a 400-gallon oil storage tank. One individual was killed as a result of a pressure vessel explosion during the processing of wheat. One individual was killed while performing MIG welding repairs to the inside of a four-compartment cargo tank that previously held diesel fuel. One individual was killed when the vibratory plow he was operating struck a 24-inch diameter high-pressure gas line.

Falls

Falls accounted for 24 of the work-related fatalities. The reason for the fall was identified for 16 (66.7%) individuals. Eight (50.0%) individuals slipped or tripped which contributed to their fall.

Six (37.5%) incidents involved the decedent working on a structure that collapsed. One (6.3%) individual fell while jumping from one area of metal decking sheets to a set of decking sheets that were not secured on a roof. One (6.3%) individual fell and died from complications of knee surgery after he injured his knee by stepping into a pothole in a parking lot.

The distance the worker fell was identified in 16 (66.7%) of the 24 falls. Five (31.3%) individuals fell less than 10 feet: two 4-foot, one 5-foot and two 6-foot falls. Five (31.3%) incidents had falls between 10-20 feet; 11-foot fall, 12-foot fall, 15-foot fall, 16-foot fall, and 20-foot fall. Four individuals had falls between 21-50 feet; one 28-foot fall, two 30-foot falls, and one 36-foot fall. One individual fell 55 feet and one individual fell 120 feet.

The surface location from which the worker fell was identified for 23 (95.8%) of the 24 falls. Individuals fell from a scaffold or ladder in 6 (26.1%) incidents, an unguarded roof edge in 3 (13.0%) incidents, and a vehicle, machinery or equipment in 3 (13.0%) incidents. A fall through a skylight occurred in 2 (8.7%) incidents. One (4.3%) fall incident occurred from the following surfaces/structures: ground, unguarded roof opening, tree, a roof hatch cover that gave way, steel stairs, train car, roof truss, uncovered floor opening in a home under construction, and a T-frame on an antenna tower.

The surface to which the worker fell was identified for 18 (75.0%) of the 24 falls. Twelve (66.7%) individuals fell to a concrete, rock or asphalt surface. Four (22.2%) individuals fell to packed dirt. Other surfaces to which the decedent fell were: wood and a train track.

The condition of the work surface the decedent fell from was known in 19 (79.2%) of the 24 falls. The decedent fell from a dry working surface in 17 (89.5%) incidents. One (5.3%) individual fell from a working surface that was frost-/snow-covered. One (5.3%) work surface condition was wet.

Twenty-three (95.8%) of the 24 falls could be classified regarding the location and type of work performed at the incident site. Twelve (54.5%) of the 22 fall events occurred while individuals were working on construction activities. Eight (66.7%) falls occurred during residential construction activities and 4 (33.3%) falls occurred during commercial construction activities. Two (8.7%) fall incidents occurred at a manufacturing facility. Two (8.7%) falls occurred in parking lots; one fall occurred at a meat packing facility parking lot and one fall occurred at a party store parking lot. Other fall locations included: a hospital, car warehouse, train switching yard, school complex, city park, pellet processing facility, and cellular phone tower. One fall event could not be classified due to lack of information as to the location and type of work performed at the incident site.

Homicides

There were 11 work-related homicides, a decrease of 5 homicides from 2005. All homicide victims were men. Five (45.5%) work-related homicide victims were Caucasian, three (27.3%) individuals were African-American, and 3 (27.3%) individuals were Asian/Pacific Islander.

A gun was the cause of death in seven (63.6%) homicides. One (9.1%) individual died as a result of being stabbed by a knife. One (9.1%) individual died from being struck in the head and then stabbed and beaten by his assailants. One (9.1%) individual died from being struck on the head

with an axe. One (9.1) individual died from being struck on the head by a sledgehammer and then run over with a vehicle.

Five (45.5%) of the 11 individuals worked in Retail Trade (NAICS 44-45). Three (27.3%) victims worked in the Accommodation and Food Service (NAICS 72). One (9.1%) individual each died as a result of a homicide in the following industries: Transportation and Warehousing (NAICS 48-49), Other Services (NAICS 81), and Public Administration (NAICS 92).

Machine-Related Deaths

There were 14 machine-related fatalities. The leading cause of a machine-related death was the pinning of the operator in/by component parts or under the machine. Nine (64.3%) individuals were killed when they were pinned in/by or under the machine: five individuals in Manufacturing, three individuals in Construction, and one individual in Retail Trade. Two individuals were run over by the machine: one individual in Agriculture, Forestry, Fishing and Hunting and one individual in Manufacturing. One individual who worked in Mining was killed when he became entangled in the machine; one individual who worked in Manufacturing was struck by a tool he was using to clear a jam in a machine, and one individual was fatally injured by injuries sustained when in the bucket of a machine that was being unloaded from a trailer.

Motor Vehicle Related Deaths

There were 29 motor vehicle related fatalities in 2006, all single fatality incidents. In two incidents, the decedent was a passenger.

Work-related deaths involving motor vehicles usually were 2-unit incidents (15, 51.7%) followed by single-unit incidents (8, 27.6%). Three (10.3%) 3-unit incidents, one (3.4%) 4-unit incident, and one (3.4%) 5-unit incident were each involved in the remaining work-related deaths. A "unit" is identified as a motor vehicle, bicycle, pedestrian, or train involved in the crash and individually reported; therefore, a car-animal crash or a car-tree crash is categorized as a single-unit incident.

The type of crash was identified as single motor vehicle in 10 (37.0%) incidents, 7 (25.9%) angle incidents, 6 (22.2%) head-on incidents, and 4 (14.8%) rear-end incidents. The responding enforcement agency indicated the crash type was other/unknown for two incidents. 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 (25, 86.2%). Three (10.3%) incidents occurred at night; two nighttime crashes occurred on a road that was lit and one nighttime crash occurred on an unlit road. One (3.4%) crash occurred at dawn.

The weather was clear in 14 (48.3%) incidents, cloudy in 10 (34.5%) incidents, foggy in 3 (10.3%) incidents, and snow/blowing snow in 2 (6.9%) incidents.

Most crashes occurred primarily on 2-lane roads (16, 55.2%). Five (17.2%) crashes occurred on 3-lane roadways. Four (13.8%) crashes each occurred on a 2-lane roadway and a 4-lane roadway. In

19 (65.5%) of the 29 incidents, the roadway was dry. Roadway surface conditions may have been a factor in 10 (34.5%) incidents. The roadway surface was wet in 8 (27.6%) incidents and icy in 2 (6.9%) incidents.

The speed limit was 55 miles per hour (mph) in 16 (55.2%) incidents, 70 mph in 7 (24.1%) incidents and 45 mph in 3 (10.3%) incidents. One (3.4%) incident each occurred at the following speed limits: 60 mph, 40 mph, and 25 mph. The posting of speed limit signs was known for 28 (96.6%) of the 29 roads where a death occurred: posted on 25 (89.3%) roads and not posted on 3 (10.7%) roads. For one incident, the posting of a speed limit sign is unknown.

Restraint system use (seat belt/shoulder harness) was identified by the responding enforcement agency for 24 (82.8%) of the 29 individuals who died. Over one-half (14, 58.3%) of the individuals (13 drivers and 1 passenger) were wearing a shoulder and seat belt at the time of the fatal injury. One of the restrained individuals was partially ejected from the vehicle. For seven (50.0%) of the 14 individuals (6 drivers and 1 passenger), the motor vehicle they were within at the time of the crash was a car. Four (28.6%) individuals were the drivers of semi-trucks, and three (21.4%) individuals were the drivers of pickup trucks. When the motor vehicle involved in the fatal incident was a car, in six of the seven incidents, the vehicle the car was struck by was larger and heavier than the car. The car struck a semi-truck in two incidents, a van in two incidents, a SUV in one incident, a garbage truck in one incident, and another car in one incident. Ten (41.7%) individuals were not wearing a seat belt/shoulder harness at the time of the fatal injury; 6 individuals were ejected from their vehicle, and 4 individuals were trapped within their vehicle.

The presence or absence of airbags in the vehicle was identified for 27 (93.1%) of the 29 vehicles. The presence or absence of an airbag was unknown for two vehicles. An airbag was present in 19 (70.4%) of the vehicles involved in fatal incidents; 8 (29.6%) vehicles were not equipped with an airbag. The airbag deployed at the time of the crash in 12 (63.2%) of the 19 vehicles with an airbag, and did not deploy in 7 (36.8%) vehicles.

The decedent was the driver of the vehicle in 27 (93.1%) of the 29 incidents. The driver's condition was indicated by the responding enforcement agency as appearing normal in 11 (40.7%) incidents. The responding enforcement agency indicated that illegal drug use may have contributed to one death and that one individual was asleep at the time of the incident. The medical examiner indicated that a myocardial infarction contributed to the crash that ultimately caused the death of one individual. The driver's condition was indicated as unknown in 12 (48.1%) incidents. For one individual, the responding enforcement agency did not complete this section on the UD-10 report.

For two incidents, the decedent was a passenger in the vehicle. The condition of the driver of the vehicles in which one passenger was killed was described as normal. The condition of the driver of the other passenger death was described as unknown. The type of vehicle involved in the fatal injury could be identified in all 29 incidents. A truck/bus was the vehicle being used in 12 (41.4%) incidents; a passenger car was used in 11 (37.9%) incidents, a pickup truck in 3 (10.3%) incidents, a van in 2 (6.9%) incidents, and a small truck (<10,000 pounds) in 1 (3.4%) incident.

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 26 (96.3%) of the 27 incidents where the driver died. In 5 (19.2%) crashes, the driver

of the vehicle was driving too fast, and for 5 (19.2%) crashes, the hazardous action was identified as careless/negligent driving. The driver failed to yield in 4 (15.4%) crashes. No hazardous action was noted on the UD-10 for 3 (11.5%) crashes. In 3 (11.5%) crashes, the driver of the vehicle was described as driving left of center. The driver disregarded a traffic signal in 2 (11.5%) incidents and in 2 (11.5%) crashes; the driver was unable to stop in an assured clear distance. The responding enforcement agency identified the hazardous action as "Other" in 2 (11.5%) crashes with no explanation. For two drivers of a vehicle where a passenger was killed, the driver hazardous action was described as none.

All motor vehicle work-related fatalities were classified into three broad categories: noncollision, collision with a non-fixed object, and collision with a fixed object. Six (20.7%) noncollisions occurred; the vehicle overturned in 5 (83.3%) incidents and ran off the roadway to the right in 1 (16.7%) incident. Twenty (69.0%) collisions with a non-fixed object occurred. Seventeen (85.0%) of the 20 collisions with a non-fixed object involved a collision with a moving motor vehicle in transport. Two (10.0%) non-fixed object collisions involved the decedent's vehicle striking a train, and 1 (5.0%) collision involved the decedent's vehicle striking a parked motor vehicle. Collisions with a fixed object occurred in 3 (10.3%) of the 29 motor vehicle work-related incidents: 1 vehicle struck a median barrier, 1 vehicle struck a tree, and 1 vehicle struck an embankment.

Struck By

Thirty-seven individuals were fatally injured when an object struck them, an increase of 27 deaths from 2005. A vehicle striking a worker occurred in nearly one-third of the fatal incidents (12, 32.4%). A tree or tree limb striking a worker was the cause of death for 8 (21.6%) individuals. A trench/excavation wall collapse killed 3 (8.1%) workers. Two (5.4%) individuals were working under a parked trailer when the trailer collapsed onto them. The following 12 objects each struck 1 (2.7%) individual: 600-pound hay bale, shredder grate, belt loader at an airport, industrial mold being moved by a overhead crane, falling scaffold, sawmill log from the sawmill, 30- to 40-pound gutter, steel die, driver of an agricultural sprayer struck a semi-tractor/trailer, geofoam block, pipe end cap, and a 800-pound conveyor component that fell from a truck trailer.

Suicides

Eight individuals committed suicide while at their workplace. Two individuals each died from the following self-inflected actions: hanging, drug intoxication, and gunshot wounds. One individual died from carbon monoxide poisoning when he left vehicles running in an enclosed garage, and one individual died due to self inflicted scalpel wounds.

Toxic Exposures

Seven individuals died due to a toxic exposure while working. Five (62.5%) of the 7 individuals were overcome by carbon monoxide; 3 individuals were providing security services at the same incident site; 1 individual was providing security services at a different incident site, and 1 individual was heating a duplex home under construction while he slept at the site. One individual had a high level of exposure to methylene chloride during the stripping of a bathtub. One individual died due to an unintentional drug overdose.

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 three employers, two Construction employers and one Wholesale Trade employer, whose work activity was considered in-scope for a MIOSHA inspection had a work-related fatality prior to 2006.

Of the 157 work-related fatalities at 153 employers in 2006, MIOSHA personnel conducted an on-site investigation for 52 (33.1%) fatalities. The IMIS database identified that 17 (32.7%) of the 52 employers had a previous MIOSHA Occupational Health, General Industry Safety or Construction Safety compliance investigation.

Depending upon the work being performed at the time of the MIOSHA inspection, a company can receive citations from the applicable MIOSHA compliance division. Of the 17 previously inspected companies, three companies received an Occupational Health and General Industry Safety inspection, and one company received an inspection by Occupational Health, General Industry Safety and Construction Safety divisions. Seven companies of the 17 companies received General Industry Safety inspections, and three companies received a General Industry Safety and Construction Safety inspections. Three companies received a Construction Safety inspection.

For 2006, MIFACE requested, received permission, and conducted a work-related fatality investigation at 18 facilities and has received permission from one company to conduct an investigation in 2008. Copies of completed MIFACE investigation reports and summaries of MIOSHA inspections are available on the MSU Occupational and Environmental Medicine 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 rational 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 12 deaths of Hispanic workers in Michigan in 2006. Using the United States Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2006, this was a rate of 4.75 per 100,000 for 16-65 year old Hispanics as compared to

a rate of 2.28 per 100,000 for 16-65 year old Caucasians and 1.71 per 100,000 for 16-65 year old African-Americans.

In 2006, five Hispanics died in the Construction-related incidents (two individuals struck by an object, electrocution, fall, fire/explosion), two Hispanics died in Manufacturing-related incidents (machine-related), and two Hispanics died in an Agricultural-related (passenger in motor vehicle, animal) incident. One Hispanic died in a Retail Trade (fall from ladder) incident, one Hispanic died in a Transportation (driver of semi truck) incident, and one Hispanic died in an Administrative and Support and Waste Management and Remediation Services (motor vehicle) incident. One of the 12 companies (Construction) agreed to participate in the MIFACE research program. Eight companies declined and MIFACE did not contact three companies (motor vehicle incidents).

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 157 acute traumatic work-related deaths in 2006 is included in Appendix I. Table 14 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 157 deaths in 2006.

Discussion

There were 157 acute traumatic work-related fatalities in Michigan in the year 2006. One individual was injured in a fall down steel steps from an unknown height in 2002 and one individual sustained a head injury after falling from the back of a truck in the facility's parking lot in 1984. 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 3.0 acute traumatic work-related fatalities per week although the deaths were not evenly distributed throughout the year. August was the most common month for the occurrence of a fatal traumatic injury (22 incidents) and the months of October and May were the second most common months (16 incidents).

Individuals who died from an acute traumatic work-related fatality were most likely to be men (94%), white (83%), married (61%) and had at least a high school education (47%). The average age of death was almost 45 but ranged from 16 to 85, with 1 individual less than 18 years of age. The largest number of deaths occurred in Construction (42, 26.8%). Mining (3, 1.9%) had the highest risk of acute traumatic work-related fatalities. The rate in Mining was 46.2 deaths per 100,000 workers as compared to 23.3 deaths per 100,000 workers in Construction (Table 9) and 22.5 deaths per 100,000 workers in Agriculture. 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 21 of the non-suicide deaths, illegal drugs, alcohol or prescribed medications may have contributed to the individual's death. Illegal drugs may have been a factor in 11 deaths: illegal drugs not in combination with other substances in 6 deaths, illegal drugs and prescribed medication in 4 deaths, and illegal drugs and alcohol (0.8%) in 1 death. Although a total of 13 individuals tested positive for alcohol in their bloodstream at the time of their death, alcohol levels were below 0.08%, the level used to indicate impairment for driving a motor vehicle in 6 deaths (not including the individual testing positive for both illegal drugs and alcohol). Prescribed medication not in combination with other substances may have been a factor in three deaths. Over-the-counter medicine may have been a factor in one death. One individual died from a drug overdose at work.

MIOSHA staff investigated 52 of the deaths at 52 employers. The police investigated 50 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 50 different employers. Twelve of the deaths (10 different employers) were investigated by Federal agencies (National Transportation Safety Board (NTSB) (8 deaths), Mine Safety and Health Administration (MSHA) (3 deaths) and the Federal Railroad Administration (RR) (1 death)). The remaining 43 work-related fatalities (41 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 36 of the 43 work-related fatalities not inspected by a regulatory or enforcement agency. MIFACE conducted an on-site investigation at 3 of these employers and was denied the opportunity for a site visit at 26 of the 36 attempted contacts. MIFACE attempted to contact an additional 2 companies/families, but phone information was unavailable to make a phone call and the individuals did not phone MSU after a MIFACE outreach letter was mailed to them. MIFACE did not attempt to contact the remaining 10 other companies/families.

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 47 more deaths in 2006 than in 2005. All industry classifications had a greater number of deaths with the exception of Arts, Entertainment, and Recreation (71) and Public Administration (91). Two new industry classifications had a work

related death in 2006: Real Estate and Rental and Leasing (53) and Health Care and Social Assistance (62). Information (51), represented in 2005 was not represented in 2006.

This increase in work-related fatalities in Michigan in 2006 ends a downward trend in deaths since 1999. On a national basis, 23 states and the District of Columbia had fewer deaths in 2006. Michigan was one of 27 states that had a higher number of deaths. 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 157 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 similar to 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.

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This report was funded by the National Institute for Occupational Safety and Health under cooperative agreement #U60-CC521205

Table 1. Demographic Characteristics of Acute Traumatic Work-Related Fatalities, Michigan, 2006

Demographic Characteristic		Number of Deaths	Percent
Sex			
	Male	148	94.3
	Female	9	5.7
Race			
	White	131	83.4
	Black	17	10.8
	Asian/Pacific Islander	6	3.8
	Hispanic	3	1.9
Age			
	<20	3	1.9
	20-29	24	15.3
	30-39	22	14.0
	40-49	52	33.1
	50-59	38	24.2
	60-69	11	7.0
	70-79	5	3.2
	80-89	2	1.3
Marital Status			
	Never Married	37	23.7
	Married	96	61.5
	Divorced	22	14.1
	Widowed	1	0.6
	Unknown	1	--
Educational Level			
	Less than High School	20	12.8
	High School graduate	74	47.4
	Some College (1-4) years	52	33.3
	Post College (5+ years)	10	6.4
	Unknown	1	--
Total		**157**	

Table 2. Number of Acute Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2006

Age									
Industry Sector (NAICS Code)	**13-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**Totals**
Agriculture, Forestry, Fishing and Hunting (11)	0	3	1	5	4	2	2	1	**18**
Mining (21)	0	1	0	2	0	0	0	0	**3**
Construction (23)	2	9	4	14	9	3	1	0	**42**
Manufacturing (31-33)	0	2	5	7	5	0	0	0	**19**
Wholesale Trade (42)	0	0	1	4	0	1	0	0	**6**
Retail Trade (44-45)	0	3	1	3	1	0	1	1	**10**
Transportation and Warehousing (48-49)	0	1	5	5	7	1	0	0	**19**
Real Estate and Rental and Leasing (53)	0	0	0	0	1	0	0	0	**1**
Professional, Scientific, and Technical Services (54)	0	0	0	1	1	0	0	0	**2**
Administrative and Support and Waste Management and Remediation Services (56)	1	1	1	2	5	0	1	0	**12**
Educational Services (61)	0	1	0	1	2	0	0	0	**4**
Health Care and Social Assistance (62)	0	1	1	2	2	0	0	0	**6**
Arts, Entertainment, and Recreation (71)	0	0	1	0	0	0	0	0	**1**
Accommodation and Food Services (72)	0	0	0	1	0	3	0	0	**4**
Other Services (except Public Administration) (81)	0	1	0	2	1	1	0	0	**5**
Public Administration (92)	0	1	2	2	0	0	0	0	**5**
Totals	**3**	**24**	**22**	**52**	**38**	**11**	**5**	**2**	**157**

Table 3. Number of Acute Traumatic Work-Related Fatalities by Education Level and Industry Sector, Michigan 2006

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)	2	11.1	9	50.0	6	33.3	1	0.6
Mining (21)	0	--	2	66.7	1	33.3	0	--
Construction (23)	10	23.8	21	50.0	11	26.2	0	--
Manufacturing (31-33)	1	5.3	9	47.4	8	42.1	1	5.3
Wholesale Trade (42)	0	--	3	50.0	2	33.3	1	16.7
Retail Trade (44-45)	3	30.0	5	50.0	2	20.0	0	--
Transportation and Warehousing (48-49)	1	5.3	11	57.9	7	36.8	0	--
Real Estate and Rental and Leasing (53)	0	--	0	--	1	100.0	0	--
Professional, Scientific, and Technical Services (54)	0	--	0	--	0	--	2	100.0
Administrative and Support and Waste Management and Remediation Services (56)	2	16.7	8	66.7	2	16.7	0	--
Educational Services (61)	0	--	1	25.0	3	75.0	0	--
Health Care and Social Assistance* (62)	1	20.0	1	20.0	2	40.0	1	20.0
Arts, Entertainment, and Recreation (71)	0	--	1	100.0	0	--	0	--
Accommodation and Food Services (72)	0	--	1	25.0	3	75.0	0	--
Other Services (except Public Administration) (81)	0	--	2	40.0	2	40.0	1	20.0
Public Administration (92)	0	--	0	--	2	40.0	3	60.0
Total	**20**	**12.8**	**74**	**47.4**	**52**	**33.3**	**10**	**6.4**

* Education level unknown for one individual

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 2006

Day of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation and Warehousing Deaths (NAICS 48-49)		Agriculture, Forestry, Fishing and Hunting Deaths (NAICS 11)		Homicides	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Sunday	15	9.7	3	7.3	0	--	3	16.7	3	16.7	1	9.1
Monday	26	16.9	6	14.6	5	27.8	2	11.1	1	5.6	2	18.2
Tuesday	22	14.3	7	17.1	5	27.8	4	22.2	2	11.1	0	--
Wednesday	32	20.8	12	29.3	4	22.2	2	11.1	5	27.8	1	9.1
Thursday	24	15.6	3	7.3	2	11.1	3	16.7	2	11.1	3	27.3
Friday	22	14.3	7	17.1	1	5.6	2	11.1	4	22.2	2	18.2
Saturday	13	8.4	3	7.3	1	5.6	2	11.1	1	5.6	2	18.2
Total	**154****		**41**[+]		**18**[+]		**18**[++]		**18**		**11**	

* Only industries with 18 or more deaths are included in the table.
** Day of injury was unknown for three deaths.
[+] Day of injury was unknown for one death.
[++] One individual was a homicide victim.

