MARCH 22, 2011

# 2009 ANNUAL REPORT

## TRACKING WORK-RELATED DEATHS IN MICHIGAN



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### MICHIGAN



## **2009 ANNUAL REPORT** TRACKING WORK-RELATED DEATHS IN MICHIGAN

### Prevention through comprehensive research and investigation

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Thanks to the health and safety commitment of those employers, health and safety professionals, and regulatory personnel who understand the significance of ensuring a safe workplace, as well as all of the people who took the time to share their thoughts and experience about a work-related death and its impact on their life.

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There are many resources available to help employers, employees, safety and health professionals and others understand more about workrelated deaths. Links to these resources can be found at: www.oem.msu.edu.

### Acronyms

**BLS** Bureau of Labor Statistics

MDELEG Michigan Department of Energy, Labor & Economic Growth

MSU OEM Michigan State University Occupational and Environmental Medicine Division

MIFACE Michigan Fatality Assessment and Control Evaluation

MIOSHA Michigan Occupational Safety & Health Administration

NAICS North American Industrial Classification System

**NIOSH** National Institute for Occupational Safety & Health

**OSHA** Occupational Safety & Health Administration

SOC Standard Occupational Code



A male construction laborer died when the articulated machinery overturned pinning him under the rear tire.

This report was funded by NIOSH, under cooperative agreement #I U60 CC521205-01

## Summary

This is the 9th annual report on acute traumatic work-related (WR) deaths in Michigan. There were 95 WR deaths in 2009, representing 92 different employers and 92 incidents. The number of WR deaths decreased 22% from 2008 when there were 121 deaths. This decrease represents fewer people working; the rate of death at 2.9/100,000 workers was essentially unchanged from 2008.

Construction had the highest number of WR deaths (19), followed by Administrative & Support & Waste Management & Remediation Services (13).

## Summary, continued...

A male construction laborer died when the underground tank he was cutting exploded. MIFACE Summary of MIOSHA Investigation Case 211.

- The largest numerical change in the number of deaths occurred in Construction - the number of deaths decreased from 28 in 2008 to 19 in 2009. However, the *hours-based rate* of construction deaths in Michigan at 16.5 was 1.7 times greater than the 9.7 US rate.
- Mining had the highest risk of incurring a WR death per 100,000 workers (18.1). Construction was next (15.3) and then Agriculture (12.9).
- The most common cause of death was motor vehicles (20), followed by struck by an object (17), falls (14), suicides (12), and then homicides (10).
- Individuals who died were most likely to be men (89%), white (92%), married (60%) and have at least a HS education (77%).
- The average age of death was approximately 47. The age at the time of death ranged from 16 to 88.
- A fatal injury occurred in 33 of Michigan's 83 counties. Wayne County had the highest number (18), followed by Macomb and Berrien (7 each).

## Background

In 2001, MSU OEM instituted a tracking program for all traumatic WR deaths, first with financial assistance from MDELEG and then from NIOSH. This is a joint project of MIOSHA/MDELEG and MSU OEM.

The goal of the MIFACE program is to prevent WR deaths by identifying and investigating work situations at high-risk for injury and disseminating prevention strategies to those who can intervene in the workplace.

## *Work-Related Deaths Tracking Procedures...*

### SOURCES USED TO IDENTIFY WR DEATHS

- ♦ MIOSHA
- Newspapers
- Medical Examiners (ME), Police and Fire Departments
- Workers' Compensation Agency
- MSU Agricultural Extension
- Death Certificates

All WR deaths are required to be reported to MIOSHA within 8 hours of the death. The toll-free hotline to report a death is: 1-800-866-4674

## WR Deaths Tracking Procedures in Michigan

### IDENTIFY INDIVIDUALS

- Receive Report of Death
- Determine if WR Death
  - Paid employee or self employed
  - Working at job or family business when incident occurred
  - Traveling "while on-theclock" or compensated travel
  - Volunteers
  - In parking lot of business

### GATHER INFORMATION

- ♦ Contact
  - MIOSHA if MIOSHA investigation conducted
  - Appropriate Police and Fire Departments, request written report and pictures of incident scene, as appropriate.
  - Medical Examiner, obtain ME Death Scene investigation and autopsy reports
- Obtain newspaper clippings

### CONTACT EMPLOYER/FARM FAMILY

- Send Letter and Brochure about MIFACE program
- Follow-up phone contact
  - Answer questions and inquire if employer and/or family will voluntarily participate
  - If employer/family agree to participate, schedule date and time for MIFACE site visit
  - If employer/family decline to participate, case summary or MIFACE Summary of MIOSHA Investigation is written.

