2003

Annual Report on Traumatic Work-Related Fatalities in Michigan

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On Traumatic Work-Related Fatalities in Michigan

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February 2, 2005

Table of Contents

Summary

This is the 3rd Annual Report on Traumatic Work-Related Fatalities in Michigan. One hundred fifty-two individuals died in 2003 from an acute traumatic injury at work, up from 151 in 2002 and down from 174 in 2001. When utilizing the Standard Industrial Classification (SIC) coding of industrial sectors, there were 34 deaths in Construction, 33 deaths in Agriculture, 22 deaths in Services, 21 deaths in Transportation, and 16 deaths in Retail Trade. If the new North American Industry Classification System (NAICS) coding was used, there were 34 deaths in Construction, 32 deaths in Agriculture, 18 deaths in Transportation and Warehousing, 12 deaths in Retail Trade, and 10 deaths in Manufacturing.

The ranking of industries by *risk* of death differed. When industry is classified by NAICS, Mining had the highest annual average incidence rate (62.5 deaths per 100,000 workers), followed by Agriculture (40.1 deaths per 100,000 workers), and Construction (17.9 deaths per 100,000 workers).

Most deaths occurred among men (93.4%) who were white (92.3%). The average age of death was 45.8 years and ranged from 13 to 87. Illegal drugs or alcohol was a potential factor in 20 (13.6%) of the non-suicide deaths, and the side effects of prescribed or over-the-counter medication were a factor in 11 (7.5%) of the non-suicide deaths. One of these 11 had alcohol in their body fluids in addition to the prescribed medication.

The largest number of work-related traumatic events occurred on a Wednesday (36, 24.2%) followed by Monday (30, 20.1%). July was the most common month (21, 13.8%) and 8:00a.m. to 12:00p.m. was the most common time of the day (43, 30.1%) for the occurrence of traumatic incidents.

The most common means of death were machine-related (39, 25.7%), followed by motor vehicles (29, 19.1%), falls (19, 12.5%), and homicides and struck by (15 each, 9.9%).

The 152 individuals who died had 149 different employers. Three 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 reports of the detailed investigations are at the Michigan State University Department of Occupational & Environmental Medicine (MSU OEM) website: www.chm.msu.edu/oem.

Michigan Occupational Safety and Health Administration (MIOSHA) staff investigated 51 of the deaths at 50 employers. The police investigated 55 of the deaths (motor vehicle, homicides and suicides). Five of the deaths were investigated only by Federal agencies (National Transportation Safety Board, Mine Safety and Health Administration, and Federal Railroad Administration). The State of Michigan Office of Racing investigated one work-related fatality. The remaining 40 work-related fatalities were not investigated by any regulatory agency as to cause of death other than by the police to exclude a homicide or suicide.

Although acute work-related traumatic fatalities represent only a small percentage of the approximately 87,000 deaths that occur annually in Michigan, work-related traumatic fatalities

are preventable. The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to take action to prevent them despite their relatively small number. Further efforts to investigate the circumstances leading to these deaths and disseminate information from what we learn are necessary to educate and, where applicable, recommend change in regulations to prevent similar deaths from occurring in the future.

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.

For the 2001 and 2002 Annual Reports on Work-Related Traumatic Fatalities in Michigan, the 1987 Standard Industrial Code (SIC) classification system was used to group establishments into industry sectors. This 2003 Annual Report on Work-Related Traumatic Fatalities in Michigan grouped establishments by both SIC and the North American Industry Classification System (NAICS). The United States adopted the revised classification in its statistical programs beginning on or after 2002. In future years, analysis will be performed using the NAICS system only.

NAICS has 20 sectors that group establishments into industries according to economic activity. The sectors, their two-digit code, and their distinguishing activities are listed in Appendix II. NAICS uses a six-digit coding system to identify particular industries and how those industries are placed within the NAICS coding structure. MIFACE classified an establishment to an industry when the establishment's primary activity met the definition for that industry.

Methods

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

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

Once an individual had been identified and confirmed as an eligible work-related death, various sources of information were used to describe the circumstances associated with the fatal event. Basic information we attempted to collect included: the size of the company; the content of the safety program; the victim's age, gender, and occupation; tasks the victim was performing; tools or equipment the victim 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 depended on the type of incident.

For homicides, suicides and most transportation-related fatalities that occurred while the individual was at work, MIFACE collected source documents and did not attempt to perform an onsite investigation.

Source documents included reports from agencies that investigated the death or provided emergency services when the event occurred, death certificates, medical examiner reports and, when appropriate, the MIOSHA fatality investigation narrative.

For the remaining work-related fatalities including agricultural fatalities, MIFACE initiated contact with employers or farm family members to request permission for an on-site investigation. Employer participation in the MIFACE program was voluntary and was unrelated to any regulatory or enforcement procedures. It is important to note that MIFACE investigators did not enforce compliance with Michigan Occupational Safety and Health Act (MIOSHA) rules and regulations and did not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE with employer agreement, accompanied the MIOSHA compliance officer. MIFACE also interviewed the compliance officers about their investigation.

When the MIFACE on-site fatality investigation was completed, a report was written based on the facts identified during the investigation and from reviewing the source documents. Neither reports nor educational materials produced by the MIFACE program contained personal identifiers. The MIFACE report contained a summary of the fatal incident, a detailed narrative of the fatal incident, the cause of death and recommendations to minimize the chances of a similar fatality occurring in the future. Before releasing the MIFACE report, the report was reviewed by members of the MIFACE advisory board and MIOSHA (if MIOSHA conducted an investigation).

The MIFACE report was 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 were also posted on the MSU Occupational and Environmental Medicine (OEM) website at

www.chm.msu.edu/oem/. 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 target industrial sectors.

Results

There were 152 acute traumatic work-related fatalities in 2003. One hundred forty-eight (97.4%) of the 152 work-related traumatic incidents occurred in 2003. In four cases, the traumatic incidents occurred in a prior year, and the individuals died of complications from their injuries in 2003. The four traumatic incidents that caused death in 2003 occurred in 1974, 1980, 2000 and 2002. Three individuals died from complications of injuries sustained after falling from a height (two from complications of a fractured cervical spine and one from complications of quadriplegia) and one individual died as a result of thermal burns to 80% of his body.

Demographics

Gender

One hundred forty two (93.4%) of the individuals who died were men and 10 (6.6%) were women.

Race/Ethnicity

One hundred thirty eight (90.8%) of the individuals who died were Caucasian, seven (4.6%) were African-American, four (2.6%) were Hispanic, and three were Asian/Pacific (2.0%). Nine of the ten women were Caucasian and one woman was Hispanic.

Age

The age distribution of the individuals who died from a work-related injury is shown in Figure 1. The ages ranged from 13 to 87, one death in a youth (age 13) and 13 deaths in individuals 70+ years old. The average age was 45.8 years, up from 42.2 years in 2002. One hundred thirty eight (90.8%) of the deaths occurred in individuals between the ages of 18-69.

The thirteen-year-old youth who died worked on a farm and was entangled in an unguarded rotating power-take-off (PTO) shaft on a tractor.

Of the thirteen individuals with ages ranging from seventy to eighty-seven who died from acute work-related events, nine were farm owner/operators. Two of the remaining four individuals were truck drivers, one individual was a horse trainer and one individual was a grain elevator manager.

Table 1 shows the distribution of deaths by industry as categorized by the Standard Industrial Classification (SIC) coding. The majority of deaths in the Construction industry occurred between the ages of 20-49 (28, 82.4%). In Agriculture, nearly one-half of the deaths occurred

between the ages of 60-89 (14, 42.4%), 10 (31.3%) of these 14 deaths occurred after the age of 70.

Table 2 shows the distribution of deaths by industry as categorized by NAICS. The results were similar to those found using the SIC classification.

Marital Status

Eighty (53.3%) individuals who died from traumatic incidents were married, 43 (28.7%) individuals were single or never married, 23 (15.3%) individuals were divorced, and four (2.7%) individuals were widowed. Marital status was unknown for two individuals.

Educational Level

Twenty-three individuals (15.5%) had not completed high school, 66 individuals (44.6%) completed high school and received a high school diploma, 52 individuals (35.1%) completed one to four years of college, and seven individuals (4.7%) had over five years of college. Educational level was unknown for four individuals.

Table 3 shows the distribution of education level by industry using the SIC coding system. Among individuals completing high school but no college, the highest proportion of deaths occurred while working in Construction (19, 28.8%), followed closely by those working in Agriculture (18, 27.3%). Among individuals who did not complete high school, the highest proportion of deaths occurred while working in Agriculture (six, 26.1%), followed by Retail Trade (five, 21.7%) and Construction (four, 17.4%). One of the six individuals in Agriculture was a youth. Among individuals with some college education, the highest proportion of deaths occurred while working in the Services industry and Construction (11 each, 18.6%), Agriculture (nine, 15.3%), and Transportation/Public Utility and Retail Trade with seven deaths each (11.9%).

Table 4 shows the distribution of education level by industry using the NAICS coding system. The results were similar to those found using the SIC classification.

Drug/Alcohol/Medication Use

Among the non-suicide cases, 104 of the 147 individuals (70.7%) had an alcohol screen performed after death. Eight individuals (7.7%) had measurable alcohol; all eight individuals had measurable alcohol in their blood and two of the eight individuals had measurable alcohol in their urine.

Among the non-suicide cases, 92 individuals had a drug screen performed after death. Twelve individuals (13.0%) tested positive for illegal drugs; three individuals tested positive for marijuana, three individuals tested positive for the marijuana metabolite (one in blood, two in urine), one individual tested positive for both marijuana and marijuana metabolite, three individuals tested positive for both cocaine and cocaine metabolite, one individual tested positive for a cocaine metabolite, and one individual tested positive for codeine and cocaine.

Among non-suicide cases, 22 (15.0%) individuals tested positive for metabolites of medication (prescription and over-the-counter). After reviewing the type of medications found, we concluded that in 11 deaths medications might potentially have been a factor in the death. The medications in the eleven deaths were: doxylamine, diphenhydramine, citalopram (2), diltiazem, hydrocodone, meperedine, orphenadrine, propoxyphene, norchlorcyclizine, and sertaline.

Among the non-suicide deaths, a total of 30 individuals had measurable levels of alcohol, illegal drugs or medications in their system at the time of their death, which may have been a risk factor for the occurrence of the injury. One of the 30 individuals had an overlap of a prescription drug and alcohol in their body fluid at the time of his death.

Work-Related Event Details

Day of Injury

Table 5 shows the day of injury when categorizing industry using SIC coding. The largest number of work-related fatal injuries occurred on a Wednesday (36 of 149, 24.2%). Monday had the next highest number of work-related fatal injuries with 30 (20.1%), followed by Tuesday with 28 (18.8%) and Thursday with 23 (15.4%) fatal injuries. The day of injury is unknown for three individuals.

Wednesday had the highest number of work-related injuries (10 of 34; 29.4%) within the Construction industry, followed by Monday (eight, 23.5%) and Tuesday (six, 17.6%). Most work-related fatal injuries in the Agricultural sector occurred on Thursday (eight of 32 with a known date of injury; 30.4%), followed by Wednesday (seven, 21.9%). Tuesday was the day of the week when the most work-related homicides occurred (six of 14; 42.9%) with a known date of injury. The Services industry had the highest number of fatal injuries on Monday (six with a known date of injury, 27.3%), followed by Friday (four with a known date of injury, 18.2%). The Transportation/Public Utility industry sector had most fatal injuries occur on Wednesday (eight, 38.1%), followed by Tuesday (five, 23.8%).

Table 6 shows the day of injury when categorizing industry using the NAICS coding. The results were similar to those found using the SIC classification.

Month of Injury

Table 7 shows the month of injury for industries classified using the SIC coding. July had the highest number of injuries resulting in fatalities with 21 (13.8%), followed by August with 20 (13.2%), October and May with 17 fatal injuries each (11.2%), then January and September with 14 fatal injuries (9.2%). Of the 34 deaths in the Construction industry, the month with the highest number of work-related fatal injuries was November (six, 17.6%), followed by January (five, 14.7%), then August and October with four each (17.6%). Of the 33 fatal injuries in the Agricultural industry, August was the most likely month for a fatal injury (11, 33.3%), followed by May (six, 18.2%). The month of July (five, 33.3%) was when most homicides occurred.

Table 8 shows the month of injury for industries classified using the NAICS coding. The same pattern of fatal injury by month was evident.

Table 9 shows the means of death by the month the injury occurred.

Time of Injury

The time of the injury was known in 143 of the 152 work-related deaths; the time of the fatal injury was unknown for nine individuals. The 24-hour day has been divided into the following four-hour time periods: 12:00a.m.-4:00a.m., 4:00a.m.-8:00a.m., 8:00a.m.-12:00p.m., 12:00p.m.-4:00p.m., 4:00p.m.-8:00p.m., and 8:00p.m.-12:00a.m.

Forty-three (30.1%) fatal injuries occurred between 8:00a.m.-12:00p.m., 40 (28.0%) fatal incidents occurred between 12:00p.m.-4:00p.m., 25 (17.5%) fatal incidents occurred between 4:00p.m.-8:00p.m., 12 (8.4%) fatal incidents occurred between 12:00a.m.-4:00a.m., 12 (8.4%) fatal incidents occurred between 4:00a.m.-8:00a.m., and 11 (7.7%) fatal incidents occurred between 8:00p.m.-12:00a.m.

Table 10 shows the four-hour time periods by industry SIC. The Construction, Agricultural, and Services industries had the highest number of work-related fatal injuries between the hours of 8:00a.m.-12:00p.m. Fifteen (45.5%) of the work-related fatal injuries in Construction, 10 (31.3%) fatal incidents in the Agriculture, and five (31.3%) in the Service industry occurred between 8:00a.m.-12:00p.m. Most homicides (five, 38.4%) occurred in the early morning hours of 12:00a.m.-4:00a.m. Most fatal injuries in Transportation occurred between 4:00a.m.-8:00a.m. In Construction, the four-hour time period where the next second highest number of fatal injuries occurred was 12:00p.m.-4:00p.m., while in Agriculture and Services, the time period having the next highest number of fatal injuries was 4:00p.m.-8:00p.m.

Table 11 shows the time period by NAICS industry classification. Again, even with the different industry coding, the time periods of the highest number of fatalities did not change compared to the SIC classification.

Place of Death

For 85 (55.9%) individuals, the place of death was at the scene of the traumatic incident. For 66 (43.4%) individuals, the death occurred in the hospital, and one (0.7%) individual died in a long-term care facility.

Geographic Distribution

Table 12 and Figure 2 show the county in which the victim worked where he/she was fatally injured. The most common locations were: Wayne (29 deaths, 19.1%) and Oakland (14 deaths, 9.2%). Six counties incurred five (3.3%) fatal injury events each: Allegan, Genesee, Ingham, Kalamazoo, Macomb and Van Buren.

Type of Industry

The number of work-related fatalities and the annual incidence rate by industry was not computed for industry as classified by SIC; the Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), organized Michigan employment data for 2003 according to the 2002 NAICS classification system. Table 13 shows the number of work-related fatalities and the annual incidence rate by industry as classified by the 2002 North American Industry Classification System (NAICS).

Within the Construction industry (NAICS 23), 20 of 34 (58.8%) construction-related deaths occurred in the Special Trade Contractors classification. Painting and Wall Covering and Electrical contractor classifications each had four deaths (20%). Three contractor classifications had three (15%) deaths each: Framing, Roofing, and Structural Steel and Precast Concrete. Three contractor classifications had one death each: Other Building Equipment Contractors, Site Preparation, and Other Specialty Trade. Within the Construction industry, nine (26.5%) individuals died as a result of a fall from a height, seven (20.6%) were killed as a result of contact with electrical current, seven (20.6%) died as a result of a machine-related incident, six (17.6%) individuals died as a result of being struck by an object, two (5.9%) individuals died as a result of being overexposed to a chemical, two (5.9%) individuals died when they were involved in a motor vehicle accident, and one (2.9%) individual died due to complications of heat exposure.

Agriculture (NAICS 11) had the next highest number of work-related deaths (32, 21.7%). Machine-related events accounted for 22 of the 32 deaths (68.8%). The victim was operating a tractor in 20 of the 22 deaths (90.9%). Of the 20 tractor-related fatalities, the victim was pinned due to a tractor rollover to the rear in five (25.0%) events, pinned due to a tractor overturn to the side in five (25.0%) events, fell from the tractor and was run over by the implement used at the time of the event in three (15.0%) instances, fell from the tractor and struck a part of the tractor or implement causing the fatal injury in two (10%) events, while driving the tractor became pinned against another object in two (10.0%) events, run over by the tractor in one (5.0%) event, entangled in a rotating power-take-off in one (5.0%) event, and was run over by the implement when standing on the ground with the tractor in gear in one (5.0%) event. Over one-half (18 of 32, 56.3%) of the fatal events occurred in Crop Production. Animal Production had seven (21.9%) deaths, Support Activities for Agriculture and Forestry had four (12.5%) deaths and Forestry and Logging had two (6.3%) deaths.

Transportation and Warehousing (NAICS 48-49) classification had the next highest number of fatal injuries (18, 11.8%). Truck transportation fatalities comprised 15 of the 18 (83.3%) deaths in this classification. Retail Trade (NAICS 44-45) had 12 (7.9%) deaths, Manufacturing (NAICS 31-33) had 10 (6.6%) deaths, and Arts, Entertainment and Recreation (NAICS 71) had seven (4.6%) deaths. Two industry classifications had six deaths (3.9%) each: Accommodation and Food Services (NAICS 72) and Other Services (except Public Administration). Health Care and Social Assistance (NAICS 62) had five (3.3%) deaths. Mining (NAICS 21) and Public Administration (NAICS 92) had four (2.6%) deaths each. Professional Scientific and Technical Services (NAICS 54) and Administrative and Support and Waste Management and Remediation Services (NAICS 56) had three (2.0%) each. Four industry classifications had two (1.3%) deaths

each: Utilities (NAICS 22), Wholesale Trade (NAICS 42), Finance and Insurance (NAICS 52), and Educational Services (NAICS 61).

Occupations

In 2003, the Standard Occupational Classification (SOC) system was used to categorize occupations of the individuals who died. Under the SOC system all workers are classified into one of over 820 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Table 14 shows the breakdown of occupational categories.

The occupational category that had the most work-related deaths was Management Occupations (11-0000) with 34 of the 152 work-related deaths in Michigan in 2003. Within this major grouping, Farmers and Ranchers (11-9012) accounted for 25 of the 34 (73.5%) work-related deaths. Transportation and Material Moving Occupations (53-0000) accounted for 32 deaths. Within this occupation category, Truck Drivers, Heavy and Tractor-Trailer (53-3032) accounted for 19 of the 32 (59.4%) deaths. Construction and Extraction occupations (47-0000) followed with 27 deaths in 2003. Construction Trade occupations accounted for 21 of the 27 (77.8%) deaths.

Victim's Activity at the Time of the Fatality

The activity of the victim at the time of the fatality was known for 127 of the 132 non-homicides/non-suicide related deaths. In these 127 deaths, the individual was the operator in 93 fatal incidents (70.5%), a coworker directly involved in the work activity in 25 fatal incidents (18.9%), a bystander, pedestrian, or passenger in six fatal incidents (4.5%). Three individuals did not fit these broad categories; one individual drowned in a ditch, and two individuals died as a result of a drug overdose.

At the time of the fatal injury, the individual who died was working indoors in 48 incidents (32.9%) and outdoors in 98 incidents (67.1%). This includes the homicides and suicides. Location of work was unknown in six cases.

For all deaths, the victim was working alone in 90 fatal incidents (64.3%) and working with a coworker in 50 fatal incidents (35.7%). Whether the victim was working alone or with a coworker could not be identified in 12 fatal incidents. The victim was working alone in five (38.5%) homicide cases and eight (61.5%) homicide victims were working with a coworker. Working alone or with a coworker could not be determined in two homicide cases.

Means of Work-Related Death

Table 15 presents the 152 work-related fatalities by means of death. Machine-related events accounted for 39 (25.7%) of all work-related deaths in Michigan in 2003, followed by motor vehicles (29, 19.1%), and falls (19, 12.5%). An object striking an individual occurred in 15 (9.9%) cases. Fifteen (9.9%) homicides and five (3.3%) suicides occurred at work.

Ten (6.6%) individuals were electrocuted, six (3.9%) died as a result of a toxic exposure, four (2.6%) were killed as a result of an explosion and four (2.6%) individuals died from asphyxiation. Two (1.3%) individuals died as a result of an encounter with an animal, two (1.3%) individuals died as a result of an aircraft crash, one (0.7%) individual drowned and one (0.7%) individual died from complications of heat exposure.

Aircraft

There were two individuals fatally injured in separate aircraft-related fatalities; both individuals were crop-dusting fields. Both single-engine planes were in flight when the incidents occurred.

Animals

Two individuals died as a result of injuries from horses. One individual was exercising a horse at a racetrack; a Belgian horse trampled the other individual while he was holding the horses as they were being hitched to a sled.

Asphyxiation

Four individuals were asphyxiated; two individuals died after food they swallowed became caught in their windpipe, corn engulfed one individual while he was in a silo, and one individual was buried in landfill sludge.

Drownings

One individual died as a result of drowning. He left his workstation during his work shift and was found in a ditch filled with water.