Table 5. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths; by Industry Code*; and for Homicides Separately, by Month of Injury, Michigan 2006

Month of Injury	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation and Warehousing Deaths (NAICS 48-49)		Agriculture, Forestry, Fishing and Hunting Deaths (NAICS 11)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	5	3.2	1	2.4	0	--	0	--	2	11.1	0	--
February	13	8.4	3	7.1	2	11.1	2	11.1	0	--	0	--
March	6	3.9	1	2.4	2	11.1	0	--	1	5.6	0	--
April	14	9.0	4	9.5	0	--	1	5.6	0	--	1	9.1
May	16	10.3	5	11.9	3	16.7	2	11.1	2	11.1	1	9.1
June	14	9.0	3	7.1	1	5.6	3	16.7	3	16.7	1	9.1
July	12	7.7	2	4.8	0	--	0	--	2	11.1	2	18.2
August	22	14.2	5	11.9	8	44.4	3	16.7	0	--	2	18.2
September	11	7.1	4	9.5	1	5.6	1	5.6	1	5.6	2	18.2
October	16	10.3	7	16.7	1	5.6	1	5.6	3	16.7	0	--
November	15	9.7	2	4.8	0	--	2	11.1	1	5.6	2	18.2
December	11	7.1	5	11.9	0	--	3	16.7	3	16.7	0	--
Total	**155****		**42**		**18*****		**18**+**		**18**		**11**	

* Only industries with 18 or more deaths are included in the table.
** Month of injury unknown for two individuals.
*** Month of injury unknown for one individual.
+ One individual was a homicide victim.

Table 6. Number of Acute Traumatic Work-Related Fatalities by Means of Death and Month of Injury, Michigan 2006

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Aircraft	1			2		1		4					**8**
Animal												2	**2**
Asphyxiation							1						**1**
Drowning							1			1			**2**
Electrocution		1			2	1	1	2		3			**10**
Explosion					1			1			1	1	**4**
Fall	1	2	1	2	2	2	2	1	2	4	2	1	**22**[+]
Homicide				1	1	1	2	2	2		2		**11**
Machine		1		1	2	1		4	2	1		2	**14**
Motor Vehicles		3	1	4	4	4	2	2	3	2	3	1	**29**
Struck By	3	5	4	3	4	4	2	5	1	2	1	3	**37**
Suicide				1			1		1		4	1	**8**
Toxic Exposure		1						1		3	2		**7**
Total	**5**	**13**	**6**	**14**	**16**	**14**	**12**	**22**	**11**	**16**	**15**	**11**	**155**[+]

[+] Month of injury unknown for two individuals

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 Periods, Michigan 2006

Time of Day	All Deaths		Construction Deaths (NAICS 23)		Manufacturing Deaths (NAICS 31-33)		Transportation and Warehousing Deaths (NAICS 48-49)		Agriculture, Forestry, Fishing and Hunting Deaths (NAICS 11)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12am-4am	10	7.0	0	--	2	11.8	3	17.6	0	--	3	37.5
4am-8am	21	14.8	4	9.8	4	23.5	6	35.3	0	--	0	--
8am-12pm	38	26.8	11	26.8	5	29.4	4	23.5	4	23.5	1	12.5
12pm-4pm	42	29.6	18	43.9	2	11.8	1	5.9	8	47.1	1	12.5
4pm-8pm	22	15.5	5	12.2	4	23.5	2	11.8	3	17.6	2	25.0
8pm-12am	9	6.3	3	7.3	0	--	1	5.9	2	11.8	1	12.5
Total	**142****		**41**+**		**17**++**		**17*****		**17**+**		**8**+++**	

* Only industries with 18 or more deaths are included in the table.
** Time of injury was unknown for 15 deaths.
*** Time of injury was unknown for one death and one individual was a homicide victim.
+ Time of injury was unknown for one death.
++ Time of injury was unknown for two deaths.
+++ Time of injury was unknown for three deaths.

Table 8. Number and Percent of Acute Traumatic Work-Related Fatalities by County of Injury, Michigan 2006

County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	0	--	Gratiot	1	0.6	Missaukee	0	--
Alger	0	--	Hillsdale	1	0.6	Monroe	0	--
Allegan	1	0.6	Houghton	1	0.6	Montcalm	1	0.6
Alpena	0	--	Huron	2	1.3	Montmorency	0	--
Antrim	0	--	Ingham	3	1.9	Muskegon	1	0.6
Arenac	0	--	Ionia	0	--	Newaygo	1	0.6
Baraga	0	--	Iosco	1	0.6	Oakland	15	9.6
Barry	1	0.6	Iron	0	--	Oceana	0	--
Bay	1	0.6	Isabella	0	--	Ogemaw	0	--
Benzie	0	--	Jackson	5	3.2	Ontonagon	1	0.6
Berrien	3	1.9	Kalamazoo	3	1.9	Osceola	0	--
Branch	0	--	Kalkaska	0	--	Oscoda	0	--
Calhoun	4	2.6	Kent	7	4.5	Otsego	3	1.9
Cass	3	1.9	Keweenaw	0	--	Ottawa	2	1.3
Charlevoix	0	--	Lake	0	--	Presque Isle	0	--
Cheboygan	0	--	Lapeer	0	--	Roscommon	0	--
Chippewa	5	3.2	Leelanau	0	--	Saginaw	4	2.6
Clare	0	--	Lenawee	1	0.6	St. Clair	2	1.3
Clinton	0	--	Livingston	4	2.6	St. Joseph	2	1.3
Crawford	1	0.6	Luce	1	0.6	Sanilac	2	1.3
Delta	1	0.6	Mackinac	0	--	Schoolcraft	0	--
Dickinson	1	0.6	Macomb	12	7.7	Shiawassee	2	1.3
Eaton	2	1.3	Manistee	1	0.6	Tuscola	0	--
Emmet	1	0.6	Marquette	2	1.3	Van Buren	1	0.6
Genesee	4	2.6	Mason	1	0.6	Washtenaw	12	7.7
Gladwin	0	--	Mecosta	1	0.6	Wayne	27	17.3
Gogebic	0	--	Menominee	2	1.3	Wexford	1	0.6
Grand Traverse	1	0.6	Midland	1	0.6	Unknown	1	0.6

Table 9. Number of Acute Traumatic Work-Related Fatalities by Industry Sector, Michigan, 2006

NAICS Code	Number Of Deaths	Percent	Number Of Employees*	2006 Michigan Rate[a]
Agriculture, Forestry, Fishing and Hunting (11)	**18**	**11.5**	**79,883**	**22.5**
Crop Production (111)	8	5.1	50,170	15.9
Animal Production (112)	5	3.2	29,713	16.8
Forestry and Logging (113)	4	2.5	4,094	97.7
Support Activities for Agriculture and Forestry (115)	1	0.6	11,156	9.0
Mining (21)	**3**	**1.9**	**6,500**	**46.2**
Mining (except Oil and Gas) (212)	1	0.6	**	
Support Activities for Mining (213)	2	1.3	**	
Construction (23)[+]	**42**	**26.8**	**180,100**	**23.3**
Construction of Buildings (236)	8	5.1	43,500	18.4
Heavy and Civil Engineering Construction (237)	9	5.7	17,900	50.3
Specialty Trade Contractors (238)	24	15.3	118,700	20.2
Manufacturing (31-33) [+]	**19**	**12.1**	**648,400**	**2.9**
Food Manufacturing (311)	2	1.3	32,900	6.1
Wood Product Manufacturing (321)	1	0.6	13,167	7.6
Non-metallic Mineral Product Manufacturing (327)	4	2.5	14,900	26.8
Primary Metal Manufacturing (331)	2	1.3	26,100	7.7
Fabricated Metal Product Manufacturing (332)	1	0.6	84,100	1.2
Machinery Manufacturing (333)	2	1.3	74,400	2.7
Transportation Equipment Manufacturing (336)	5	3.2	217,700	2.3
Miscellaneous Manufacturing (339)	1	0.6	18,000	5.6
Wholesale Trade (42)	**6**	**3.8**	**170,800**	**3.5**
Merchant Wholesalers, Durable Goods (423)	2	1.3	98,000	2.0
Merchant Wholesalers, Nondurable Goods (424)	3	1.9	48,600	6.2
Wholesale Trade Agents and Brokers (425)	1	0.6	**	
Retail Trade (44-45)	**10**	**6.4**	**495,600**	**2.0**
Motor Vehicle and Parts Dealers (441)	4	2.5	58,500	6.8
Building Material, Garden Equipment, Supplies Dealers (444)	2	1.3	44,600	4.5
Food and Beverage Stores (445)	3	1.9	82,200	3.6
Gasoline Stations (447)	1	0.6	25,400	3.9
Transportation and Warehousing (48-49)	**19**	**12.1**	**107,700**	**17.6**
Air Transportation (481)	2	1.3	14,300	14.0
Rail Transportation (482)	1	0.6	4,700	21.3
Truck Transportation (484)	12	7.6	38,800	30.9
Transit and Ground Passenger Transportation (485)	2	1.3	**	
Support Activities for Transportation (488)	2	1.3	**	

NAICS Code	Number Of Deaths	Percent	Number Of Employees*	2006 Michigan Rate[a]
Real Estate and Rental and Leasing (53)	**1**	**0.6**	**54,700**	**1.8**
Real Estate (531)	1	0.6	37,700	2.7
Professional, Scientific, and Technical Services (54)	**2**	**1.3**	**246,100**	**0.8**
Professional, Scientific, and Technical Services (541)	2	1.3	29,200	6.8
Administrative and Support and Waste Management and Remediation Services (56)	**12**	**7.6**	**279,200**	**4.3**
Administrative and Support Services (561)	10	6.4	**	
Waste Management and Remediation Services (562)	2	1.3	**	
Educational Services (61)	**4**	**2.5**	**433,000**	**0.9**
Educational Services (611)	4	2.5	433,000	0.9
Health Care and Social Assistance (62)	**6**	**3.8**	**535,700**	**1.1**
Ambulatory Health Care Services (621)	2	1.3	172,100	1.1
Hospitals (622)	3	1.9	211,900	1.4
Nursing and Residential Care Facilities (623)	1	0.6	92,100	1.1
Arts, Entertainment, and Recreation (71)	**1**	**0.6**	**62,000**	**1.6**
Performing Arts, Spectator Sports, and Related Industries (711)	1	0.6	9,200	10.9
Accommodation and Food Services (72)	**4**	**2.5**	**345,400**	**1.2**
Accommodation (721)	1	0.6	35,300	2.8
Food Services and Drinking Places (722)	3	1.9	310,100	1.0
Other Services (except Public Administration) (81)	**5**	**3.2**	**178,100**	**2.8**
Repair and Maintenance (811)	2	1.3	40,000	5.0
Personal and Laundry Services (812)	2	1.3	40,300	5.0
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	1	0.6	97,800	1.0
Public Administration (92)	**5**	**3.2**	**315,000**	**1.6**
Justice, Public Order, and Safety Activities (922)	5	3.2	**	
Totals	**157**		**4,138,183**	**3.9**

*Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. www.nass.usda.gov/census/. November 22, 2004.For Agriculture and Other Industry Categories: Land Policy Institute, Michigan State University, Report # 2007-06. www.landpolicy.msu.edu/. Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2006. www.milmi.org/cgi/dataAnalysis/, October 17, 2007.

[a] Rates calculated per 100,000 workers.

** No Data provided on IES report.

[+] Industry subsector unknown for one individual.

Table 10. Number and Rate of Acute Traumatic Work-Related Fatalities by Industry Sector, Michigan Rates Compared to US Rates, Michigan 2006

Industry Sector* (NAICS Code)	Number of Fatalities	2006 Michigan Rate	2006 US Rate **
Agriculture, Forestry, Fishing and Hunting (11)	18	22.5	29.6
Mining (21)	3	46.2	27.8
Construction (23)	42	23.3	10.8
Manufacturing (31-33)	24	2.9	2.7
Wholesale Trade (42)	6	3.5	4.8
Retail Trade (44-45)	10	2.0	2.1
Transportation and Warehousing (48-49)	19	17.6	16.3
Real Estate and Rental and Leasing (53)	1	1.8	**
Professional and Business Services (54, 56)	14	4.3	3.1
Educational and Health Services (61, 62)	10	1.0	0.9
Leisure and Hospitality (71, 72)	5	1.2	2.2
Other Services (except Public Administration) (81)	5	2.8	2.5
Public Administration (92)	5	1.6	2.3
Total	**157**	**3.9**	**3.9**

*Source: For Agriculture: USDA, National Agricultural Statistics Service. 2002 Census of Agriculture, AC-02-A-51, June 2004. www.nass.usda.gov/census/. November 22, 2004.For Agriculture and Other Industry Categories: Land Policy Institute, Michigan State University, Report # 2007-06. www.landpolicy.msu.edu/. Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2006. www.milmi.org/cgi/dataAnalysis/, October 17, 2007.

** Bureau of Labor Statistics News, United States Department of Labor, USDL 07-1202, Release Date: August 9, 2007. http://www.bls.gov/iif/home.htm

[a] Rates calculated per 100,000 workers.

Table 11. Number of Acute Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2006

Industry Sector (NAICS Code)	Aircraft	Animal	Asphyxiation	Drowning	Electrocution	Fall	Fire/Explosion	Homicide	Machine	Motor Vehicle	Struck By	Suicide	Toxic Exposure	Total
Agriculture, Forestry, Fishing and Hunting (11)		2			1	1			1	2	11			**18**
Mining (21)				1		1			1					**3**
Construction (23)				1	5	13	2		3	5	10	1	2	**42**
Manufacturing (31-33)	3				1	3	1		7		4			**19**
Wholesale Trade (42)						1				4	1			**6**
Retail Trade (44-45)						2			1	2				**10**
Transportation and Warehousing (48-49)	1					1		5	1	9	5	1		**19**
Real Estate and Rental and Leasing (53)								1		1				**1**
Professional, Scientific, and Technical Services (54)												1	1	**2**
Administrative and Support and Waste Management and Remediation Services (56)					2					2	4		4	**12**
Educational Services* (61)	2					1				1				**4**
Health Care and Social Assistance (62)			1			1				2		2		**6**
Arts, Entertainment, and Recreation (71)											1			**1**
Accommodation and Food Services (72)								3				1		**4**
Other Services (except Public Administration) (81)					1		1	1				2		**5**
Public Administration (92)	2							1		1	1			**5**
Total	**8**	**2**	**1**	**2**	**10**	**24**	**4**	**11**	**14**	**29**	**37**	**8**	**7**	**157**

Table 12. Number of Acute Traumatic Work-Related Fatalities by Standard Occupational Code (SOC), Michigan 2006

SOC Number	SOC Classification	Number of Deaths	Percent
11	**Management Occupations**	**22**	**14.4**
11-1000	**Top Executives**		
11-1011	Chief Executive	1	
11-1021	General and Operations Managers	3	
11-3000	**Operations Specialties Managers**		
11-3071	Transportation, Storage, and Distribution Managers	1	
11-9000	**Other Management Occupations**		
11-9012	Farmers and Ranchers	7	
11-9021	Construction Managers	2	
11-9051	Food Service Managers	2	
11-9199	Managers, All Other	6	
15	**Computer and Mathematical Occupations**	**1**	**0.7**
15-2000	**Statisticians**		
15-2041	Statistician	1	
17	**Architecture and Engineering Occupations**	**3**	**2.0**
17-2000	**Engineers**		
17-2141	Mechanical Engineers	1	
17-3000	**Drafters, Engineering, and Mapping Technicians**		
17-3022	Civil Engineering Technicians	1	
17-3031	Surveying and Mapping Technicians	1	
23	**Legal Occupations**	**2**	**1.3**
23-1000	**Lawyers, Judges, and Related Workers**		
23-1011	Lawyers	2	
25	**Education, Training, and Library Occupations**	**2**	**1.3**
25-1000	**Post-Secondary Teachers**		
25-1194	Vocational Education Teachers, Postsecondary	1	
25-3000	**Other Teachers and Instructors**		
25-3021	Self-Enrichment Education Teachers	1	
29	**Healthcare Practitioners and Technical Occupations**	**3**	**2.0**
29-1000	**Health Diagnosing and Treating Practitioners**		
29-1063	Internist, General	1	
29-1111	Registered Nurses	2	
31	**Healthcare Support Occupations**	**2**	**1.3**
31-1000	**Nursing, Psychiatric, and Home Health Aides**		
31-1012	Nursing Aides, Orderlies, and Attendants	1	
31-9000	**Other Health Care Support Occupations**		
31-9099	Health Care Support Workers, All Other	1	
33	**Protective Services Occupations**	**8**	**5.2**
33-1000	**First Line Supervisors/Managers, Protective Service Workers**		

SOC Number	SOC Classification	Number of Deaths	Percent
33-1012	First Line Supervisors/Managers of Police and Detectives	1	
33-2000	**Fire Fighting and Prevention Workers**		
33-2011	Fire Fighters	1	
33-3000	**Law Enforcement Workers**		
33-3051	Police and Sheriff's Patrol Officers	1	
33-9000	**Other Protective Service Workers**		
33-9032	Security Guards	5	
35	**Food Preparation and Serving Related Occupations**	**1**	**0.7**
35-1000	**Supervisors, Food Preparation and Serving Workers**		
35-1012	First Line Supervisors/Managers of Food Preparation and Serving Workers	1	
37	**Building and Grounds Cleaning and Maintenance Occupations**	**6**	**3.9**
37-2000	**Building Cleaning and Pest Control Workers**		
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1	
37-3000	**Grounds Maintenance Workers**		
37-3011	Landscaping and Groundskeeping Workers	1	
37-3013	Tree Trimmers and Pruners	3	
37-3019	Grounds Maintenance Workers, All Others	1	
39	**Personal Care and Service Occupations**	**1**	**0.7**
39-6000	**Transportation, Tourism, and Lodging Attendants**		
39-6011	Baggage Porters and Bellhops	1	
41	**Sales and Related Occupations**	**5**	**3.3**
41-1000	**Supervisors, Sales Workers**		
41-1011	First Line Supervisors/Managers of Retail Sales Workers	1	
41-3000	**Sales Representatives, Services**		
41-3099	Sales Representatives, Services, All Other	1	
41-4000	**Sales Representatives, Wholesale and Manufacturing**		
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1	
41-9000	**Other Sales and Related Workers**		
41-9099	Sales and Related Workers, All Other	2	
45	**Farming, Fishing, and Forestry Occupations**	**9**	**5.9**
45-2000	**Agricultural Workers**		
45-2091	Agricultural Equipment Operators	2	
45-2092	Farm Workers and Laborers, Crop, Nursery, and Greenhouse	1	
45-2093	Farm Workers, Farm and Ranch Animals	1	
45-4000	**Forest, Conservation, and Logging Workers**		
45-4021	Fallers	4	
45-4022	Logging Equipment Operators	1	
47	**Construction and Extraction Occupations**	**30**	**19.6**
47-1000	**Supervisors, Construction and Extraction Workers**		
47-1011	First-Line Supervisors/Managers of Construction Trades and	1	