### MIFACE SITE VISIT

- Explain MIFACE program
- Complete appropriate research forms
- Conduct interviews with appropriate personnel
- Learn about process, equipment involved, work activities of deceased, training, safety programs, etc.
- Observe area and/or equipment involved
- Take pictures, ensuring identifiers are noted and removed for final report

### WRITE MIFACE REPORT

- Report Includes:
  - Summary Statement
  - Detailed narrative of the investigation
  - Cause of death as determined by the Medical Examiner
  - Recommendations to prevent future fatalities, including a discussion
  - References
  - Pictures, drawings, sketches of equipment or source of injury
  - Review of draft report by outside experts and MIFACE Advisory Board

### FOLLOW UP ACTIVITIES

- Identify Stakeholders
- Internet search for similar companies and/or trade groups
- Update Database
- Information collected from each site visit and statewide tracking entered into a database
- ♦ Analyze Data
- Annual Report developed analyzing and discussing the data

### FOLLOW UP ACTIVITIES

- Educational Outreach
- Send MIFACE Report to Employer, Farm Family and Stakeholders
- Write case summary or MIFACE Summary of MIOSHA Investigation
- Post on MSU OEM website: MIFACE Summary of MIOSHA Investigation
- Send notice of posted summary to MIFACE email distribution list
- Develop Hazard Alert
- Guest speaker, display booths at health and safety conferences, industry trade group training programs



A male golf course worker died when the dead ash tree he was felling struck him in the back..

### By the Numbers:

148.5: Average number of WR fatalities per year between 1992-2009.

1.8: Average number of 2009 traumatic WR fatalities per week although the deaths were not evenly distributed.

## Results

There were 95 traumatic work-related deaths in 2009. Ninety-one (95.8%) of the work-related traumatic incidents occurred in 2009. Four individuals died from complications from injuries that occurred prior to 2009:

- 1973: one individual was involved in a forklift incident
- 1998: one individual fell from a roof
- 2008: one individual tripped and fell as he was descending stairs
- 2008: one individual was struck by a falling crane jib

The number of traumatic work-related deaths per year in Michigan since 1992 is shown in Figure 1.



### Figure 1. Number of Traumatic Work-Related Fatalities, Michigan 1992-2009

Incidence rates (per 100,000 workers) are shown by the **blue line**. Number of work-related deaths per year are shown by the **green columns**. Rates shown from 1995-2000 were provided by the BLS website. Rates shown for 2001-2009 were determined from MIFACE statistics. Incidence rates were not calculated for the years 1992-1994.

## **Demographics**

### Race

Table 1 shows the distribution of demographic characteristics of all WR fatalities in Michigan in 2009.

Seventy seven (90.5%) of the 85 men were Caucasian, 6 (7.1%) men were African-American, and two (2.4%) men were identified as Hispanic. Another two of the Caucasian men were identified as Hispanic for ethnicity. All of the women were Caucasian.

### Age

The age distribution of the individuals who died from a work-related injury is shown in Table 1 and Figure 2. The ages ranged from 16 to 88; 3 deaths in youths under 18 years of age and 7 (7.4%) deaths in individuals 70+ years old.

The average age was 47.2 years, which was slightly lower than the average of 48.7 years in 2008.