Electrocutions

Ten individuals were electrocuted. Five of the ten deaths involved contact with energized overhead lines; two individuals were electrocuted after crane rigging contacted a 7,200-volt line, one individual was operating an extensible-boom rough terrain fork truck that contacted a 4,800-volt line, one individual was in contact with a dump truck when the dump bed was raised and contacted a 69,000-volt line and one individual was moving a ladder when the ladder contacted a 4,800-volt line. One individual contacted 360-volt direct current while upgrading a series of batteries, one individual contacted an 120-volt open low water cut-off switch for a boiler while reading a water meter, one individual was on an aerial work platform and contacted 277 volts while wiring an emergency sign, one individual was repairing an electrical transfer machine and contacted 480 volts, and one individual was welding a hay wagon with a 220-volt arc welder when he was electrocuted.

In four cases, the victim's work area was identified as wet and in two cases as dry. One victim was working in an area with limited access. Six individuals were working in the vicinity of the electrical system, two individuals were conducting maintenance of the electrical system, one individual was traveling in the vicinity of the electrical system, and one individual was

maintaining another piece of equipment other than the electrical equipment when the electrocution occurred.

Explosions/Burns

Four individuals died as a result of explosions. One individual was involved in a fireworks display, one individual died as a result of burns he received from flash fire that occurred while servicing oil storage tanks, one individual died after being knocked off of a tanker truck when the hatch lid was forcefully blown off the top of the tanker, and one individual was killed when a barrel that previously contained a flammable material exploded while he was cutting it with a cutting torch.

Falls

Falls accounted for 19 of the 152 work-related fatalities. The reason for the fall was identified in 15 (78.9%) cases and was unknown in four cases. The individual slipped or tripped in seven (46.7%) cases. In two (13.3%) cases, the victim had a pre-existing medical condition that was a contributing factor to the fall. The structure gave way in one (6.7%) case. One (6.7%) individual fell because a cable broke, one (6.7%) individual fell when the boom supporting the vehicle-mounted aerial work platform he was working from was struck by a semi-truck passing underneath, one (6.7%) victim fell because the shape of the water tower was a contributing factor, and one (6.7%) individual fell because the "spider" scaffold suspended from a single-point he was working from was not properly secured.

The distance the worker fell was identified in 13 cases, six cases were unknown. The individual's fall was less than 10 feet in five (38.5%) cases, 10-20 feet in five (38.5%) cases, 21-50 feet in one (7.7%) case, and for two (15.4%) cases, the fall was 50+ feet (130 feet and 190 feet).

The surface location from where the worker fell was identified for 16 cases, and three were unknown. Individuals fell from a roof edge in three (18.8%) instances, a vehicle, machine or other equipment in three (18.8%) instances, the ground surface (floor) in three (18.8%) instances, a scaffold or ladder in two (12.5%) instances and a water tower in two (12.5%) instances. The deck of a bed-and-breakfast inn was the location of one (6.3%) individual's fall, one (6.3%) individual fell from a hay wagon, and one (6.3%) individual died from complications after falling down stairs in the building where she worked.

The surface to which the worker fell was identified for 16 cases, and three were unknown. In eight (50.0%) instances, the individual fell to a concrete, rock or asphalt surface. The individual fell directly to carpet or tile in four (25.0%) instances, and to packed dirt in three (18.8%) instances. One individual fell onto a pickup truck, then to packed dirt.

The condition of the work surface the victim fell from was known in 10 of 19 cases. In all known cases, the working surface was dry.

Six of 19 (52.4%) of the falls occurred while individuals were working on construction activities. Two falls occurred during commercial construction activities and four during residential

construction activities. Two falls occurred in manufacturing facilities (one during a construction activity) and two falls occurred in a school setting, one of the falls occurred during a construction activity performed by an outside contractor. Two individuals fell while at a loading or unloading station (one at an asphalt loading station, one at a company dock area). Other general activities where falls occurred were on the farm, at a grain elevator, in an office building, at a lumber company, at a bowling alley, roadway intersection, and at a place of lodging.

Heat/Cold

One individual died of heat-related complications.

Homicides

There were 15 work-related homicides. Twelve (80.0%) homicide victims were men and three (20.0%) victims were women.

Using the SIC coding system, the 15 homicides occurred in the following industries: 11 (73.3%) victims worked in Retail Trade, three (20%) in Services, and one (7.0%) in Public Administration. Using the NAICS coding system, eight (53.3%) victims worked in Retail Trade, four (26.7%) worked in Accommodations/Food Service, and one (7.0%) victim each Health/Social Services, Other Services and Public Administration.

Eleven (73.3%) work-related homicide victims were Caucasian, two (13.3%), were African-American, and two (13.3%) were Indian. Two of the seven (28.6%) work-related fatalities among African-Americans were caused by homicides. Three of the ten (30%) work-related fatalities among women were caused by homicides.

A gun was the cause of death in 13 (86.7%) cases, and for two (13.3%) cases, a knife was used.

Machine-Related Deaths

There were 39 machine-related fatalities; the cause of one individual's machine-related death is unknown (he was moving the machine). Twenty-two of 38 (57.9%) machine-related fatalities occurred in the Agricultural industry (SIC 01-09); farm tractors were involved in 20 (52.6%) fatal incidents. Seven (18.4%) individuals were run over by a machine. Five (13.2%) individuals were killed when the machine rolled over to the rear and five (13.2%) individuals were killed when the machine overturned to the side. Four (10.5%) individuals were caught between the machine and another object (ceiling beam, tree, steel-encased auger, two trucks). Mechanical asphyxiation was the cause of the machine-related fatality for four (10.5%) individuals, and three (7.9%) individuals were crushed in/by the machine. Two (5.3%) individuals died due to entanglement in the machine, two (5.3%) individuals died after being struck by the machine, two (5.3%) individuals died when an object fell from or was set in motion by the machine, and two (5.3%) individuals died after falling from the machine. One (2.6%) individual died when the machine he was working from collapsed, and one (2.6%) individual was pinned under a suspended machine when it fell on him.

Machine-related fatal injuries were the cause of 22 of 33 (66.7%) fatal agricultural (SIC 01-09) deaths and 22 of 32 (68.8%) fatal agricultural deaths as coded by the NAICS (NAICS 11) system. Tractors were the machines directly involved in 15 of the 22 deaths (68.2%). For the other seven deaths, the machines were: mowing machines (four instances), implements of tillage (two instances) and a harvesting machine.

Motor Vehicle Related Deaths

There were 29 motor vehicle related fatalities. Work-related deaths involving motor vehicles usually were two unit incidents (15, 51.7%) followed by nine (31.0%) single unit incidents A "unit" is identified as being 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 majority of crashes occurred during the daylight hours (20, 69.0%), although eight (27.6%) occurred at night; three crashes occurred on roads that had lighting and five crashes occurred on unlighted roads. Most crashes occurred primarily on 2-lane roads (15, 51.7%); four (13.8%) crashes occurred on roadways with four lanes, three (10.3%) crashes occurred on roadways having three lanes, three (10.3%) crashes occurred on roadways having five lanes, and one (3.4%) crash occurred on a six-lane roadway, one (3.4%) incident occurred in a parking lot and one (3.4%) incident occurred on a mining road. The weather was clear in 16 (55.2%) incidents, cloudy in 10 (34.5%) incidents, foggy in two (6.9%) incidents and snowy in one (3.4%) incident.

Roadway conditions may have been a factor in seven of the 29 incidents; the roadway was dry in 22 (75.9%) incidents, wet in four (13.8%) cases and snowy in three (10.3%) incidents. The speed limit was 55 miles per hour in 12 (41.4%) incidents, 70 miles per hour in six (20.7%) cases, 60 miles per hour in one (3.4%) case, 50 miles per hour in three (10.3%) cases, 45 miles per hour in two (6.9%) cases, 40 miles per hour in one (3.4%) case, and 35 miles per hour in two (6.9%) cases. Speed limits were not applicable in two motor vehicle related deaths; one death occurred in a parking lot and one death occurred on a mining road. Speed limit signs were posted on 21 (72.4%) of the roads where a death occurred.

The crash type was identified as single motor vehicle in 10 (34.5%) incidents, head-on in six (20.7%) incidents, rear-end crashes in five (17.2%) incidents, other in five (17.2%) incidents (loader ran over victim while he was sitting in a pickup truck, pickup truck ran over victim, vehicle struck debris spilled on roadway, pedestrian struck by vehicle, and fire engulfed vehicle), two (6.9%) were angle crashes and one (3.4%) was a sideswipe incident.

Seat belt use could be identified for 21 of the individuals who died in vehicles. Eleven individuals who were driving (52.4%) were wearing a shoulder and lap belt at the time of the fatal injury. Nine (42.9%) individuals who were driving were not wearing a shoulder or lap belt at the time of the fatal injury. One (4.8%) individual was wearing a lap belt only. A restraint system was not applicable (victims were pedestrians) in four incidents. Restraint use was unknown for four drivers. One of the nine (11.1%) individuals who were not wearing a shoulder or lap belt was ejected from the vehicle; eight (88.9%) individuals were trapped within the vehicle.

The presence or absence of an airbag in the vehicle was identified for 23 cases; the presence or absence of an airbag was not applicable in four instances (victims were pedestrians) and was unknown in two instances. An airbag was present in 12 (52.2%) of the vehicles involved in fatal incidents; eleven (47.8%) vehicles were not equipped with an airbag. The airbag deployed at the time of the crash in nine (75.0%) of 12 vehicles with an airbag, in three (25.0%) instances the airbag did not deploy.

The victim was the vehicle driver in 26 cases. The condition of the vehicle driver may have been a contributing factor in seven of the 29 (24.1%) motor vehicle work-related deaths. In three (12.0%) incidents, the driver was described as drinking; two of the drivers who were drinking were the drivers of the vehicles, which struck two of the four victims identified as pedestrians. In two (8.0%) instances, the driver fell asleep while driving. In one (4.0%) incident, the driver was described by responding enforcement agency as distracted, in one (4.0%) incident, the driver was using a cell phone when the incident occurred, and in one (4.0%) incident, driver fatigue may have been a factor in the crash. The driver's condition was indicated by the responding enforcement agency as appearing normal in four (15.4%) instances; one of the drivers of a vehicle that struck a pedestrian was identified as appearing normal. The condition of the driver of the vehicle was identified as unknown in 17 (65.4%) instances; in one case, the victim was run over by the truck he had been driving.

The type of vehicle involved in the fatal injury could be identified in all 29 cases. A truck/bus was involved in 12 (41.4%) cases, passenger car was the vehicle being used at the time of the incident in six (20.7%) cases; a pickup truck was involved in five (17.2%) cases, a van was involved in five (17.2%) cases, and a police car was involved in two (6.9%) instances.

The investigating enforcement agency codes 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 27 of the 29 cases; in two cases, the responding enforcement agency did not identify a hazardous action. In ten (37.0%) instances, no hazardous action was noted in the opinion of the responding enforcement officer, in six (22.2%) instances, the vehicle driver was driving too fast, and in six (22.2%) instances, the driver was careless/negligent. In one (3.7%) incident, the driver failed to yield and in one (3.7%) incident, the driver made an improper turn. In two instances, the enforcement officer identified the hazardous action as unknown.

All motor vehicle work-related fatalities were classified into three broad categories: non-collision, collision with a non-fixed object, and collision with a fixed object. Two (6.9%) non-collisions occurred; the vehicle overturned in one incident and in one incident, the vehicle ran off the road. Twenty-one (72.4%) collisions with a non-fixed object occurred. Twelve (57.1%) of the 21 collisions with a non-fixed object involved a collision with a moving motor vehicle in transport. The vehicle's driver collided with a parked motor vehicle in four (19.0%) cases. The vehicle struck a pedestrian (victim) in three (14.3%) cases. In one (4.8%) instance, the driver collided with an animal (deer) and in one (4.8%) case, the vehicle struck debris on the roadway. Collisions with a fixed object occurred in six (20.7%) of the 29 motor vehicle work-related deaths. Two (33.3%) of the six collisions with a fixed object involved a tree, one (16.7%) incident involved a bridge abutment, one (16.7%) incident involved a luminary/light support, one (16.7%) incident involved a utility pole, and one (16.7%) incident involved a ditch.

Struck By

Fifteen individuals were fatality injured when an object struck them. Falling trees (5, 33.3%) and falling tree limbs (1, 6.7%) accounted for six of the fatal stuck by injuries. Two (13.3%) individuals were killed when they struck and buried by dirt during an excavation cave-in. One (6.7%) individual was struck by a trash unit steel door, one (6.7%) individual was struck by ice and roofing material that broke through a roof, one (6.7%) individual was struck by a section of conveyor while he was disassembling it, one (6.7%) individual was struck by a two-inch by six-inch wooden frame wall during residential construction activities, one (6.7%) individual was struck by a bean tote weighing approximately 2000 pounds, one (6.7%) individual was struck by a steel coil that fell from a rack and one (6.7%) individual was struck by construction debris.

Suicides

Five individuals committed suicide while at their workplace. Two individuals died from a self-inflicted gunshot wound, two individuals died by hanging, and one individual died by self-injection of a drug.

Toxic Exposures

Six individuals died due to a toxic exposure while working. Three (50%) individuals died from drug intoxication while at work; two individuals died from acute cocaine intoxications and one individual died from a multiple drug intoxication. One individual experienced a fatal asthma attack after applying a spray-on truck bed liner containing an isocyanate, one individual died when he was overexposed to VMP naphtha solvent, and one individual died from coronary artery disease after being exposed to excessive levels of carbon monoxide from a snorkel lift while painting.

MIOSHA Fatality Investigations

The 152 individuals who died worked for 149 employers. One hundred four (72.2%) individuals were identified as employees. Four of the 104 individuals were identified as contract/temporary employees. Forty-three (29.9%) individuals were identified as either self-employed or the business owner. For five individuals we are unsure whether they were employees or self-employed and/or business owners.

Three employers had a fatal incident where more than one person died during the incident; two incidents involved homicides and one incident was an electrocution incident.

Fifty-one of the 152 work-related fatality cases (33.6%) at 50 of the 149 (32.0%) companies were within MIOSHA's jurisdiction and were investigated by MIOSHA. 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 eight (5.4%) of the 149 employers had a work-related fatality occur during or prior to 2003. Three of these employers were in Construction, two were in

Manufacturing, and one employer each was in Agriculture, Mining and Public Administration employer. One Construction employer had an employee run over by a machine in 2003. One Construction employer had an employee die from heat stress in 1994. One Construction employer had an employee struck by a plow blade in 2000. One Manufacturing employer had two work-related fatalities in 1999; one incident was an explosion, one incident involved exposure to toxic fumes. For one Manufacturing employer, the circumstances of the fatality were unclear. The Agricultural employer had an employee die in an airplane crash in 2002. The Mining employer had an employee killed during an explosion in 1999 and after a fall in 1997. The Public Administration employer had two homicide fatalities occur, one in 2000 and one in 1991.

Of the 149 employers who had a work-related fatality, the IMIS database identified 21 of the 149 (14.1%) employers as having had a previous MIOSHA Occupational Health, General Industry Safety or Construction Safety compliance inspection. Ten (10, 47.6%) of the 21 companies had received an Occupational Health Inspection. Eight of ten (80.0%) companies had previously been inspected one to five times, one of ten (10.0%) companies had been previously inspected six to ten times, and one company (10.0%) had been previously inspected over ten times. Citations were issued to four of the ten companies during the previous inspection; if conditions warrant, a company can receive multiple citations as a result of a MIOSHA inspection. For the four companies receiving an Occupational Health citation, one company received citations categorized as Serious and Other, one company received citations categorized as Serious and Willful and Other, one company received citations categorized as Serious, Willful, Repeat and Other, and one company received a citation categorized as Other.

Eight of the 21 (38.1%) companies were identified as having had a previous MIOSHA General Industry Safety compliance inspection. Five of eight (62.5%) companies that had previously received a General Industry Safety inspection had previously been inspected one to five times, two of eight (25%) had previously been inspected six to ten times, and one of eight companies (12.5%) had previously been inspected over 10 times. Citations were received by all eight of the companies. For the eight companies receiving General Industry Safety citations, five companies received citations classified as Serious and Other, one company received citations classified as Serious, Willful, Repeat and Other, one company received citations classified as Serious, Repeat and Other, and one company received citations classified as Repeat and Other.

Ten companies were identified as receiving a compliance inspection from the MIOSHA Construction Safety division. Six of 10 (60%) that had previously received a Construction Safety inspection had previously been inspected one to five times, two companies (20%) had previously been inspected six to ten times, and two companies (20%) had previously been inspected more than ten times. Citations were received by all ten of the companies. Eight of ten companies received citations classified as Serious and Other, one company received a citation classified as Serious, and one company received a citation classified as Other.

MIFACE requested and received permission to conduct a work-related fatality investigation at 21 facilities. MIFACE has received permission from three employers to conduct a work-related fatality inspection in 2005 for fatalities that occurred in 2003. Copies of the MIFACE reports are on the Michigan State University Occupational & Environmental Medicine web site and click on the MIFACE link to view the reports (www.chm.msu.edu/oem).

Hispanic Initiative

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

In partnership with Federal OSHA, NIOSH has added Hispanic worker fatalities to the list of the current targets for the Federal in-house FACE program. Information gathered will be made available to the OSHA Hispanic Worker Task Force. The Michigan FACE program supports the concept and rational of this initiative. As a result, we have utilized a draft Immigrant Workers/Limited English Speakers Workers investigation guide during on-site investigations to gather information when it is appropriate.

There were four deaths of Hispanic workers in Michigan in 2003. Using the US Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2003, this was a rate of 1.8 per 100,000 for 16-65 year old Hispanics as compared to a rate of 2.6 per 100,000 for 16-65 year old Caucasians and 0.77 per 100,000 for 16-65 year old African-Americans.

Using industry as coded by SIC, two Hispanics died in the Services industry, one Hispanic died in a Construction-related incident, and one Hispanic died in a Manufacturing-related incident. All companies that had a Hispanic work-related fatality declined to participate in the MIFACE research program.

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 152 acute traumatic work-related deaths in 2003 is included in Appendix I. When a brand name of equipment is known, MIFACE included this information in the narratives; this does not signify that there was a defect or other problem with the machine (unless noted).

Discussion

There were 152 acute traumatic work-related fatalities in Michigan in the year 2003. Four of the incidents causing death occurred prior to 2003; 1974, 1980, 2000 and 2002. 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. 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 reported 151 deaths in 2003. The reason our total differs by one death from CFOI is that CFOI

does not count a death if the victim is an inmate at a correctional facility who was working on a work crew when the fatal injury occurred; MIFACE considers this injury situation work-related.

There were on the average 2.9 acute traumatic work-related fatalities per week although the deaths were not evenly distributed throughout the year. July was the most common month for an incident causing a fatal traumatic death and August was the second most common month. November was the most common month for Construction-related fatalities and August was the most common month for agricultural-related fatalities (Table 7). Wednesday was the most common day of the week for a fatal traumatic incident and Monday was the second most common day. Wednesday was the most common day for Construction and Thursday was the most common day for Agriculture. Tuesday was the most common day for work-related homicides (Table 5). From 8a.m. to 12p.m. was the most common time of the day for an incident causing a fatal traumatic death, and 12p.m. to 4p.m. was the second most common time.

Eight in the morning to 12p.m. were the most common time for Construction and Agricultural fatalities. From 4a.m. to 8a.m. was the most common time for the Transportation/Public Utilities industry (Table 10).

Individuals who died from an acute traumatic work-related fatality were most likely to be men (93%), white (92%), on the average nearly 46 years of age, married (53%) and had at least a high school education (84%).

Although the largest number of deaths occurred in Construction (34, 22.4%), Agriculture (32, 21.1%) deaths) had a much higher risk of acute traumatic work-related fatalities. The rate in Agriculture was 40.1 per 100,000 as compared to 17.9 per 100,000 in Construction (Table 13). Despite the high fatality rate in Agriculture, farms with less than 11 employees are exempted from many workplace regulations.

Past agricultural censuses conducted by the United States Department of Agriculture (USDA) applied a “one farm, one operator” principal. The 2000 Census of Agriculture allowed the counting of more than one operator per farm, collected detailed information for up to three operators, adjusted for undercoverage and collected information on operator households. The counting of all operators for each farm operation gives a better estimate of the number of people actually involved in managing farms. The number of individuals in Michigan in 2003 involved in the Agricultural industry increased from 46,027 in the 1997 census to 79,883 in 2003. The increased number of people involved in farming dramatically affects rate of death in the agricultural industry. Although the number of people fatally injured in 2003 was higher than in 2002 (32 vs. 21, respectively), the 2003 rate was similar to the 2002 rate (40.1 vs. 45.6 respectively).

Illegal drugs and/or alcohol were found to have a role in approximately 14% of acute work-related fatalities. Alcohol was found in eight individuals and another twelve tested positive for illegal drugs. In 11 individuals, the side effects of prescribed and over-the-counter medications may have been a factor in the death.

MIOSHA investigated 51 (33.6%) of the deaths. The local police, county sheriff and state police investigated 55 (36.2%) deaths. Federal agencies including the National Safety Transportation Board, and Mine Safety and Health Administration investigated five (4.0%) of the deaths and a State agency other than MIOSHA investigated one (0.7%) work-related fatality. There were 40 (26.3%) deaths not investigated by a 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 33 of the 40 work-related fatalities not investigated by a regulatory or enforcement agency. MIFACE was denied the opportunity for a site visit at 22 of the employers, and conducted an on-site investigation at 11 employers.