SOC Number	SOC Classification	Number of Deaths	Percent
	Extraction Workers		
47-2000	**Construction Trades Workers**		
47-2031	Carpenters	3	
47-2061	Construction Laborers	7	
47-2071	Paving, Surfacing, and Tamping Equipment Operators	1	
47-2073	Operating Engineers and Other Construction Equipment Operators	2	
47-2081	Drywall and Ceiling Tile Installers	1	
47-2111	Electricians	2	
47-2141	Painters, Construction and Maintenance	1	
47-2152	Plumbers, Pipefitters, and Steamfitters	2	
47-2181	Roofers	1	
47-2211	Sheet Metal Workers	1	
47-2221	Structural Iron and Steel Workers	1	
47-3000	**Helpers, Construction Trades**		
47-3016	Helpers-Roofers	2	
47-4000	**Other Construction and Related Workers**		
47-4099	Construction and Related Workers, All Others	1	
47-5000	**Extraction Workers**		
47-5049	Mining Machine Operators, All Other	1	
47-5081	Helpers, Extraction Workers	2	
47-5099	Extraction Workers, All Other	1	
49	**Installation, Maintenance, and Repair Occupations**	**12**	**7.8**
49-1000	**Supervisors of Installation, Maintenance, and Repair Workers**		
49-1011	First Line Supervisors/Managers of Mechanics, Installers, and Repairers	2	
49-3000	**Vehicle and Mobile Equipment Mechanics, Installers, and Repairers**		
49-3023	Automotive Service Technicians and Mechanics	1	
49-3041	Farm Equipment Mechanics	1	
49-9000	**Other Installation, Maintenance, and Repair Occupations**		
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics	2	
49-9041	Industrial Machinery Mechanics	1	
49-9042	Maintenance and Repair Workers, General	1	
49-9044	Millwrights	1	
49-9051	Electrical Power Line Installers and Repairers	1	
49-9052	Telecommunications Line Installers and Repairers	1	
49-9099	Installation, Maintenance, and Repair Workers, All Other	1	
51	**Production Operations**	**9**	**5.9**
51-3000	**Food Processing Workers**		
51-3093	Food Cooking Machine Operators and Tenders	1	
51-4000	**Metal Workers and Plastic Workers**		
51-4032	Drilling and Boring Machine Tool Setters, Operators,	1	

SOC Number	SOC Classification	Number of Deaths	Percent
	and Tenders, Metal and Plastic		
51-4111	Tool and Die Makers	1	
51-4121	Welders, Cutters, Solderers, and Brazers	1	
51-4199	Metal Workers and Plastic Workers, All Other	1	
51-7000	**Woodworkers**		
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	1	
51-9000	**Other Production Occupations**		
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	1	
51-9123	Painting, Coating, and Decorating Workers	1	
51-9198	Helpers – Production Workers	1	
53	**Transportation and Material Moving Occupations**	**37**	**24.2**
53-2000	**Air Transportation Workers**		
53-2011	Air Line Pilots, Copilots, and Flight Engineers	2	
53-2012	Commercial Pilots	1	
53-3000	**Motor Vehicle Operators**		
53-3032	Truck Drivers, Heavy and Tractor-Trailer	21	
53-3033	Truck Drivers, Light or Delivery Services	2	
53-3041	Taxi Drivers and Chauffeurs	2	
53-3099	Motor Vehicle Operators, All Other	2	
53-4000	**Rail Transportation Workers**		
53-4031	Railroad Conductors and Yardmasters	1	
53-6000	**Other Transportation Workers**		
53-6031	Service Station Attendants	1	
53-7000	**Material Moving Workers**		
53-7051	Industrial Truck and Tractor Operators	5	
Total*		**153**	

* Standard Occupational Code unknown for four individuals.

Table 13. Number and Percent of Acute Traumatic Work-Related Fatalities by Means of Death, Michigan 2006

Means of Death	Number of Deaths	Percent
Aircraft	8 (4)*	5.1
Animal	2	1.3
Asphyxiation	1	0.6
Drowning	2	1.3
Electrocution	10	6.4
Explosion	4	2.5
Fall	24	15.3
Homicide	11	7.0
Machine-Related	14	8.9
Motor Vehicles	29	18.5
Struck By	37	23.6
Suicide	8	5.1
Toxic Exposure	7	4.5

*Number in parentheses is the number of incidents.

Table 14. Narrative Case Number by Means of Death and Industry Sector, Michigan 2006

Industry Sector (NAICS Code)	Narrative Case Number
Agriculture, Forestry, Fishing, and Hunting (11)	
Animal	9, 10
Electrocution	23
Fall	51
Machine-Related	73
Motor-Vehicle Related	101, 102
Struck By	106-116
Mining (21)	
Drowning	13
Fall	47
Machine-Related	74
Construction (23)	
Drowning	12
Electrocution	14-18
Explosion	24, 25
Fall	28-40
Machine-Related	70-72
Motor Vehicle-Related	86-90
Struck By	117-126
Suicide	147
Toxic Exposure	155, 156
Manufacturing (31-33)	
Aircraft	4-6
Electrocution	21
Explosion	26
Fall	41-43
Machine-Related	63-69
Struck By	136-139
Wholesale Trade (42)	
Fall	50
Motor Vehicle-Related	91-94
Struck By	140

Industry Sector (NAICS Code)	Narrative Case Number
Retail Trade (44-45)	
Fall	44, 45
Homicide	52-56
Machine-Related	75
Motor Vehicle-Related	95, 96

Transportation and Warehousing (48-49)	
Aircraft	8
Fall	46
Homicide	61
Machine-Related	76
Motor Vehicle-Related	77-85
Struck By	127-131
Suicide	148

Real Estate and Rental and Leasing (53)	
Motor Vehicle-Related	103

Professional, Scientific, and Technical Services (54)	
Suicide	149
Toxic Exposure	157

Administrative and Support and Waste Management and Remediation Services (56)	
Electrocution	19, 20
Motor Vehicle-Related	97, 98
Struck By	132-135
Toxic Exposure	151-154

Educational Services (61)	
Aircraft	1, 7
Fall	48
Motor Vehicle	104

Health Care and Social Assistance (62)	
Asphyxiation	11
Fall	49
Motor Vehicle-Related	99, 100
Suicide	143, 144

Arts, Entertainment, and Recreation (71)	
Struck By	141

Industry Sector (NAICS Code)	Narrative Case Number
Accommodation and Food Service (72)	
Homicide	57-59
Suicide	150
Other Services (Except Public Administration) (81)	
Electrocution	22
Fire/Explosion	27
Homicide	60
Suicide	145, 146
Public Administration (92)	
Aircraft	2, 3
Homicide	62
Motor Vehicle-Related	105
Struck By	142

Figure 1. Annual Number of Acute Traumatic Work-Related Fatalities, Michigan 2006

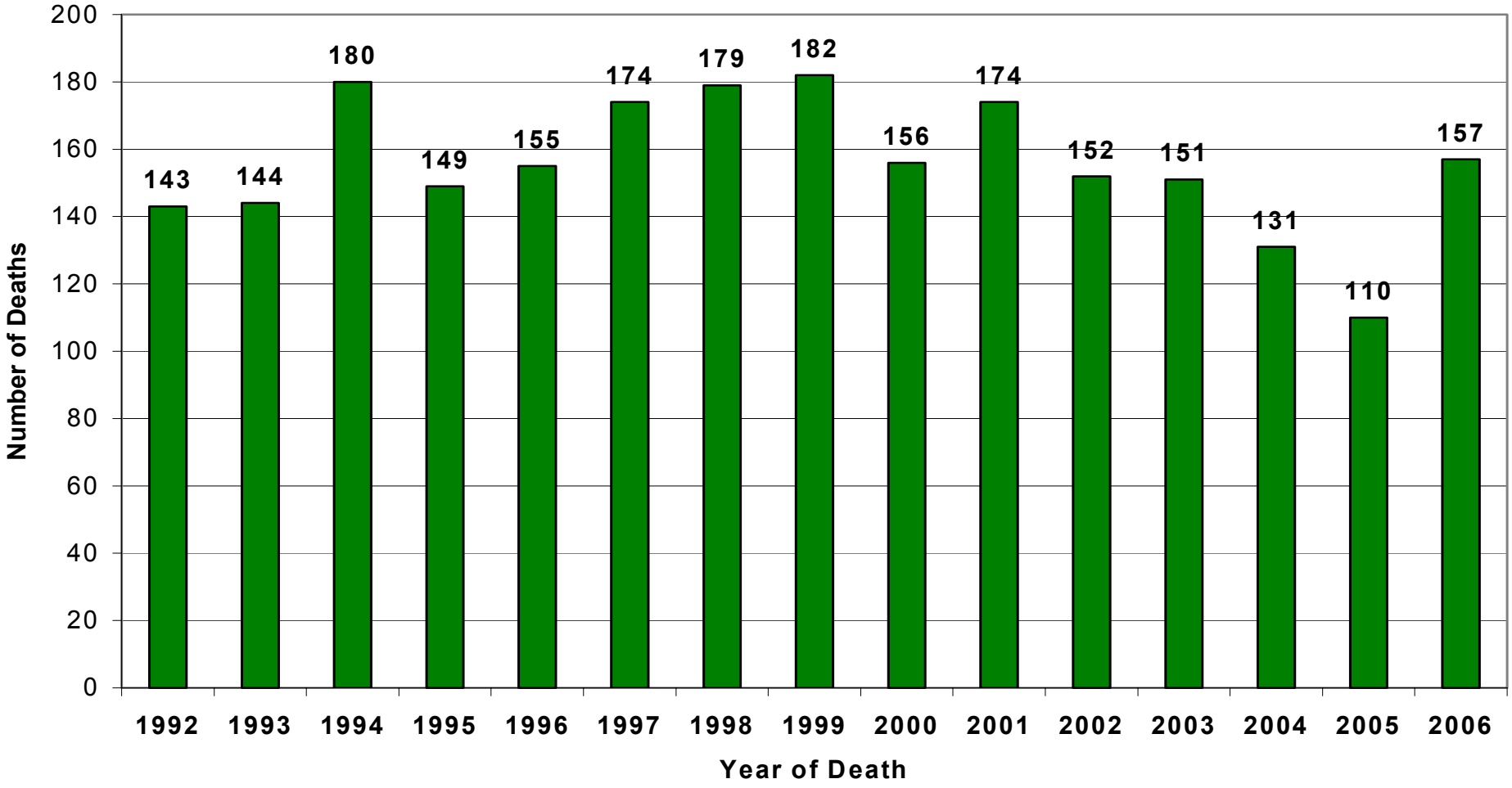


Figure 2. Age Distribution of 157Acute Traumatic Work-Related Fatali
Michigan 2006

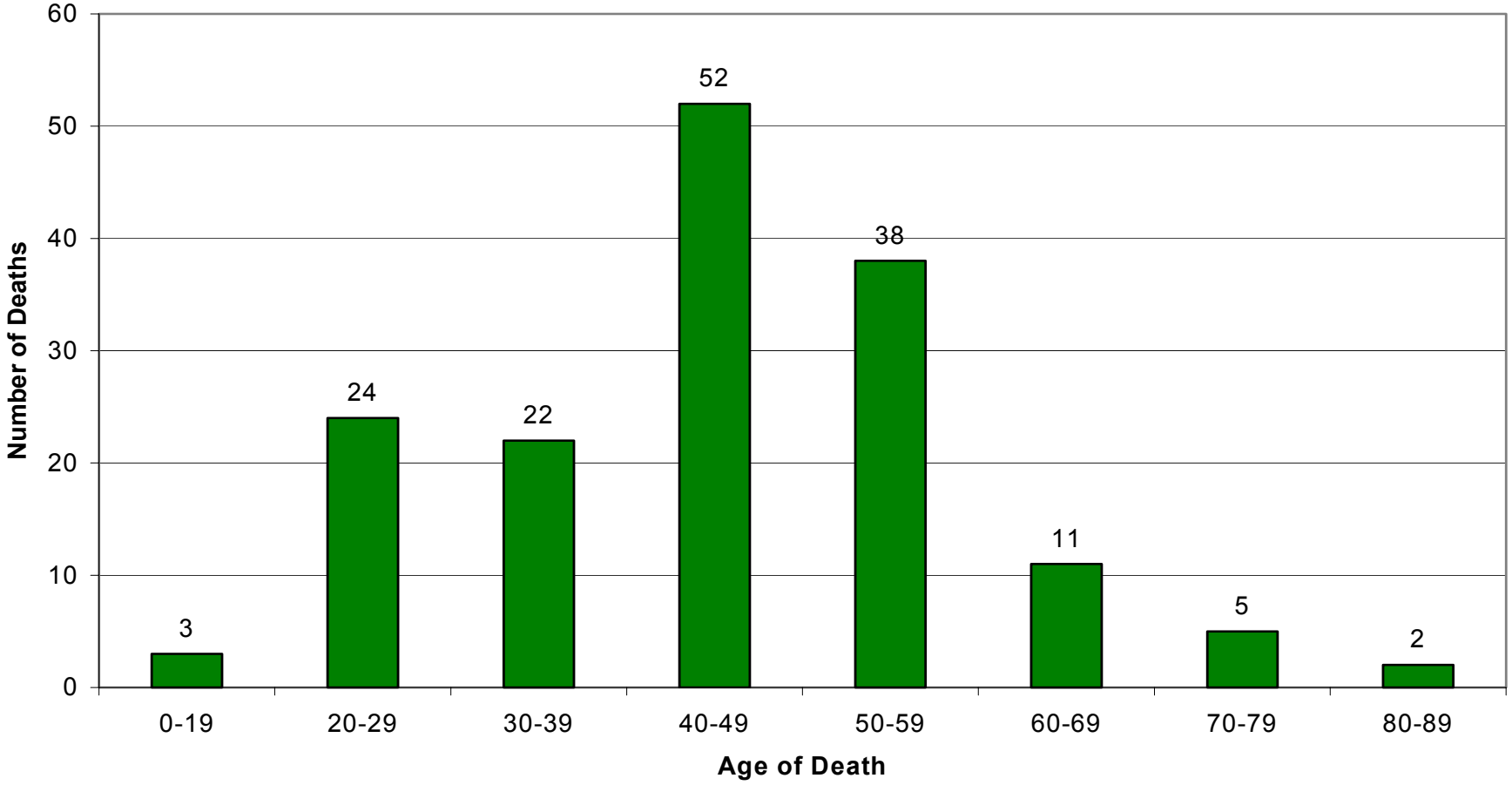


Figure 3. County Distribution of 157 Acute Traumatic Work-Related Fatalities by County of Injury, Michigan 2006

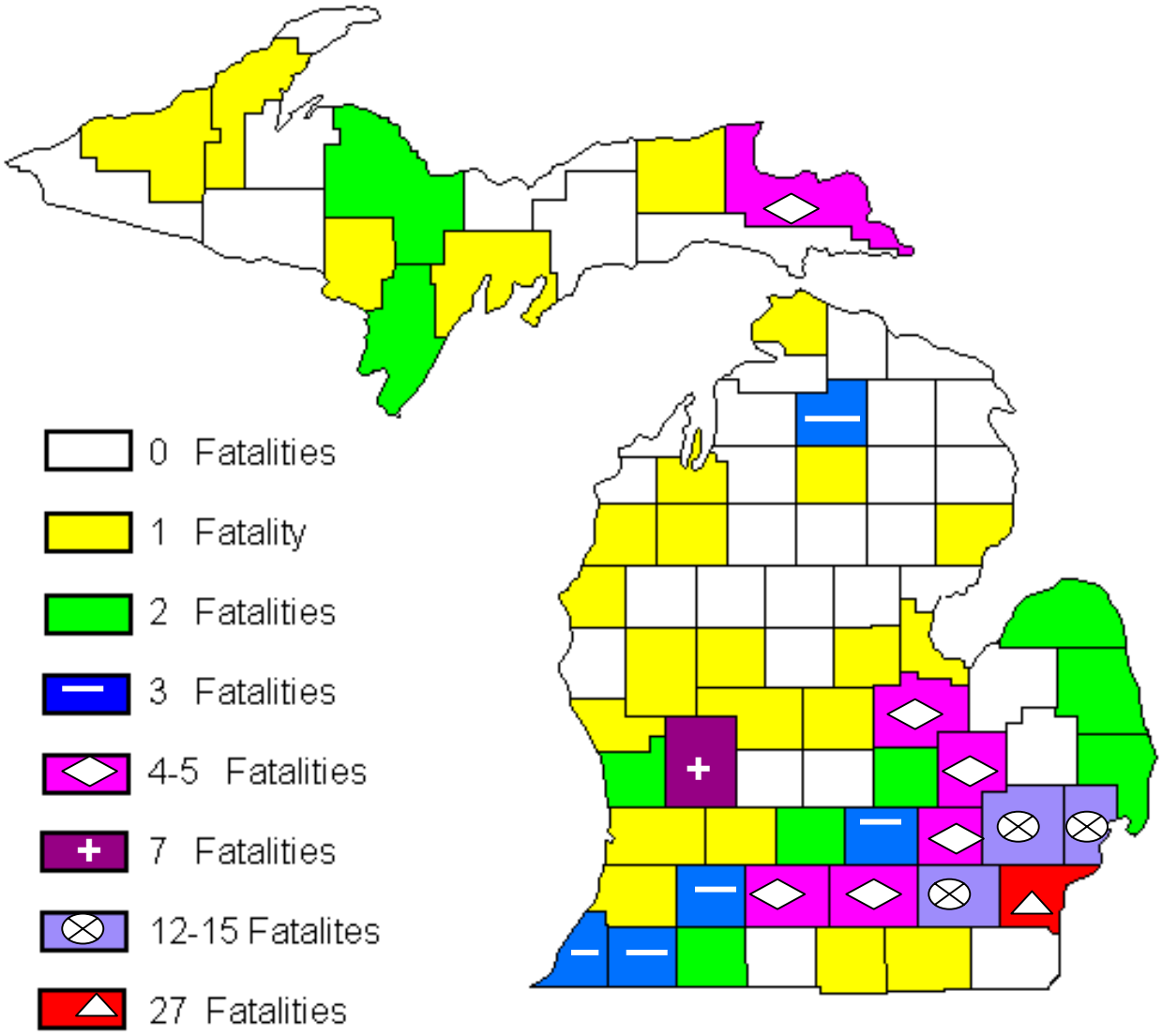
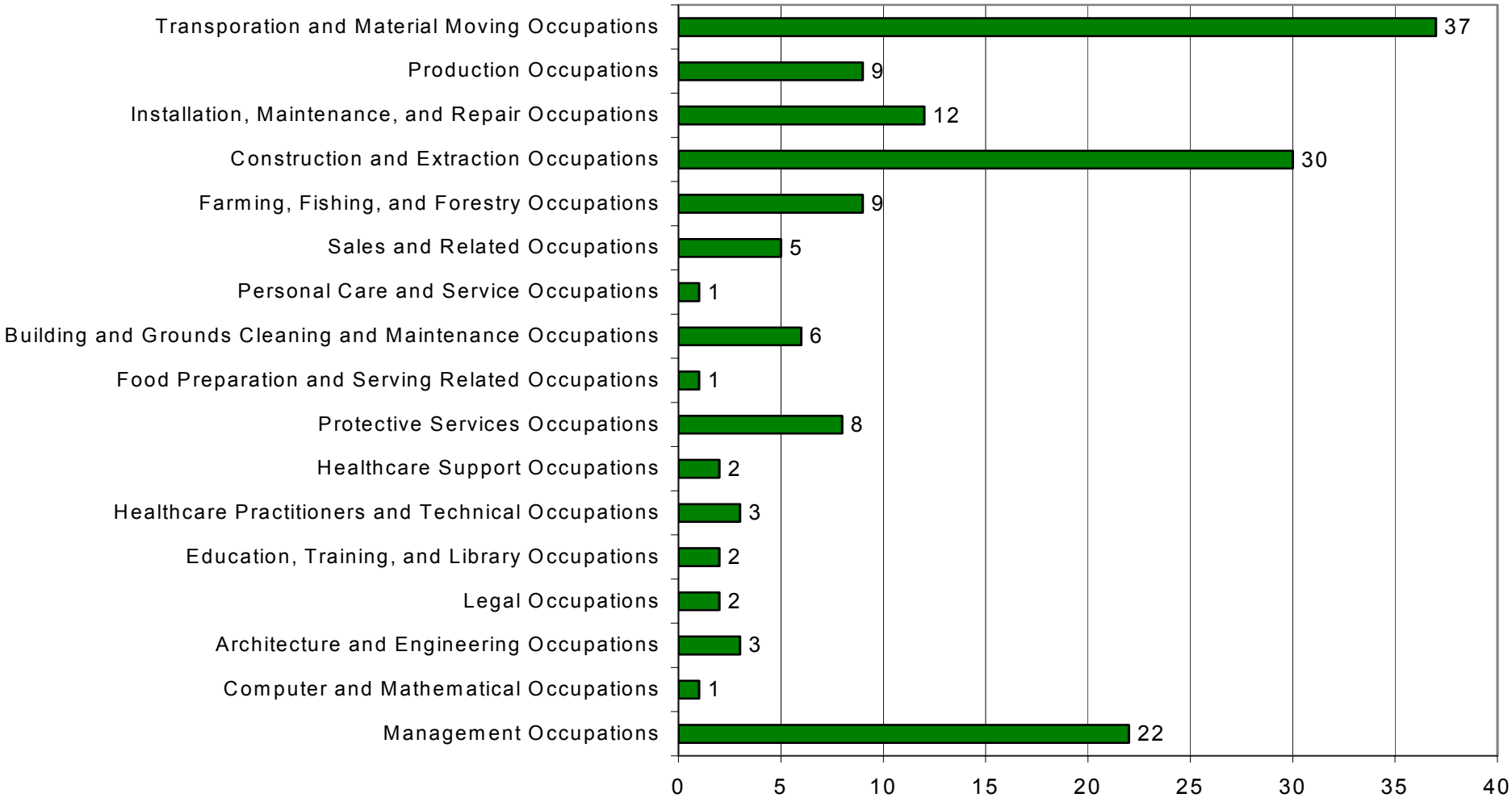


Figure 4. Acute Traumatic Work-Related Fatalities by Occupation, Michigan 2006



Appendix I

2006 Acute Traumatic Work-Related Fatality Narratives by Cause of Death

AIRCRAFT (8)

Case 1
51-year-old male flight instructor died of multiple blunt force injuries following an airplane crash. His student was a licensed commercial pilot. They were practicing touch and go takeoffs and landings at a county airport in a single-engine plane. Witnesses stated that during previous pre-descent traffic patterns, the airplane was making steep bank turns that were not necessary for normal flight. The plane crashed 100 yards short of the runway. The National Transportation Safety Board determined that the probable cause(s) of the incident included the excessive bank angle executed by the flight crew, their failure to maintain airspeed during the turn (which led to the inadvertent stall and crash) and low altitude.