Figure 2. Age Distribution of Work-



0-19 20-2930-3940-4950-5960-6970-7980-89

## Table 1. Demographic Characteristics of Work-<br/>Related Fatalities, Michigan 2009

Demogra	Number	Percent	
N	lichigan 2009		
Sex			
	Male	85	89.5
	Female	10	10.5
Race			
	White	87	91.6
	Black	6	6.3
	Asian/Pacific Islander		
	American Indian/Alaskan Native		
	Hispanic (as identified on DC)	2	2.1
Age			
	<20	4	4.2
	20-29	12	12.6
	30-39	15	15.8
	40-49	19	20.0
	50-59	22	23.2
	60-69	16	16.8
	70-79	4	4.2
	80-89	3	3.2
Marital Status			
	Never Married	21	22.1
	Married	57	60.0
	Divorced	14	14.7
	Widowed	3	3.2
Educational Level			
	Less than High School	22	23.2
	High School Graduate	40	42.1
	Some College (1-4 years)	33	34.7
	Post College (5+ years)		
Total		95	

Individuals 50-59 years of age had the greatest number of deaths (22, 23.2%), followed by individuals in the age group of 40-49 years of age (19, 20.0%).

## Demographics, continued...

### Age

Table 2 shows the age of the individual who died and the industry in which he/she worked. Three of the 4 youths who died worked in Administrative & Support & Waste Management & Remediation and were killed when the vehicle they were traveling in was involved in a motor vehicle crash. One youth worked in Construction; he fell from a residential roof.

Two of the four individuals with ages ranging from 70-79 who died from traumatic WR incidents worked in Agriculture. Both incidents involved a tractor rollover; in each case, the tractor was not equipped with a rollover protective structure (ROPS). One individual was a farmer and one individual was a farm hand. Two of the three individuals who died who were in their 80s worked in Retail Trade; one individual was involved in a motor vehicle crash and one individual fell from a standing position. Among the other deaths in individuals 70-88, two individuals worked in Manufacturing (forklift injury, suicide), and one individual worked in Arts, Entertainment & Recreation (fell descending staircase).

Approximately one-third of all deaths in the 50-59 year-old age group occurred in the Construction industry; these seven deaths accounted for approximately 37% of all Construction deaths.

Industry Sector	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Total
(NAICS Code)									
	Number								
Agriculture, Forestry, Fishing and		2		4	1	2	2		
Hunting (11)					1	2	2		11
Mining (21)						1			1
Utilities (22)		1							1
Construction (23)	1		4	4	7	3			19
Manufacturing (31-33)		1	3	3	1	1	1	1	11
Wholesale Trade (42)			1		1	1			3
Retail Trade (44-45)		2	1	1	2	2		2	10
Transportation and Warehousing (48-49)		1	1	1	2	1			6
Real Estate and Rental and Leasing (53)					2				2
Professional, Scientific, and Technical			2						2
Services (54)			2						2
Administrative and Support and Waste									
Management and Remediation Services	3	5	2	1	1	1			13
(56)									
Health Care and Social Assistance (62)				2					2
Arts, Entertainment, and Recreation (71)			1		2		1		4
Accommodation and Food Services (72)				1	2	2			5
Other Services (except Public				1		2			3
Administration) (81)				1		2			3
Public Administration (92)				1	1				2
Totals	4	12	15	19	22	16	4	3	95

### Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2009

## Demographics, continued...

### **Marital Status**

Fifty-seven (60.0%) individuals who died from traumatic WR incidents were married, 21 (22.1%) were never married, 14 (14.7%) were divorced, and 3 (3.2%) were widowed. Of the 85 men, 51 (60.0%) were married, 20 (23.5%) were never married, 13 (15.3%) were divorced, and 1 (1.2%) was widowed. Of the 10 females, 6 were married, 1 was never married, 1 was divorced and 2 were widowed.