Copies of 52 MIFACE investigations completed for the years 2001-2003 are on our web site www.chm.msu.edu/oem. Summaries of investigations conducted by the Michigan OSHA program are also on the same web site. For each report there is a dissemination plan to maximize awareness of the report. Reports 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 was one more death in 2003 as compared to 2002. This change is within the variation seen in recent years (1996-155 deaths, 1997-174 deaths, 1998-179 deaths, 1999-182 deaths, 2000-156 deaths) and there has been no persistent trend in the number of acute traumatic work-related fatalities since accurate tracking of the number of deaths was begun in 1992. 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 152 deaths in this report could have been prevented. An awareness of the hazards of one's job and an attitude of safety-mindedness on the part of labor and management is critical to prevent future fatal events.

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. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2006 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.

Table 1. Number of Acute Traumatic Work-Related Fatalities by Age of Victim and Standard Industrial Classification (SIC) Code, Michigan 2003

	Age								
SIC	**13-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**Totals**
Agriculture (01-09)	2	0	3	8	6	4	8	2	33
Mining (13-14)	0	1	0	0	2	0	0	0	3
Construction (15-17)	2	10	10	8	3	0	1	0	34
Manufacturing (20-39)	0	2	2	4	5	2	0	0	15
Transportation/Public Utility (40-49)	0	2	4	7	3	3	1	1	21
Wholesale Trade (50-51)	0	0	0	0	1	1	0	0	2
Retail Trade (52-59)	0	5	3	5	2	1	0	0	16
Finance (60-67)	0	0	2	0	0	0	0	0	2
Services (70-89)	0	2	4	8	3	5	0	0	22
Public Administration (91-97)	0	0	2	0	1	1	0	0	4
Totals	**4**	**22**	**30**	**40**	**26**	**17**	**10**	**3**	**152**

Table 2. Number of Acute Traumatic Work-Related Fatalities by Age of Victim and North American Industry Classification System (NAICS) Code, Michigan 2003

Age									
NAICS	**13-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**Totals**
Agriculture (11)	2	0	1	8	7	4	8	2	32
Mining(21)	0	2	0	0	2	0	0	0	4
Utilities (22)	0	0	1	0	0	1	0	0	2
Construction (23)	2	10	10	8	3	0	1	0	34
Manufacturing (31-33)	0	1	2	3	2	2	0	0	10
Wholesale Trade (42)	0	0	0	0	1	1	0	0	2
Retail Trade (44-45)	0	3	3	3	2	1	0	0	12
Transportation/ Warehousing (48-49)	0	2	3	6	3	2	1	1	18
Finance/Insurance (52)	0	0	2	0	0	0	0	0	2
Professional, Scientific,Technical (54)	0	0	1	1	0	1	0	0	3
Admin Support/Waste Mgt (56)	0	0	1	2	0	0	0	0	3
Education Services (61)	0	0	1	1	0	0	0	0	2
Health & Social Assistance (62)	0	0	2	1	1	1	0	0	5
Arts/Entertainment/ Recreation (71)	0	1	0	3	1	2	0	0	7
Accommodations/Food Service (72)	0	2	1	3	0	0	0	0	6
Other Services (81)	0	1	0	1	3	1	0	0	6
Public Administration (92)	0	0	2	0	1	1	0	0	4
Totals	**4**	**22**	**30**	**40**	**26**	**17**	**10**	**3**	**152**

Table 3. Number and Percent of Acute Traumatic Work-Related Fatalities by Education Level and Standard Industrial Classification (SIC) Code, Michigan 2003

Industry (SIC)	Did Not Complete High School		Completed High School No College		Some College	
	Number	Percent	Number	Percent	Number	Percent
Agricultural Production (01-09)	6	(26.1)	18	(27.3)	9	(15.3)
Mining (13-14)	1	(4.3)	1	(1.5)	1	(1.7)
Construction (15-17)	4	(17.4)	19	(28.8)	11	(18.6)
Manufacturing (20-39)	2	(8.7)	5	(7.6)	8	(13.6)
Transportation/Public Utility (40-49)	2	(8.7)	10	(15.2)	7	(11.9)
Wholesale Trade (50-51)	0	--	1	(1.5)	0	--
Retail Trade (52-59)	5	(21.7)	4	(6.1)	7	(11.9)
Finance (60-67)	0	--	0	--	2	(3.4)
Services (70-89)	3	(13.0)	7	(10.6)	11	(18.6)
Public Administration (91-97)	0	--	1	(1.5)	3	(5.1)
Total*	**23**		**66**		**59**	

*Education level was unknown for one individual in wholesale trade and services and for two individuals in transportation/public utilities.

Table 4. Number and Percent of Acute Traumatic Work-Related Fatalities by Education Level and North American Industry Classification System (NAICS) Code, Michigan 2003

Industry (NAICS)	Did Not Complete High School		Completed High School No College		Some College	
	Number	Percent	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing and Hunting (11)	7	(30.4)	19	(28.8)	6	(10.2)
Mining (21)	1	(4.3)	2	(3.0)	1	(1.7)
Utilities (22)	0	--	1	(1.5)	1	(1.7)
Construction (23)	4	(17.4)	19	(28.8)	11	(18.6)
Manufacturing (31-33)	1	(4.3)	2	(3.0)	7	11.9)
Wholesale Trade (42)	0	--	1	(1.5)	0	--
Retail Trade (44-45)	4	(17.4)	2	(3.0)	6	(10.2)
Transportation and Warehousing (48-49)	2	(8.7)	8	(12.1)	6	(10.2)
Finance and Insurance (52)	0	--	1	(1.5)	1	(1.7)
Professional, Scientific, and Technical Services (54)	0	--	1	(1.5)	2	(3.4)
Administrative and Support and Waste Management and Remediation (56)	0	--	1	(1.5)	2	(3.4)
Educational Services (61)	0	--	0	--	2	(3.4)
Health Care and Social Assistance (62)	2	(8.7)	0	--	3	(5.1)
Arts, Entertainment and Recreation (71)	1	(4.3)	3	(4.5)	3	(5.1)
Accommodation and Food Services (72)	1	(4.3)	3	(4.5)	1	(1.7)
Other Services (except Public Administration) (81)	0	--	3	(4.5)	3	(5.1)
Public Administration (92)	0	--	1	(1.5)	3	(5.1)
Total*	**23**		**66**		**59**	

*Education level was unknown for one individual in wholesale trade and services and for two individuals in transportation/warehousing.

Table 5. Number and Percent of Acute Traumatic Work-Related Fatalities, for all Deaths; by Standard Industrial Classification (SIC) Code*; and for Homicides Separately by Day of the Week, Michigan 2003

Day of Injury	All Deaths		Construction Deaths (15-17)		Agricultural Deaths (01-09)		Services Deaths (70-89)		Transportation /Public Utilities Deaths (40-49)		Homicides	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Sunday	4	(2.7)	0	--	1	(3.1)	1	(4.5)	0	--	0	--
Monday	30	(20.1)	8	(23.5)	5	(15.6)	5	(25.0)	3	(14.3)	4	(28.6)
Tuesday	28	(18.8)	6	(17.6)	3	(9.4)	2	(10.0)	5	(23.8)	6	(42.9)
Wednesday	36	(24.2)	10	(29.4)	7	(21.9)	3	(13.6)	8	(38.1)	3	(21.4)
Thursday	23	(15.4)	5	(14.7)	8	(25.0)	3	(13.6)	1	(4.8)	1	(71)
Friday	16	(10.7)	4	(11.8)	5	(15.6)	4	(18.2)	3	(14.3)	0	--
Saturday	12	(8.1)	1	(2.9)	3	(9.4)	2	(9.1)	1	(4.8)	0	--
Total	**149****		**34**		**32**[+]		**20**[++]		**21**		**14**[+]	

*Only industries with 20 or more deaths are included in the table.

**Injury day was unknown for three deaths.

[+]Injury day was unknown for one death.

[++]Injury day was unknown for two deaths.

Table 6. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths; by Standard Industrial Classification (SIC) Code*; by Month of Injury, Michigan 2003

Day of Injury	All Deaths		Construction Deaths (23)		Agricultural Deaths (11)		Transportation and Warehousing Deaths (48-49)		Retail Trade Deaths (44-45)		Manufacturing Deaths (31-33)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sunday	4	(2.7)	0	--	2	(6.5)	1	(4.5)	1	(8.3)	0	--
Monday	30	(20.1)	8	(23.5)	6	(19.4)	6	(27.3)	3	(27.3)	1	(10.0)
Tuesday	28	(18.8)	6	(17.6)	4	(12.9)	3	(13.6)	5	(13.6)	1	(10.0)
Wednesday	36	(24.2)	10	(29.4)	5	(16.1)	3	(13.6)	1	(13.6)	2	(20.0)
Thursday	23	(15.4)	5	(14.7)	6	(19.4)	3	(13.6)	1	(13.6)	3	(30.0)
Friday	16	(10.7)	4	(11.8)	5	(16.1)	4	(18.2)	0	(18.2)	0	--
Saturday	12	(8.1)	1	(2.9)	3	(9.7)	2	(9.1)	1	(9.1)	3	(30.0)
Total	**149****		**34**		**31+**		**18**		**12**		**10**	

*Only industries with 10 or more deaths are included in the table.
**Injury day was unknown for three deaths.
+Injury day was unknown for one death.

Table 7. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths; by Standard Industrial Classification (SIC) Code*; and for Homicides Separately, by Month of Injury, Michigan 2003

Month of Injury	All Deaths		Construction Deaths (15-17)		Agricultural Deaths (01-09)		Services Deaths (70-89)		Transportation /Public Utilities Deaths (40-49)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	14	(9.2)	5	(14.7)	0	--	2	(8.3)	2	(9.5)	2	(13.3)
February	9	(5.9)	1	(2.9)	0	--	4	(18.2)	2	(9.5)	1	(6.7)
March	8	(5.3)	1	(2.9)	2	(6.1)	1	(4.2)	1	(4.8)	1	(6.7)
April	4	(2.6)	2	(5.9)	0	--	0	--	0	--	0	--
May	17	(11.2)	3	(8.8)	6	(18.2)	3	(13.6)	2	(9.5)	1	(6.7)
June	11	(7.2)	2	(5.9)	4	(12.1)	1	(4.2)	3	(14.3)	0	--
July	21	(13.8)	3	(8.8)	4	(12.1)	3	(4.3)	3	(14.3)	5	(33.3)
August	20	(13.2)	4	(11.8)	11	(33.3)	2	(8.3)	1	(4.8)	1	(6.7)
September	14	(9.2)	3	(8.8)	2	(6.1)	2	(8.3)	2	(9.5)	3	20.0
October	17	(11.2)	4	(11.8)	2	(6.1)	2	(8.3)	3	(14.3)	0	--
November	11	(7.2)	6	(17.6)	1	(3.0)	1	(4.2)	2	(9.5)	0	--
December	6	(3.9)	0	--	1	(3.0)	1	(4.2)	0	--	1	(6.7)
Total	**152**		**34**		**33**		**22**		**21**		**15**	

*Only industries with 20 or more deaths are included in the table.

Table 8. Number and Percent of Acute Traumatic Work-Related Fatalities, for All Deaths; by North American Industry Classification (NAICS) Code*; by Month of Injury, Michigan 2003

Month of Injury	All Deaths		Construction Deaths (23)**		Agricultural Deaths (11)		Transportation/ Warehousing Deaths (48-49)		Retail Trade Deaths (44-45)		Manufacturing Deaths (31-33)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	14	(9.2)	5	(14.7)	2	(6.3)	2	(11.1)	2	(16.7)	1	(10.0)
February	9	(5.9)	1	(2.9)	0	--	2	(11.1)	0	--	0	--
March	8	(5.3)	1	(2.9)	1	(3.1)	0	--	1	(8.3)	2	(20.0)
April	4	(2.6)	2	(5.9)	0	--	0	--	0	--	1	(10.0)
May	17	(11.2)	3	(8.8)	5	(15.6)	2	(11.1)	1	(8.3)	0	--
June	11	(7.2)	2	(5.9)	4	(12.5)	2	(11.1)	1	(8.3)	0	--
July	21	(13.8)	3	(8.8)	4	(12.5)	3	(16.7)	3	(25.0)	1	(10.0)
August	20	(13.2)	4	(11.8)	10	(31.3)	0	--	0	--	1	(10.0)
September	14	(9.2)	3	(8.8)	2	(6.3)	2	(11.1)	2	(16.7)	2	(20.0)
October	17	(11.2)	4	(11.8)	2	(6.3)	3	(16.7)	0	--	2	(20.0)
November	11	(7.2)	6	(17.6)	1	(3.1)	2	(11.1)	0	--	0	--
December	6	(3.9)	0	--	1	(3.1)	0	--	2	(16.7)	0	--
Total	**152**		**34**		**32**		**18**		**12**		**10**	

*Only industries with 10 or more deaths are included in the table.

Table 9. Number of Acute Traumatic Work-Related Fatalities by Means of Death and Month of Injury, Michigan 2003

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Aircraft (2)								2				
Animal (2)					1			1				
Asphyxiation (4)	1							1		2		
Drowning (1)												1
Electrocution (10)						2	1	2	1	1	3	
Explosion (4)						1	1		1		1	
Fall (19)		1	1	1	1	2	3	2	2	5	1	
Heat/Cold (1)								1				
Homicide (15)	2	1	1		1		5	1	3			1
Machine (38)	3	3	3	2	6	3	5	6	2	2	1	2
Motor Vehicles (30)	3	2	2	1	3	2	4	1	3	6	2	1
Struck By (15)	5		1		2	1		2	2	1	1	
Suicide (5)		1			2						1	1
Toxic Exposure (6)		1			1		2	1			1	
Totals	**14**	**9**	**8**	**4**	**17**	**11**	**21**	**20**	**14**	**17**	**11**	**6**

Table 10. Number and Percent of Acute Traumatic Work-Related Fatalities for all Deaths; by Standard Industry Classification (SIC) Code*; and for Homicides Separately, by 4 Hour Time Periods, Michigan 2003

Time	All		Construction Deaths (15-17)		Agricultural Deaths (01-09)		Transportation /Public Utilities Deaths (40-49)		Services Deaths (70-89)		Homicides	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12am-4am	12	(8.4)	1	(3.0)	0	--	2	(9.5)	2	(11.1)	5	(38.4)
4am-8am	12	(8.4)	1	(3.0)	2	(6.3)	7	(33.3)	0	--	0	--
8am-12pm	43	(30.1)	15	(45.5)	10	(31.3)	4	(19.0)	5	(31.3)	2	(15.4)
12pm-4pm	40	(28.0)	12	(36.4)	8	(25.0)	6	(28.6)	3	(16.7)	0	--
4pm-8pm	25	(17.5)	4	(12.1)	9	(28.1)	1	(4.8)	4	(22.2)	3	(23.1)
8pm-12am	11	(7.7)	0	--	3	(9.4)	1	(4.8)	2	(12.5)	3	(23.1)
Total	**143**[**]		**33**[+]		**32**[+]		**21**		**16**[++]		**13**[+++]	

*Only industries with 20 or more deaths are included in the table.
**Time of injury was unknown for nine deaths.
[+]Time of injury was unknown for one death.
[++]Time of injury was unknown for six deaths.
[+++]Time of injury was unknown for two deaths.

Table 11. Number and Percent of Acute Traumatic Work-Related Fatalities for all Deaths; by North American Industry Classification System (NAICS) Code*; by 4 Hour Time Periods, Michigan 2003

Time	All		Construction Deaths (23)**		Agricultural Deaths (11)		Transportation and Warehousing Deaths (48-49)		Retail Trade Deaths (44-45)		Manufacturing Deaths (31-33)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
12am-4am	12	(8.4)	1	(3.0)	0	--	2	(11.1)	2	(18.2)	2	(20.0)
4am-8am	12	(8.4)	1	(3.0)	1	(3.2)	8	(44.4)	0	--	1	(10.0)
8am-12pm	43	(30.1)	15	(45.5)	10	(32.3)	2	(11.1)	3	(27.3)	2	(20.0)
12pm-4pm	40	(28.0)	12	(36.4)	8	(25.8)	5	(27.8)	2	(18.2)	4	(40.0)
4pm-8pm	25	(17.5)	4	(12.1)	9	(29.0)	1	(5.6)	2	(18.2)	0	--
8pm-12am	11	(7.7)	0	--	3	(9.7)	0	--	2	(18.2)	1	(10.0)
Total	**143****		**33**[+]		**31**[+]		**18**		**11**[+]		**10**	

*Only industries with 10 or more deaths are included in the table.
**Time of injury was unknown for nine deaths.
[+]Time of injury was unknown for one death.

Table 12. Number and Percent of Acute Traumatic Work-Related Fatalities By County of Injury, Michigan 2003

County	Number	Percent	County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	0	--	Dickinson	0	--	Lake	1	(0.7)	Oceana	0	--
Alger	1	(0.7)	Eaton	2	(1.3)	Lapeer	1	(0.7)	Ogemaw	0	--
Allegan	5	(3.3)	Emmet	0	--	Leelanau	0	--	Ontonagon	0	--
Alpena	1	(0.7)	Genesee	5	(3.3)	Lenawee	2	(1.3)	Osceola	0	--
Antrim	0	--	Gladwin	1	(0.7)	Livingston	2	(1.3)	Oscoda	0	--
Arenac	0	--	Gogebic	0	--	Luce	0	--	Otsego	0	--
Baraga	0	--	Grand Traverse	2	(1.3)	Mackinac	0	--	Ottawa	3	(2.0)
Barry	1	(0.7)	Gratiot	2	(1.3)	Macomb	5	(3.3)	Presque Isle	1	(0.7)
Bay	1	(0.7)	Hillsdale	4	(2.6)	Manistee	0	--	Roscommon	0	--
Benzie	0	--	Houghton	0	--	Marquette	0	--	Saginaw	3	(2.0)
Berrien	3	(2.0)	Huron	4	(2.6)	Mason	1	(0.7)	St. Clair	3	(2.0)
Branch	2	(1.3)	Ingham	5	(3.3)	Mecosta	3	(2.0)	St. Joseph	2	(1.3)
Calhoun	2	(1.3)	Ionia	1	(0.7)	Menominee	1	(0.7)	Sanilac	0	--
Cass	0	--	Iosco	1	(0.7)	Midland	1	(0.7)	Schoolcraft	0	--
Charlevoix	1	(0.7)	Iron	2	(1.3)	Missaukee	0	--	Shiawassee	1	(0.7)
Cheboygan	1	(0.7)	Isabella	1	(0.7)	Monroe	4	(2.6)	Tuscola	0	--
Chippewa	1	(0.7)	Jackson	0	--	Montcalm	1	(0.7)	Van Buren	5	(3.3)
Clare	1	(0.7)	Kalamazoo	5	(3.3)	Montmorency	0	--	Washtenaw	2	(1.3)
Clinton	0	--	Kalkaska	0	--	Muskegon	4	(2.6)	Wayne	29	(19.1)
Crawford	0	--	Kent	4	(2.6)	Newaygo	2	(1.3)	Wexford	1	(0.7)
Delta	1	(0.7)	Keweenaw	0	--	Oakland	14	(9.2)			

Table 13. Number of Acute Traumatic Work-Related Fatalities by North American Industry Classification System (NAICS) Code; Michigan, 2003

NAICS Code	Number Of Deaths	Percent	Number Of Employees *	Annual Average Incidence Rate per 100,000
Agriculture, Forestry, Fishing and Hunting (11)	**32**	**21.1**	**79,883**	**40.1**
Crop Production (111)	19	12.5	50,170	37.9
Animal Production (112)	7	4.6	29,713	23.6
Forestry and Logging (113)	2	1.3	**	**
Support Activities for Agriculture and Forestry (114)	4	2.6	**	**
Mining (21)	**4**	**2.6**	**6,400**	**62.5**
Mining (except Oil and Gas) (212)	2	1.3	4,500	45.5
Support Activities for Mining (213)	2	1.3	***	***
Utilities (22)	**2**	**1.3**	***	***
Utilities (221)	2	1.3	***	***
Construction (23)	**34**	**22.4**	**190,000**	**17.9**
Construction of Buildings (236)	5	3.3	44,700	11.2
Heavy and Civil Engineering Construction (237)	9	5.9	17,300	52.0
Specialty Trade Contractors (238)	20	13.2	128,000	15.6
Manufacturing (31-33)	**10**	**6.6**	**727,200**	**13.8**
Nonmetallic Mineral Product Manufacturing (327)	2	1.3	17,500	11.4
Primary Metal Manufacturing (331)	3	2.0	27,300	11.0
Fabricated Metal Product Manufacturing (332)	1	0.7	82,400	1.2
Transportation Equipment Manufacturing (336)	3	2.0	280,800	1.1
Miscellaneous Manufacturing (339)	1	0.7	18,300	5.5
Wholesale Trade (42)	**2**	**1.3**	**173,600**	**1.2**
Merchant Wholesalers, Durable Goods (423)	1	0.7	97,400	1.0
Merchant Wholesalers, Nondurable Goods (424)	1	0.7	50,700	2.0
Retail Trade (44-45)	**12**	**7.9**	**516,600**	**23.2**
Motor Vehicle and Parts Dealers (441)	5	3.3	62,200	8.0
Building Mat'l, Garden Equipment, Supplies Dealers (444)	1	0.7	45,700	2.2
Food and Beverage Stores (445)	1	0.7	90,000	1.1
Gasoline Stations (447)	2	1.3	27,300	7.3
Sporting Goods, Hobby, Book, and Music Stores (451)	1	0.7	24,800	4.0
Miscellaneous Store Retailers (453)	1	0.7	30,300	3.3
Nonstore Retailers (454)	1	0.7	***	***
Transportation and Warehousing (48-49)	**18**	**11.8**	**125,100**	**14.4**
Truck Transportation (484)	15	9.9	35,100	42.7