Cases 2-3
44-year-old male police chief and a 28-year-old male fire captain piloting a two-seat helicopter died when the helicopter crashed due to an engine stall. The helicopter, which was owned by the fire captain, was being used in the pursuit of a fugitive. Federal Aviation Administration inspectors obtained fuel samples from the fire captain's refueling storage tank at his residence and an additional fuel sample from the helicopter's fuel tanks. The fuel storage tank at the residence was located above ground under the eaves of a pole building. No gutters were present on the building. Watermarks on the ground revealed that water from the roof fell on top of the storage tank. The collected samples were taken to an aerospace fuels laboratory. The laboratory reported that the liquid from the helicopter's fuel tanks "consisted of an organic layer and an aqueous layer." Aqueous layers were also found in the liquid samples from the storage tank.

Cases 4-7
23-year-old male pilot and three employees from the same company, a 30-year-old male company vice president, 47-year-old male chief mechanic, and a 59-year-old male fleet safety director were killed when the twin-engine plane they were aboard was destroyed during a ground fire following an in-flight collision with the ground while attempting to land at an airport.

Case 8
56-year-old male owner/operator of a construction company died when the single engine plane he was piloting crashed into trees approximately 2,000 feet from an airfield runway. He reported problems with the engine prior to crashing. The plane caught fire and burned after the crash. The airplane was being flown on its first flight after an annual inspection.

ANIMAL (2)

Case 9
23-year-old Hispanic female farm laborer was killed after being kicked and trampled by a dairy cow as it was being moved into the milking area. A fellow employee entered the milking parlor to complete his chores and found the decedent. Standard work practice required workers to stay in a "pit area" to move the cows into the milking area to complete the milking process. The decedent may have had difficulty moving the cow into the milking area from the pit area. She left the pit area and used a pipe to help move the cow along. The medical examiner indicated the decedent had been kicked in the head and subsequently sustained several injuries to her body consistent with those inflicted by a cow.

Case 10
76-year-old male farmer was injured when a heifer struck him as they were walking in an alley toward the loading chute to a livestock trailer. The alley was "L" shaped. One side of the alley consisted of the wooden barn wall with concrete support posts and a concrete quarter-wall slab. The other side of the alley was constructed of portable wooden gates made of two-inch by six-inch pieces of lumber. The livestock trailer was at the front of the barn. In order to be loaded into the trailer, the heifer entered the alley from the yard through a barn door, walked down a 36-foot alley, made a 90-degree right turn, walked down a 23-foot alley, and then was directed by an angled portable gate into the livestock trailer. The incident occurred in the first section of the 36-foot alley. It appears that the heifer may have kicked the decedent and he lost his balance, or the heifer first contacted the decedent in another way, which caused the decedent to fall. The heifer then kicked the decedent after he fell. The hauler heard the commotion inside of the barn and discovered the decedent on the floor. He called 911 and emergency response arrived. 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. In the Industry drop down menu, select Agriculture (11). In the Fatality Type drop down menu, select Animal. Click the Search Button, and then scroll down to Investigation Report #06MI205.

ASPHYXIATION (1)

Case 11
27-year-old male was receiving job-training instruction at a group home. He choked on a piece of food that had a piece of plastic wrap on it.

DROWNING (2)

Case 12
18-year-old male construction laborer drowned while attempting to assist coworkers in saving an individual whose vehicle was submerged in a pond. The decedent and his two coworkers were returning to the home office after meeting with a potential client. His coworkers entered the water in an attempt to rescue the driver of the vehicle. They instructed the decedent to get a hammer out of the truck. The decedent entered the water with the hammer to allow his coworkers to break the vehicle's window. As he was bringing them the hammer, his coworkers pulled the individual out of the vehicle. The decedent could not swim and drowned as he was

trying to bring the hammer to his coworkers.

Case 13
45-year-old male dredge operator drowned when the modified floating clamshell dredge he was operating capsized. The decedent worked at a surface sand and gravel mining operation. The dredge was actively mining in a pit area in approximately 115 feet of water. The dredge had been used beyond the manufacturer's intended design capacities. It appears that during the dredge operation, the dredge capsized by rotating around the operator's side. The Mine Safety and Health Administration (MSHA) conducted a site investigation. The MSHA written report may be found on the MSHA website at: www.msha.gov. Click on Fatalgrams/Reports, and then click on All Fatalities in the Metal/Nonmetal Mine Fatalities section. Click on 2006, and then Fatality #22.

ELECTROCUTION (10)

Case 14
27-year-old male sider died when he contacted a 7,000-volt energized power line with his hands. He contacted the power line after losing his balance on the scaffold he and his partner were working from. The day was windy, but it is unknown if the wind was a factor in the decedent's losing his balance. The energized power line was located three to five feet from where the siders were installing vinyl siding on the second story of a newly constructed home. When the decedent's partner realized he had grabbed an energized power line, he attempted to hit or push him to break his hold. The decedent was released from the power line and fell to the ground. His partner ran to a nearby residence to call 911. A passing motorist who had witnessed the event while stopped in traffic assisted until emergency personnel arrived. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 138.

Case 15
68-year-old male self-employed truck driver was electrocuted when the dump box of his truck contacted an overhead power line energized to 7,200 volts. The decedent was delivering a load of stone to a home for a driveway. The decedent backed his truck into the driveway, and then exited the vehicle and pulled the dump lever to dump the load. While holding the lever, the dump box rose up and contacted two electrical wires that led to the home.

Case 16
34-year-old Hispanic male journeyman electrician was fatally electrocuted when he contacted bus-bars energized to 7,200 Kvs while walking on the steel structure of a new, non-energized electrical substation. The decedent was a member of a three-person crew who were wiring a new electrical substation. The decedent was directed to run the transformer drops. The decedent asked the supervisor if he should check the substation's security lights so the crew would not have to check them the next day in the dark. His supervisor agreed and directed the decedent to take a ladder and tape off the security lights' photocells so that the lights would come on during the daylight. The decedent went to the electrical panel and ran the secondary leads from the AC

power transformer to the top of the panel. He took a short extension cord (pig tail) and wired the (red) hot wire into the secondary lead from the station AC power transformer. The decedent then wired the neutral (white) into the circuit for lighting and then connected the plug end of the pigtail into an extension cord from the work trailer on site. At this point, the panel became energized and back fed 110-volts through the transformer, which boosted the voltage to 7,200 Kv. The decedent climbed a ladder to cover the photocells on one corner of the structure. Instead of climbing down the ladder and moving the ladder to another light location, he climbed across the structure to another corner to cover the light in this location. The decedent contacted an energized bus bar and fell 15 feet to the ground. His coworkers heard him yell and found him on the ground. One of his coworkers initiated CPR while the supervisor ran to the road via the substation's hidden driveway to get a cell phone signal so he could call 911. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 115.

Case 17

57-year-old male master electrician was electrocuted after contacting 12,447 volts when working in a switchgear cubicle installing the control wiring for the new generator building. Company A was the owner of the equipment involved and was the controlling employer over this project. An electrician of Company A was shutting down the electrical power to the overall worksite. Company B personnel were in the process of shutting down a substation to de-energize the feeders to Company A switchgear thus allowing Company C (decedent's employer) to install the control wiring in seven switchgear cubicles for a new generator building. On the day of the incident, Company C employees (the decedent and his coworker) waited for Company A's electrician to arrive and open the door at the Company A's primary switchgear building. Company A employee opened the switchgear and shut down power for the outage. Company B employees walked into the switch house to check that the Company A #1, #2, and #3 switchgears were open. Company B verified that they were open and then left the switch house to continue following the switching order to shut down the substation. Meanwhile, all the doors and screen doors to all the switchgear (Company A #1, #2, #3, tie breaker and generator breaker) were opened. The decedent was not wearing lineman gloves and was wearing a baseball cap. No testing was performed to ensure that the electricity was shut off to the switchgear where the decedent was performing work. The decedent's coworker told the decedent that he was going to start removing the cable raceway cover in the tie breaker switchgear. The decedent began work on Company A's #1 switchgear. He removed the bolts from the raceway cover and then contacted the energized phase of the transformer in the bottom of the #1 switchgear. The decedent's coworker and a Company A electrician heard the explosion and saw the arc flash. Both individuals ran to the decedent and saw him slouched over the A phase transformer. The decedent was on fire and his coworker and an employee of Company B who came from the substation to the switchgear building patted him down to extinguish the fire out and then pulled the decedent out of the cubicle. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 130.

Case 18
16-year-old male church youth group member was electrocuted when the aluminum extension ladder he was holding contacted an energized overhead power line. The youth group was assisting the youth pastor in the renovation of his home so it could be sold to finance a mission trip. The pastor and the decedent had been scraping old paint from and applying new paint to the roof peak trim. The ladder they were using to access the work area was extended past 29 feet. They needed to move the aluminum extension ladder to another work location. It appears that both the pastor and the decedent were standing on the grassy ground and maneuvering the ladder when the ladder came into contact with a nearby energized overhead power line.

Case 19
22-year-old male company-certified line clearance tree trimmer was electrocuted while trimming branches from a pine tree that was overgrown into a 4,800-volt power line. The victim was wearing a hardhat, safety harness, climbing spurs, and lightweight work gloves consisting of jersey (cotton) with leather backing. It is unknown if he was wearing safety glasses. The crew had arrived the day prior to the incident date and performed a site survey. On the night before the incident, it had rained and the pine trees were still wet. The overhead power line was in contact with the trunk of the tree the victim was cutting. The decedent was a member of a four-person crew; two crewmembers were certified line clearance tree trimmers. One coworker was in a tree to the decedent's east, one coworker was in a tree to his west, and one crewmember was responsible for clearing the site of tree debris and feeding the debris to the chipper. On the day of the incident, the crew worked for approximately two hours and then went on break. They commented to a homeowner who was working outside that they were feeling "tingles" and were receiving "pokes" from the electrical current. After break, the tree trimmers ascended the trees and resumed trimming operations. The coworker to the west saw the victim contact the energized overhead line with the back of his right shoulder. He was held against the tree by the power of the current. His coworker to the west climbed down the tree he was trimming and tried to cut the tree he was trimming to land against the power line to break the line. When the tree fell against the line, the line did not break. He called to the homeowner, who was standing next to the chipper to alert the chipper operator of the incident, and to call 911. The operator then cut down the tree the victim was working in, and this tree broke the power line. The MIFACE 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. In the Industry drop down menu, select Administrative, Support, Waste Management and Remediation Services (56). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 163.

Case 20
35-year-old owner of a tree trimming service was electrocuted while cutting a large branch from a tree. The incident was witnessed by two of his employees who were watching from the ground. When the decedent cut the top limb of the tree, it fell onto a nearby 7,200-volt primary non-insulated power line. The limb slipped back and struck the decedent in the stomach. He was secured in the tree with a harness and a belt for protection from a fall. The workers tried to pull him away from the limb with ropes they had been using to guide limbs to the ground but were unsuccessful. The electrical current carried from the power line through the branch, through the decedent, through the tree and into the ground. The workers notified the homeowner

who called 911. Fire department personnel lowered him to the ground and determined he was deceased at the site. The MIFACE 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. In the Industry drop down menu, select Administrative, Support, Waste Management and Remediation (56). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 156.

Case 21

59-year-old male master electrician at a foundry was killed when he contacted a 480-volt, 70-amp electrical system during troubleshooting a 10-ton bridge crane. The decedent was working on an elevated work platform aisle way that was approximately 36 inches wide. About two-thirds of the way across the platform on the south side was a fuse panel for the electromagnetic pendant that was used to load materials and products into the skip hoist leading to the cupola. About three feet from the fuse panel was a 480-volt DC transformer for the crane. Both the fuse panel and transformer covers had been removed. The decedent had previously replaced a 70-amp breaker in the fuse panel. The breaker he had installed melted and employees in the work area noticed sparking/flames at the control panel. The decedent again replaced this 70-amp breaker and the crane operated without incident. It was unknown why the decedent returned to the aisle way. The decedent did not de-energize or lockout the fuse panel or transformer. His coworkers, upon finding him near live power, de-energized and locked out the electrical system. Conditions at the scene indicated that the decedent had not replaced the covers and that he simultaneously contacted both panels and completed the circuit. The panel and transformer covers were found lying near the decedent on the aisle way. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 120.

Case 22

66-year-old male volunteer was electrocuted when he contacted an un-insulated 4,800-volt overhead power line. He was volunteering electrical services for a 301K non-profit organization (club). The decedent's family belonged to this club. The club was in the process of sponsoring a show, and club members were arriving at the site. The decedent and one of his family members were installing a 120/240-volt power bank. They were hot tapping an un-insulated 4,800-volt overhead line to add more power for the show. Neither the decedent nor his family member was a licensed journeyman/electrician. The new line went underground to feed a panel. Working in a rented, un-insulated JLG aerial lift approximately 12 inches from the energized line, the family member had completed crimping the center phase to the new line. The decedent was handing tools to the family member from the rear of the platform. After the family member removed his hot tap gloves and was clear of the line, he told the decedent that he was clear. The decedent turned at his hips and his right elbow contacted the now energized line. . The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Electrocution. Click on the Search button, and then scroll down to Case 155.

Case 23

53-year-old male truck driver was electrocuted when the raised long-bed dump trailer of the truck he was driving contacted an energized 4,800-volt overhead line. The decedent had delivered several loads of sugar beets to a local processing facility. Prior to re-entering the wet beet field for another load, he wanted to dump the tare weight (dirt, sugar beet parts) from the dump trailer bed. While inside the tractor cab, he activated the dump trailer to elevate. The event was unwitnessed. A probable incident scenario was developed during the interview of the decedent's employer, who was the farm owner. The farm owner suggested that the decedent would have wanted to ensure that the tare weight was leaving the dump trailer. While the trailer was rising, he exited the truck cab and walked along the side the truck trailer body to take a look at the exiting tare. Sometime during this activity, the top of the trailer bed contacted the overhead line. It is unknown if the decedent was aware of the contact. A truck driver whose truck was being loaded with sugar beets nearby in the same field noticed a flash of light and saw the truck on fire. The farm owner was operating the beet harvester and loading this truck, the truck driver and his passenger, a paramedic, immediately ran to the decedent and began CPR. 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. In the Industry drop down menu, select Public Administration (92). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI185.

EXPLOSION (4)

Case 24

38-year-old Hispanic male construction equipment operator died when an explosion occurred while he was cutting pipes on top of a 400-gallon oil storage tank. He was using a Partner K950 gas-powered chop saw with an abrasive-type blade. The decedent was a member of a two-person crew assigned to disassemble a tank battery (two condensate oil storage tanks and one water tank) at a natural gas production facility. Another company had previously flushed (rinsed with hot water) but did not clean the tank battery. To clean the tank, the bottom hatch would be removed and personnel would enter the tank to scrape the sides and bottom and remove all the remaining sludge. The decedent was instructed to set up the job and to wait for his coworker to arrive. The company procedure for taking the tanks down involved using pipe wrenches and open-end wrenches to disconnect the pipes on top of the tanks and to dismantle the stairs and catwalk. The decedent did not wait for his coworker to return to the worksite and began to cut the gas vent piping system connecting Tank 2 (oil storage) and Tank 3 (water tank) using the spark-creating chop saw. The oil storage tanks were empty except for one to two inches of a water/oil mixture in the bottom of the tank below the discharge pipe. The tank thief hatches were opened. The decedent did not conduct air monitoring or testing before starting to cut on the tank piping, nor were the tanks purged to eliminate the hazardous vapors. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fire/Explosion. Click on the Search button, and then scroll down to Case 125.

Case 25

27-year-old male lineman was killed when the Flextrak 75 vibratory plow he was operating struck a 24-inch diameter high-pressure natural gas line. The decedent was a member of a three-person crew installing a transformer, and an underground secondary and primary service for two residential homes. The electrical company had contacted MISS DIG to identify all underground lines. The work area had been staked as clear by both a television and telephone provider. The MISS DIG ticket response inquiry indicated that one of the two natural gas companies contacted had provided a Positive Response. The gas company provider whose pipeline was involved in the incident did not make a Positive Response. Beginning at the transformer location, the decedent began to plow the cable approximately 36 inches deep into the ground, heading south towards a corner marker where he had to make a 90-degree turn to the west. Approximately 58 yards after he turned the corner, the vibratory plow hit a 24-inch high-pressure natural gas pipeline that was buried approximately 36 to 40 inches below the existing grade. The rupturing pipeline created an explosion throwing dirt and debris into the air and created an 80-foot crater. His coworkers, who were uninjured, called 911. After the explosion occurred, Coworker #1 and Coworker #2 noticed two yellow natural gas pipeline markers at the edge of the road. 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fire/Explosion. Click the Search Button, and then scroll down to Investigation Report #06MI207.

Case 26

36-year-old male production operator was killed as a result of a pressure vessel explosion during the processing of wheat. The unfired pressure vessel was controlled by a process logic control (PLC) located in an adjacent control room. The preheated wheat was transported to the pressure vessel and the PLC initiated the processing cycle. After the wheat was processed and expelled from the pressure vessel, the PLC returned the pressure vessel cycle to a start position and the process would be repeated. There was an eight- second window of time between when the wheat was expelled and the vessel was opened to accept a new load. The pressure vessel did not have a pressure relief valve on the vessel or between the inlet steam valve and the vessel. On the day of the incident, there was a brief power outage. The power outage caused the PLC to go through a reboot procedure. The reboot procedure caused the pressure vessel to return to a start position regardless of the load status in the vessel. If a load was still in the vessel following a reboot, when the next cycle was initiated, a two-tone alarm would sound. The two-tone alarm had been sounding for several minutes before the pressure vessel exploded. The decedent and his coworker were waiting for operating instructions from the PLC in the control room. The pressure vessel was located four feet from the control room and when it exploded, there was enough momentum to break free of the valve mountings and lines and break through the control room's three-foot high eight-inch thick web lined interior cinderblock wall. The decedent was struck by the vessel components and other projectiles created by the explosion. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Fire/Explosion. Click on the Search button, and then scroll down to Case 126.

Case 27
27-year-old male welder was killed while performing MIG welding repairs to the inside of a cargo tank that previously held diesel fuel. The four-compartment tanker was rinsed with steam and cooled, and then transferred into the work area. The decedent placed a ventilation hose into Compartment #4 by opening the ten-inch fill lid of the portal covering. After visually checking the outside of the tanker to confirm the leak location, the decedent removed the portal cover for Compartment #3 and transferred the ventilation hose from Compartment #4 to Compartment #3. With the ventilation hose operational, the decedent entered Compartment #3 four different times to conduct work operations. It is unknown if the decedent conducted air monitoring. After his fourth entry into Compartment #3, vapors from Compartment #4 ignited while he was welding in Compartment #3.