## Table 3. Traumatic Work-Related Fatalities by Educational Levelof Victim and Industry Sector, Michigan 2009

Industry Sector	Did	Not	Comple	ted High	Some College		
(NAICS Code)	Comple	te High	Sch	lool	(1-4 Years)		
	Sch	lool	No C	ollege			
	Number	Percent	Number	Percent	Number	Percent	
Agriculture, Forestry, Fishing & Hunting (11)	3	27.3	5	45.5	3	27.3	
Mining (21)					1	100.0	
Utilities (22)					1	100.0	
Construction (23) <sup>a</sup>	6	31.6	9	47.4	4	21.1	
Manufacturing (31-33)	1	9.1	5	45.5	5	45.5	
Wholesale Trade (42)	1	33.3			2	66.7	
Retail Trade (44-45)			6	60.0	4	40.0	
Transportation & Warehousing (48-49)	3	50.0	1	16.7	2	33.3	
Real Estate & Rental & Leasing (53)			1	50.0	1	50.0	
Professional, Scientific & Technical Services (54)			1	50.0	1	50.0	
Administrative & Support & Waste Management & Remediation Services (56) <sup>b</sup>	4	30.8	6	46.2	3	23.1	
Health Care & Social Assistance (62)			1	50.0	1	50.0	
Arts, Entertainment & Recreation (71)			3	75.0	1	25.0	
Accommodation & Food Services (72)	3	60.0			2	40.0	
Other Services (except Public Administration) (81)	1	33.3	2	66.7			
Public Administration (92)					2	100.0	
Total	22	23.2	40	42.1	33	34.7	

<sup>a</sup> One individual was in high school.

<sup>b</sup> Three individuals in high school died in the same incident.

Twenty (23.5%) of the 85 males had not completed high school, 36 (42.4%) had completed high school, and 29 (34.1%) had completed 1-4 years of college. Two (20.0%) of the 10 females who died had not completed high school, four (40.0%) had completed high school and four (40.0%) had completed 1-4 years of college.

### **Educational Level**

Table 3 shows the distribution of educational level by industry. Overall, 22 (23.2%) individuals had not completed high school, 40 (42.4%) completed high school and received a high school diploma and 33 (34.7%) completed 1-4 years of college. No individuals who died as a result of a WR fatal injury had 5+ years of college.

Within industries having 10 or more deaths, the most common education level among individuals who died was completing high school but no college. Construction had the highest percentage of individuals who were high school graduates but did not attend college (9, 47.40%). Agriculture and Manufacturing had the lowest percentage (5 each, 45.5%).

Manufacturing had the largest number (5, 45.5%) of individuals with some college who were killed in a WR incident., followed by Retail Trade (4, 40%), Agriculture (3, 27.3%), Administrative Support (3, 23.1%) and then Construction (4, 21.1%).

Construction had the largest number of individuals who had not complete high school (6, 31.6%); one of the deaths included the 19-year-old youth. One motor vehicle incident claimed the lives of three high school youths in Administrative & Support & Waste Management & Remediation.

## Demographics, continued...

### Drug/Alcohol/Medication Use

Of the 80 individuals whose death was not a suicide or a drug overdose, a toxicology screen was performed on 60 (75.0%) individuals for alcohol and for illegal, prescription and non-prescription drugs; 34 individuals had detectable levels of alcohol, illegal, prescription, or non-prescription drugs in their bloodstream. Eleven of the 34 (32.4%) individuals had levels on autopsy that may have been a contributory factor to the fatal incident. Two individuals had detectable blood alcohol above 0.08% (0.1%, 0.13%), which were considered to be contributory; one individual also had an illegal drug (cocaine) in his bloodstream, and one individual had methadone and diphenylhydramine in his bloodstream. Nine additional individuals had detectible levels of illegal, prescription and non-prescription drugs. Three individuals had marijuana in their bloodstream. Prescription medications included hydrocodone, lorazepam, and diazepam. Non-prescription medications included diphenylhydramine.

## Work-Related Event Details

### Day of Injury

Overall, the largest number of work-related fatal injuries occurred on a Tuesday (22, 23.9%). Wednesday had the next highest number of work-related fatal injuries (20, 21.7%). Thursday had 12 (13.0%) fatal injuries, and Monday and Friday had 11 each (12.0%). Sunday had 9 (9.8%) and Saturday had 7 (7.6%). The day of the fatal injury was unknown for 3 individuals. Table 4 shows the day of injury for industries with 10 or more deaths.

In Construction, most fatal incidents occurred on Tuesday (11, 57.8%). In Administrative Support, Thursday was the weekday with the highest number of fatal incidents (5, 38.5%).