NAICS Code	Number Of Deaths	Percent	Number Of Employees *	Annual Average Incidence Rate per 100,000
Support Activities for Transportation (488)	1	0.7	***	***
Warehousing and Storage (493)	2	1.3	15,300	13.1
Finance and Insurance (52)	**2**	**1.3**	**162,500**	**1.2**
Credit Intermediation and Related Activities (522)	2	1.3	87,300	2.3
Professional, Scientific, and Technical Services (54)	**3**	**2.0**	**587,000**	**0.5**
Professional, Scientific, and Technical Services (541)	3	2.0	249,300	1.2
Administrative and Support and Waste Management	**3**	**2.0**	**269,400**	**1.1**
Administrative and Support Services (561)	2	1.3	257,800	0.8
Waste Management and Remediation Services (562)	1	0.7	11,700	8.5
Educational Services (61)	**2**	**1.3**	**441,800**	**0.5**
Educational Services (611)	2	1.3	441,800	0.5
Health Care and Social Assistance (62)	**5**	**3.3**	**503,900**	**1.0**
Ambulatory Health Care Services (621)	2	1.3	156,200	1.3
Hospitals (622)	1	0.7	179,300	0.6
Nursing and Residential Care Facilities (623)	1	0.7	86,100	1.2
Social Assistance (624)	1	0.7	49,500	2.0
Arts, Entertainment, and Recreation (71)	**7**	**4.6**	**62,300**	**11.2**
Performing Arts, Spectator Sports, and Related Industries (711)	3	2.0	9,800	30.6
Amusement, Gambling, and Recreation Industries (713)	4	2.6	49,100	8.1
Accommodation and Food Services (72)	**6**	**3.9**	**335,700**	**1.8**
Accommodation (721)	2	1.3	33,900	5.9
Food Services and Drinking Places (722)	4	2.6	301,800	1.3
Other Services (except Public Administration) (81)	**6**	**3.9**	**171,200**	**3.5**
Repair and Maintenance (811)	5	3.3	42,200	11.8
Religious, Grantmaking, Civic, Professional, and Similar Organizations (813)	1	0.7	54,200	1.8
Public Administration (92)	**4**	**2.6**	**251,400**	**1.6**
Justice, Public Order, and Safety Activities (922)	3	2.0	***	***
Administration of Economic Programs (926)	1	0.7	***	***
Totals	**152**		**4,603,983**	

*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 all other Industry Categories: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment Series (IES), Michigan, Year: 2003. www.michlmi.org/LMI/lmadata/cesdata/AET/micaet03.htm, November 17, 2004.
No Data provided on USDA report. * No Data provided on IES report

Table 14. Number of Acute Traumatic Work-Related Fatalities by Standard Occupational (SOC) Code, Michigan 2003

SOC Number	SOC Classification	Number of Workers
11	**Management Occupations**	**34**
11-1000	**Top Executives**	
11-1021	General and Operations Managers	2
11-2000	**Advertising, Marketing, Promotions, Public Relations and Sales Mgrs**	
11-2022	Sales Managers	1
11-3000	**Operations Specialties Managers**	
11-3031	Financial Managers	1
11-3061	Purchasing Managers	1
11-9000	**Other Management Occupations**	
11-9012	Farmers and Ranchers	25
11-9081	Lodging Managers	1
11-9199	Managers, All Other	3
13	**Business and Financial Operations Occupations**	**2**
13-1000	**Business Operations Specialists**	
13-1011	Agents and Business Managers of Artists, Performers, and Athletes	1
13-2000	**Financial Specialists**	
13-2011	Accountants and Auditors	1
15	**Computer and Mathematical Occupations**	**1**
15-1000	**Computer Specialists**	
15-1051	Computer Systems Analysts	1
17	**Architecture and Engineering Occupations**	**4**
17-2000	**Engineers**	
17-2199	Engineers, All Other	3
17-3000	**Drafters, Engineering and Mapping Technicians**	
17-3023	Electrical and Electronic Engineering Technicians	1
19	**Life, Physical, and Social Science Occupations**	**1**
19-3000	**Social Scientists and Related Workers**	
19-3031	Clinical, Counseling and School Psychologists	1
21	**Community and Social Services Occupations**	**1**
21-2000	**Religious Workers**	
21-2011	Clergy	1
25	**Education, Training, and Library Occupations**	**1**
25-9000	**Other Education, Training, and Library Occupations**	
25-9041	Teacher Assistants	1
27	**Arts, Design, Entertainment, Sports and Media Occupations**	**2**
27-2000	**Entertainers and Performers, Sports and Related Workers**	

SOC Number	SOC Classification	Number of Workers
27-2042	Musicians and Singers	1
27-2099	Entertainers and Performers, Sports and Related Workers, All Other	1
29	**Healthcare Practitioners and Technical Occupations**	**2**
29-1000	**Health Diagnosing and Treating Practitioners**	
29-1069	Physicians and Surgeons, All Other	1
29-2000	**Health Technologists and Technicians**	
29-2099	Health Technologists and Technicians, All Other	1
31	**Healthcare Support Occupations**	**1**
31-9000	**Other Healthcare Support Occupations**	
31-9099	Healthcare Support Workers, All Other	1
33	**Protective Services Occupations**	**3**
33-3000	**Law Enforcement Workers**	
33-3051	Police and Sheriff's Patrol Officers	3
35	**Food Preparation and Serving Related Occupations**	**2**
35-2000	**Cooks and Food Preparation Workers**	
35-2014	Cooks, Restaurant	1
35-9000	**Other Food Preparation and Serving Related Workers**	
35-9099	Food Preparation and Serving Related Workers, All Other	1
37	**Building and Grounds Cleaning and Maintenance Occupations**	**6**
37-1000	**Supervisors, Building and Grounds Cleaning and Maintenance Workers**	
37-1012	First-Line Supervisors/Managers of Landscaping, Lawn Service and Groundskeeping Workers	1
37-2000	**Building Cleaning and Pest Control Workers**	
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1
37-3000	**Grounds Maintenance Workers**	
37-3013	Tree Trimmers and Pruners	4
39	**Personal Care and Service Occupations**	**3**
39-2000	**Animal Care and Service Workers**	
39-2011	Animal Trainers	2
39-3000	**Entertainment Attendants and Related Workers**	
39-3091	Amusement and Recreation Attendants	1
41	**Sales and Related Occupations**	**6**
41-2000	**Retail Sales Workers**	
41-2011	Cashiers	2
41-2031	Retail Salespersons	2
41-9000	**Other Sales and Related Workers**	
41-9091	Door-to-Door Sales Workers, News and Street Vendors, and Related Workers	1
41-9099	Sales and Related Workers, All Other	1
43	**Office and Administrative Support Occupations**	**3**
43-1000	**Supervisors, Office and Administrative Support Workers**	
43-1011	First-Line Supervisors/Managers of Office and Administrative	1

SOC Number	SOC Classification	Number of Workers
	Support Workers	
43-5000	**Material Recording, Scheduling, Dispatching and Distributing Workers**	
43-5041	Meter Readers, Utilities	1
43-5071	Shipping, Receiving and Traffic Clerks	1
45	**Farming, Fishing, and Forestry Occupations**	**3**
45-2000	**Agricultural Workers**	
45-2041	Graders and Sorters, Agricultural Products	1
45-2093	Farmworkers, Farm and Ranch Animals	1
45-4000	**Forest, Conservation, and Logging Workers**	
45-4021	Fallers	1
47	**Construction and Extraction Occupations**	**27**
47-1000	**Supervisors, Construction and Extraction Workers**	
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	2
47-2000	**Construction Trades Workers**	
47-2031	Carpenters	4
47-2061	Construction Laborers	3
47-2111	Electricians	3
47-2141	Painters, Construction and Maintenance	5
47-2152	Plumbers, Pipefitters, and Steamfitters	2
47-2181	Roofers	2
47-2221	Structural Iron and Steel Workers	2
47-3000	**Helpers, Construction Trades**	
47-3016	Helpers-Roofers	1
47-3019	Helpers-Construction Trades, All Other	1
47-4000	**Other Construction and Related Workers**	
47-4051	Highway Maintenance Workers	1
47-5000	**Extraction Workers**	
47-5013	Service Unit Operator, Oil, Gas and Mining	1
49	**Installation, Maintenance, and Repair Occupations**	**5**
49-3000	**Vehicle and Mobile Equipment Mechanics, Installers, and Repairers**	
49-3023	Automotive Service Technicians and Mechanics	1
49-3041	Farm Equipment mechanics	1
49-3092	Recreational Vehicle Service Technicians	1
49-9000	**Other Installation, Maintenance and Repair Occupations**	
49-9041	Industrial Machinery Mechanics	1
49-9044	Millwrights	1
51	**Production Operations**	**13**
51-1000	**Supervisors, Production Workers**	
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	1
51-3000	**Food Processing Workers**	
51-3011	Bakers	2

SOC Number	SOC Classification	Number of Workers
51-4000	**Metal Workers and Plastic Workers**	
51-4041	Machinists	1
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators and Tenders, Metal and Plastic	1
51-4111	Tool and Die Makers	1
51-4121	Welders, Cutters, Solderers, and Braziers	2
51-8000	**Plant and System Operators**	
51-8099	Plant and System Operators, All Other	1
51-9000	**Other Production Occupations**	
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	1
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1
51-9122	Painters, Transportation Equipment	1
51-9199	Production Workers, All Other	1
53	**Transportation and Material Moving Occupations**	**32**
53-2000	**Air Transportation Workers**	
53-2012	Commercial Pilots	2
53-3000	**Motor Vehicle Operators**	
53-3032	Truck Drivers, Heavy and Tractor-Trailer	19
53-3033	Truck Drivers, Light or Delivery Services	1
53-4000	**Rail Transportation Workers**	
53-4031	Railroad Conductors and Yardmasters	1
53-6000	**Other Transportation Workers**	
53-6031	Service Station Attendants	2
53-7000	**Material Moving Workers**	
53-7021	Crane and Tower Operators	4
53-7032	Excavating and Loading Machine and Dragline Operators	1
53-7060	Laborers and Material Movers, Hand	1
53-7061	Cleaners of Vehicles and Equipment	1
Total		**152**

Table 15. Number and Percent of Acute Traumatic Work-Related Fatalities by Means of Death, Michigan 2003

Means of Death	Number of Deaths	Percent
Aircraft	2	1.3
Animal	2	1.3
Asphyxiation	4	2.6
Drowning	1	0.7
Electrocution	10 (9)*	6.6
Explosion	4	2.6
Fall	19	12.5
Heat/Cold	1	0.7
Homicide	15 (13)	9.9
Machine-Related	39	25.7
Motor Vehicles	29	19.1
Struck By	15	9.9
Suicide	5	3.3
Toxic Exposure	6	3.9

*Number in parentheses is the number of incidents.

Figure 1. Age Distribution of Acute Traumatic Work-Related Fatalities, Michigan 2003

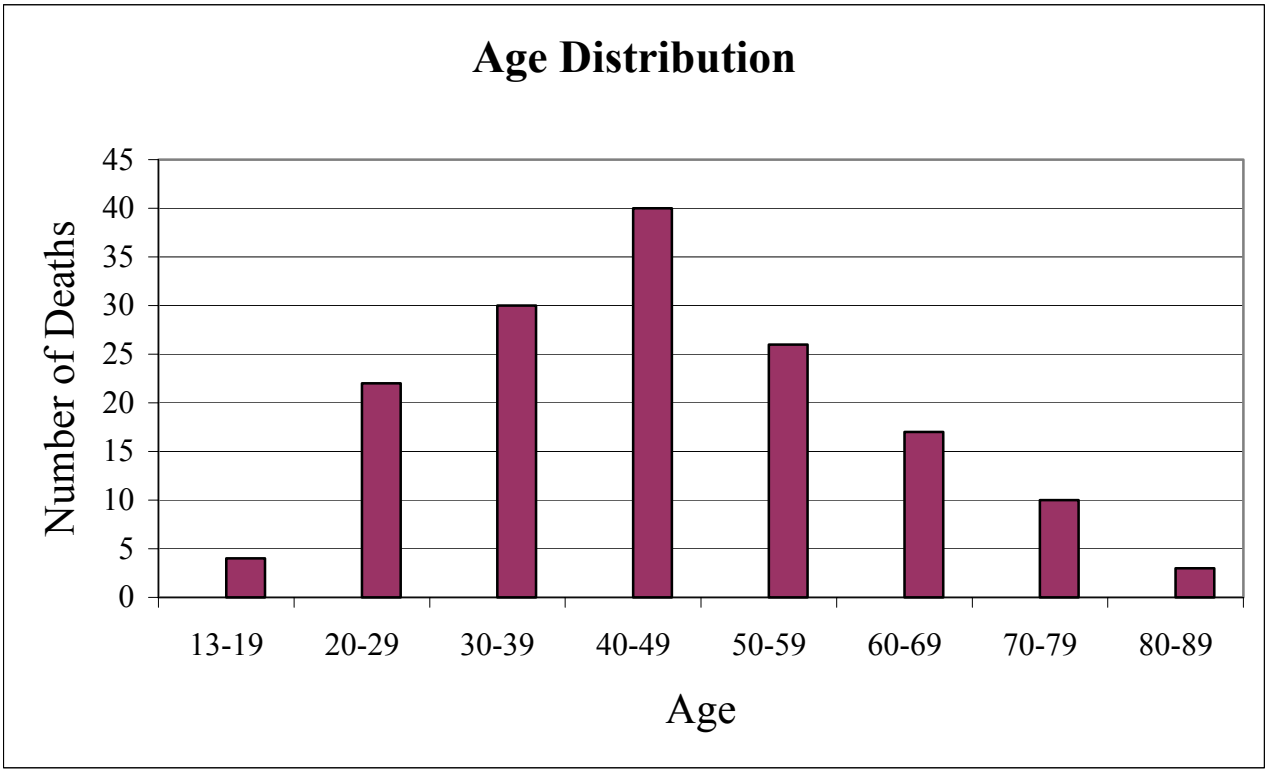
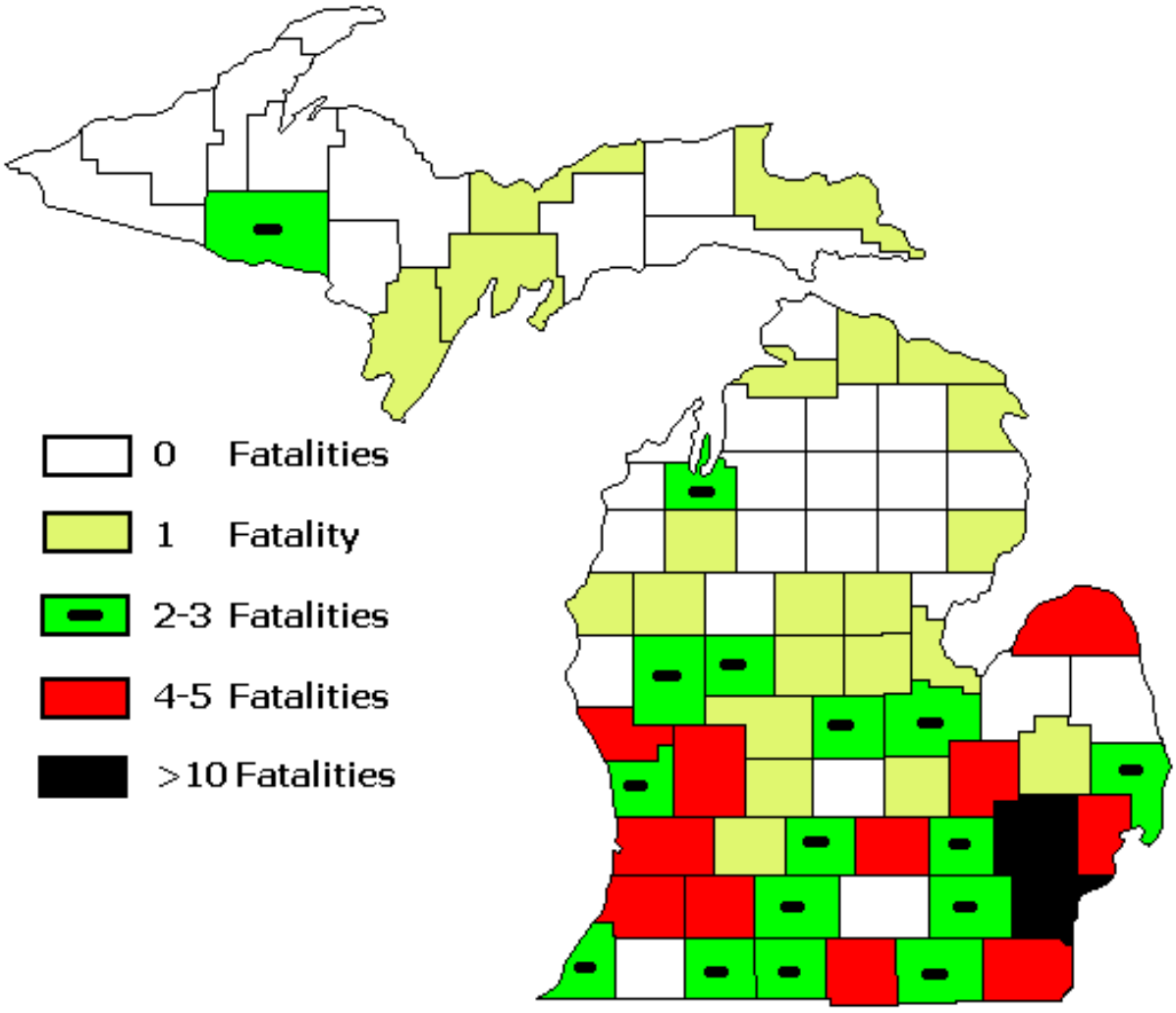


Figure 2. County Distribution of 152 Acute Traumatic Work-Related Fatalities By County of Injury, Michigan 2003



APPENDIX I

2003 CASE NARRATIVES BY CASE NUMBER

AIRCRAFT (2)	
Case 1	19-year-old male pilot died when his fixed-wing, single-engine aircraft crashed nose first into the ground. The victim had sprayed crop dusting material on a soybean field. There were no trees in the immediate crash area and the closest trees were approximately an eighth of a mile north of the crash scene. There were no power lines in the area. After spraying the soybean field, the pilot pulled the plane straight up. It is unclear if the plane's engines cut out while pulling the plane up. The plane did a slow arch and started to spiral down to the ground, nose first. The victim was declared dead at the scene.
Case 2	58-year-old male crop duster died when his single engine airplane struck a low hanging, non-electrical utility line while spraying crop dusting material on a soybean field. The utility line was running in an east-west direction through the field. The tail of the aircraft struck the utility line six inches from the top of the tail. The tail broke off and the plane crashed, nose first, into the ground. The victim survived the crash and died at the hospital.
ANIMAL (2)	
Case 3	25-year-old male horse exercise rider died when the horse he was riding reared and fell back into a fence. The victim and his horse were leaving the track to go back to the stables after he "worked out" the horse. As he was leaving the track, the horse reared and fell back into the fence. The victim was unable to get off of the horse and was pinned between the horse and the fence. The victim struck his head on a metal connector for the fence. The victim was wearing the proper riding equipment, including a helmet.
Case 4	76-year-old male horse trainer was trampled by Belgian draft horses while assisting two other individuals in the training of the horses. One of his coworkers led a team of two Belgian horses up to a pulling sled. While that coworker held the reins, another coworker hitched the horses to the sled. The victim stood in front of the horses and held them while the sled was hitched. As the horses were hitched, they lunged forward in an effort to pull the sled. The horses stepped on the victim.
ASPHYXIATION (4)	
Case 5	40-year-old male farmer died when he was engulfed in shelled corn. He entered a 49-foot diameter metal Chief grain bin to clear corn that had clogged the unloading holes. The bin was approximately one-half full, with approximately 30,000 bushels left in the bin. The bin was equipped with a power sweep head unit that was not running. He was standing on the grain with the augers running so he could identify the location of the unloading holes. The bin's two outside one-foot square holes were flowing. The victim may have been attempting to clear the hole next to the center hole. He entered the grain bin from the top hatch and used a 20-foot long ½-inch pipe to clear the plugged hole. It appears that due to the pattern of grain flowing from the unloading holes, that the remaining grain in the bin was at a 20-30 degree slope up one side of the bin. When the hole was cleared and the grain started flowing, it is postulated that the sloped grain wall sheared upon the movement of the grain at the base of the pile and the victim was engulfed. When he could not be