FALL (24)

Case 28
44-year-old male truck driver/crane operator was killed when he fell through a three-foot by eight-foot unprotected corrugated fiberglass skylight that was approximately 1/8 to 3/16 inches thick. The decedent was delivering roofing materials to a firm contracted to re-roof the southwest section of a warehouse. He climbed a ladder to the roof and spoke with three roofing contractors about placement of the roofing materials. For reasons unknown, the decedent stepped over a roof parapet wall onto the low-sloped metal warehouse #2 roof that was not near the area where the roofing was to occur. One of the roofing contractor employees warned the decedent of the skylights on warehouse #2 roof. The decedent took several steps and then fell through a skylight that was flush with the roof. He landed on the concrete floor 20 feet below. 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click the Search Button, and then scroll down to Investigation Report #06MI006.

Case 29
41-year-old male trim installer sustained fatal injuries in a fall from an unguarded roof surface. He and several coworkers were installing flashing on the fascia at the rear of the building. They were working from a work platform supported on a rough terrain forklift elevated approximately 20 feet above the ground. The decedent exited the elevated work platform onto the unguarded roof surface to move metal decking sheets that had been lifted by a crane onto the roof to a position where they could be installed. The metal decking sheets were temporarily secured with screws until they could be permanently installed. Apparently the decedent jumped approximately 20 inches from one sheet to another on the roof. The sheet to which he jumped did not have securing screws at the top. The sheet gave way and he fell 20 feet to the concrete floor below. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 144.

Case 30
50-year-old male carpenter was killed as a result of a nine-foot eight-inch fall from a 5/12 pitch residential roof. The decedent was a member of a three-person work crew. The crew consisted of the company owner, another employee and the decedent. The homeowner had hired the company to take down some existing eave troughs, to check all the siding and fascia for loose nails, and to determine if any other repairs were necessary. After working all morning, the company owner stated to the crewmembers that they would need to remove some pine needles from around two skylights on the backside of the lower roof after lunch. All of the crewmembers used ladders to access the roof. The decedent had a dustpan, the company owner had a broom and the other coworker had a garbage bag. They worked their way up one side of the gable-style roof and then started down the backside of the roof. Near the bottom on the backside of the roof were two skylights. The decedent was positioned at the bottom of the skylight, a couple of feet from the rake edge of the eave, and his coworker was at the top of the skylight as the company owner was sweeping the pine needles into piles. The decedent took a step backwards and he fell from the roof edge to the deck below. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 127.

Case 31
53-year-old male technician for a heating and cooling company died after he fell while installing ductwork in a garage. He was working from a mobile scaffold and fell approximately five feet to the concrete floor sustaining a fatal head injury. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 114.

Case 32
63-year-old male siding installer was critically injured when he fell from a roof while installing a J channel on a dormer for a home under construction. The decedent had erected a roof bracket scaffold platform on a high pitch roof (14/12) approximately three feet from the roof edge. The roof brackets that he installed were spaced approximately 11 feet apart and were secured by two 2-inch screws instead of 16d nails. The screws were installed in the roof sheathing, not secured into a roof rafter. The decedent had placed two 2x6-inch wood planks laid on their sides across the span of the roof brackets. He then placed a ladder on the planks to use as a climbing device to reach the dormer to install the J channel. He was on the ladder when it appears that either the north roof bracket failed or the decedent fell from the ladder. The decedent slid down the roof, off the roof edge and fell nine feet to the asphalt below. 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click the Search Button, and then scroll down to Investigation Report #06MI117.

Case 33
61-year-old male self-employed painter died after falling from a ladder approximately 20 feet to the ground below. The decedent was working off a debt by scraping paint off the second story of a residential building. The decedent had made a makeshift brace out of wood and had attached the brace to the top of the ladder with a C-clamp, while the left side of the wooden brace overlapped the edge of the roof near the peak of the second floor. Police speculated that the wood brace snapped while the decedent was scraping point, causing the ladder to shift and slide down six to eight feet. The decedent lost his balance and fell approximately 20 feet onto the dirt ground. Witnesses heard the ladder shift and the decedent strike the ground. The decedent had a blood alcohol level of 0.18%.

Case 34
35-year-old homebuilder/roofer/carpenter died after he lost his balance and fell from the peak of a 10/12-pitch roof while installing a two-piece metal drip edge near a dormer. He was a member of a four-person crew that had been working at the incident site for two weeks. A coworker saw him stand up. The decedent then slid 23 feet down the roof on his back, and then fell from the 11-foot eave through a porch awning to the cement driveway below. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 118.

Case 35
52-year-old handyman/maintenance worker who was hired as an outside contractor to perform maintenance activities for a business died after falling 30 feet through a storage facility's corrugated plastic roof skylight to the concrete floor below. The decedent and a coworker were hired to seal holes and repair the roof seam in the loading dock area of the warehouse. The decedent was using buckets of tar. Police found two cans of beer beside the skylight through which the decedent fell. The roofline of this part of the building was convex, similar to that of a Quonset hut. The decedent was not wearing fall protection. Upon autopsy, the decedent's blood alcohol level was 0.161%.

Case 36
45-year-old male, who was the sole owner of a gutter installation company, died after falling 30 feet from a rough terrain forklift platform. The decedent was hired by a homeowner to install leaf guards on the rain gutters he had previously installed on the home. The homeowner had previously used a Lull 644 rough terrain forklift truck/platform to install the rock face on his home. The decedent indicated to the homeowner he wanted to use the Lull forklift/platform to install the leaf gutters on the tower area of the home. The homeowner moved the forklift truck/platform to the tower area and positioned it to the location indicated by the decedent. The decedent carried an eight-foot fiberglass stepladder onto the 12-foot by 4-foot scaffold platform. The platform had a four-foot high railing located on the side toward the forklift carriage. The homeowner operated the forklift and raised the platform approximately 30 feet to allow the decedent to install the leaf guards. The decedent leaned the ladder against the platform railing and installed the first section of the gutter leaf guard. While installing the second section, he fell approximately 30 feet to the ground. The homeowner stated that the decedent was not standing

on the platform when the fall occurred. The homeowner began CPR. The decedent regained consciousness and the homeowner ran into his home and yelled to a family member to call 911 and then ran back to the decedent. Emergency response arrived and transported the decedent to a local hospital. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 117.

Case 37

23-year-old male ironworker died after falling 120 feet to a concrete surface while erecting a monopole cellular phone tower. The monopole had been stacked with a crane and the antenna array had been erected on the ground and then hoisted to the top with the crane. The monopole did not have platforms installed at the top. Two crewmembers were on the ground cleaning up debris; another coworker and the decedent were assigned to work on the monopole. When the work crew arrived, it was raining. The rain stopped at approximately 11:30 a.m. After lunch, at approximately 1:00 p.m., the decedent and his coworker ascended the monopole. The decedent was working on the final alignment of three groups of antennas while his coworker was working 10 feet below the antenna array on some buss-bar installations. To move around the antenna array, the decedent walked on the four-inch wide horizontal antenna supports extending from the monopole to each antenna quadrant. The MIOSHA file indicated that work practice for tying off was to: (a) clip to the horizontal masts (supports from the monopole to the main horizontal antenna mounting pipe), or (b) hook off to the individual vertical antenna mounting pipe (between the mounting clamps), or (c) hook off to the "all-thread" for the collars around the monopole. The coworker heard a metallic "clink, clink" from above. As he moved around the cell tower, he witnessed the decedent falling and called out "Headache" to warn workers below. A ground worker tried to call 911 on his cell phone, but could not get a connection. He then went to a nearby company office where the landline was used to call 911. One of the antennas facing north was flipped approximately 155 degrees from where it was prior to the fall. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 149.

Case 38

23-year-old Hispanic male construction laborer was killed when he fell from wooden building roof trusses that collapsed during installation. The decedent was a member of a five-person crew who were installing 75-foot trusses for a second story addition on a church. One crewmember was operating the boom truck and four members (one of whom was the decedent) were setting the trusses. The truss setting operation began from the middle of the building with the boom truck set up on the south side of the building. There were two truss styles, T-01 and T-03. Twenty-eight trusses had been set working from the north to the south. These trusses were toe-nailed/braced. A determination was made that a series of T-01 and T-03 trusses were not set in the correct position and required relocation. The crew removed the toe-nail support from the trusses requiring relocation prior to attaching the crane. Several T-01 trusses were lifted up and over existing trusses and positioned to the south side of the building. It is unknown if the trusses

were braced/toe-nailed after repositioning. The T-03 trusses were moved south of their incorrect position. When the trusses were relocated, there was no strong back-type bracing to prevent collapse in a northerly direction, which was the direction of the collapse. The incident occurred during the re-setting of the third T-03 truss to its new position. It is assumed that the truss was set on location and tension released from the boom truck cable. The west shackle was disconnected from the rigging and showed no signs of becoming disconnected on its own. The west shackle ended up in the basement indicating that it might have been thrown. The east shackle was still connected after the truss collapsed. The decedent was located on the east side of a truss and was found by another worker on site pinned under five trusses. Due to the limited English skills of the workers on site, limited information about the incident details was acquired. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 132.

Case 39

49-year-old male printer was killed when he fell nine feet through an unprotected floor opening while raising a foyer wall at a residential construction site. His family member, who was a self-employed contractor, was subcontracted to build a residential home by one of the coworkers (homeowner) on the scene. The family member asked the decedent to come to the worksite to help tip up the 12-foot 6-inch by 18-foot tall foyer exterior wall. The foyer wall was framed with 2-inch by 6-inch lumber and had plywood sheeting nailed to it. After the decedent arrived, the family member, two crewmembers, and the decedent attempted to manually lift the foyer wall. Nearby was an unprotected 10- by 3-foot floor opening for the basement steps. The crew was able to set the wall approximately three-quarters of the way up by lifting on the wall. As they were lifting the wall, the crewmembers apparently lost their grip on the wall and the wall fell inward toward the interior of the home. The falling wall caused the decedent to fall through the unprotected floor opening. He fell nine feet to the dirt floor below and hit his head on a concrete pad footing for a support column. It is unknown if the wall, as it fell, hit the decedent on the head or if he just fell straight through to the basement floor. The wall they were lifting was found lying on top of the floor opening. This MIFACE summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 129.

Case 40

49-year-old male builder fell from a ladder from an unknown height.

Case 41

57-year-old male machine repairman died when he fell to the floor from a platform while attempting to access the underside of a power press. He was assigned to change a cushion on a die under a press line in the plant basement. In order to access the area where the work was to be done, he first climbed onto a five-foot by five-foot piece of plywood that was being used as a platform over the opening of a scrap chute. It was approximately three feet above the basement floor. From this platform he would have climbed to a second plywood platform placed between two brackets attached to the press approximately five feet above the first. His coworker did not

see the decedent fall. When he heard a commotion, he turned and saw the decedent had fallen onto his hands and knees on the lower platform and then he fell off the platform to the basement floor. He apparently struck his head on air valves located on the press column as he fell. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 150.

Case 42
49-year-old male service manager for the automobile industry died as a result of complications of a closed head injury sustained from a fall down steel steps from an unknown height while at work in 2002.

Case 43
41-year-old male maintenance and yard work helper at a meat packing facility was a passenger in a truck. He fell off the back of the truck in the facility's parking lot and sustained a head injury. He died of complications 22 years after his injury.

Case 44
37-year-old male warehouse worker was killed when he fell from an order picker while retrieving boxes from a 15- to 20-foot high rack. The decedent was operating a Crown Order Picker SP3000 powered industrial truck. The order picker platform was 48 inches wide and 60 inches long. The operator's controls were located at the end of the platform. There was no standard barrier on the platform. The order picker was equipped with a tether strap connected to the overhead guard. There was no safety belt or harness connected to the tether. The incident area was an aisle between rows of warehouse racks. It appears that the decedent, who was not wearing a safety harness, raised the order picker platform to a height of 14-feet 8-inches above the concrete floor to retrieve boxes. The decedent was found lying below the order picker platform. Several boxes were found on the floor by the decedent. One box was 21.5-inches by 33-inches by 76-inches and one box was 19-inches by 22-inches by 76-inches. All of the boxes weighed approximately 15 pounds. The MIFACE 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. In the Industry drop down menu, select Retail Trade (44). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 133.

Case 45
46-year-old Hispanic male laborer died after falling approximately 30 feet from a tree. He was working in a park hanging holiday lights in a tree. The decedent was instructed to run extension cords and lights up tree trunks to a distance reachable by a 12-foot stepladder. His coworkers were hanging lights at higher elevations from a bucket truck. The decedent was not wearing a safety harness when he climbed the tree. He had completed hanging lights on one limb and climbed another limb to continue hanging the lights. His coworkers heard a crash and went to investigate. They found the decedent on the ground and a ball of lights in a branch approximately 30 feet high in the tree. The decedent had recently received training on proper ladder use. Employee interview statements taken by MIOSHA indicated that they had been instructed not to

climb structures or trees. The company for whom the decedent worked ensured that Spanish-speaking employees received training and memos in Spanish. This MIFACE summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Retail Trade (44). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 148.

Case 46

51-year-old male train conductor died when he fell from and was run over by a train traveling in reverse. The decedent was in a mining yard riding on the rear of the train. The engineer was in the engine. The decedent had just switched the tracks and had boarded the rear car of the train to relay the exact location of the rear car to the engineer during the backing up activity. The exact location was identified by the decedent by calling out the number of train car lengths to the final destination. The standard work practice was to call out the number of lengths by one half of the previous number, i.e., 100, 50, 25. During this trip, the decedent called out an unusual numbering sequence, 120, 50, and then 15. Upon hearing 15, the engineer adjusted the brakes because he believed he was getting closer than expected to the final destination. The engineer called the decedent on the radio, but the decedent did not answer. The engineer completely stopped the train to search for the conductor. The engineer found the decedent between the two rear wheels entangled in the axle.

Case 47

49-year-old male pellet plant utility man at an iron ore processing facility died after falling through a corroded roof hatch cover to a grate 55 feet below. The decedent was using a hose to clean off a build-up of material from the pallet plant unit stack-cap roof area when he stepped on the corroded hatch cover. The opening in the stack-cap roof was 43-inches wide by 50-inches long. The cover of the opening was approximately 42.25 inches by 50.5 inches and constructed of four pieces of 2-inch by 2-inch by 1/4-inch angle stock welded together to form a rectangular frame. The frame was covered with No. 16 gage, A36 sheet metal that was fastened to the frame with puddle welds along the perimeter. Approximately eight to nine inches of dust had accumulated on the roof and covered the roof opening cover. The decedent inadvertently stepped on the roof cover, and due to the severely corroded metal, the cover failed. There were no barricades or warning signs near the roof opening. MSHA conducted a site investigation. The MSHA written report may be found on the MSHA website at: www.msha.gov. Click on Fatalgrams/Reports, and then click on All Fatalities in the Metal/Nonmetal Mine Fatalities section. Click on 2006, and then Fatality #16.

Case 48

44-year-old female school custodial worker was fatally injured when she fell off the back of a pick-up truck. She was being driven to her assigned school from the school where she had just finished having lunch with three fellow workers. The schools were located on a large complex. One worker was driving, another was in the truck cab, and the third was sitting in the truck bed with her. According to the third worker, he was seated far back in the bed, so that only his feet reached the tailgate. The decedent was seated with her legs were dangling off the tailgate. As the driver pulled out onto a service road, the decedent lost her grasp and fell from the vehicle striking her head on the road. No evidence of rapid acceleration or negligent driving was found.

The MIFACE 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. In the Industry drop down menu, select Educational Services (61). In the Fatality Type drop down menu, select Fall. Click on the Search button, and then scroll down to Case 151.

Case 49
49-year-old female patient care technician at a hospital died from a pulmonary thromboemboli. As she was helping to move a patient, she fractured her right leg. She had been in a cast and had diminished mobility associated with the injury. Approximately one month after the injury she died.

Case 50
45-year-old male route driver for a beverage company died due to complications from surgery to his knee. The decedent had stepped into a pothole in the delivery site's parking lot and sustained his knee injury. He died from a blood clot eleven days following his surgery.

Case 51
63-year-old male rose garden proprietor died after falling from a ladder from an unknown height.

HOMICIDE (11)

Case 52
26-year-old male gas station attendant died as a result of multiple gunshot wounds.

Case 53
47-year-old male retail store manager died due to multiple gunshot wounds sustained after an argument with a customer that occurred at the store.

Case 54
40-year-old male convenience store owner was shot and killed during a robbery attempt.

Case 55
73-year-old male convenience/liquor storeowner was killed during a robbery attempt. The decedent was struck in the head and then stabbed and beaten by his assailants while standing behind the store counter.

Case 56
55-year-old male porter/night watchman for a retail car sales company was killed and died from complications one month after being struck on the head by a sledgehammer and then run over with a vehicle during a robbery.

Case 57
63-year-old male hotel maintenance/self-employed handyman was stabbed and beaten while at the hotel.

Case 58
62-year-old male assistant manager of a restaurant was shot and killed during a robbery attempt.

Case 59
64-year-old male restaurant owner was shot and killed during a robbery attempt. The decedent had left the store with several employees when the assailant entered the restaurant. The decedent re-entered the restaurant when he discovered that an employee was still inside the store. The decedent encountered the individual with the gun and was shot several times.

Case 60
49-year-old male coin laundry owner was killed by an assailant who struck his head with an axe.

Case 61
30-year-old male cab driver died due to multiple gunshot wounds.

Case 62
31-year-old male police officer died from a gunshot wound to the head. The decedent had responded to a 911 call involving a man walking around his neighborhood with a gun and arguing with garbage workers. The man then began shooting from inside his front door at the officers who had arrived on the scene to investigate the complaint. The decedent was providing his fellow officers with real-time updates of the gunman's location when he sustained a fatal head wound. He died at the hospital.

MACHINE (14)

Case 63
46-year-old Hispanic male utility man was killed when he backed an 8,670-pound, propane-powered Toyota Model 426FGCU25 forklift over the edge of a loading dock, which then overturned and landed on him. The dock plate had two standard guardrails on either side with a chain across the dock opening. The decedent was found when another employee traveling through the area noticed the forklift's lights shining on the wall and the truck's forks up and against the wall in the truck well. This employee summoned others to the area when he found the decedent pinned face down between the concrete floor and the overhead guard. Several employees manually lifted the forklift enough to move the decedent from under it. It is assumed that the forklift was traveling in reverse, because neither the forks nor the mast appeared bent, as would have been the case if he had been traveling forward and drove off of the dock edge. It is unknown if he jumped or was thrown from the operator's seat. The MIFACE Investigation Report can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select MIFACE Investigation Reports. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Investigation Report #06MI007.

Case 64
34-year-old male truck driver was pinned under the forklift truck he had been operating. The decedent's forklift was on its side with no load on the forks and the mast telescoped up. The incident occurred in the yard near the loading dock where the decedent was working to retrieve

empty bins to load in his truck. The worker who found the decedent called to another worker who used a second forklift truck to lift the downed one from the decedent. The decedent was unconscious at this time. According to the coworkers, the decedent had returned to work after a break shortly before he was found. The path to the yard involved several turns to approach the stacks of empty bins. Police department photos and measurements indicated that, in travel, the rotating tires of the forklift left a 19-foot rubber deposition arc path going into the second turn. Regardless whether the mast was deployed before the turn or in the process of the turn, the center of gravity was changed, and the vehicle carried over onto its right side. It was determined that the vehicle came to rest with 25 feet remaining to reach the empty bins. During the carryover of the vehicle the operator left the seat and was crushed by the outside of the upper rear cage. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 152.

Case 65

30-year-old male truck driver/operating engineer for a concrete company was killed when he was pinned between the bucket of the front-end loader he had been operating and a stationary batch conveyor. The decedent had used the front-end loader to load sand onto the conveyor and was carrying a load of gravel to the same conveyor to be mixed. There was a five-degree downgrade from the location of the gravel pile to the stationary conveyor. Positioning the front-end loader approximately eight feet from the conveyor, the decedent dismounted the front-end loader with the loader in gear and the gravel-filled bucket raised approximately three feet above the ground. He did not set the loader's hand-operated parking brake. Next to the parking brake was a mounted expanded metal guard for the heater blower motor. The proximity of the guard to the parking brake caused operators to scrape their knuckles on the guard; thus the parking brake was not used routinely. After dismounting, the decedent walked between the front-end loader bucket and the stationary conveyor to manipulate the batch conveyor controls to move the conveyor to a different position for the gravel. Adjacent to the positioning controls was a hole cut in the cover over the conveyor so employees could look inside to verify that material had cleared the conveyor before adding more or different material. While the decedent was looking into the hole to verify that the sand had cleared, the loader rolled forward pinning the decedent against the batch conveyor frame. The decedent was conscious when he was found by a coworker who moved the loader and called 911. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 119.

Case 66

33-year-old male engineer and owner of a metal fabrication company died when the forklift he was charging with a battery charger lurched rearward and ran over him. The forklift was an International M460 tractor that had been retrofitted to be a forklift. The forklift did not have a good battery and it often needed to be jumped in order to start. The vehicle frame was 12 inches above the ground and the forks where measured were 15 inches above the ground. The battery was externally mounted on the left side of the vehicle and behind the front drive tire. The

decedent was standing in front of the battery, just behind the drive tire. The forklift was in reverse gear. The decedent had connected the battery charger to the battery and/or the starter in an effort to start the vehicle. He then reached over and pushed the starter button. The vehicle attempted to start and lurched rearward. When the vehicle moved it caught the decedent's right leg and pulled him and the battery charger under the vehicle. As the decedent was pulled under the vehicle, he and the battery charger became lodged under the forks. Once the battery charger cables were pulled free of the battery, the motor died because it had not accumulated enough energy to fully start the motor and keep it running. When the vehicle stopped the battery charger was across the upper portion of the decedent's back pinning him to the ground. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 136.