In Agriculture, 55% of the fatal injuries in Agriculture occurred on Saturday and Sunday (3 each, 27.3%). In Manufacturing, the weekend accounted for 30% of the fatal injuries.

In Retail Trade, Tuesday and Thursday accounted for 60.0% of all fatal injuries (3 each, 30.0%)

Wednesday and Thursday were the weekdays when most homicides (3 each, 30.0%) occurred.

### Table 4. Traumatic Work-Related Fatalities by Day of Injury and Industry Sector, Michigan 2009

Day of Injury	All Deaths		Constr (NAIC	ruction CS 23)	Admini & Sup Waste Remee (NAIO	strative port & Mgt & liation CS 56)	Agrico Fore Fishi Hun (NAIO	ulture, stry, ing & iting CS 11)	Manufa (NAICS	octuring S 31-33)	Retail (NAICS	Trade 8 44-45)	Hom	icide
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Monday	11	12.0	1	5.3	2	15.4	2	18.2	1	10.0	1	10.0		
Tuesday	22	23.9	11	57.8	1	7.7			1	10.0	3	30.0	2	20.0
Wednesday	20	21.7	3	15.8	3	23.1	1	9.1	2	20.0	2	20.0	3	30.0
Thursday	12	13.0	2	10.5	5	38.5	1	9.1			3	30.0	3	30.0
Friday	11	12.0	2	10.5			1	9.1	3	30.0			1	10.0
Saturday	7	7.6			2	15.4	3	27.3	2	20.0				
Sunday	9	9.8					3	27.3	1	10.0	1	10.0	1	10.0
Total	92*		19		13		11		10**		10		10	

\* Day of week unknown for three individuals.

\*\* Day of week unknown for one individual.

### Month of Injury

Overall, September had the highest number of injuries resulting in fatalities with 11 (11.6%), followed by January and May (10 each, 10.5%), June and August (9 each, 9.5%) and then April and December (8 each, 8.4%). February, March had 7 each (7.4%). November had 6 (6.3%) incidents, and July and October had 5 (5.3%) incidents. Table 5 shows the month of injury for industries with 10 or more deaths, and WR homicides by month.

Month of	All D	eaths	Constr	uction <sup>a</sup>	Admini	strative	Agrice	ılture,	Manufa	cturing	Retail	Trade	Homicide	
Injury			(NAIO	CS 23)	& Support & Fores		stry,	(NAICS 31-33)		(NAICS 44-45)				
					Waste Mgt & Fishing			ng &						
					Remed	diation	Hun	ting						
					(NAIC	CS 56)	(NAIO	CS 11)				-		
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	10	10.5	2	40.5	0		1	9.1	2	18.2	1	10.0	1	10.0
February	7	7.4	0		1	7.7	1	9.1	0		1	10.0	0	
March	7	7.4	1	5.3	3	23.1	0		0		0		0	
April	8	8.4	2	10.5	0		4	36.4	1	9.1	1	10.0	1	10.0
May	10	10.5	2	10.5	0		2	18.2	4	36.4	2	20.0	1	10.0
June	9	9.5	2	10.5	1	7.7	1	9.1	1	9.1	1	10.0	3	30.0
July	5	5.3	2	10.5	2	15.4	0		0		0		1	10.0
August	9	9.5	1	5.3	4	30.8	0		0		2	20.0	1	10.0
September	11	11.6	4	21.1	0		1	9.1	0		1	10.0	1	10.0
October	5	5.3	0		1	7.7	1	9.1	0		1	10.0	1	10.0
November	6	6.3	3	15.8	0		0		1	9.1	0		0	
December	8	8.4	0		1	7.7	0		2	18.2	0		0	
Total	95		19 <sup>b</sup>		13		11		11		10 <sup>c</sup>		10	

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1 able 5.	I raumatic	work-Kelated	Fatalities	by Month	of injury and	Industry Sector	, Michigan 2009
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<sup>a</sup> Only industries with 10 or more deaths are included in the table. <sup>b</sup> One individual was a homicide victim.

<sup>c</sup> Five individuals were homicide victims.