	found, rescue persons were called. After nearly three hours he was found by his brother in the bin and removed. He was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI108.
Case 6	53-year-old female assembler with cerebral palsy choked on a piece of food while working at a vocational center. She died two weeks later after the incident.
Case 7	38-year-old male truck driver was asphyxiated when he was buried in processed human waste sludge at a landfill. At the time of the incident, the truck was already backed to the edge of the trench. Witnesses saw him at the rear of the truck trailer loosening a tailgate turnbuckle latch. The latches along with a main release mechanism hold the tailgate in place until it is time to dump the load. The latch apparently gave way unexpectedly due to the weight of the sludge pressing against the tailgate. Witnesses stated that the tailgates often release abruptly. One of victim's co-workers, who also witnessed the conditions following the incident, stated that the tailgate latches should have been loosened first. The next step would be to back the truck to the trench edge. The driver should then exit the cab and operate the main release mechanism from the driver side of the trailer, near the truck cab. Finally, the driver should operate the controls in the cab area to dump the load. An examination of the turnbuckle latch revealed that it was bent. Among others, some possible scenarios are that he had actuated the main release out of order, had forgotten to release the latch before backing, failed to properly free the latch when it jammed during operation of the main release, or some combination of these scenarios. The same witness mentioned previously also stated that he did not observe the accident as it occurred, and was not sure of the exact sequence of events or the conditions just prior to the releasing of the load. The witness heard the tailgate slam and looked in time to see sludge flowing into the trench. The witness then attempted to locate the fallen driver. The driver was found buried at the bottom of the trench in the sludge in the inverted position to the waist level. He remained in this position for approximately 40 minutes despite rescue efforts, and was pronounced dead at the scene. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 45.
Case 8	60-year-old male psychologist choked on a piece of food at a conference for mental health professionals.
DROWNING (1)	
Case 9	53-year-old male drowned in a ditch filled with four to six inches of water at his place of employment. The victim was identified as having an alcohol problem The victim had worked on and off for this employer. According to the police report, his coworkers stated that the victim would go to this spot when he began to shake uncontrollably, perhaps due to alcohol withdrawal. He would hide at this spot until the episode would pass.
ELECTROCUTIONS (10)	
Case 10	42-year-old male supervisor for an electronics-engineering firm was electrocuted as he was working on battery upgrades for a security system. He was replacing nine

	out of thirty batteries, which were wired in series, creating 360 volts direct current in a battery cabinet within an electrical room. He was working on an energized circuit with no insulation, no insulating tools, no insulating matting or blankets. An employee for the company for whom the victim was installing the batteries noticed a pause in the system. The employee checked the area where the victim was working. The door to the battery cabinet was open and the victim was leaning against it. The employee found the victim on the floor, his face against the second shelf of the battery cabinet and his right hand "reaching back" into the lower shelf. A plastic four-wheel cart used to transport the batteries and his tools to the room was lying across his legs. The employee left and called for emergency assistance. Upon hearing the page for emergency assistance, another company employee went to the room. The selector switch to the battery unit was in the "ON" position. He turned off the power feed to the room. He found the victim's gloves (which he was not wearing), donned them, and pulled the victim from the equipment. This employee found the victim's multi-meter lying on the floor in the "ON" position, set for DC voltage measurement. The victim was not a licensed electrician. He was an International Electrical Testing Association (NETA) level IV certified technician and had completed manufacturer's service training seminars for the product line he was servicing two years prior to the incident.
Case 11	37-year-old male Department of Public Works (DPW) employee was electrocuted while attempting to read a water meter that was located behind an apartment boiler. The boiler room was lit by one overhead 40-watt light bulb. The meter was located near ground level. There was approximately a two-foot gap between the boiler and the back wall. He placed his water meter logbook on top of the boiler. Bracketed on a water pipe near the boiler was the boiler's low water cutoff switch. It is unknown if the switch cover was on the switch when the victim tried to maneuver between the water pipes and the boiler to read the water meter. During his attempt to read the water meter, he contacted exposed 120-volt energized low water cut-off switch terminals with his right chest. Following contact with the terminals, he collapsed and became wedged between vertical pipes coming from the boiler. The low water cutoff switch cover was found hanging under the victim's chest. A cigarette lighter was found on the floor under his body. A screwdriver, not the type used by DPW employees, and a small metal screw was found near the victim's body. He was found by an apartment complex resident who alerted an apartment complex employee. The apartment complex employee contacted 911. The power company was notified and turned the power off to the boiler room. The victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI079.
Case 12	21-year-old male college student was electrocuted when the ladder he was repositioning contacted a 4,800-volt energized overhead electrical line. The victim was a member of a two-person crew whose company was hired by a homeowner to paint their residence. Before the work was initiated, a company supervisor accompanied the victim and his coworker to the job site and instructed them in the steps necessary to complete the painting task. The supervisor did not discuss the overhead line location with the victim and his coworker. It was their first day of

	work. The incident occurred while the victim and coworker, both on aluminum ladders, were preparing the residence for painting. His coworker was power washing and the victim was scraping off the remaining paint. The ground was wet. The victim descended the ladder to the ground and was repositioning the ladder when it contacted the overhead electrical line that was approximately 22 feet from the ground. The ladder contacted the line and the victim became a path to ground. He broke contact with the ladder and dropped to the ground. The ladder fell back against the residence. Emergency response was contacted and the victim taken to a local hospital, where he was declared dead. The police report states that when the electrical company lowered the ladder to the ground it was noted that a rope was caught in the pulley, which would not allow the extension ladder to be raised or lowered. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 26.
Case 13	22-year-old male truck driver was electrocuted while standing on the ground when his truck's raised dump box contacted an energized 69,000-volt overhead power line. The victim was working with three other coworkers constructing a parking lot. The victim was the driver of a dump truck that was stuck in the lot under the energized 69,000-volt overhead line. With one coworker acting as a "spotter," the victim stood outside of the dump truck and raised the bed to dump some of the gravel to help lighten the load so he could be pulled out. The power line was approximately 23 feet high. With the help of his spotter, he partially dumped the load and lowered the box. One of his coworkers went to get a grader that was going to be used to pull the victim's truck. Another coworker went to get a chain to attach the grader to the dump truck. While these two individuals were going to their respective positions, without the use of a spotter, the victim apparently decided to empty the truck bed. He raised the dump box while standing on the ground, maintaining contact with the truck. The dump box contacted the energized overhead power line. The victim became a path to ground and was electrocuted. The grader operator, while backing up his vehicle saw sparks coming from the powerline to the victim's truck. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 51.
Case 14	39-year-old fourth year male electrical apprentice died when he contacted 277 volts of electricity. He was wiring an emergency exit sign, working from an aerial work platform about 15 feet in the air. A co-worker climbed up the lift when he heard the victim groan and saw him slumped over and shaking. He pulled the victim away from the wires by his shirt and threw the wires that were grasped in the victim's hands off the lift. The lift was lowered by insulated ground controls. Two workers applied CPR until the fire department emergency squad arrived and took him to a local hospital where he was pronounced dead.
Case 15	44-year old male machinist was electrocuted while repairing an electrical transfer machine. The transfer machine picked up pallets of cement blocks and unloaded them at one kiln. The machine traveled to another kiln and retrieved finished blocks and unloaded those blocks to another location. The victim was being trained by an

	outside contractor to perform maintenance on the transfer machine, but had not yet completed his training. The machine had stopped working earlier that day. There was no power to the main panel. Using a voltmeter, the victim and coworker started to check wires for loose connections, fuses and relays. The victim identified a cracked wire and replaced it. The coworker thought the transfer machine was fixed and left to go to the mechanic's shop to get some reflective tape for a broken reflector. Sometime while the coworker was at the mechanic's shop, the victim crawled under the machine with the electrical test equipment. It appears that the transfer machine was still not operational. Upon closer inspection, he may have identified a problem with the vertical lifting motor that drives the hydraulic pump; a wire had come off the terminal. To fix the wire required reaching approximately 8 inches into a 12-inch drum to where the terminals were located. The victim was lying on damp ground with no insulating tools. The power to the transfer machine was "On" throughout the procedure. His right forearm made contact with the 480-volt terminal strip. The coworker returned and found the victim on his back next to the transfer machine, not moving or breathing. When the police arrived, they found the victim's right arm elevated and in contact with the machine. The electrical box near the top of the transfer machine was open. Police state that it appeared that the victim had the voltage meter in his right hand. The victim was not breathing and did not have a pulse. Emergency response was summoned, CPR initiated, and the victim was transported to a local hospital. He was pronounced dead shortly thereafter. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 34.
Case 16 Case 17	25-year-old male carpenter and 19-year-old male student working part-time as a laborer died when they were electrocuted after contacting 7,200 volts of electricity. They were rough framing a two-story house in a residential neighborhood. The trusses they were using were stored on the ground below 7,200-volt energized electrical lines. The carpenter was operating the crane that was used to lift the trusses. As the 19-year-old attempted to lift the trusses, he pulled the rigging toward the power lines causing the crane load line to contact an energized power line. When his co-worker, the carpenter, saw he was in trouble, he left the crane controls and tried to help him. Upon making contact with the victim, he was also electrocuted.
Case 18	23-year-old male ironworker was electrocuted while operating an extensible boom rough terrain forklift that made contact with a 4,800-volt overhead power line. The victim was a member of a work crew that was installing metal decking on the roof of a pre-engineered building frame. A generator used for power tools was located under the decking on the ground. The ground was muddy. The ground fault circuit interrupter (GFCI) for the generator kept "tripping" requiring the victim to repeatedly go down to the ground via a ladder and reset the GFCI. Earlier in the day, the victim's supervisor had used an extensible boom rough terrain forklift to place the roof decking. The victim drove this forklift to the site of the generator and was going to lift the generator to the floor where they were working. There was approximately 11-12 feet of space between the building, which was approximately 23-25 feet in height, and the electrical wires. The 4,800-volt power line was 29 feet

	off the ground. The workers on-site were aware of the power line; it was a topic of conversation each day. As he was lifting the generator, the front face of the boom contacted the energized 4,800-volt electrical line. He attempted to exit the cab. He made contact with the ground while his hand was on the cab and was electrocuted. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 53.
Case 19	44-year-old male farmer was electrocuted while welding a hay wagon. The portable 240-volt plug-in cord-connected welder was in disrepair. The welder lead cables were at least 10 years old and were 12 feet long. The power cord and the cables had damaged insulation exposing the conductor's wiring. The victim had attached the ground cable to the hay wagon. The victim parked the hay wagon near a wooden building that was filled with tools and junk metal. The welder was plugged into an outlet that had exposed conductors and, according to the police report, also had other items plugged into it. To allow the welding leads to reach the location of the hay wagon, the victim spliced together two sets of welding cables and placed the un-insulated, spliced cables on bare dirt. The victim was lying on bare ground and, according to the police report, was sweating heavily. An individual who had been previously working with the victim found the victim under the hay wagon with the welder cables lying across his lap. The victim was wearing his welding mask. He was not wearing gloves. The victim was found sitting up under the trailer with his head resting on a metal support railing under the hay wagon. According to the police report, the person who found the victim knelt down and put his hands on the ground and received a "large" shock. This individual turned off the welder and called for assistance. The victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI193.
EXPLOSION (4)	
Case 20	53-year-old male well hand died from complications of the burns he sustained when a flash fire occurred during a tank rollover or "hot oil" service on two 400-barrel oil storage tank contents. This process involved pumping crude oil from a storage tank into a tanker truck where it was heated to separate out the water and the "clean" oil was pumped back into the tank. The hot oil service rig had a tank and, in front of the tank, a heater unit with circulation tubes and a flame. To determine if the flame was lit a worker opened a hatch covering the flame; this hatch was left open during the "hot oil servicing." The tank system had a flame stack to burn off accumulations of flammable gasses. Instead of connecting the hose from the truck to a line in the storage tank, the two-inch hose was inserted directly into the 20-inch diameter hatch on top of the tank, which allowed open space for the unburned gasses to accumulate and migrate towards the source of ignition. The victim and his coworker had placed folding chairs approximately five-six feet from the heater with the open flame while waiting for the hot oil servicing to be completed. One storage tank had been serviced and the 2nd storage tank had almost completed service. The victim was standing near the tank when the gasses ignited and there was a flash fire, which engulfed the victim.

	Approximately one month after the incident he died from complications of the burns sustained in the incident. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 32.
Case 21	50-year-old truck driver/bulk lime deliveryman died after being knocked off a tanker by an exploding dome shaped hatch lid. The victim's job was to transport and deliver bulk lime in a pneumatic trailer. When the semi tractor is kept running, the air lines to the tanker are filled with air, pressurizing the tanker to no more than 15 psi. On the day of the incident, it appears as though there was a problem with the lime pumping from the tanker. It is believed that the victim climbed on top of the tanker to check the seals on the hatches. Operators stated that they sometimes have to work on the hatches to reposition or replace seals, tighten latches, or re-secure them. He may have attempted to open the pressurized tanker's hatch lid or simply manipulate latches to achieve a better seal while the semi tractor was running. Before manipulating or opening any fitting, coupling or other openings, the company's procedure required shutting down the blower and decompressing the equipment. However, victim did not follow this procedure. The lid apparently blew off as the victim attempted to manipulate it and struck the victim, knocking him off the tanker. He fell 15 feet to the concrete. A delivery site worker found the victim on the ground approximately 10 feet from the trailer with lime blowing out of the open top trailer hatch. The victim was not wearing eye protection or fall protection. He was taken to the hospital and died approximately two weeks later. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 41.
Case 22	41-year-old male part-time fireworks display operator was killed when a fireworks shell struck him in the head. The fireworks display was set up in a gravel pit that had three "levels." Fireworks shells were placed and lit at each level. The victim used a propane torch to manually light his zone of shells on the lowest level. He lit a first round of shells to start the show, then climbed up a hill and directed his assistants at the middle level to light their shells. He left them and they lit their zone of shells. One of his assistants working on the middle level had been instructed to light a "cake" on the lower level at a certain time during the show. The assistant slid down the hill from the middle level to the lower level and was walking to the "cake" when he stumbled upon the victim. The victim was lying in the sand with his head partially in the water and his legs pointing in the general direction of two four-inch empty mortars buried at an angle in the sand. The victim's flashlight was in his shirt pocket and he was not wearing a hard hat. He did not have a spotter or communication device. His earmuffs were approximately 20 feet away; the right earmuff was not attached to the muff's head strap. The assistant ran up the hill and notified the on-site emergency response unit. The show was stopped and the victim was declared dead at the scene. Autopsy results showed a blood alcohol level of 0.25% and an antidepressant in his bloodstream.
Case 23	22-year-old male foundry worker was killed while using a cutting torch to cut up an empty metal 55-gallon drum that previously contained isopropyl alcohol. The

	employee was a member of a cleanup crew that was being paid overtime. One of the clean up duties was to cut up the 55-gallon barrels that were piled near a recycling container for removal. The barrel the victim was attempting to cut was located among barrels in an outside storage area that were being cut into pieces for recycling. The drum was marked with a red placard on the side as flammable and with a white hazardous material information label with the words isopropyl alcohol. The barrel was sealed on both ends, had a non-removable head and had both bung plugs in place. The barrel had not been cleaned and purged of residual flammable material before being placed outside. As the victim was cutting the top end of the drum, the isopropyl alcohol vapors exploded. The top of the barrel came off and struck the victim's head. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 48.
FALLS (19)	
Case 24	39-year-old male substitute school custodian died after a fall from a ladder while attempting to change a burned-out light bulb located 16 feet high on the back wall of an auditorium stage. When he fell, he was working alone. He called 911 on his cell phone. He told those who arrived to help that he had fallen from the second step from the top of a six-foot stepladder. He fell approximately five feet from the ladder to the wood covered with linoleum stage floor. When help arrived, he was found lying on the stage floor pretty much directly below the burned-out light with his head toward the back of the stage and his legs toward the front. A six-foot aluminum and fiberglass stepladder in good condition was lying on the stage floor in the closed position slightly to the left of the victim. A play set constructed like a room with a roof and used in the play "Fiddler on the Roof" was located to the right of the victim. The play set was approximately eight feet high and eight feet wide and on coasters. According to the police report of the incident, he complained of severe pain in his ankles and knees when he attempted to move them. He was transported to a local hospital. Subsequent examination indicated that his right leg was broken. His injuries required surgery. Three days following his fall, prior to surgery, he died from a pulmonary embolus (blood clot). The medical examiner stated that the victim "died of a pulmonary embolus which originated from deep vein thromboses of the calves of both legs. Fracture of the right leg, sustained in a fall contributed to the formation of the clots and to (his) death." A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI020.
Case 25	38-year-old male roofer died as a result of a fall from a roof. The victim was working at the edge of the roof putting on the starter course of shingles. He apparently lost his balance and fell forward off the roof and landed on a concrete sidewalk. He was taken to the hospital and died two days later from his injury. According to the autopsy report, the victim was under the influence of cocaine at the time of the incident. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click

	on Case 39.
Case 26	35-year-old male electrician was killed when the boom supporting the vehicle-mounted aerial work platform he was working from was struck by a semi-truck passing underneath it. The electrician and his partner had been changing lights in an overhead traffic signal above a traffic intersection. The work had been completed, but he had returned for something they had forgotten. Their boom truck was parked in the far right lane of the three lanes entering the intersection from the west. The far left lane was a left turn lane; the middle lane was a through lane. The incident happened near midnight. The boom was extended out over oncoming traffic to enable the aerial work platform to reach the work area 13 feet 5 inches above the intersection. The top of a semi-truck proceeding east in the middle lane struck the boom. The boom was damaged, but the aerial work platform did not fall. The electrician was propelled out of the aerial work platform onto the street approximately one half block away where he struck his head on the pavement. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 40.
Case 27	58-year-old male truck driver died when he fell approximately 42 inches from his dump truck. The victim appeared to be attempting to secure or adjust the tarp over the top of a 15-ton, dual-axle dump truck after it was loaded with asphalt. The top load cover was electric and was unfurling properly at the time of the MIOSHA investigation. The tarp was in the ¾ position and the tarp lever was in neutral position. He was standing either on the bottom outside edge of the box or on a rear wheel when he fell backward to concrete. Scuffmarks were present on the edge of the box. The victim may have been loosening stuck asphalt from the edge of the dump truck to allow the cover to close. He was taken to a local hospital where he was pronounced dead. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 31.
Case 28	39-year-old male carpenter was killed when he and the elevated platform he was working in fell approximately 12 feet. The victim was a member of a three-person crew involved with constructing a second story addition over the garage at a residential property. The week prior, the crew had parked the rough terrain forklift on the property. Arriving the day of work, the forklift was placed into service without performing a vehicle or work platform check. The homemade platform was four feet wide by ten feet long with a railing on three sides and did not comply with MIOSHA regulations. On the day of the incident, the forklift operator raised the victim while he stood in the platform to a height of approximately 12 feet. The operator got off the forklift, parked and shut off the forklift. He handed the victim a 20-foot aluminum pick (plank) to place on the floor of the platform. The driver handed the other end of the pick to another coworker who carried the pick up to the ladder jack. The pick extended approximately one to two feet on the floor of the basket and the same distance on the ladder jack. The driver went to get some tools and the victim entered the building from the platform for some tools. The coworker was moving along the pick marking trusses for trimming. The victim reentered the

	basket and began to use a saw to cut the tails off some of the marked trusses. Neither the victim nor the coworker on the pick was wearing fall protection. The driver was in the second story addition when he heard the saw go quiet, then a loud noise. He looked out of a nearby window and observed the coworker on the pick fall to the ground. Turning his head, he saw the victim, in the basket with the forks on the ground. The forks of the forklift had disengaged from the mast and the basket and the forks had fallen to the ground. The coworker that fell contacted 911 while the forklift driver went to free the victim from the basket. Emergency response arrived, and the victim was declared dead. It appears that he hit his head on the railing. It was found that the safety latches that are designed to hook the forks to the forklift were in the up position. A chain was around the basket and the forks but was not attached to the forklift. The employer did not have a written safety program. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 25.
Case 29	72-year-old male truck driver fell after becoming dizzy while at his employer's dock area. Observers saw him fall to the ground and strike his head while he was standing beside his truck. He was found lying outside the truck, which was running and in gear, five feet from the docking doors. He died approximately two weeks later from complication of his head injury.
Case 30	29-year-old male painter fell 120 to 130 feet onto the back of a parked pickup truck from a water tower that he had been painting. He was the crew foreman on the job. One other worker was on the top of the water tower when the incident occurred. The other worker was mixing paint and painting handrails at the top of the water tower when the victim told him to go down and clean up for the end of the day. As the other worker descended the stairs, he heard a noise like something falling. He climbed back to the top but could not see the victim or the equipment he had been using. The victim had moved the cable supporting the single-point adjustable scaffold "spider" he was working from to the other side of a post on the top of the tower. When he reassembled his equipment, he placed only one eye of the two-eyed chocker into the shackle on the cable that secured the spider to the supporting equipment on the tower. He was not using a lifeline with a harness and rope grab. When he started to descend over the side of the tower, he and the spider fell causing his death. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 52.
Case 31	55-year-old male roofer died when he fell 15 feet from the roof of a residence. The victim was a member of a three-person roofing crew stripping and replacing shingles. The victim was installing flashing material for a chimney. He had placed his ladder at the garage wall. The garage had a flat roof that was approximately 10 feet six inches above the ground. He descended from the ladder to the ground to pick up additional flashing material. He ascended the ladder with the material and walked across the garage roof. The roof that had the chimney had a 5-12 pitch. It appeared he was going to the chimney when he fell fifteen feet from the roof.