Case 67

23-year-old male forklift operator was killed when he attempted to stop a forklift being towed from striking a personal vehicle. The decedent did not have an operator's permit for the forklift. The decedent had notified his employer that the forklift was not working. His employer told him to make sure the forklift's gearshift was in neutral. The decedent was working alone in the yard. The forklift had a modified tine; the left tine had a ball hitch. He attached multiple 10- to 50-foot long straps connected together by a ratchet to the ball hitch tine on the forklift and to the rear of a utility truck. The forklift was in neutral and was running. The yard had a drain and the pavement had a 10- to 15-degree slope toward the drain. Personal vehicles were parked on the downward slope side of the yard in a parking lot. As he was towing the forklift, the forklift drifted toward personal vehicles. The decedent exited the utility truck in an attempt to stop the forklift from striking the parked vehicles. The decedent may have attempted to run in front of the forklift in an attempt to get to the gearshift lever or he may have attempted to grab hold of the forklift to stop it from striking the personal vehicle. The right fork struck the decedent in the left shoulder possibly causing him to fall backward. The decedent was pinned by the left fork against the parked personal vehicle. Another employee discovered him pinned in the neck area between the modified forklift tine and a personal vehicle. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 123.

Case 68

28-year-old Hispanic male machine operator with seven months experience was killed while attempting to pry loose a part that had jammed in a machine. The machine ran in automatic mode with full barrier guarding. A 22-inch part to be machined was placed on a conveyor where it was taken into the machine. As it exited the conveyor, the part contacted a switch, which activated a ram to drop the part to the machining area, where a clamp kept it secure as one side was machined. After the part was machined, it exited the machine by conveyor where it was loaded onto a pallet. On the day of the incident, the part jammed when it failed to seat all the way into the machine from the conveyor, causing it to become lodged between the conveyor and the clamp under pressure. The decedent removed the guard at the back of the machine and attempted

to pry the part loose using a four-foot long metal bar. When the part became dislodged from the clamp, the clamp came down striking the pry bar. The pry bar then struck the decedent in the head. The decedent was able to walk after being struck by the pry bar. His coworker transported him to an industrial clinic. Due to the extent of his injuries, the clinic referred him to a local hospital. As his coworkers transported him to the hospital, his symptoms worsened. He died four days later from the injuries sustained at the time of the incident.

Case 69

46-year-old male foreman died when a robot arm activated and he was pinned between the upper and lower die of a press. The decedent entered the cell of a pick and place robot to clean sensors that signaled the robot that a part was ready to be removed from the press and placed on a conveyor. The decedent did not lock out the robot or take the teach pendant with him. He entered the robot envelope at the end of the robot control panel where there were no barriers to prevent unauthorized entry. An open keyed-access gate, which required two keys, was not functioning properly. The gate could open using the key in the gate without first having to remove the key from the robot control panel. There was no interlock on the gate itself. The press was open and in a hold mode and the robot was in an automatic mode. Upon cleaning the sensors and manipulating a sensor connector, the robot arm began to move forward and it struck the decedent in the back. The press was in the open position and the forward motion of the robot caused the decedent's head to contact the upper die and his lower torso to contact the lower die. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 135.

Case 70

53-year-old male part owner of a paving company and his crew were breaking up a concrete approach to the driveway to an office building in preparation for replacing it. They were using an attachment on the front of a CAFE 90-XT skid-steer loader that hits down like a sledgehammer. During the work the skid-steer loader began to leak oil. When the crew had completed cleaning up the site, the decedent positioned the skid-steer loader at the end of a driveway with approximately a two-degree incline. A front-end loader was used to raise the front wheels slightly off the ground. The hydraulic cylinder that assisted with the lifting of the operator cage was not working, so the crew of three raised the cage manually so the decedent could access the engine compartment. He was bent at the waist leaning into the area under the cage where the hydraulics were located when the 450-pound cage fell onto his upper torso and pinned him. The crew had been having trouble getting the securing latch that would lock the cage into its up position to engage properly. The latch apparently gave way causing the cage to fall onto the decedent. The crew immediately lifted the cage and called 911. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 142.

Case 71
53-year-old male machine operator was killed when the SP-48 Ingersoll-Rand Series Vibratory Compactor he was operating overturned and landed on top of him. The decedent operated a bulldozer to spread the sand and the vibratory compactor to compact the sand for an outbuilding at a facility. The sand pad was elevated approximately three to four feet from the existing grade. The sand backfill pad was level and approximately 50-feet long and 50-feet wide. The compactor weighed 125,250 pounds and was not equipped with a rollover protective structure, which was optional on this model compactor. The original seat had been removed and the compactor retrofitted with a seat with a seat belt. The compactor was configured with the roller in the front and tires in the rear. It appears that the compactor was backing along the edge of the elevated grade too close to the edge of the sand backfill and rolled down the slope onto its side. The angle of elevation near where the compactor overturned was approximately 30 degrees. The steering wheel/steering column landed on the decedent's chest. The decedent was found by a passerby who called 911. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 153.

Case 72
51-year-old male heavy equipment operator was killed when he was pinned between the excavator boom and the excavator cab. A demolition company (site contractor) had been hired by the site owner to demolish the building on the incident site and clear the site of debris. The decedent was a subcontractor for the site contractor. On the day of the incident, the decedent was at the incident site waiting for the site contractor to arrive. After speaking with the decedent and giving instructions to the excavator operator he had hired, the site contractor left the location. The excavator operator hired by the site contractor was operating a Caterpillar Model 225 DLC excavator. The excavator cab was positioned perpendicular to the tracks of the excavator with the boom in an upright position. The cab window adjacent to the excavator boom was broken. The decedent jumped onto the excavator tracks under the raised boom and leaned through the cab window. His torso/arm contacted the excavator boom joystick-type control lever and the boom lowered pinning the decedent between the boom and the cab frame. Emergency response was called and 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Machine. Click the Search Button, and then scroll down to Investigation Report #06MI209.

Case 73
67-year-old male farmer was killed when the tractor he was operating ran over him. The decedent was in the process of moving the tractor and hay conditioner from one field to another field. One of the bolts that must be remounted in order to result in a narrower profile for the tractor and equipment was partially in place in its travel position but the process had not been completed. It is unknown whether the decedent was mounting or dismounting the tractor. The tractor was idling. The decedent may have slipped while mounting or dismounting and attempted to prevent a fall from the tractor by grabbing the closest item, which was the gearshift lever. The

lever was moved to a forward position and ran over the decedent. Police noted that the gearshift lever was bent.

Case 74
23-year old male died from traumatic asphyxia after his clothing became entangled in the rotating tail pulley of a conveyor belt at a portable crushing plant. The deceased had one month of mining experience. He was performing his regular duties of removing spillage from beneath the crusher that had been discharged from the sides of the tail pulley. The conveyor was not de-energized nor was it blocked against motion prior to him entering the area. A root cause analysis was performed by MSHA. MSHA concluded, "operating procedures and controls were inadequate and failed to ensure that persons could safely remove spillage around moving conveyor belts." The MSHA written report may be found on the MSHA website at: www.msha.gov. Click on Fatalgrams/Reports, and then click on All Fatalities in the Metal/Nonmetal Mine Fatalities section. Click on 2006, and then Fatality #5.

Case 75
21-year old male lawn mower set up/delivery man died from lower back and pelvic compression with complications after being pinned for twelve hours by a six-foot brush hog that had slipped out from the jack during a blade change. The decedent came into the shop after-hours to change the brush hog blade but was not authorized to do so. The company had an unwritten standard procedure to change the brush hog blades. The procedure was to place ladder jacks close to the 3-point hitch. The decedent had placed the ladder jacks at the opposite end of the brush hog. As he was working, brush hog shifted and the weight of the brush hog caused one of the ladder jacks to become unstable and tip, causing the brush hog to fall onto him. His brother found him pinned on his back beneath the mower on a creeper the following morning when he arrived to work at the equipment company. The brother noted that the brush hog was still hooked up to the tractor by the 3-point hitch. The decedent was conscious and described what happened to his brother. The brother started the tractor and lifted the brush hog off the decedent and took him to the hospital.

Case 76
59-year-old male operating engineer for a heavy equipment company was killed while unloading a Genie JLG from a trailer. The driver of the tractor-trailer, which was hauling the JLG, positioned the trailer at a dock. The driver released the JLG securement chains. A yard person for the company, which received the JLG, requested that the driver cut the plastic tie securing the JLG control panel keys. The trailer brakes had not yet been locked and no wheel chocks/blocks were positioned. Using the side controls, the yard person started the machine and moved the selector from ground control to basket control. The decedent, who worked for a third employer, was present at the site to pick up a piece of equipment for his employer. Unbeknownst to the truck driver and the yard person, the decedent had climbed into the bucket of the JLG. Upon discovering that the decedent was in the bucket, the yard person crossed to the other side of the trailer going under the boom so that he could assist the decedent by watching the wheels to make sure they stayed on the trailer. The decedent began to drive the JLG off of the trailer and the yard person directed the driver to set the trailer brakes. Just before the JLG started onto the ramp, the tractor and flat bed trailer skidded away from the dock. The decedent was "tossed" back and forth within the bucket and fell to the floor of the basket. The yard person switched the JLG

operation back to ground control, lowered the basket, ran to the yard shack, and instructed another employee to call 911. The JLG was partially on the trailer. The rear of the JLG was resting on the loading dock and the under carriage of the JLG was resting on the rear of the trailer. The rear wheels of the JLG were off of the trailer approximately two- to six-inches off the ground. This MIFACE summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Transportation and Warehousing (48-49). In the Fatality Type drop down menu, select Machine. Click on the Search button, and then scroll down to Case 141.

MOTOR VEHICLE (29)

Case 77
43-year-old Hispanic female inspector for an electrical manufacturing firm was killed in a crash involving two tractor-trailers. The decedent was not an employee of the trucking company but was an "authorized rider." At some point after signing out their cargo, the trucking company employee with the valid truck driver's license put on her pajama bottoms and went to rest in the "sleeper" section of the tractor cab. The decedent, who did not have a current driver's license, took over the driving of the tractor-trailer. The decedent's vehicle was northbound on a two-lane road when it came to an intersection with a flashing red light in the north/south direction and a flashing yellow light in east/west direction. The decedent failed to stop and yield the right-of-way to the tractor-trailer traveling eastbound. The tractor-trailer driver traveling eastbound realized too late that the decedent's vehicle was not going to stop and the eastbound vehicle could not avoid the collision. The decedent, who was not wearing a seat belt, was thrown out of the tractor cab upon the collision and was killed when the tractor's rear driver's side wheel ran over her. The tractor cab was not equipped with an airbag. Both traffic lights were properly functioning.

Case 78
51-year-old male driver who was employed as the driver of a van from a taxi company died of multiple injuries when the van he was driving at a high speed struck the trailer of a parked tractor/trailer. The decedent was traveling on a dark, unlighted, wet, one-lane road with a speed limit of 25 mph. It was unclear as to whether the victim was wearing his seat belt/shoulder harness. The cab's air bag deployed. Upon autopsy, the decedent's blood alcohol level was 0.17%.

Case 79
43-year-old male truck driver died when the tractor-tractor he was driving collided with a train. The decedent drove the tractor-trailer up to and stopped at the railroad tracks. The track's warning lights were flashing and its bells were sounding. As the train approached, the decedent drove the tractor across the railroad tracks and was hit by the train. The train dragged the tractor-trailer with the decedent inside along the tracks and the tractor burst into flames.

Case 80
36-year-old male driver who transported cars from one location to another for an auction firm was killed when the car he was driving was run over by a tractor-trailer. The decedent was delivering the car from a car show to his employer's location. The decedent was traveling too

fast for conditions on a wet entrance ramp that provided access to a three-lane expressway. The decedent lost control of the car, spun out, and entered the expressway where the car collided with the side of the tractor-trailer. The car then slid under the trailer and the trailer ran over the car. Police indicated that it had just started raining when the decedent lost control of the vehicle. The decedent was wearing a lap/shoulder belt. The vehicle's air bag deployed.

Case 81
43-year-old male truck driver died as a result of a collision with a median wall. The decedent was the driver of a tractor-trailer on a four-lane, dry roadway that had a 55 mph speed limit. For reasons unknown, the decedent drove the tractor-trailer across four lanes of travel and then struck a median wall. The tractor then burst into flames. The decedent was found inside the tractor cab. Lap/shoulder belt use was unknown.

Case 82
42-year-old male truck driver died when he lost control of the tractor-trailer as the truck was rounding a curve. The tractor-trailer drifted off the two-lane blacktop roadway to the right onto the gravel shoulder. The decedent overcorrected by making a sharp turn to the left in an attempt to reenter the roadway. The tractor-trailer tipped onto its side and slid across the road and into oncoming traffic. The tractor collided with an oncoming car. The decedent was wearing a lap/shoulder belt. The tractor was not equipped with an airbag.

Case 83
38-year-old male truck driver died when the tractor-trailer he was driving collided with another tractor-trailer and burst into flames. The decedent was northbound in the center lane of a dry, three-lane expressway. Upon approaching a construction zone, the decedent did not slow down. As he changed from the center lane to the right lane, the tractor-trailer struck the left side of a slow moving tractor-trailer (#2). After impact with #2, the decedent's trailer jackknifed and continued northbound striking the rear of another tractor-trailer. The decedent's tractor-trailer then burst into flames. The decedent was trapped within the tractor. The decedent's restraint use was unknown. The tractor was not equipped with an airbag.

Case 84
52-year-old male truck driver died when he failed to stop his truck (Truck #1) and struck another vehicle (Vehicle #1) that was disabled in the right lane of a dry, lighted, three-lane expressway. The incident occurred at approximately 11:00 p.m. The driver of Vehicle #1, who was under the influence of alcohol and illegal drugs, had parked his vehicle in the right lane of travel near the expressway's fog line. Vehicle #1's driver exited his vehicle and was standing in front of the vehicle. The decedent's tractor-trailer struck the rear of the parked vehicle. The driver of Vehicle #1 was struck by his own vehicle, and then struck by the tractor-trailer. The tractor-trailer ran off the roadway to the right, collided with a cement barrier wall, and overturned onto its left side. The decedent was not wearing a lap or shoulder belt. The tractor's airbag deployed.

Case 85
45-year-old male truck driver was killed when the tractor-trailer he was driving collided with the rear of a slow-moving tractor-trailer. The incident occurred on an inclined, three-lane, icy roadway. Snow was blowing across the roadway. A witness traveling behind Vehicle #3 at

approximately 65 mph gave the following account of the incident. Vehicle #1 was stopped due to a traffic backup. Vehicle #2 was traveling in the right lane, slowing for the traffic ahead. Vehicle #2 was struck from behind by the decedent's vehicle. The decedent was wearing a lap/shoulder belt. The tractor was not equipped with an airbag.

Case 86
42-year-old male equipment operator for a construction company died when the dump truck he was driving collided with a passenger train. The decedent's dump truck was northbound on a one-lane private drive when he failed to yield to an eastbound train. The incident occurred during daylight hours, with clear and dry conditions. There was a traffic sign that indicated a railroad crossing and a stop sign at the crossing/railroad track. The train was traveling at 74 mph. When the engineer of the train realized that the truck was not going to stop, he sounded the horn and activated the emergency brake but the train was unable to avoid the collision. The decedent was ejected from his vehicle.

Case 87
25-year-old crane operator for a roofing company died when the tractor-trailer he was driving left the roadway and flipped onto its roof, pinning him in the cab. The decedent was northbound on a wet, two-lane expressway. It was raining at the time of the incident. There was a curve in the roadway. As the decedent rounded the curve, vehicles ahead of the decedent were braking and merging to the left. The decedent could not merge, so he drove the tractor-trailer onto the right shoulder. A pickup truck with a flat tire was present on the shoulder. To avoid striking the pickup truck, the decedent drove off the shoulder, subsequently losing control of the tractor-trailer. The truck went into a ditch, hit some trees and flipped, landing on the cab and pinning the decedent. The decedent was not wearing a lap/shoulder belt. The tractor was not equipped with an airbag. Post-incident inspection by the police showed that axle #1 left side brakes were out of adjustment.

Case 88
42-year-old male laborer for a heating and cooling company was killed when the van he was driving struck a car. The decedent was driving southbound on a two-lane asphalt road with a posted 55 mph speed limit when he disregarded a stop sign and entered an intersection. The van was struck on the front passenger corner by an oncoming eastbound vehicle that had the right of way. The decedent was not wearing his lap/shoulder belt and was ejected from the van's passenger side window. He landed approximately 50 feet from the van. The passenger side airbag deployed.

Case 89
20-year-old male student was working for another family member driving a pickup truck hauling a utility trailer filled with scrap drywall. He was taking the drywall to a local dump. The decedent was northbound on a dry, two-lane asphalt roadway with an unposted speed limit of 55 mph. South of the intersection was a "Stop Ahead" sign. At the intersection the stop sign had reflective tape wrapped around the post. The decedent disregarded the stop sign and entered the intersection where his vehicle struck a tractor-trailer that had the right of way. The decedent was wearing a lap/shoulder belt. The vehicle's airbags deployed.

Case 90
27-year-old male self-employed contractor was killed when the car he was driving left the highway to the right, continued up an embankment onto the highway's service drive, hit a fence and tree, and then rolled over and down the embankment and landed on the road. The decedent was not wearing a lap/shoulder belt and was ejected. Witnesses stated that the decedent was driving erratically at a high rate of speed prior to the incident. The decedent had measurable levels of active and inactive metabolites of cocaine in his blood in addition to prescription medication.

Case 91
32-year-old male office machine salesman died due to a head-on collision with a car. The decedent was traveling eastbound on a two-lane road. Two passenger cars, Vehicle #1 and Vehicle #2 were traveling westbound. Vehicle #1 struck the rear of Vehicle #2, causing Vehicle #2 to cross the centerline and enter the eastbound lane, where it collided head-on with the decedent's vehicle. The decedent was wearing a lap/shoulder belt. The vehicle's airbags deployed.

Case 92
42-year-old male driver/buyer for a wholesale florist driving a box truck was killed while delivering flowers. The decedent was driving the delivery truck eastbound on a wet, two-lane roadway when a pick-up truck, which was headed westbound, crossed over into the eastbound lane and struck his delivery truck head-on. It was raining heavily at the time of the incident. The victim was wearing his seatbelt. The truck's airbag did not deploy. The decedent was trapped in the delivery truck, which flipped over and landed on its roof on the road shoulder.

Case 93
46-year-old female owner of a wholesale food store was killed when she lost control of the vehicle she was driving and was hit by an oncoming garbage truck. The decedent was traveling eastbound on a wet, paved, two-lane roadway. There was slushy snow covering the fog lines at the sides of the road. The incident occurred between two small hills in the valley between these hills. The vehicle left the roadway, and it appears that the decedent lost control of the vehicle and the vehicle fishtailed. The vehicle re-entered the roadway and crossed the centerline, where the passenger side of the vehicle was struck by the garbage truck, which had just crested one of the hills. The decedent was wearing a lap/shoulder belt. The vehicle's airbag did not deploy.

Case 94
66-year-old industrial machinery salesman died as a result of a head-on motor vehicle crash with a sport utility vehicle (SUV). Responding police noted the weather was cloudy with light snow, and that the roadways were very slippery. The SUV, traveling northbound, began to fishtail and crossed the road median into the southbound lanes where it made head-on contact with the decedent's vehicle. The decedent was wearing a lap/shoulder belt.

Case 95
81-year-old male was killed as a result of a head-on collision with a van when the car he was driving abruptly crossed the centerline of a dry, two-lane roadway into oncoming traffic. The decedent was driving the vehicle for a motor mall to make a "dealer trade." The decedent was

wearing a lap/shoulder belt. The vehicle's airbags deployed.

Case 96
24-year-old male executive automobile broker was killed when the vehicle he was driving struck a tractor-trailer. The four-lane paved asphalt roadway was dry. The decedent crossed the centerline of the road and was struck by the tractor-trailer. In an attempt to avoid the collision, the tractor-trailer changed lanes and blew his horn to alert the decedent. The police department inspected the decedent's vehicle and found that the right rear tire was flat with no indication of impact. A small metal object was located within the tread, which could have also caused a leak to the tire. The right front tire was noted to have outside edge wear. The left front tire, which was flat and torn due to the collision, was also noted to be worn. The left tire showed signs of cupping and steel cord was visible on the tire's outside edge. Police concluded that with the wear of the left front tire and the steel cord protruding through the tire it could have been possible that the left front tire had blown just prior to the collision. Due to the condition of the front tires, the decedent, under normal driving conditions, would have been compensating for the alignment pull. If the left front tire blew due to wear, it would have caused the vehicle to pull to the left abruptly, which could have led to the collision. The decedent was not wearing a lap/shoulder belt. The vehicle's airbag deployed.