	Emergency response was called and he was transported to a local hospital. He was transferred to a second hospital where he died. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 33.
Case 32	22-year-old male construction laborer was killed when he fell approximately 190 feet from the top of a 500,000-gallon globe-type water tower. He had been working at the company approximately nine weeks and was a member of a four-person crew performing cleanup activities, filling in low spots in the welds to the steel, grinding seams and burrs, removing temporary hand lines and toe boards and welding the hatch lid. The victim was working directly with one of his coworkers. Initially, his coworker was filling in the low spots and the victim was using a grinder to smooth the filled area. They then were assigned to take down a hand line that consisted of a steel four-inch toe board, steel pipe and wire rope. The hand line was used as perimeter protection during the installation and welding of the water tower roof. The victim and his coworker were using a choker, choked to the permanent handrail and attached to a lanyard as fall protection while removing the hand line. After they removed and lowered the toe boards, his coworker started to grind the burrs that were left from the toe board welds while the victim did other chores. To gain a little more length from the fall protection, his coworker added another six-foot to eight-foot choker, basket hitched back to the eye of the choker that went to the handrail using a seven-eights-inch shackle. The fall protection system had three eyes shackled together. The shackle was used to hook the two chokers together and to choke it around the handrail. The coworker hooked his lanyard into the loop of the bottom choker. His coworker was able to grind approximately 1/3 of the burrs before breaking for lunch. After lunch, the victim and a different coworker climbed the interior ladder to the top of the tower. While his coworker was welding, the victim began to grind the remaining burrs. A witness stated that it appeared the victim stepped outside of the working platform. He had his safety harness on but the 1/2-inch chokers were not attached to the supports on the tower. He fell from the tower to the ground. Another coworker, upon ascending to the top of the tower and not seeing the victim, radioed to personnel on the ground asking if the victim was on the ground. Another coworker found the victim lying on the ground. Emergency response was called and he was declared dead at the scene.
Case 33	28-year-old male self-employed painter died after falling six feet from a stepladder, hitting the back of his head on the ground. The victim was painting a home. He complained of head pain, but after a few minutes, he was unconscious. He was airlifted to a hospital and died three days later from complications of the head injury sustained at the time of the incident.
Case 34	48-year-old male sales clerk fell while standing on a dry tile floor due to an unknown cause. He died six days later from head injuries sustained in the fall. At the time of admission to the hospital 0.010% alcohol was found in his blood.
Case 35	44-year-old male welder fell 24 feet to his death while attempting to weld a steel plate onto an I-beam to stabilize it. The I-beam was being stabilized to temporarily support the weight of a piece of equipment (a crown) that was to be placed on the top of the press next to it. The floor at the base of the press upon which the crown

	was to be placed was 24 feet below the area where he was welding. An approximate two-foot gap existed between the I-beam he was welding on and the press. A co-worker saw him climb onto the steel plate, apparently to weld on the side next to the gap. When he looked again, the victim was not to be seen. The victim was not using fall protection. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI179.
Case 36	48-year-old female part-time rancher fell off of the front of a hay wagon and was run over by the wagon. She was working with her husband bailing hay. He was operating the tractor and she was on the hay wagon. The hay shifted. She lost her balance and fell off the front of the wagon. Her husband was unable to stop the wagon in time and she was run over by the hay wagon. She died three weeks later from her injuries.
Case 37	61-year-old male shipping and receiving specialist fell and struck his head on a concrete floor. He died two weeks later from his injuries.
Case 38	38-year-old female service manager fell on the stairway while at work. She died two months later from complications of the fall.
Case 39	68-year-old male service technician tripped over a chair and fell, striking his head while he was working at a bowling alley. After the fall he complained of a headache and went home. Later that evening he awoke with a severe headache and was taken to a hospital emergency room. He died 15 days later from complications of the head injury sustained at the time of the fall. A medical condition contributed to the severity of his injury.
Case 40	37-year-old male construction laborer fell 20-30 feet from a roof to the ground in 2000. He died from complications of neck fractures approximately three years after his injury.
Case 41	49-year-old male business owner died after falling 10-feet from the deck of a bed-and-breakfast inn to a concrete patio. The deck did not have a railing around its edge. It appears that he was leaning over the edge of the deck applying the product to the deck's logs when he lost his balance and fell to the patio. A family member heard a "thump" and went to see what was the cause of the noise. After finding the victim she called for emergency response. The victim died the following day from the injuries sustained at the time of the fall.
Case 42	86-year-old male grain elevator manager died from complications of a fall he sustained in 1974. In 1974, while working at an unknown height in a grain elevator, a cable snapped and he fell. He fractured his cervical spine.
HEAT/COLD (1)	
Case 43	55-year-old male operating engineer died from cardiac arrhythmia with extreme heat exposure as a contributing factor. He and two coworkers had been working since 7:30am. The coworkers indicated that they took frequent breaks. He stated he felt "ill." He was perspiring and short of breath before his collapse. His coworkers placed him in an air-conditioned van. The victim requested that he be taken to a local hospital because of chest pains. Emergency response arrived and the victim lost consciousness. He was taken to a local hospital where he died.
HOMICIDE (15)	
Case 44	57-year-old male storeowner and 33-year-old male coworker were shot during a

Case 45	robbery.
Case 46	24-year-old male pizza deliveryman was shot during a robbery at the pizza store.
Case 47	32-year-old male convenience store clerk was shot during a robbery at the convenience store.
Case 48	47-year-old male auto parts dealer was shot after exiting the auto parts store with a coworker.
Case 49	33-year-old male police officer was shot by an individual after the officer entered the home during a standoff.
Case 50 Case 51	40-year-old male baker and 23-year-old male pastry decorator were shot during a store robbery.
Case 52	45-year-old female health care support worker was stabbed by a group home resident.
Case 53	35-year-old female hotel night clerk was shot during a robbery attempt.
Case 54	21-year-old female gas station attendant was killed by multiple stab wounds.
Case 55	29-year-old male store clerk was shot during an apparent robbery attempt at a party store.
Case 56	55-year-old male assembler/operator was working at a gun shop. He was found with a gun shot wound of the head.
Case 57	28-year-old male laborer was found shot at a car wash.
Case 58	23-year-old male college student was working at a gas station when he was shot during a robbery attempt. He was found behind a bulletproof partition.
MACHINE RELATED (39)	
Case 59	40-year-old male laborer was killed when he was struck by a dump truck trailing him that was pulling an arrow board to provide him protection from traffic. The victim was a member of a four-man road patching crew. He was crushed between the trailing dump truck and the dump truck in front of him from which he was collecting cold patch with a shovel to fill potholes.
Case 60	21-year-old male crew leader was killed when the Care-Lift Zoom boom rough terrain forklift, model XB-5044-44, he was driving turned over backwards and landed on him. He and another worker were going to pick up a load of slate from a storage area at the top of a steeply inclined driveway. The other worker was walking alongside the forklift. As they approached the top of the driveway, the forklift was blocked from making a left turn by a car parked in its way. The victim raised the forks of the forklift to their maximum height to clear the top of the car. There was still a steep rise of approximately 30 degrees to negotiate. As he started to move in that direction, the forklift turned over backwards and fell to the left where it came to rest. The victim was caught under the frame. There was no seatbelt on the forklift. He died of multiple injuries. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 22.
Case 61	49-year-old male snowplow/salt-truck driver died after being struck by a road grader in a road equipment storage facility. The victim had parked his truck in the road equipment storage facility and was signing for a package from a vendor when the operator of the road grader drove the grader into the garage to park it. The event was unwitnessed and it was unknown why the victim was so near the right side of

	the road grader. The right rear wheel or both wheels of the grader struck him 35 feet inside an overhead door as the operator drove the grader forward. If the victim were trying to verbally contact the grader operator, the operator would likely not have heard him as the cab doors were closed to reduce vehicular noise. The visibility from the grader windows was diminished due to dirt and salt spray on the windows except for the area of the wiper blades. There was a mirror on the left side of the road grader, but no mirror on the right side. Outside mirrors are not standard equipment on a road grader. The employer had ordered mirrors as an option since the grader was operated on a public roadway. According to the Michigan State Police, outside mirrors are not required on special purpose vehicles, such as a grader, and are exempt under the Motor Vehicle Code. The employer has a written policy in place about not approaching operating heavy equipment and the employees were aware of this policy. The victim was airlifted to the hospital where he died during surgery from multiple internal injuries. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 28.
Case 62	57-year-old male train conductor was killed when he was struck by the first train car of a series of 21 cars being "shoved" in a northerly direction by an engine. The first train car struck the victim while he was between the track rails. Another engineer on a nearby track noticed the victim's baseball cap lying on the ground alongside of the rail for the northbound train. This engineer then noticed the victim on the ground underneath a railcar and notified personnel to stop all movement. The victim was found under the 16th car in the series.
Case 63	77-year-old male truck driver was killed when a coworker ran over him while positioning a delivery truck at a construction site. The victim was delivering windows and was having difficulty properly positioning the truck at the delivery location. The construction site dirt was frozen, snow-covered and rutted. Snowdrifts were also present on site. His coworker offered to drive the truck and the victim was to direct him. The driver thought that the victim went into the building to see about the delivery location; he did not see him. The driver drove the truck forward to reposition and then began to back the truck up to the delivery location. The driver struck a woodpile, and then went forward again to reposition the truck. While backing up a second time, he again struck a woodpile. The driver went forward a third time to reposition the truck. The driver looked for but did not see the victim. It was believed that the driver had struck the victim during one of the two reverse attempts. After repositioning the truck, the driver backed up, again running over the victim. He was able to back up the truck far enough so when he looked out the front window of the cab he saw the victim in the snow. When the driver saw the victim in the snow on the ground, he jumped out of the truck to offer assistance. It was thought that the driver could not see the victim due to the height of the truck or that the victim may have fallen on the slippery ground and could not get out of the way of the truck when it backed up to the delivery location. The driver gave his cell phone to another person at the site who called 911. The victim was declared dead at the scene. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click

	on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 19.
Case 64	43-year-old male amusement manager of an indoor restaurant and game room facility was killed when he was struck from behind by a moving five-car roller coaster. The victim entered the fenced roller coaster area near the end of the ride circuit. The ride operator had completely loaded the cars and the ride was approximately half way through one circuit of the track. It was thought that he was looking at a structural area previously identified by a building inspector as needing a support plate on the floor. The roller coaster operator did not see the victim enter the area or see the coaster strike the victim. When the roller coaster came around the track curve, it either struck him or a piece of the front roller coaster car caught on a piece of his clothing and dragged him on the track. The coaster ran over the back of the victim's neck and derailed. 911 was called and emergency response arrived. The victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI022.
Case 65	57-year-old male toolmaker was killed while performing maintenance on an indexing piece of equipment that had not been locked out. He was seated on the top of a shuttle conveyor replacing wire mesh screen also located on the top of the conveyor. The shuttle conveyor was designed to approach a quench oven, receive a piece of glass from the oven, transport and deposit it at the next station, and return for the next piece of glass. He was seated facing the quench oven. When an operator activated a workstation of the furnace some distance away, the shuttle conveyor indexed toward the quench oven to receive a piece of glass. The victim was slammed into the wall of the quench oven at a high rate of speed causing severe crushing injuries to his head and upper and lower extremities resulting in his death. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 49.
Case 66	59-year-old male part-time blueberry farmer was killed when the tractor he was driving overturned and landed on top of him. The victim was driving down a snow covered narrow two-track road, returning home after pruning his blueberry bushes. It appears he was trying to turn the tractor around when the tractor left the two-track road and started to roll down a six-foot embankment. The victim was thrown from the tractor, and the tractor landed on top of him.
Case 67	62-year-old male forging company co-owner died when a solid metal cylinder he had placed on the stripping plate of a full-revolution press struck him in the chest when the press cycled. The firm was initiating a new operation – trimming a rubber boot to protect steering linkages from dirt and other contamination. The die set had been purchased from the company from which the forging company had previously outsourced this operation. The forging company did not purchase the press in which the die set was used. The victim installed the die set in the "bender" press, a full revolution press. The "bender" was selected because the bed size of the "bender" was appropriate for the die set. One rubber boot trim run had been performed, but because the boot was not completely trimmed, hand trimming was

	necessary. The victim placed a piece of solid, cylindrical steel, measuring four-inch long, one and seven-eighth-inches in diameter on the front edge of the die stripping plate to act as a stop block. The victim activated the "bender" by pressing the dual palm buttons without removing the steel cylinder. He may have sat down in front of the press on a stool. When the ram came down, it contacted the cylindrical piece of steel. When the ram contacted the steel, it caused the stripping plate to unevenly depress at an angle toward the victim instead of horizontally. This caused the piece of steel to be forcefully ejected from the press and strike the victim in the chest. The co-owner working in a different shop area heard two loud noises, turned, and saw the victim fall to the ground. Another worker called 911 while the co-owner initiated CPR. Emergency response arrived and transported the victim to a local hospital where he died. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI029.
Case 68	43-year-old male craft foreman crane operator was killed when the butt section of the jib on a Manitowoc 250 Luffing crane fell on him. The company for which he worked was the general contractor for a large construction project. The operator had 23 years experience working with cranes and was the general contractor's crane authority on the project. He had worked the day shift but had stayed over to shorten the jib on the crane. The jib was not lying down nor cribbed. It was six to seven feet in the air. He was working underneath it reaching overhead to hammer the horizontal bottom pins holding a section in place to the outside. He apparently did not know that on this type of crane, when these pins were removed, there was nothing to hold the butt section in place. When the horizontal bottom pins were removed, the butt section of the jib fell onto the operator crushing him and causing his death. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 50.
Case 69	42-year-old male barge captain was killed when the crane he was operating toppled over and he was trapped in the crane cab. The victim was operating the crane on a barge. The crane was not anchored to the barge deck. The victim and his coworkers were in the process of positioning new piling for a fish barrier net that protected fish from entrainment at a power plant. One of his coworkers noticed a hydraulic line that could be pinched and signaled the victim to move the crane's boom to the victim's left so the line could be untangled. The victim moved the boom and was waiting for a signal to re-center the boom when the crane began to lift and topple to the victim's left. The crane overturned in the direction of the wind. The crane boom went off the left side of the barge and into the water. The crane landed upside down on the barge deck and the victim was trapped in the crane cab. The crane was not equipped with a rated capacity limiter (RCL).
Case 70	64-year-old male farmer was killed when he was pinned under an overturned tractor. The victim was driving a farm tractor with a disc that was weighted down by eight-inch cinder blocks. At the base of a hill at the edge of a field being tilled, the tractor rolled over to the rear and the victim was pinned at the abdomen/chest area between the operating handle of the disk and the tractor seat. He died two days later from the injuries. It is unknown if the tractor was equipped with rollover

	protection.
Case 71	13-year-old male farm youth was killed when he became entangled in an unguarded rotating power take-off (PTO) shaft at the rear of his narrow front Farmall Model M tractor. The youth and his teenage cousin were raking hay in a field that had been cut a few days prior on an adjoining property. Both were driving narrow front Farmall Model M tractors equipped with a non-PTO powered hay rake designed for attachment to the tractor's drawbar. Neither tractor had a PTO master shield installed. The victim's tractor was ahead of his cousin's tractor and as he had already finished raking, had driven the tractor up near the barn. The victim's tractor had an owner-modified extension lever to activate the PTO located at the right side of the operator. This extension lever was a one-half inch (approx.) diameter steel rod with an aluminum pop can placed over the end that allowed the operator to activate the PTO lever located to his left behind the seat without turning around in his seat. The PTO shaft on the victim's tractor had a PTO extension attachment secured by an unshielded 5/16-inch bolt that protruded approximately 1-1/4 inches beyond the shaft. Another individual installing a fence nearby saw the victim dismount from the tractor. It is unknown if the victim had disengaged the PTO before he dismounted, how the victim dismounted the tractor, and when the extension's bolt caught the right arm of victim's sweatshirt. After his cousin finished his raking, he pulled up behind the victim's tractor. He walked to the victim's tractor, saw the victim, turned off the tractor, and ran to the property owner's house to notify him. The individual installing the fence saw the cousin run to the property owner's house and went to the victim's tractor. Seeing the victim, he called 911. Emergency personnel arrived and the youth was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI052.
Case 72	56-year-old male horse farm owner was killed when he was crushed under a Bush Hog Brand Rotary Cutter Model 3210 rotary mower while changing the cutting blades. A few days before, he had cut a field and noticed that there was a problem with the mower. He left the mower at a location other than the utility barn. The floor in the utility barn was a concrete pad and the ground where he left the mower had what appeared to be dry mortar sand on its surface. The event was unwitnessed. According to his wife, he was planning to change the blades prior to its next use. His wife requested that he wait for her to assist him. It appears the victim used a tractor equipped with a front-end loader to lift the mower by placing the bucket under the mower tongue. It is unknown what happened next. He may have raised the front of the mower with the tractor bucket, placed wood under the tongue and on either side of the mower, then moved the tractor back about four feet with the bucket raised. Another possibility is that he left the mower tongue in the raised bucket, and placed the wood supports under the mower. He positioned himself under the raised mower with a socket wrench to remove nuts holding the blades in place. When he did not return to the house as planned, the victim's wife and daughter went to look for him. The tractor was found running about four feet away from the mower, with the bucket raised about five feet in the air. There was a chain that appeared to be unused in the bucket. There were blades and nuts on the

	ground. When his family members found him under the mower, the victim's wife attempted to raise the mower by placing the bucket under the mower's tongue. She was unable to do so. As she was attempting rescue, the victim's daughter drove back to the house and called 911. Emergency response arrived, removed the victim from under the mower, and took him to a local hospital where he was declared dead. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI053.
Case 73	48-year-old male warehouse worker was killed when he fell from a tractor and was run over by a brush hog. It appears that while cutting the family's farm field the tractor ran over a two-foot stump hidden in the grass. When the tractor went over the stump, the victim fell from the tractor and was run over by the brush hog. The tractor continued to run unattended until stopped by trees. He died at the scene.
Case 74	66-year-old male farmer died while plowing with a three-bottom plow in his farm field. It is unknown if he fell from the tractor while it was moving or dismounted the tractor, leaving it running and in gear. It is thought that he was attempting to remove weeds from a plow blade when the tractor moved forward and he was pinned under the plow.
Case 75	74-year-old male farmer was killed when he was pinned under an overturned tractor. The victim was returning home after discing a field. It was foggy and he was driving the tractor on a two-lane road when the tractor went off of the road overturning in a ditch filled with water. The victim was pinned under the tractor. The tractor was not equipped with a rollover protective structure.
Case 76	57-year-old male farmer was killed when the Belarus tractor, Model 220 he was driving entered a ditch on the north side of his soybean field and he was pinned between the tractor seat and a tree in the ditch. The tractor was equipped with a cultivator at the rear, a front-end loader, and a rollover protection structure. A family member saw the victim drive the tractor behind a silo and into the plowed soybean field. The victim may have been moving dirt near the edge of the ditch when the incident occurred. The tractor entered the ditch and the tractor tipped on its right side into a tree. When the family member didn't see him after about a half an hour, she went looking for him. She saw him pinned against the tree in the ditch. Emergency response was called and he was declared dead on the scene. He died from a crushing injury to his chest. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI067.
Case 77	52-year-old female farmer was killed when the tractor she was driving flipped over backward pinning her to the ground. The tractor was connected to a tractor equipped with both a backhoe and front-end loader that was stuck in a hole in a farm field. The victim was working with a family member who was driving the backhoe/front-end loader. The tractor the victim was operating was connected to the front–end loader bucket by a 20-foot tow strap that was approximately four inches wide, and then approximately a 20-foot log chain. The log chain was connected above the drawbar on the victim's tractor. The victim's family member suggested that she accelerated too quickly or double-clutched the tractor causing the tractor to accelerate too quickly. The end of the tow strap/log chain was

	reached, and due to the tractor's acceleration, caused the tractor to overturn to the rear, pinning the victim underneath the overturned tractor.
Case 78	32-year-old male mechanic died from asphyxiation after being pinned in a prototype rotary press while attempting to set up a fixture within a vacuum chamber that supports the product being made within the press. The rotary press consisted of twelve vacuum chambers affixed to a carousel, a large circular rotating table in the base of the machine. Each vacuum chamber had a square bottom plate (approximately 21-inches wide) with brackets that hold a circuit board. The upper portion of each vacuum chamber consisted of a one-inch thick aluminum box-shaped lid (approximately 21 inches wide and 13 inches tall). The underside of the lid had a plate that moves up and down within the lid and had several air holes in it to permit a vacuum to be drawn within the chamber. The lid had a sensor indicating when a circuit board was present on the bottom plate and in contact with the upper plate. The presence of the circuit board in contact with the upper plate triggered the sensor to cycle the press. The press cycle was complete when the lid rose to a point that tripped an upper limit switch. The press had an emergency stop that deactivated the motion of the carousel, but did not bleed hydraulic pressure or block the opening/closing of the lid. Running the press was a two-person operation; the victim was conducting the circuit board switchover alone. The victim was replacing a large circuit board on one of the vacuum chamber's bottom plates with a smaller one to run a different product. He had pressed the emergency stop to prohibit the carousel from rotating. To change the circuit board, the company required the plate from the lid be removed and contact paper placed over the holes from the inside to accommodate the smaller circuit board on the bottom plate. In the past, instead of removing the plate and using contact paper, the victim used the smaller circuit board, placed it against the upper plate, traced around it with a marker, and used masking tape to cover the holes on the underside of the plate. On the day of the incident, the victim placed the circuit board against the upper plate to trace the circuit board size onto the vacuum plate to measure the desired area for masking tape application. Changing the circuit boards was done only after the machine had reached a full cycle as sensed by the upper limit switch. However the press failed to complete its full cycle during the prior shut down. It was found that the press was operating on a back-up compressor that did not provide as much air pressure. This did not permit the lid to open enough to trigger the upper limit switch, indicating a completed press cycle. When the victim placed the small circuit board against the vacuum plate for measurements, the press completed the cycle it had begun before shutdown. The lid closed, trapping the head and upper torso of the victim in the press. A coworker found the victim and pressed the emergency stop button and bled the air pressure from the press. The lid could then be opened and coworkers extracted him from the press and began CPR. Emergency personnel arrived and the victim was declared dead at the scene. A safety chain designed to hold the lid in the up position was not hooked to the lid. There was also a non-operational portable emergency stop button on the floor with its cord wrapped around it. Toxicology showed he had marijuana in his blood and urine. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE

	Summaries of MIOSHA inspections, then click on Case 37.
Case 79	62-year-old male farmer was killed when he was pinned under a brush hog. The victim was cleaning a three-section brush hog. The brush hog was not connected to a tractor. Its wheels were placed against a trailer ramp to keep the brush hog from moving. The victim raised the front of the brush hog into the air by using a bobcat, and secured the brush hog to the bobcat by using a chain. While clearing the debris from under the brush hog, the chain slipped off and the brush hog fell on top of the victim, crushing him. A family member heard the brush hog fall, and called another family member to operate the bobcat to raise the brush hog. The victim was declared dead at the scene.
Case 80	73-year-old male cattle farmer was killed when he was pinned beneath the front of a flail mower. He had been clipping pastures on a Farmall International 706 fast hitch tractor with a MC rotary sythe (flail mower) attached. When moving from the field he had just cut, he placed the flail mower in a locked upright position. The next pasture he was going to cut was protected by a ribbon electric fence. He traveled along a two-track road, through a wooded area and approached the field he was preparing to mow. To enter the field protected by the electric fence, the victim normally dismounted the tractor, pulled up the fence posts, laid the posts on the ground, and drove the tractor over energized wire. On the day of the incident when he did not return home, his wife went looking for him. When she found him, she drove home and called for emergency responders. Emergency responders found the tractor contacting the electric wire approximately eight feet from the fence line. The fence posts were not pulled up. The flail mower was locked in the upright transport position. The tractor was in neutral, the parking brake was not set, and the PTO was not activated. It is unknown how the victim became pinned beneath the mower. The victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI098.
Case 81	54-year-old male plumber/pipe fitter was killed while removing the securing bolts from a roller that was part of a castor segment. The victim was a member of the mechanical maintenance team in the company's castor division. Two bolts on each side of the roller secured it to the castor assembly, which was resting on cement pylons. The roller was 62 inches in length, 12 inches in diameter and had a two-inch water jacket. The roller weighed approximately 2500 pounds. The roller was being removed for maintenance because the water jacket was losing approximately 80 gallons of water during operation. The maintenance team knew the roller was cracked but did not know the caster was broken all the way through. The roller bolts were located underneath the roller. The bolt location required the victim to be under the roller during bolt removal. The roller was not supported by outside means during removal of the bolts. When the deceased removed the last bolt, the crack gave way and one side of the roller struck the victim. The victim had received rigging training during the prior year. The manufacturer of the castor assembly had developed a procedure for changing rollers that included supporting the roller during roller change-out. Emergency response was called and the victim was declared dead from multiple injuries.

Case 82	77-year-old male farmer was killed when he was pinned under an overturned tractor. He was driving a 1954 77 Oliver tractor equipped with a front-end loader with 12-inch bucket tines to a woodlot on his property. He was carrying a salvage flail mower chained to the loader. The tractor was not equipped with a roll-over protection structure (ROPS). He traveled along a lane between his cornfields to the back of his property and made a right turn around a 10-foot deep by 15-foot wide drainage ditch. There was a variable width path to the wood area on the side of the ditch. It appears that after he turned the corner and was on the path to the woodlot, he tried to avoid damaging a field of planted corn with the flail chopper. In trying to avoid the corn, he got too close to the drainage ditch and the tractor overturned to the side into the ditch, landing on top of him. When he did not return home, his wife went looking for him and saw the overturned tractor. She called a family member who called 911. Emergency response arrived and the victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI103.
Case 83	38-year-old male farmer died when he was ejected from a tractor and struck his head. The victim was testing the tractor's steering after the tractor had been repaired. He may have used the left wheel brake to cause the tractor to make a tight radius turn. It is presumed that the tractor's front tires struck a small knoll of dirt causing the tractor to roll over. The victim was ejected from the tractor. He struck his head, presumably on the axle of the tractor as he was ejected. It is unknown if the tractor had rollover protection. Toxicology tests performed after his death showed his blood alcohol level at 0.16%.
Case 84	75-year-old male farmer was killed when he was pinned under an overturned tractor. The victim was rotovating a field with a tractor and a six-foot rotovator with a thatcher attachment. The victim was operating the unit near a 10-foot by 30-foot ravine filled with water. The rotovator caught a root causing the tractor to overturn into the ravine. The victim was ejected from the tractor into the ditch. The tractor landed on the chest of the victim. The tractor was not equipped with rollover protection.
Case 85	40-year-old male farmer hand was killed when he was run over by a tractor. The victim was driving the tractor when it stalled. He dismounted the tractor leaving the tractor running and in gear. It appears that the victim thought he had placed the tractor in neutral before dismounting. While on the ground, he checked the fuel injection pump. He attempted to start the tractor while standing on the ground while depressing the clutch with his hand. After the tractor started, he released the clutch and the tractor moved forward. The 30-inch water filled rear wheel ran over him. A coworker driving a semi-truck saw the unattended moving tractor coming toward his truck. He parked the truck and the tractor hit the truck. The coworker then saw the victim, and called 911. Emergency response arrived and transported him to the hospital. He died nine days later from injuries he sustained at the time of the incident.
Case 86	71-year-old male farmer was killed when he was pinned under an overturned tractor in a pit filled with approximately three feet of water. The victim was unloading round hay bales from a hay wagon, driving a tractor equipped with a bale

	spike on a small two-track road and moving the bales to another location. Near the hay wagon was a pit, approximately 15 feet long, 10 feet wide and nine feet deep filled with approximately three feet of water. The pit was located approximately 52 feet from the wagon. The view of the pit was partially obscured by a pile of dirt. The victim loaded a hay bale on the spike and traveled in reverse where he backed into the pit. The tractor overturned, pinning the victim in the pit. It is unknown if the tractor was equipped with rollover protection.
Case 87	57-year-old male farmer died when he was thrown from a tractor and run over by a five-foot cut brush hog. The victim was driving the tractor/brush hog when the tractor struck a stump, two and one-half feet above ground level and approximately two and one-half feet in diameter. This forced the tractor onto its two left wheels causing the victim to be thrown from the tractor. The tractor stayed on its two left wheels for approximately 10-15 feet, when the right wheels came down to the ground. Approximately five to six feet after the stump was struck, the victim was run over by the brush hog. The tractor continued to move forward until it became lodged on some stumps and logs. The victim was taken to the hospital where he died approximately one week after the incident.
Case 88	78-year-old male farmer was killed when he was pinned under an International Farmall Cub tractor that overturned to the side as he attempted to turn the tractor while on a hill. He traveled several hundred yards in a field to an area where he was going to trim trees with damaged limbs to use as firewood for the next year's maple harvest. A family member suggested that he experienced some sort of health emergency. In the past, the victim had a heart attack and he had been told he was allergic to bee stings. While in the field, the victim instead of walking back to the house or driving the tractor back the way he came, or taking another safer, although more distant, alternative route back to the house, attempted to drive the tractor backward up the hill as a shortcut to the house. Backing the tractor up the hill, the victim reached the top of the hill and turned the tractor wheels to the right to align himself in the direction of his home. His tractor tracks showed evidence that the tractor's tires were slipping in the dirt. After turning the wheels, the tractor rolled sideways down the hill. Rolling over two times, the tractor came to rest on top of the victim. When the victim didn't return for lunch, his wife went to look for him. She found him lying face down with the tractor seat and rear axle on the top of his back and his head against a tree stump. She ran to a neighbor's home to call for emergency response. A sheriff department officer arrived, and the officer and the victim's wife were able to pull the victim from under the tractor. Additional emergency response personnel arrived. The victim was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI134.
Case 89	35-year-old owner of a residential landscaping company died from asphyxiation under a 1000-pound Bobcat hydraulic riding type lawn mower. He was found in a pole barn on his property where he stored and repaired equipment. The floor of the barn was concrete and the lighting was good. The mower was the type with the mower deck in front and the motor in back of the driver's seat. The end of the chain from a half-ton overhead hoist was found dangling on the floor toward the

	rear of the mower. It was suggested by relatives that the chain had been attached to itself with a swivel hook placed around a chain link, not attached through a link in the chain. No blocks or jacks were found nearby to support the suspended vehicle. The exact circumstances are unknown. A likely scenario is that the victim had suspended the mower on its front wheels to remove the mower blade drive belt. He may have wrapped the hoisting chain around the motor support frame at the back of the mower. It is possible that some motion, perhaps due to the force of his exertion to remove the drive belt under the mower, caused the chain swivel hook to release the link and subsequently the frame from the back of the mower allowing it to fall onto his chest which resulted in his asphyxiation. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 43.
Case 90	55-year-old male electrician was crushed between the controls of the boom supported, elevated aerial work platform he was working from and a pipe on the plant ceiling. He was apparently moving the work platform toward an electrical box. Witnesses indicated he appeared to be positioned such that the controls were forced into the up position. They were unable to release the pressure on him for from two to four minutes, because a key that would give them control of the platform was missing from the ignition. He was pronounced dead as a result of chest and abdominal injuries.
Case 91	68-year-old male farmer died when he fell from a tractor seat. He was in the field with a wheat planter. His tractor seat was mounted to a battery box cover that was mounted to a battery box. The battery box cover had three bolts, two one-half-inch bolts in front and a pivot bolt in back. Two bolts were found missing from the front of the box. One bolt had been missing for an extended period of time and showed evidence of dirt, rust and other particles in the bolt's hole. The other bolt hole had indications that there had recently been a bolt in the hole. It appeared that the front bolt worked its way loose during tractor operation and when it came out it allowed the battery cover to fall backwards, causing the seat to also fall backwards. The seat was found in a 90-degree angle. The victim fell off of the seat and struck his head on the tongue of a planter being pulled behind the tractor.
Case 92	26-year-old male dry chemical process equipment operator died when he became entangled in an unguarded rotating shaft and was crushed. He was responsible for a process involving calcined alumina filler used for abrasives. The material, with the general consistency of flour, tended to bridge or clog in the dust collection hoppers. The bridging prevented it from flowing into the dust collection bags beneath the hoppers. When this happened, the victim would enter the dust collection tower and rap on the hoppers with a rubber mallet to free the material, allowing it to fall into the dust collection bags at the bottom of the hoppers. A revolving steel shaft, one and one-half inches to two inches in diameter and approximately 12 feet long, was positioned across the base of the three hoppers driving valves to fill each bagging station. There were protrusions on the shaft near each of the valves, although the protrusions did not seem to be involved in the entanglement. The rotation of the shaft opened the valves and allowed the dust to fall into the bags. The exact reason for the entanglement is unknown, though the

	deceased man's clothing appeared to be closest to the shaft in most areas. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 46.
Case 93	87-year-old male farmer died while backing his Oliver Super 77 tractor with an attached five-foot cut rotary mower into a storage area in a barn. He placed the tractor in reverse to park the rotary mower. The sequence of events is unknown. It appears that the left rear tractor wheel traveled over a portion of a doorframe on the ground and raised the tractor. This caused the victim to duck his head to avoid or he did hit his head on the barn beam and then had difficulty engaging the clutch to stop the tractor. At some point, the rotary mower began to jackknife, hit a car also stored in the barn, and continued to the barn wall. The tractor continued in reverse approximately another 12-15 feet. Running the length of the barn was an enclosed round feet auger which was 71-inches from the ground. The victim, sitting in the tractor seat, was pinned between the enclosed auger and the tractor steering wheel. When he did not return as expected, his wife went to look for him in the fields. Not finding him, she called her son, who found the victim. Emergency response was called, the tractor moved forward, and the victim removed from the tractor seat. He was declared dead at the scene. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI202.
Case 94	82-year-old male farmer died when he was pinned under a tractor that overturned to its side. The victim was driving a narrow-front tractor equipped with a front-end loader with a bale spear transporting a hay bale to cattle. While on a hill, the tractor overturned to the side. The tractor was not equipped with rollover protection.
Case 95	44-year-old male farmer died when he was pinned under an overturned tractor. It appears that the tractor was stuck in the mud while pulling a trailer hauling a deer blind. To gain traction, he hooked up a piece of timber with a chain on both rear wheels. As he attempted to gain traction, the tractor flipped over with the front end going up, pinning the victim underneath the steering wheel. It is unknown if the tractor was equipped with rollover protection.
Case 96	69-year-old male Michigan Department of Transportation inspector was a pedestrian on foot at a road paving operation in 1980. Two lanes were under construction. Two northbound lanes were under construction. In the east lane, an asphalt paver was behind an asphalt truck loaded with approximately 18 tons of asphalt. A dump truck was backing up in the west lane. The victim was run over by this dump truck. The dump truck's back-up alarm was not functional when checked by responding police. He died from complications of this injury in 2003.
Case 97	51-year-old male saw technician was moving equipment when he was injured. He died approximately two days following his injury.
MOTOR VEHICLES (29)	
Case 98	63-year-old male dump truck driver was killed while driving a dump truck loaded with tires. The driver's side front tire blew out and caused him to veer to his left striking another vehicle. Both vehicles crossed the opposite lanes of traffic and went through a ditch and then into a stand of trees. The dump truck rolled over onto the passenger side when it entered the ditch. As it continued to move toward the

	trees, the truck cab filled with snow. Other individuals found the victim, covered in snow. They brushed the snow away from his face. The victim died of compressional asphyxia. He was not wearing a lap/shoulder belt. The truck was not equipped with an airbag.
Case 99	62-year-old male Department of Public Works (DPW) employee died after being run over by the ¾-ton pickup truck equipped with a snowplow that he had been driving. He drove the truck to a position in front of the garage door on a 10-foot unsalted blacktop apron. He needed to get out of the truck to open an overhead garage door so the truck could be parked in the garage. An automatic garage door opener was located inside the pedestrian entrance door. The ground in front of the garage was snow- and ice- covered. It appears that he thought he had placed the truck in park; it was unknown if he applied the parking brake. It is unknown if he completely exited the truck when the truck began to move in reverse. While either trying to get himself back into the vehicle from the ground or push himself into the truck, he began to use his right foot as the springboard. All imprints in the snow were of his right foot. The first imprint was approximately six yards from the door and was repeated three times. He placed the front half of his right foot on the ground. The imprint shows that his foot slid to the right and back. It appears that he lost his balance, fell, and was run over by the truck, first the truck undercarriage, and then struck by the plow. The truck continued in reverse and struck the garage wall. People across the street noticed the truck at the side of the garage and went to investigate. Seeing the victim in the snow, one of the individuals contacted the police who called 911. Emergency response arrived and the victim was declared dead at a local hospital. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI025.
Case 100	27-year-old male semi-truck driver was killed after he left the highway at a high rate of speed and struck a walkover bridge support. The victim was wearing a lap belt only. The truck was not equipped with an airbag.
Case 101	39-year-old male purchasing director was killed when he rear-ended a county salt truck that was applying salt to the road with his car. His blood alcohol level was 0.30 %. He was not wearing a lap/shoulder belt. The airbag did not deploy.
Case 102	24-year-old male truck driver was killed while driving a grain truck. As he was coming out of a curve, the truck went into a ditch and traveled in the ditch several hundred feet. The truck then flipped over on top of the cab, with the driver's side in the ditch, pinning the driver. The victim was not wearing the lap belt. The truck was not equipped with an airbag.
Case 103	49-year-old male truck driver was killed when the semi-truck hauling a tanker filled with fuel he was driving left the roadway and struck a parked vehicle that was unoccupied. The victim lost control of the truck and traveled over an embankment for several hundred feet. The truck rolled on its side in a ditch. The initial impact with the parked vehicle caused the fuel tank to rupture. Further impact with the trees at the bottom of the embankment caused the fuel to ignite, causing a large fire, which engulfed the tractor. Restraint use was unknown. The truck was not equipped with an airbag.
Case 104	44-year-old female teacher aide was killed when the car she was diving hit a utility

	pole. The roadway was wet with some “slushy” spots. The victim was traveling westbound when the driver lost control, crossed the road and struck the utility pole on the driver’s side door. The victim was wearing her lap/shoulder belt. The airbag did not deploy.
Case 105	61-year-old male facility engineer was killed while driving a service van on an interstate highway. A semi-truck with trailer stopped in the lane in front of him due to an accident caused by a snow whiteout. The victim’s van hit the trailer on his driver's side. He was pinned in his vehicle. The victim was wearing a lap/shoulder belt. The service van was not equipped with an airbag.
Case 106	49-year-old male semi-truck driver was killed when his truck cab struck a median wall and light pole. The truck cab hit a van that was completing a lane change. The truck cab struck the van's passenger side in the vehicle’s rear causing both the van and the truck to veer to the left and strike the median. The van bounced off of the median. The truck driver's cab struck the median wall and a light pole. The light pole went through the truck cab. Restraint use was unknown. The truck was not equipped with an airbag.
Case 107	59-year-old male truck driver was killed after he exited the cab of his stalled truck and was hit by another semi-truck that swerved attempting to avoid a rear-end collision. The victim’s truck apparently stalled in the middle lane of a three-lane expressway.
Case 108	60-year-old male sales representative was killed while driving a van on a two-lane road. The van was struck head on by an oncoming pickup truck. The truck was passing in a "no pass" zone. The victim was not wearing a lap/shoulder belt. The airbags deployed.
Case 109	31-year-old male truck driver was driving a tractor-trailer truck carrying a load of asphalt. The truck was traveling too fast to negotiate a curve and the driver lost control of the truck. The trailer began to tip, causing the axle to snap. The truck turned over on its side throwing the load of asphalt out of the back of the truck. He was trapped in the vehicle and was not wearing a seat belt. The driver died two days later from complications of the injuries sustained at the time of the incident. It is unknown if the vehicle was equipped with an airbag or if the airbag deployed.
Case 110	52-year-old male police officer was killed when his police car was struck in the rear by a car traveling at a high rate of speed. The victim was investigating a suspicious vehicle that was abandoned on the side of a dirt road in a marked police car. After his investigation, he returned to his police car. While sitting in the police car, his car was struck in the rear by the car driven at a high rate of speed. The officer was partially ejected from the police car. The blood alcohol level of the driver whose car struck the officer was 0.04%. It is unclear if the patrol vehicle had its overhead warning lights activated.
Case 111	44-year-old male truck driver was killed while driving a semi-tractor westbound with a pup trailer loaded with logs. An eastbound vehicle struck a deer and sent the deer airborne. The deer collided with the westbound semi-truck on the driver's side mirror. The deer then swung around and went through the victim’s side windshield. The force of the deer caused the steering wheel to be bent out of shape and forced the driver's seat back into the prone position. The victim was not wearing a lap/should harness. The truck was not equipped with an airbag.