Case 97
19-year-old Hispanic male tree service sales representative died as a result of a head on motor vehicle crash with a small bus. The decedent, who was the driver of the vehicle, crossed the centerline of a dry, two-lane road and struck the oncoming vehicle. The decedent was wearing a lap/shoulder belt. The vehicle's airbag deployed.

Case 98
50-year-old male worker for a lawn maintenance business died when the pickup truck he was driving left the roadway and overturned onto its roof. The decedent was on an entrance ramp to an expressway. The ramp's surface was wet. The pickup truck went into a "side slip" and then continued rotating to 180 degrees. The truck left the roadway and then rolled over onto the roof. The decedent was suspended by his lap/shoulder belt. His chin compressed to his chest. The vehicle's airbag did not deploy.

Case 99
51-year-old female registered nurse was killed when she was ejected from the passenger side front window of the automobile she was driving after the vehicle left the road and rolled over. The decedent was driving on a dry, two-lane roadway while on a work-related errand. For an unknown reason, the decedent drove off the roadway to the right, slid sideways going partially down into a grassy ditch before re-entering the roadway and rolling over two times before coming to rest upright. The decedent was not wearing a lap/shoulder belt. The vehicle's airbags did not deploy.

Case 100
52-year-old male medical courier/phlebotomist was killed when the vehicle he was driving was hit head-on by an oncoming tractor-trailer. The decedent was traveling northbound in the left lane of a dry, three-lane highway with a posted speed limit of 70 mph. He was en-route to pick

up medical samples when for unknown reasons his vehicle fishtailed. He lost control of the vehicle, crossed the grass median and was hit head-on by an oncoming tractor-trailer. The decedent was wearing a lap/shoulder belt. The vehicle's airbags deployed.

Case 101
44-year-old male truck driver was killed when the straight truck he was driving left the roadway and struck a tree. He was driving on a two-lane dry asphalt roadway with a posted speed limit of 55 mph. The truck slowly left the roadway to the right and struck several trees before stopping. The truck partially tipped toward the tractor's passenger side in a ditch and the load spilled onto the ground. The decedent was wearing his lap/shoulder belt. The vehicle was not equipped with an airbag.

Case 102
43-year-old Hispanic male agricultural technician, who was a passenger in a tractor-trailer, died when the tractor overturned on an exit ramp. The exit ramp was in a construction zone where there was a right lane closure marked by barrels. The roadway was wet and the speed limit was 60 mph. Previously, another vehicle had exited the expressway and spun out on the ramp, striking several traffic barrels. One barrel was in the grass and one was on the exit ramp. A Good Samaritan arrived and assisted the driver who struck the barrels. The Good Samaritan decided that the barrel on the exit ramp should be removed. The driver and the Good Samaritan started to walk toward the barrel when the driver of the tractor-trailer, which was hauling farm equipment, exited onto the ramp. To avoid striking the barrel on the exit ramp, the tractor-trailer driver drove onto the ramp's "rumble strip." The driver applied the tractor brakes, which caused the trailer to jackknife and the tractor to overturn. The decedent, who was not wearing a lap/shoulder belt, was partially ejected from the tractor cab. The decedent was pinned by the tractor cab against the ground.

Case 103
59-year-old male owner of a real estate company was killed as a result of a multiple vehicle accident when he was ejected from the car he was driving. The decedent was the driver of Vehicle #1. He was driving southbound on a dry, two-lane roadway with a posted speed limit of 55 mph. He failed to yield and ran a stop sign. His vehicle impacted Vehicle #2 and then he also struck another vehicle. His vehicle came to rest on the southeast corner of the intersection. The decedent was ejected through the driver's door area. He was not wearing a lap/shoulder belt. The vehicle's airbag deployed at the time of the incident.

Case 104
52-year-old male Driver's Education instructor died when the vehicle in which he was a passenger was struck on the passenger side by an oncoming van. He was supervising a 15-year-old student driver at the time of the incident. The student driver was traveling east on a wet, two-lane highway when he lost control of the vehicle and spun sideways into the westbound lane. An oncoming van attempted to avoid the spinning vehicle but could not and struck the spinning vehicle on the passenger side. Neither the speed of the driver's education vehicle nor the oncoming van was considered to be factors in this incident. A witness traveling behind the decedent's car stated that there appeared to be either hard packed snow or a heavy concentration of salt along the centerline of the roadway. Another witness stated that there was heavy slush

along the centerline and shoulders. It is unknown why the student lost control of the vehicle. The decedent was wearing a lap/shoulder belt. The driver's education vehicle's airbag did not deploy.

Case 105
47-year-old male data analyst was killed when the small truck (<10,000 pounds) he was driving rolled on top of him as he was returning home from job-related training. The decedent was traveling on a two-lane concrete expressway with a posted speed limit of 70 mph. The brakes on a vehicle in front of the decedent were applied. The decedent, in response to the situation in front of him, applied his brakes and then swerved to his right to avoid a collision. The decedent lost control of his vehicle, ran off the road through a ditch and struck an embankment. The decedent, who was not wearing a seatbelt, was partially ejected from the vehicle. While being ejected, his arm was caught in the seat belt causing the vehicle to roll on top of him. The vehicle's airbags did not deploy.

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Case 106
30-year-old male dairy farmer was killed when a round straw bale fell from the top of a bale stack on a large bale wagon. The eight-foot long round bales were thirty inches in diameter and were stacked six high on the wagon. The stack dimensions were approximately 14-feet in height, 80-feet long and 40-feet wide. The decedent and another farm owner, after loading the straw on the wagon, attempted to get out of the wind by standing behind the bales. Wind gusts were over 40 mph. The air temperature was 28 degrees Fahrenheit. The top straw bale, weighing approximately 600 pounds, fell from the stack and struck the decedent in the back and head.

Case 107
50-year-old male independent contractor died from complications sustained at a logging site when a stray branch/falling tree struck him. The decedent was working alone the day of the incident. His neighbor went to check on him because he no longer heard the decedent's saw running. The decedent was found alive near a felled tree, next to a stray branch from the adjacent tree. He was transported to a local hospital. He had no recollection of the incident and there were no witnesses. One possible scenario surmised from evidence at the scene was that the tree he cut down was holding up a stray branch from the adjacent tree; therefore, when the first tree fell, the stray branch fell with it and struck him. This summary may also be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Agriculture (11). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 116.

Case 108
44-year-old male farmer was struck by an oncoming vehicle while he was standing on the road near his disabled tractor, which was hauling a disc. The decedent was traveling southbound, returning home from the field on a two-lane, dark, unlighted roadway. He experienced difficulty with the tractor and positioned the tractor partially on the roadway. The disc was on an angle sitting more into the roadway. The tractor/disc did not have an affixed slow moving vehicle sign. A vehicle traveling southbound approached the equipment and swerved into the northbound lane to avoid hitting the tractor/disc. The southbound vehicle struck the disc. A vehicle driver

traveling in the northbound lane noted the southbound vehicle's headlights swerve over into the northbound lane. The northbound driver slammed on his brakes. About the same time, the northbound driver saw the decedent running across the roadway from the west side to the east side of the roadway. The northbound vehicle was unable to stop and struck the decedent. The decedent's blood alcohol level was 0.062%.

Case 109
73-year-old male died from blunt force injuries during an unwitnessed tree cutting incident. The decedent, who had 50 years of lumberjack experience, was volunteering at a Boy Scout camp. The decedent was wearing spike boots, hardhat with earmuffs, and gloves. It appeared that the decedent had been attempting to cut down a tree when it split up the middle. The entire top of the tree snapped off and fell to the ground. As it fell, it struck him and pushed him back into a tree that was located behind the tree he had been cutting. A fellow volunteer lumberjack found him unresponsive with his chainsaw nearby and his hard hat about 20 feet to his south. The lumberjack who found him phoned 911. He was pronounced dead on the scene.

Case 110
48-year-old male logger was killed after he was struck in the back by a tree that fell onto him. His primary job function was that of a mechanical harvester operator. At some point, while working alone, the decedent attempted to fell a 20-inch diameter tree with a chain saw. The tree was not properly notched. This tree fell as directed by the notch and became lodged on a small branch in a nearby standing tree. The lodged tree was not removed prior to the decedent beginning to delimb another felled tree on the ground. This felled tree was in the fall path of the lodged tree. While the decedent was delimbing the tree on the ground with a chainsaw, the lodged tree fell, striking him in the back. His chainsaw was last heard running at about 1:30 p.m. A fellow logger walked to the incident area at approximately 5:20 p.m. and found the decedent's head and neck pinned against the tree he was delimbing by the tree that had fallen onto him. 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. In the Industry drop down menu, select Agriculture (11). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI066.

Case 111
28-year-old male press operator, who was working at the family farm, was crossing the road on an all-terrain vehicle (ATV) when an oncoming vehicle struck the ATV. The decedent was asked by a family member to help round up some cows that were out of their fenced area and in the roadway. Leaving the homestead, the decedent failed to yield at the end of their residential driveway and was struck by the vehicle that had the right of way.

Case 112
42-year-old male farm helper died when the cherry shaker he was driving left the roadway to the right and struck a tree. The two-lane roadway was dry. The decedent's coworker, who was traveling behind the decedent was too far behind and did not see the incident occur. As the coworker came around the corner, he saw the cherry shaker against the tree and the decedent in the seat. The coworker ran to a nearby home and called 911. The decedent had worked a minimum of 60 hours per week, leaving home at 4:30 a.m. and returning at night at 10:00 –

10:30 p.m. There were detectable levels of active cannabis metabolite in his bloodstream.

Case 113
21-year-old male student was contracted to cut down trees. The decedent was struck in the head by a tree branch that fell from twenty feet above him.

Case 114
53-year-old male custom applicator for a farm cooperative died when he was ejected from a front-boom, self-propelled sprayer he was operating after the sprayer struck a semi-truck trailer at an intersection. The decedent was the driver of the sprayer and was not wearing a seat belt. The decedent was traveling westbound and ran a stop sign. A semi-truck traveling southbound had the right of way. The sprayer struck the trailer of the truck. After striking the trailer, the decedent was ejected from the sprayer and landed in a ditch by the side of the road's southbound lane. 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. In the Industry drop down menu, select Agriculture (11). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI135.

Case 115
56-year-old male farmer died when a jack under a semi-trailer that was filled with used tires collapsed and fell onto him. The trailer had been obtained from a local scrap yard for metal scrap. Coworker #1, owner of the trailer, could not scrap out the trailer's metal and was given permission to park it on the decedent's property. The decedent, Coworker #1 and Coworker #2 were in the process of removing the trailer from the decedent's property. The trailer was very old and rusty. Cable pulls were used to hold the landing legs together because the trailer's landing legs were spreading due to the trailer's condition and the weight of the tires on the trailer. The trailer was placed on a downhill slope, facing nose down, with a slight grade to the driver's side. The trailer had been resting against a bucket loader. The decedent was under the trailer tying the frame rails together. Coworker #1 did not know that the decedent was under the trailer. Coworker #1 moved the bucket loader. When the loader was moved, the trailer began to wobble and Coworker #2 called out to the decedent to get out from under the trailer. The trailer fell onto the decedent's back and pinned him.

Case 116
85-year-old male farmer was killed when he was struck by a branch while using a bulldozer to clear his field. He had been pushing some trees with the bulldozer blade when he pushed one tree that was still connected to its root ball. A tree branch measuring approximately five inches in diameter snapped back like a rubber band and struck the roll bar on the bulldozer on the right side causing the metal bar to snap off and the branch to break. The branch then struck the decedent on the right side of his face.

Case 117
29-year-old Hispanic male landscape laborer died when the two-foot wide, sixteen-foot long and nine-foot deep trench he was working in collapsed and covered him with soil. The victim and four other laborers had been hand digging the trench over a two-day period at a private residence. The victim was kneeling to inspect a broken drainpipe at the bottom of the east end of

the trench. At approximately 3:00 p.m., a laborer on top of the trench saw a crack in the soil and yelled to the victim. The wall collapsed and the victim was completely covered with soil in seconds. Three laborers along with the company owner who was checking on the job began frantically hand digging to reach the victim. The fourth laborer remained above and outside of the trench. The owner stopped digging after a couple of minutes to call 911 with his cellular telephone. All four men (three laborers and company owner) continued to hand dig until the local fire and police departments arrived on the scene. Fire and police personnel continued hand digging. The victim's head was uncovered approximately 45 minutes after the trench collapse. 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI004.

Case 118

79-year-old male shipping clerk died after a four-tier, twenty-foot high tubular welded-frame steel scaffold fell and struck his head. The decedent was a volunteer who was one of many volunteers installing vinyl siding on a church addition. The scaffold that struck him was not tied to the building and did not appear to be properly supported at its base. The scaffold frames did not appear to be locked together vertically with pins where uplift could occur. The scaffold did not have proper guardrails and the working platforms were not fully decked. The scaffold did not have base plates or leveling jacks. The base consisted of concrete blocks laid directly on the ground with a wood board over the top of the blocks. The decedent was standing on the ground when the scaffold tipped over and landed on him. There were other co-workers present who responded and drove him to the hospital where he was pronounced dead in the emergency room. This MIFACE summary can also be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 128.

Case 119

47-year-old male truck driver for a road commission was killed after a 60-foot tall tree fell and struck him on the head. The decedent was a member of a four-person crew assigned to cut down a rotting 37-inch diameter tree. The group leader was operating a front-end loader positioned across the street. The decedent, wearing a hard hat with earmuffs, operated the chain saw. Two crewmembers were positioned as flaggers for traffic control. A cable was wrapped around the tree approximately 16 feet up from the ground and attached to the front-end loader across the street prior to any cuts on the tree. The plan was to have the decedent signal the front-end loader operator to apply tension to the tree when the tree was ready to be pulled. The decedent cut a notch (undercut) in the north side of the tree; the north side faced the roadway. The decedent, standing on the southwest side of the tree, made a notch in the south side of the tree. The crew intended the tree to fall towards the roadway. The tree split vertically and started falling prior to the decedent's signal. Instead of falling to the north towards the roadway, the tree twisted and fell southwest onto the victim who was attempting to run to safety. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu,

select Struck By. Click on the Search button, and then scroll down to Case 113.

Case 120

41-year-old male worker was killed when the sides of the trench in which he was working collapsed onto him and a fellow worker. The two men were laying sewer pipe in an unprotected excavation approximately eight-feet deep and four and one half-feet wide. The sides of the excavation were nearly vertical. The workers' employer was operating a backhoe to dig the trench and placing the spoils along one edge of the excavation. Prior to the fatal collapse, the two workers had to run to avoid being buried by another cave-in. Approximately ten minutes after the initial cave-in, they were buried by the fatal collapse. The decedent was completely buried for several minutes. His coworker was buried up to his neck. Once the backhoe operator and the property owner had dug down to the coworker's arms and chest, he uncovered the decedent's head and part of a shoulder. The coworker was seriously injured and taken to the hospital. The company was charged criminally with willfully violating the MIOSHA requirement that an employer provide a place of employment, which is free from recognized hazards that are likely to cause death or serious physical harm to the employee. The full description of this fatality can be accessed in the MIOSHA News, Vol. 11, No. 1, Winter 2007. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 143.

Case 121

34-year-old male construction laborer was killed by an oncoming westbound vehicle after stepping out into the active traffic lane to sweep away debris generated from the bridge demolition overhead. The three-lane roadway was narrowed down to one westbound travel lane. The decedent was one of nineteen employees at a bridge/overpass demolition site. It was the first day of demolition work. A deflector shield was placed on the closed lanes under the area of bridge demolition to control the falling debris. The deflector shield was a semi-trailer with plywood along the bottom of the trailer deck. The shield was approximately 18-feet high and angled about 30 degrees towards the closed lanes. There was approximately a four-foot gap between the bottom of the bridge deck and the deflection shield. The debris fell onto the deflector shield and was directed into the closed lanes of traffic. As the demolition process took place, debris fell outside of the closed lanes and into the active highway lane. The decedent's job was to use a push broom to sweep away any debris that fell into the active lane by waiting for an opening in traffic and then step out into the lane to sweep away the debris. The incident occurred at night. Portable lighting illuminated the road construction area. The decedent was positioned on the west side of the deflector shield. He was not wearing a reflective vest. The roadway was wet at the time of the incident. There was intermittent mud and dirt on the roadway as well as very small pieces of stone and debris. The decedent stepped from behind the deflector shield into the live lane from the south side of the lane carrying his broom to sweep away the debris. The decedent looked up as he stepped into the roadway and saw the oncoming vehicle. The oncoming vehicle made an evasive maneuver to the right towards the north shoulder of the roadway. The decedent attempted to run to the north side of the lane but was struck by the vehicle. The driver pulled off the road and saw the decedent trapped underneath his rear wheel. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 131.

Case 122
47-year-old male surveyor for a county Road Commission was struck by an oncoming vehicle while conducting surveying operations in the middle of an intersection of a two-lane highway. He was wearing an orange high visibility vest. The two-person survey crew had not set up any road signage indicating that survey work was being conducted. The crew had not established a proper lane closure nor had they set up traffic cones around the area where he was standing, holding the prism pole. The decedent was holding the prism pole in the southbound lane when an oncoming vehicle traveling in the southbound lane struck him. The collision caused him to become airborne and he was struck again by a northbound vehicle. The driver of the southbound vehicle was driving on a revoked license due to "vision problems." 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI068.

Case 123
40-year-old male ground man/truck driver was killed when a dump truck driven by a county road commission employee ran over him while the truck was backing into the work zone. The three-person work crew consisted of the rotomill operator and two ground men, one of whom was the decedent. The rotomill had made two passes on an asphalt road and was in the process of a third pass. The dump truck into which the mill was emptying had to be changed out because it was filled. The decedent decided to perform some required measurements during the downtime in the operation while the dump trucks were being changed out. The decedent sketched the jobsite to record his measurements on a notepad. With a digiroller in hand, he walked across the road. Apparently unbeknownst to the decedent, as the full dump truck was exiting (Truck #1), another dump truck driver (Truck #2) was backing his empty dump truck into position by the rotomill from his staging position. It appears the decedent waited for Truck #1 to pass him, and then he walked behind Truck #1 into the path of the Truck #2. He was struck by the driver's side rear wheel and run over. 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI096.

Case 124
29-year-old Hispanic male laborer was killed when he was crushed by a trench wall cave-in while installing water service lines for a newly constructed residential home. The decedent was a member of a three-person work crew. One crewmember operated the CAT 312B excavator. The decedent was one of two laborers. The decedent and his laborer coworker were working inside of a nearly vertical excavation that was 50-feet long, 9-feet deep, 7-feet wide on top and 6 1/2-feet wide at the bottom. The soil conditions were a mixture of a medium clay and runny sand/loam mix. The trench was an "L" shape. The work consisted of laying schedule 40, 4-inch pipe from

the main near the street to the home. The decedent was assigned to dig under the footing near the basement while his coworker in the trench was laying pipe near the street. The decedent was working approximately 15 to 20 feet from his coworker who was using a gas powered saw to cut pipe. The coworker could not see the decedent. It is thought that the decedent was using a pick-ax to dig out from the footing on the south side of the trench. There was no trench box. The decedent's coworker heard a collapse and yelled to the heavy equipment operator concerning the location of the decedent. His coworker then ran to the decedent's location and found him under a large chunk of dirt. The heavy equipment operator told the coworker to call the company. Prior to emergency response arrival, different contractor workers working nearby heard the commotion and entered the trench with the decedent's coworker to attempt to move the dirt from the decedent. The excavator was directly west of the decedent and close enough that the heavy equipment operator used the bucket to dig around the decedent. One of the other contractor employees attempting to dig out the decedent told the excavator operator to stop digging. The operator then left the excavator cab to help dig out the decedent. Emergency response arrived. While attempting rescue, the south wall collapsed again. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 147.

Case 125

59-year-old male field technician died when a 24-inch high by 32-inch wide by 8-foot long expanded polystyrene (geofoam) block struck him in the head and chest. A 15-foot deep excavation had been dug as part of a brownfield redevelopment site to provide the foundation for an add-on to a large retail store. At the base of the excavation was a French drain system that permitted the water to be drained away. A part of the excavation had been laid with geofoam blocks and had already been ballasted with soil. The incident occurred on the section of geofoam foundation that was not ballasted. The French drain had backed up causing the geofoam blocks to float on the water. After the water was drained, a section of geofoam did not settle to grade. After entering the excavation and standing on the top layer of geofoam pad, the decedent spoke with a representative from the company that had laid the block (Company A) about upcoming work at the site. A wind gust of approximately 53 miles per hour (mph) came from the southwest direction. The force of the wind caused geofoam layer #3 to rise up about 12 feet like a wave. The wave of geofoam block collapsed and the wind began to blow the individual blocks at the decedent and the Company A employees who were removing the block from the pad. Six or more Company A employees and the decedent were struck by the wind-blown blocks. Emergency response was called when the decedent was found while laying on the pad bleeding from his nose and having difficulty breathing. The decedent was transported 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI193.

Case 126
41-year-old male plumber/pipefitter died when he was struck in the chest by a pipe cap that he was removing from a pressurized pipe. Some leaks had been identified in an eight-inch waterline that had been previously installed and which needed to be repaired. To aid in troubleshooting the leak locations, valves were closed off in the lines, creating sectionalized portions of air charged waterline. The waterline was pressurized to 80 psi. After pipe repair was completed, the air was released from the lines, except for a portion "downstream" of a closed valve, which left a section of line still pressurized to 80 psi. At the end of the eight-inch line there was a vic fitting end cap (also referred to as a groove lock or gasketed end cap). The decedent was removing the 25-pound vic fitting end cap from the eight-inch line in the main boiler room in preparation for continuing the waterline project. The metal cap struck the decedent in the neck and upper chest area when it blew off the end of the pipe. Fellow workers called 911. Emergency response arrived, and the decedent was taken 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI201.

Case 127
21-year-old male airport baggage handler was struck and crushed by a mobile belt loader. The decedent and his coworker, the mobile belt loader operator, had arrived at the side of an aircraft to unload baggage. The decedent was having difficulty opening the cargo door. His coworker, noticing the decedent's difficulty, pulled the mobile belt loader closer to the aircraft, put the drive gear in neutral, and jumped off the loader to assist his coworker. He did not set the emergency foot brake. The mobile belt loader rolled forward, pinning the decedent's upper shoulder and head between the mobile belt loader conveyor and the aircraft. The decedent was pronounced dead at the scene. The MIFACE 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. In the Industry drop down menu, select Transportation and Warehousing (48). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 137.

Case 128
62-year-old male truck driver was killed when he was standing outside of his tractor-trailer and was struck by an oncoming pickup truck. The tractor-trailer was on a five-lane roadway that had two lanes traveling eastbound and westbound and one center turn lane. The roadway was dark and unlit. The roadway was dry and had a posted 45 mph speed limit. The decedent had parked the truck in the far right (curbside) westbound lane. The decedent exited from the tractor cab and walked outside of the vehicle. He made a cell phone call to the destination site asking for directions. The vehicle that struck him was being driven in the adjacent lane. As the oncoming vehicle reached the front of the tractor, the decedent stepped into the lane of the oncoming vehicle and was struck and killed.

Case 129
59-year-old male truck driver was killed when he was pinned and crushed against a receiving dock wall by a truck backing up in the dock well. Three companies had personnel involved in

the incident. Company A was the incident location. Company B employed the decedent who was a truck driver. Company C employed the driver of the truck that crushed the decedent. The incident occurred at Company A's receiving docks. There was only one exterior light for the receiving dock area. The decedent had positioned his truck into the east receiving dock and was waiting for Company A employees to unload the trailer. Company C truck driver arrived and backed his truck into the west dock. He exited the tractor and went inside the building to deliver his paperwork. The west loading dock bumper block was unattached to the building and was lying on the floor (right side), and the other bumper block was hanging down, supported by one bolt. Concrete was broken from the west dock exterior on both sides. The decedent told Company C driver that he was too close to the dock and to move his truck forward so the dock plate could be raised and positioned. Company C driver did as suggested; he pulled his truck forward about six inches, waited 20 to30 seconds then backed up about six inches and set his brakes. Company C driver did not hear the dock plate being set and indicated he could not see the decedent in his rear view mirror due to it being dark. During the process of backing in, the decedent's head was struck by the rear of the 53-foot straight box trailer. The MIFACE 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. In the Industry drop down menu, select Transportation and Warehousing (48-49). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 121.

Case 130

35-year-old male truck driver was killed as he was walking across the parking/yard area in front of a loading dock and was struck from behind by another truck as it was exiting the area. At approximately 4:00 a.m., the decedent left the office area and was walking toward his truck that was located in the lot. The office area had second story lighting and the parking area had lighting approximately every 120 feet. The decedent was wearing a dark blue uniform. His back was to the exiting truck as he was walking in the center of the lot. It was a common employee work practice to walk down the center of the parking lot because the employees felt they were more visible under the lighting. The truck that struck him had frost on the windshield, with only a few inches at the bottom portion of the windshield clear. Its headlights were on. No ice scraper was found in the vehicle. MIOSHA estimated the vehicle's speed at 11to12 mph when it struck the decedent. It does not appear that the decedent made an attempt to get out of the way of the oncoming truck. The truck did not brake until after it struck the decedent. This MIFACE summary can be found at the MSU OEM website: www.oem.msu.edu/. Click on MIFACE and then select Summaries of MIOSHA Inspections. In the Industry drop down menu, select Transportation and Warehousing (48-49). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 146.

Case 131

33-year-old male truck driver was killed when he was run over by the dual wheels of a tractor while checking the air brake connections for an air leak between a tractor and trailer. The decedent was training another company driver. The decedent had backed up the tractor and hooked up to a trailer that they were to take to another destination. The trainee was seated in the driver's position and the decedent was the passenger. The decedent and the trainee noted an air leak at the connection between the tractor and trailer. The decedent took a seal from the tractor to

try to fix the leak by changing the seals. The tractor and trailer were setting on a slight incline facing downhill. The trainer set both the tractor and trailer brakes. The decedent indicated that the tractor brakes did not need to be set and then he released the tractor brakes. The trailer brakes remained set. The decedent then exited the tractor and stepped between the rear of the tractor cab and the first set of dual wheels on the driver's side. The trainee exited the cab to watch the decedent replace the seal at the glad-hand, and then walked to the back of the trailer. At this point, the trainee noticed the trailer moving forward. He then heard the decedent yell to stop the tractor. The trainee got in the cab and applied the brakes. He then heard the decedent yell to back the tractor up; he was under the wheel. The trainee backed the truck off of the decedent, exited the cab and called 911. Responding police found the emergency line connection at the glad-hand to the trailer was faulty and leaking. The company for whom the decedent worked did not have a formal procedure for setting both the tractor and trailer brakes when exiting the cab. The MIFACE 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. In the Industry drop down menu, select Transportation and Warehousing (48-49). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 134.

Case 132

44-year-old male truck driver for a waste management company was struck and killed by an oncoming car while emptying a trash container into the garbage truck. The decedent, who was wearing a fluorescent green safety vest, was standing on the right side of the truck loading a waste container into the back of the truck. The incident occurred on a dark, unlighted, two-lane road with a speed limit of 55 mph. The roadway was dry. The garbage truck was in the southbound lane and the vehicle striking the decedent was also traveling southbound. The driver of the vehicle stated he lost control of his vehicle. The police found skid marks that extended from the southbound lane into the northbound lane and then continued back into the southbound lane. The driver's side of the oncoming vehicle struck the right rear of the garbage truck. The police report indicated that the driver of the vehicle had previously observed the garbage truck in front of him. The driver had adjusted the radio and his cap, and then looked up and realized the garbage truck was stopped. It appears as the driver applied the vehicle's brakes, he lost control, began to fishtail, and subsequently struck the right rear of the garbage truck. Police inspection noted two defects on the garbage truck: one clearance light on the top of the garbage truck cab was not operational and one brake chamber was leaking on the left side of the truck.

Case 133

47-year-old male tree trimmer was killed when a tree limb struck him. A crew of five tree trimmers plus the homeowner for whom the limb trimming was being conducted were present at the time of the incident. A trimmer in a cherry picker was making cuts in a cottonwood limb, which was 10- to 20-feet long and weighed between 1,600 and 2,000 pounds. He yelled "headache," the signal to warn the ground crew to clear the area, because he was ready to make the final cut. One end of a 150-foot long rope was attached to the limb. The other end was attached to a lowering device and was being held by a worker who controlled the speed of the limb's descent to the ground. When the final cut was made, the limb started to swing out. It then abruptly fell to the ground striking the decedent who was in the limb drop zone. The rope attached to the limb had snapped at approximately 60 feet in the air causing the limb to fall

quickly into the drop zone. The ends of the rope were frayed. The rope also showed evidence of friction burns and snags. The MIFACE 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. In the Industry drop down menu, select Administrative, Support, Waste Management and Remediation Services (56). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 139.

Case 134
41-year-old male, who owned his own tree removal business, died while felling two pine trees from a client's yard. He had cut the branches on one side of the tree and had moved to the other side to begin cutting from the tree top when a limb fell backward off the top and pinned him up against the trunk 40-50 feet off the ground attached by a harness and a rope. His wife was present but was unable to move the tree limb. She called 911 and ran to get help from a neighbor. Witnesses from a local business came over and tried to help. The decedent stated he could not breathe before losing consciousness. Toxicological analysis showed measurable levels of cocaine and marijuana in his blood.

Case 135
56-year-old male painter was struck in the head by a falling gutter. The gutter that fell onto him was approximately 15-feet long and weighed between 35 and 40 pounds. It was attached to a roof overhang by a 2- by 4-inch board running its length approximately 10 feet above the concrete floor. It had been in place for 13 years. The overhang roof protected trucks as they delivered their products. Dents in the gutter indicated trucks had struck it as they drove under the overhang. Maintenance records were available for 10 years, however nothing was documented for the gutter. No strapping attached the gutter to the overhang although it had been specified on the original blueprints. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 140.

Case 136
59-year-old male millwright died when a crated transfer conveyor component weighing approximately 816 pounds toppled onto him from a lowboy flatbed trailer. He and a coworker were unloading nine packaged conveyor components from the bed of the trailer in the yard of the plant. The decedent's coworker was operating a powered industrial lift truck to remove the components. The decedent was standing on the ground next to the flatbed trailer assisting his coworker by performing signaling duties. They had removed four of the nine components. The coworker was some feet away on his lift truck facing the trailer waiting for a truck not involved in the incident to pass in front of him so he could approach the trailer to unload the next piece. The driver of the flatbed trailer truck was removing the pallet tie-down straps on the opposite side of the trailer from the decedent. At the time of the incident most of the straps had been removed. The coworker on the lift truck observed a piece of equipment on the trailer bed begin to tilt and then topple off. He heard the decedent yell and observed him raise his arms. The piece struck the decedent in the head. The crated dimensions of the piece were approximately seven feet long by five and one-half feet high by two feet wide. The conveyor component was

attached at the top of the pallet causing the entire package to be top heavy and unstable.

Case 137
52-year-old male shake-out man/chain operator (hooker) for a 50-ton overhead crane was killed when he was struck by and pinned by a moving 12,000-pound mold against an adjacent mold, and then thrown to the floor. The molds consisted of a top (cope) and a bottom (drag), which were bolted together. Both the cope and the drag had an attachment area called the trunion. The decedent and the overhead crane operator to whom he was assigned had finished shaking out the sand in a 60- by 80-foot mold. After shaking out the sand, the overhead crane operator transported the mold to a holding area. The decedent and another employee unhooked the chains from the mold. The overhead crane operator, without looking at the location of the decedent, began to move the crane to another location to pick up another mold. Two different event scenarios were stated by witnesses: (1) As the crane operator moved to the west, he had to move his chain around a jib crane. He was raising his chain when the chain caught the cope trunion of an 80- by 100-foot mold. The decedent was following the chain and when the crane operator inadvertently hooked to the trunion, the decedent tried to remove the chain. (2) The decedent took the overhead crane chains and headed west. As the decedent was walking with the chain, he hooked it up to the cope of an 80- by 100-foot mold and kept walking to the other side of the mold to hook the other chain to the cope. Under this scenario, the decedent did not notify the crane operator that he had attached the chain to the cope of the mold. In each scenario, the crane operator was not aware of the decedent's location or activity; he looked in the direction of the mold he was going to pick up. Additionally, the overhead crane operator did not activate the crane warning device before/during the crane movement. As the crane moved to its next location, it pulled the cope of the hooked mold towards an 80- by 100-foot mold that was positioned a few feet away. The decedent was positioned between the two molds. The hooked cope of the moving mold struck the decedent and threw him into the other mold and then to the floor. The MIFACE 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. In the Industry drop down menu, select Manufacturing (23). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 124.

Case 138
42-year-old mechanical engineer was killed while using a log-cutting machine in the yard behind his home. It appears that a 26-inch diameter, 15- to 20-foot long log rolled off the machine onto him. He was pinned under the log.

Case 139
42-year-old male tool and die maker died after being pinched between a rack of parallel spacers and a 47,000-pound die that was being moved by an overhead crane. The decedent, acting as spotter, was a member of a three-person crew maneuvering the die using a dual-hoist overhead crane to place the die on a rail cart. The load was passing over nearby equipment as it was being positioned on the rail cart. The die contacted the scrap conveyor of a nearby mill causing the die to rotate. At some point during the rotation, the decedent moved from his position at the end of the die to a position between the die and the rack of metal parallel spacers. Members of the crew did not see him change position, but did hear him yell out when he was pinched between the die and the spacers. The die rotated back and the decedent moved out from the pinch point and

indicated that he was hurt. The MIFACE 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. In the Industry drop down menu, select Manufacturing (31-33). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 145.

Case 140

42-year-old male machine operator was critically injured after being struck by a 2,500-pound iron grate that he was removing from a metal shredding machine (also known as a hammer mill). There were 13 grates requiring removal. Each grate lay in a track, which held them in position in the shredder box. Five grates had been removed. To remove a grate, the decedent attached a separate steel alloy chain to each end of the grate and a mobile crane lifted the grate out of the machine via the grate track. The incident occurred during the removal of the sixth grate. The grate was located at a five o'clock position. The decedent had attached the chains to the grate and the hoisting process had begun. The grate became stuck in the grate track. To facilitate its removal, the decedent used a torch to partially cut through the grate while it was still under tension from the crane. The crane again attempted to lift the grate from the machine. Because the grate again did not move, the decedent cut through the grate end while the grate was still under tension. When the grate was cut through, the momentum of coming to center caused the grate to continue past center and strike the decedent in the side of his head. 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. In the Industry drop down menu, select Wholesale Trade (42). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI009.

Case 141

36-year-old male truck driver for a traveling carnival was killed when he was caught between a 28-foot long, 14,000-pound trailer fender wall and trailer tire while loading the trailer with a disassembled carnival ride. The wheels of the semi- trailer were disconnected from the semi trailer when the ride was being used. Some components of the ride were permanently affixed to a semi-trailer frame. Other components were connected to each other forming the ride. When rides were disassembled and prepared for transport, the removable components of the ride (tracks and cars) were loaded on the semi frame. The tongue of the semi-trailer was attached, the wheels were put back on and the electrical lead was wrapped up. To prepare for transportation, the semi-trailer was raised on permanently mounted hydraulic jacks to enable the employees to reattach the travel wheels. A pin with an r-key was inserted into the travel wheel to connect the wheel to the axle. In this incident, the permanent mechanical legs of the semi-trailer were not in a set position and the hydraulic jack nearest the wheel where the decedent was working was inadequately supported. Another employee was raising the semi-trailer with a hydraulic jack under the direction of the decedent. The jack positioned near the wheel well in which the decedent was working was supported by a single 5/8-inch thick, six-inch by eight-inch piece of board. The decedent placed his head in the wheel well between the tire and frame of the semi-trailer presumably to get a better view to insert the r-key into the pin. As he was reaching into the wheel well of the trailer to re-attach the wheel assembly, the jack supporting the weight of the trailer broke through the board under the jack on the soft ground. The jack sunk six inches into the ground trapping the decedent's head between the wheel and tire assembly. The hydraulic

jacks were inspected and found to be performing according to specifications. The MIFACE 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. In the Industry drop down menu, select Arts, Entertainment and Recreation (71). In the Fatality Type drop down menu, select Struck By. Click on the Search button, and then scroll down to Case 122.

Case 142
34-year-old female firefighter was critically injured after being struck by an out-of-control pickup truck on an icy interstate highway. The fire department responded after being coded as a first call response by 911 that an accident had taken place on a local highway with occupants trapped. An engine was dispatched with three firefighters, the engine driver, lieutenant and the decedent. The incident occurred near a freeway entrance ramp. The entrance ramp was blocked by a car and a pickup truck that had been involved in a crash at the ramp junction with the highway. The lieutenant and the decedent exited the engine and walked on the side of the freeway to the crash site while the engine driver repositioned the engine. As they were walking, the driver of a pickup lost control on black ice that had formed on the highway surface. The pickup struck the decedent. She was thrown off the highway shoulder onto the grass bank alongside the highway. After the incident, the fire department developed a standard operating procedure (SOP) for emergency response on roadways. 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. In the Industry drop down menu, select Public Administration (92). In the Fatality Type drop down menu, select Struck By. Click the Search Button, and then scroll down to Investigation Report #06MI001.

SUICIDE (8)

Case 143
41-year-old female nurse died due to a self-inflicted laudanosine (morphine derivative) intoxication.

Case 144
34-year-old female physician died due to self-inflicted scalpel wounds to her wrists and groin.

Case 145
59-year-old male dry cleaning store owner/operator died due to a self-inflicted gunshot wound to the head.

Case 146
47-year-old male maintenance mechanic died from self-inflicted carbon monoxide poisoning due to the exhaust from two vehicles running in an enclosed garage at his place of business.

Case 147
45-year-old male owner of a home improvement company died of asphyxiation due to a self-inflicted hanging.

Case 148
59-year-old male truck driver died due to a self-inflicted gunshot wound to the head.

Case 149
54-year-old male attorney died due to a self-inflicted intentional overdose of medication.

Case 150
44-year-old male pizza storeowner died from asphyxiation due to a self-inflicted hanging.

TOXIC EXPOSURE (7)

Cases 151-153
58-year-old male and two 50-year-old males were providing security services for a furniture resale shop. Because the shop did not have electrical service, the shop owner utilized two gasoline-powered generators for power. The three individuals were found in a twelve by twenty-foot room. The building doors and windows were closed. All three men died from carbon monoxide poisoning. One of the decedents had measurable levels of cocaine, cocaine metabolite, and heroin metabolite in his blood; one decedent had measurable levels of ethanol, cocaine metabolite and heroin metabolite in his blood; and one decedent had measurable levels of alcohol in his blood. Carboxyhemoglobin levels in their bloodstreams ranged from 43.5% to 77.0%.

Case 154
70-year-old male providing security services for a church died as a result of carbon monoxide poisoning. The decedent entered the church with the head deacon and proceeded up the stairs to the second floor where two generators were located. The generators were placed in the second story room because a generator had been stolen when they were located outside the building. The room's window was closed. When the decedent and the head deacon entered the room with the generators, the decedent indicated he was having trouble breathing. The head deacon told the decedent to go downstairs and get into fresh air. The decedent collapsed in a nearby upstairs room. When the head deacon went downstairs, he could not find the decedent. Two female church members were working in the church area. The head deacon asked them if they had seen the decedent and they replied they had not seen him. All three individuals went upstairs and found the decedent on the floor in the room. One of the female church members stayed with the decedent and provided CPR. The other church member and the head deacon went downstairs and the female church member called 911. When the ambulance arrived, they could smell the exhaust from the generator and decided not to enter the church. The ambulance called for fire department assistance. When the fire department arrived, they entered the church and proceeded to the second floor room where the decedent and the now unconscious female church member were located. The fire department brought the decedent and this church member outside and they began resuscitative efforts. Fire department personnel transported the decedent and the unconscious church member to a local hospital. The decedent's carboxyhemoglobin level was 48%. The church member was hospitalized and recovered. 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. In the Industry drop down menu, select Administrative, Support, Waste Management and Remediation Services (56). In the Fatality Type drop down menu, select Toxic Exposure. Click the Search Button, and then scroll down to

Investigation Report #06MI204.

Case 155
40-year-old male owner/operator of a construction company died due to carbon monoxide poisoning from a propane-powered portable heater he was utilizing to heat the work area. The decedent and another family member were working on the construction of a new duplex home. The decedent had stayed late to complete some construction tasks and decided to spend the night at the duplex. When the decedent's coworkers arrived at the worksite the following day, the decedent had expired. The decedent had lethal levels of carboxyhemoglobin (58.6%) and his blood alcohol concentration was 0.037%.

Case 156
57-year-old male tub re-glazer died from arteriosclerotic and hypertensive heart disease with a contributory cause of methylene chloride poisoning while stripping a bathtub. The bathroom did not have windows and the bathroom door was closed. The police report indicated that the ventilation fan for the bathroom was operating. The decedent was found laying halfway into the bathtub, face down and not breathing. The decedent was wearing a tight-fitting, half-facepiece air-purifying respirator equipped with organic vapor/acid gas cartridges. Two cans of an aerosol chemical stripping agent were found on site. Blood methylene chloride concentration was 100 micrograms per milliliter (mcg/ml). The MSDS for the stripper used by the decedent indicated that the product contained 85-90% methylene chloride. Methylene chloride is broken down in the body to carbon monoxide. The MIFACE 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. In the Industry drop down menu, select Construction (23). In the Fatality Type drop down menu, select Toxic Exposure. Click on the Search button, and then scroll down to Case 154.

Case 157
41-year-old male attorney died due to drug abuse.