Case 112	40-year-old male truck driver was killed while driving a semi tractor-trailer with a tanker of gasoline. The driver was unable to negotiate an exit ramp curve. When he collided with the concrete wall of the ramp, his cargo shifted forcing the trailer to roll onto and over the concrete wall. The tractor rolled and separated from the trailer. The tanker exploded below the ramp and burst into flames. Restraint use is unknown. The cab was not equipped with an airbag.
Case 113	37-year-old male sheriff deputy was killed when he responded to a call about a driver possibly under the influence of alcohol. The deputy was traveling northbound. Unknown to him, the driver he was pursuing made a u-turn on the expressway and began traveling southbound on the northbound road. The southbound traveling vehicle struck the deputy's car head-on. The patrol car burst into flames and the deputy was unable to get out of the car. The driver of the other vehicle was also pronounced dead at the scene. The deputy was wearing a lap/shoulder belt. The airbag deployed.
Case 114	35-year-old male truck driver was killed when he fell asleep while driving a steel hauler rig loaded with coil steel. The truck drifted to the right and traveled into a right turn lane where a compost truck was parked after a breakdown. The parked vehicle was hit in the left rear of its trailer by the victim's truck. The steel coils were chained, but upon impact with the parked vehicle's trailer, the chains broke. The steel coils shifted forward and went through the trailer's bulkhead and into the rear of the truck cab. The victim was ejected out of the cab by the steel coils. He died at the scene. The victim was not wearing a shoulder/lab belt. The truck was not equipped with an airbag.
Case 115	22-year-old male equipment operator was killed while sitting in a pickup truck that was parked behind a front-end loader. The victim had been trailing behind a front-end loader that was traveling on a dead end, single lane dirt mine road. The road was approximately 20-30 feet wide and 100 yards long. The operator of the front-end loader was unaware that the victim was operating the pickup truck behind him as the driver of the loader drove on a dead end road to check a fox trap. The pickup truck had stopped behind the loader on the right side of the loader. After arriving at the fox trap location and seeing it empty, the operator looked over his left shoulder and began to back up. The victim's truck was in the driver's blind spot because the loader operator only looked over his left shoulder and did not use the mirrors located inside and outside of the loader. The loader's right rear tire ran over the front left side and roof of the pickup truck. The loader operator felt the back end of the loader rise upwards and stop. The loader's back up alarm was operational. The loader was moved forward off of the pickup truck and emergency response was called. It appears that the victim was on his cell phone at the time of the incident. A summary of the Mine Safety and Health Administration (MSHA) investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 27.
Case 116	42-year-old male truck driver was killed when he lost control of the truck hauling an empty double trailer combination. A light rain was falling. The victim had just rounded a curve and the truck "jack-knifed," i.e., the back trailer swerved. The driver may have tried to correct the problem by accelerating. He lost control of the

	truck and it swerved from the middle lane, across the left passing and struck the median. The tractor and first trailer went over the median wall and down an embankment, landing on the passenger side in the median. The second trailer remained upright and rested on the shoulder of the road. The tractor burst into flames. The victim did not use a lap/shoulder harness. The airbags did not deploy.
Case 117	62-year-old male minister was killed while driving a minivan running errands for his business. The victim was traveling east on a blacktop road that intersected a north/south roadway. The north/south roadway had the right-of way; the east/west roadway had stop signs at the intersection. The victim failed to stop and entered the intersection. His vehicle was struck broadside on the driver's side by another vehicle traveling south. The victim's van flipped several times and the victim was trapped in the vehicle. He sustained serious head injuries and died from those injuries five days later. The victim was wearing a lap/shoulder belt. The airbag deployed.
Case 118	41-year-old male substitute newspaper delivery person was killed while driving a passenger car on an unlit, two lane black top road with an uphill grade and a right hand curve. The road was unlined except for the centerline and had small gravel shoulders. He began delivering the papers at around 2:30 a.m. Under normal circumstances, there were two people in the car, a driver and one passenger placing the inserts into the newspapers and placing them in the delivery boxes. On the day of the incident, the victim was working alone. He may have been sitting on a bench seat in the middle between the driver and passenger side so that he could deliver the papers out of either side of the car. As he was driving, he may have been assembling the papers for delivery. He normally would travel the road in a southbound direction, on the day of the incident; he was traveling northbound and may have been unfamiliar with the curve in the road coming from this direction. When he realized that he was not going to negotiate the curve, he attempted correct and could not. He crossed the centerline and struck a tree. He had been drinking the night before. Toxicology showed that he had a blood alcohol level of 0.065%. The victim was not wearing a lap/shoulder belt. The car was not equipped with an airbag.
Case 119	32-year-old female homemaker was killed after being struck by a car while working with her spouse sealing a client's driveway. A car drove onto the shoulder and hit her. The driver was later arrested for operating a vehicle while under the influence of alcohol.
Case 120	54-year-old male inspector for an oil field service company died while driving a pickup truck. He was traveling on a two-lane road at a high rate of speed. He slowed for a vehicle making a left turn and then suddenly pulled around the turning vehicle, crossing the centerline and struck an oncoming fully loaded dump truck. He was wearing a lap/shoulder belt. The airbags deployed.
Case 121	37-year-old male technician was killed when the van he was driving was struck head on by an oncoming van that was being driven erratically crossed the centerline. He died two weeks later from injurious sustained at the time of the crash. The victim was wearing a lap/shoulder belt. The airbag deployed.
Case 122	40-year-old male computer analyst was killed when the car he was driving struck debris that had been spilled onto the highway. The driver of the vehicle whose load

	had spilled had become fatigued/distracted and struck the median. This caused the load to spill over the median into the lane the victim was driving in. The victim struck the debris and was subsequently hit by another vehicle. The victim was wearing a lap/shoulder belt. The airbag deployed.
Case 123	67-year-old male parts delivery driver was killed when he was delivering parts while driving a van. The victim's van was hit head-on by a van that had previously swerved right, hit a guardrail then swerved left and crossed the centerline, striking the victim's vehicle. The victim appeared to attempt to avoid the crash based on evidence at the scene. The victim was wearing a lap/shoulder belt. The airbag deployed.
Case 124	37-year-old male ironworker was killed when the utility truck he was driving rear-ended a semi-tractor trailer. The semi-tractor trailer was at a slow/stop pace in the right lane. The victim was either entering the freeway from an exit or traveling onto the shoulder at a high rate of speed. The victim attempted to merge into the right lane and struck the rear of trailer. The victim was wearing a lap/shoulder belt. The utility truck was not equipped with an airbag.
Case 125	34-year-old male lead engineer for an automotive parts supplier was killed when the van he was driving rear-ended a semi-tractor trailer. The semi-tractor trailer was traveling at approximately five miles/hour in the right lane due to a traffic jam ahead. The victim was traveling in the right lane at an excessive speed. He was unable to slow down sufficiently and rear-ended the trailer. The victim was wearing a shoulder/lap belt. The airbag deployed.
Case 126	38-year-old female banking executive was killed while returning home from a business trip. The car she was driving appeared to make an improper left turn out of a parking lot. Her vehicle was struck on the driver's side at an angle by a pickup truck. The victim was wearing a lap/shoulder belt. The airbag deployed.
STRUCK BY (15)	
Case 127	43-year-old male plumber was killed when the walls of the trench he was standing in collapsed while making a sewer and water tap for a home under construction. He was a member of a three-person crew. This was only the second time the company had done an excavation. The company had been contracted to install the plumbing for the home. A rubber-tired backhoe with an extendable bucket was used to dig the trench. The trench began at the basement and was approximately 40-50 feet in length. The trench was excavated the day before the incident. All along the trench, the walls were in a near vertical position; they were not sloped, shored or otherwise protected. Near the home, the trench was approximately ten feet deep and two feet wide. Company personnel had to hand-dig around utilities that were buried four feet underground to lay the sewer pipe near the home. Near the road, the trench was 12-13 feet deep, wider than the two-foot width of the rest of the trench, and had near-vertical sides. At the time of the incident, the company owner was backfilling the trench near the house. The victim was in the trench near the road attempting to locate the tap into the mainline sewer. The other coworker was handing material to the victim. The victim was kneeling down when one of the trench walls collapsed, covering him with less than three feet of clay. 911 was called while his coworkers tried to dig him out of the trench, but soil was falling in faster than they could remove it. When emergency response personnel arrived they

	ordered the coworkers out of the trench, and a rescue team that had the proper equipment stabilized the trench walls so the rescuers could safely dig down to the victim. After approximately three hours, the victim was uncovered and declared dead at the scene. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 15.
Case 128	43-year-old male part-time logger was crushed by a falling tree while he was felling the tree with a chain saw. The victim, with 25 years of logging experience, was felling a tree that was 18 inches in diameter and greater than 30 feet in height. He was wearing a hard hat with a face screen while performing the task. The victim cut through the hinge wood and the tree did not fall away, but toward the victim crushing his chest and pinning him between the falling tree and a second tree on the ground. There were no witnesses to the incident. Multiple factors may have contributed to his death. First, the back cut through the trunk cut through most of the hinge wood. Second, the wind was blowing in the opposite direction than the direction the victim was planning to fell the tree. Third, the victim had no clear escape path and his path was partially blocked by fallen logs and brush. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 29.
Case 129	49-year-old male shop foreman was struck and killed when ice and roofing material weighing approximately 2000 pounds broke through a corrugated steel building roof while he was walking from one shop area to another. Prior to the incident, there were twenty-one days of freezing weather. On the day of the incident, the temperatures rose into the 40's. It appears that the ice formation slid from an adjoining roof to the roof over the victim. The location of the adjoining building's steam traps/vents was a contributory factor to the ice buildup. The ice broke through the building roof creating a twelve-foot by ten-foot hole in the approximately 70-foot high ceiling. The ice and roofing material struck him. Emergency response was called and he was declared dead at the scene. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 44.
Case 130	51-year-old male farmer was struck and killed by a tree that fell in an unexpected direction. The victim part a member of a 5-person crew contracted to cut some trees on a piece of property. The victim was operating the skidder, moving trees that had been cut down to a clearing to the southeast of the cutting area. On the day of the incident, it was windy. The victim wore hearing aids. The victim was returning from the clearing while a tree was cut down. Witnesses stated that they yelled to the victim to stop, but he came closer to the tree about to fall. Once the tree began to fall, the victim stopped. The tree that struck the victim fell 100 degrees from where the feller thought the tree would fall.
Case 131	36-year-old male tree trimmer was struck and killed by a falling tree while felling the tree for a property owner. The victim was hired by the property owner to clear some trees for land development.

Case 132	40-year-old male inmate was struck and killed when a tree limb fell onto him. The victim was a member of a correctional facility work crew assisting county personnel in clearing trees along a street. The work crew was using a wood chipper to chip trees and limbs not exceeding five inches in diameter. A limb from a tree being cut struck the victim.
Case 133	18-year-old male carpenter was killed when the walls of the trench he was working in collapsed on him. The victim was a member of a work crew installing a four-inch sewer line to a new residence. He was working in a trench that was approximately 52 feet long and 10 feet deep. The east wall collapsed approximately midway in the trench, completely covering him. The excavation did not have a trench box, proper sloping or shoring. He was found with his head against the west wall of the excavation. After digging him out of the excavation, emergency personnel transported him to a local hospital where he was declared dead. He died of compression asphyxia and blunt force injuries to his head. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 24.
Case 134	31-year-old male tree trimmer was struck and killed by a falling white oak tree while felling the tree at a private residence. The man was part of a three-member tree-removal crew that was removing a 35-40-foot tall white oak. Prior to the incident, the crew had de-limbed the tree and the top had been cut off in preparation for felling. A rope was tied from the white oak to a second tree about 25 feet away to assist with the felling. One coworker was using a saw to cut through the trunk of the tree and the victim and the third worker were instructed to assist with the felling by pulling on the rope attached from the white oak to the second tree. Pulling on the rope directed the tree's fall to an open area, but would also fall towards them. They were instructed to move to the left as the tree fell to avoid being hit by the falling tree. As the tree fell, the victim and the third coworker attempted to move to the left, however, the victim bumped into his coworker and began running in the opposite direction, placing him beneath the path of the falling tree. The victim was struck on the head and back by the top portion of the tree, crushing his torso and lacerating the back of his head. After striking the victim, the tree fell to the side of the victim and came to rest on the ground, approximately one foot from the victim. The victim was pronounced dead at the scene. The victim was not wearing a hard hat or safety glasses at the time of the incident. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 38.
Case 135	20-year-old male construction laborer was struck and killed by falling debris at a construction demolition site. The victim was a member of a two-person crew working in an enclosed stairwell at the top of the first floor of a building that was being demolished. The victim and his coworker were building a temporary wall to separate one part of the building that was not going to be demolished from another part of the building undergoing demolition. The victim and his coworker entered their worksite from the basement and walked up an escalator. A wall encased the escalator area and the workers were not aware that demolition work was occurring

	on the floor above them. The demolition workers were not aware there were workers directly under their demolition site. While his coworker went to the basement to retrieve a tool, the victim remained at the top of the escalator. Approximately five tons of accumulated demolition debris from the work above caused the upper level structures to collapse into the escalator stairwell. The victim was trapped under the rubble.
Case 136	44-year-old male tree trimmer was struck and killed by a falling tree that hit him in the head. The victim was a member of a four-person crew hired by a homeowner to remove a tree as well as limb adjacent trees from their backyard. The victim was assigned to operate the woodchipper at the front of the residence. He had worked at the company for approximately four months. The owner (feller) and a coworker were felling the tree and another coworker was limbing an adjacent tree. The victim was assigned clean up duties, taking limbs and other debris to the woodchipper in the front yard. The chipper was not jammed and the victim left limbs, etc., near the chipper. The victim had been instructed that he was not to enter the backyard if the chainsaw was operating. For unknown reasons, the victim entered the backyard through an entrance gate. Shrubs blocked the view of the backyard entrance gate and the feller could not see the victim entering the backyard. The victim entered the backyard just as the feller had finished his backcut. The coworker who was pushing the tree to control the direction of its fall saw the victim and yelled his name. The victim could not get out of the way of the 33-foot falling tree and was struck in the head. CPR was initiated by coworkers and continued by emergency responders. The victim was declared dead at the scene. The victim was not wearing a hard hat. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 23.
Case 137	43-year-old male roll-off truck driver died after being crushed beneath a compactor box door. The victim was collecting trash at a paper mill and transporting it to a trash-collection site. This job involved collecting a compactor box filled with trash, loading the box onto the bed of his truck and transporting trash to another site for disposal. The compactor box held approximately 20-25 yards of material and was constructed of four-inch thick steel. The roll-up truck was similar to a dump truck in that the front of the truck could be raised so that when the door of the compactor box was opened, the trash was expelled through the open door at the trash unloading station. To unload the compactor box, the operator used a driver's side ratchet to initially pop open the compactor door that weighed approximately 1000 pounds. The operator walked over to the opened door, held on to the door and walked it to completely open on the passenger side of the vehicle. The operator then tilted the box to empty it. When the victim arrived at the unload site, he backed up to the unload site. He opened the door of the compactor box for preparation to unload the box. The door normally opened on three hinges. The victim's compactor box had two cracked hinges and one broken hinge. When the victim attempted to open the box door, the door fell off backward and trapped the victim beneath it. A coworker found the victim with his entire body except his head underneath the steel compactor box door, covered with trash. Emergency response was called to the scene. With the fire department's assistance, the steel

	door was lifted from the victim and CPR was administered. However, the victim was pronounced dead approximately one- half hour after he was discovered. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 36.
Case 138	23-year-old male millwright was killed when a part he was unloading from the bed of a semi trailer fell onto him. The millwright was part of a crew unloading and installing a conveyor system inside a plant. He and a coworker had unloaded the intermediate and heel sections of the conveyor and were preparing to unload the head section. The head section of the conveyor was standing upright toward the front of the trailer secured by nylon web binder straps. It weighed approximately 2500 pounds and had a drive unit with a 20-horsepower electric motor located at its top that extended two feet past its side. Its base was 18 inches wide by four feet six inches long. It stood approximately seven feet six inches high. The exact time when the last binder strap on the head section was released is unknown, but sometime after that and before the lifting and rigging equipment was attached to remove the piece from the truck, the part fell onto the millwright, fatally crushing him. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 35.
Case 139	47-year-old male crane operator was crushed by a large steel coil when it fell sideways from its storage shelf after he cut the band binding the coil to another coil. The steel coils were 16 inches in diameter and weighed seven tons each. The two steel coils were banded together with two bands and placed on 24-inch wooden cribbing that sat on a metal frame. The cribbing also had two wedges of wood so that the coils did not roll. The coils were approximately 69 inches from the floor and stored in an upright position on the wooden cribbing. One of the coils the victim was going to move was hanging over the edge of the shelf approximately eight-ten inches. The victim was working alone and used banding shears to cut the band so the coil could be staged for the press operation. When the band was cut, one of the coils fell sideways, pinning the victim underneath. A coworker found the victim. He was taken to the hospital, where he was pronounced dead. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 30.
Case 140	30-year-old male carpenter was killed when a residential gable end wall fell on him. The victim was a member of a seven-person work crew that was manually erecting a gable wall at a residential construction site. The wall, a two-inch x six-inch wood gable end wall, was nearly 21 feet wide, 25 and one-half- feet wide and 20 feet high to the peak. The wall had one layer of oriented strand board (OSB) and wood-sheeting material attached, four window headers (without windows installed) and one entryway header. Most of the building's exterior walls were up. No mechanical lifting devices were used. The work crew had manually raised the wall approximately one-half way up when two members of the crew left to get push sticks to help the wall into a vertical position, leaving five individuals holding up the wall. The five employees may have lost control of the wall or were overcome

	by the weight of the wall. The wall fell and landed on the victim. Toxicology showed the presence of marijuana in his blood.
Case 141	60-year-old male grain elevator worker was killed when a poly-type tote bag of black beans weighing approximately 2000 pounds fell on him. Two bean tote bags were double stacked on the floor using a forklift. The victim was walking by the double-stacked bean totes and the top bag fell and landed on him. The tote bags were stored on one side of a narrow 29-inch walkway that had a 24-inch retaining wall. When the tote fell, it struck him and he landed on the retaining wall with his chest. The tote broke and his upper body was covered in beans and with the tote. A coworker wondering where he was went looking for him. After finding him buried in the beans, emergency response was called. The bag was removed from the victim with a forklift. He was declared dead at the scene. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 47.
SUICIDE (5)	
Case 142	53-year-old male storeowner died from a self-inflicted gunshot wound to the head.
Case 143	56-year-old male boat refurnisher committed suicide by hanging himself.
Case 144	37-year-old male physician committed suicide by self-injection (drug overdose).
Case 145	49-year-old male committed suicide by hanging himself.
Case 146	72-year-old male farmer died from a self-inflicted gunshot wound.
TOXIC EXPOSURE (6)	
Case 147	45-year-old male store manager died from an acute asthmatic reaction after spraying an isocyanate-based truck bed liner on the floor and up the sides of a cargo van. The victim was wearing an air-supplied ½-mask respirator and coveralls. The spraying inside of the van had been completed. The victim turned off the mixer for the spray liner and walked to a side pedestrian door, which was open and had a small portable fan placed to provide air circulation for the general shop area. He disconnected his airline from the respirator and proceeded to walk around the outside of the building to the front of the store. A co-worker who had helped him set up the job was waiting in the shop's basement apartment. When the coworker came upstairs to the shop reception area, he saw the victim kneeling outside in front of the store in respiratory distress. The coworker took the victim to a nearby urgent care facility. The victim lost consciousness and stopped breathing while at the urgent care facility. Emergency response was called while CPR was administered. The ambulance took the victim to the hospital emergency room where he was declared dead. A complete MIFACE investigation report of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click on MIFACE Case ID 03MI018.
Case 148	23-year-old male painter died when he was overexposed to VMP naphtha solvent. The victim was using an electric airless sprayer to apply a primer containing VMP naphtha in a house basement that was being remodeled. Prior to spraying, he had masked the windows and placed plastic drop cloth over the hot water heater and furnace. He did not provide additional ventilation in the basement. He was not wearing a respirator. When a family member could not reach him over the phone, the family member went to the house being remodeled. He found the victim on his

	back at the basement stairs. He removed the victim to fresh air, called 911 and began resuscitative efforts. The victim was declared dead at the scene. Estimated VMP naphtha solvent levels within the basement were 14,000 ppm. A summary of the MIOSHA investigation of this incident can be found on the MSU OEM website: www.chm.msu.edu/oem/ Click on the MIFACE link, then click MIFACE Summaries of MIOSHA inspections, then click on Case 42.
Case 149	50-year-old male tour manager died from multiple drug intoxication
Case 150	47-year-old male painter died from coronary artery disease after being exposed to excessive levels of carbon monoxide during a painting operation. The victim was a member of a two-person crew spraying water-based latex paint at a factory. He was using an airless sprayer on a snorkel lift, which could be powered by gas or propane. The factory had a 30-foot high ceiling. The victim and coworker were spraying with the factory windows and bay door open. The lift was running on propane when the victim was using it. The lift was on its third propane cylinder for the day. The victim had trouble keeping the lift running so he kept it running the full time and was "running it rich."
Case 151	47-year-old male cook died from acute cocaine intoxication.
Case 152	63-year-old male entertainer died from acute cocaine intoxication.

APPENDIX II

NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS)

Two Digit Code	Economic Activity	Description of Activities Covered
11	Agriculture, Forestry, Fishing and Hunting	Growing crops, raising animals, harvesting timber, and harvesting fish and other animals from farms, ranches, or the animals natural habitats
21	Mining	Extracting naturally occurring mineral solids, such as coal and ore; liquid minerals, such as crude petroleum; and gases, such as natural gas; and beneficiating (e.g. crushing, screening, washing, and flotation) and other preparation at the mine site, or as part of mining activity
22	Utilities	Generating, transmitting, and/or distributing electricity, gas, steam, and water and removing sewage through a permanent infrastructure of line, mains, and pipes
23	Construction	Erecting buildings and other structures (including additions); heavy construction other than buildings; and alterations, reconstruction, installation, and maintenance and repairs
31-33	Manufacturing	Mechanical, physical, or chemical transformation of material, substances, or components into new products
42	Wholesale Trade	Selling or arranging for the purchase or sale of goods for resale; capital or durable nonconsumer goods; and raw and intermediate materials and supplies used in production, and providing services incidental to the sale of the merchandise
44-45	Retail Trade	Retailing merchandise generally in small quantities to the general public and providing services incidental to the sale of the merchandise
48-49	Transportation and Warehousing	Providing transportation of passengers and cargo, warehousing and storing goods, scenic and sightseeing transportation, and supporting these activities
51	Information	Distributing information and cultural products, providing the means to transmit or distribute these products as data or communications, and processing data
52	Finance and Insurance	Creation, liquidation, or change in ownership of financial assets (financial transactions) and/or facilitating financial transactions
53	Real Estate and Rental and Leasing	Renting, leasing, or otherwise allowing the use of tangible or intangible assets (except copyrighted works), and providing related services
54	Professional, Scientific, and Technical Services	Performing professional, scientific, and technical services for the operations of other organizations
55	Management of Companies and Enterprises	Holding of securities of companies and enterprises, for the purpose of owning controlling interest or influencing their management decision, or administering, overseeing, and managing other establishments of the same company or

Two Digit Code	Economic Activity	Description of Activities Covered
		enterprise and normally undertaking the strategic or organizational planning and decision making of the company or enterprise
56	Administrative and Support and Waste Management and Remediation	Performing routine support activities for the day-to-day operations of other organizations
61	Educational Services	Providing instruction and training in a wide variety of subjects
62	Health Care and Social Assistance	Providing health care and social assistance for individuals
71	Arts, Entertainment, and Recreation	Operating or providing services to meet varied cultural, entertainment, and recreational interests of their patrons
72	Accommodation and Food Service	Providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption
81	Other Services (Except Public Administration)	Providing services not elsewhere specified, including repairs, religious activities, grantmaking, advocacy, laundry, personal care, death care, and other personal services
92	Public Administration	Administration, management, and oversight of public programs by Federal, State, and local governments