In **Construction** fatalities were fairly evenly distributed throughout 2009, with the exception of September (4, 21.1%) and February, October, and December (no fatalities). **Administrative & Support & Waste Management & Remediation Services** also had a significant number of months that did not have a fatal injury occur (January, April, May, September and November). August had 4 (30.8%) fatal injuries and March had 3 (23.1%) fatalities.

In **Agriculture**, the spring months of April (4 deaths, 36.4%) and May (2 deaths, 18.2%) comprised greater than 50% of all Agricultural fatalities. Five months (March, July, August, November and December) did not have a fatal injury.

In **Manufacturing**, May was the month most likely to have a fatal injury occur (4, 36.4%). Six months (February, March, July-October) did not have a fatal injury.

In **Retail Trade**, homicides accounted for 50% of the WR deaths. The largest number of work-related **homi-cides** occurred in June (30.0 %). Interestingly, no WR homicides occurred in November and December during the height of the shopping season.

### Month of Injury, cont.

Table 6 shows the means of death by the month the injury occurred. August and September accounted for one-half of all motor vehicle incidents (5 each, 25.0%).

Ten of the 12 work-related suicides occurred in the fist half (January-June) of the year.

Struck by incidents were fairly evenly distributed throughout the year, although March and December did not have a struck by incident.

The winter months of December-March accounted for 46.2% of all fatal fall incidents, with February having the largest number (3, 21.4%), and then November and December (2 each, 14.3%).

Work-related homicides were concentrated in the Spring through early Fall (April-October); June had the highest number (3, 30.0%).



A male truck driver died when he was struck by an empty Peterbilt tractor trailer pulling a dump trailer and a shorter second trailer as he was walking to his truck in the truck parking area.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	Number												
Aircraft										1		1	2
Animal	1			1									2
Asphyxiation												1	1
Drug Overdose	1		2							1			4
Electrocution		1			1				2		1		5
Fall	1	3	1		1	2	1	1			2	2	14
Fire/ Explosion				1									1
Homicide	1			1	1	3	1	1	1	1			10
Machine			1		2	1			1	1		1	7
Motor Vehicles	1		2	1	2		1	5	5			3	20
Struck By	3	2		2	1	1	2	1	2	1	2		17
Suicide	2	1	1	2	2	2		1			1		12
Total	10	7	7	8	10	9	5	9	11	5	6	8	95

### Table 6. Traumatic Work-Related Fatalities by Month of Injury and Cause of Death, Michigan 2009

Since 2001, 128 WR fatalities have occurred in the month of October.

July is next with 118 and June with 117.

### Time of Injury

The time of the injury could be determined within a 4-hour time period in 84 of the 95 (88.4%) work-related deaths. The 24-hour day was divided into 4-hour time periods: 12:00 a.m. - 3:59 a.m., 4:00 a.m. - 7:59 a.m., 8:00 a.m. -11:59 a.m., 12:00 p.m. - 3:59 p.m., 4:00 p.m. - 7:59 p.m., and 8:00 p.m. - 11:59 p.m.

Table 7 shows the 4-hour time periods for industries with 10 or more deaths, and for homicides.

All Deaths

Construction

(NAICS 23)

Time of

Incident

### Overall,

- 31 (36.9%) fatal injuries occurred between 8:00 a.m. -11:59 a.m.,
- 20 (23.8%) occurred between 12:00 p.m. - 3:59 p.m.,
- ◆ 18 (21.4%) occurred between 4:00 p.m. - 7:59 p.m.,
- ◆ 10 (11.9%) occurred between
  4:00 a.m. 7:59 a.m.,
- ◆ 3 (3.6%) occurred between 8:00 p.m. 11:59 p.m., and
- ◆ 2 (2.4%) occurred between 12:00 a.m. - 3:59 a.m.

In **Agriculture**, for the 9 individuals with a known time of injury, the time periods of 12:00 p.m.-3:59 p.m. and 4:00 p.m.-7:59 p.m. each had 3 (33.3%) incidents.

Manufacturing

Retail Trade

(NAICS 31-33) (NAICS 44-45)

Homicide



In **Construction**, for the 18 individuals with a known time of injury, 77.8% of the injuries occurred between the "normal" working hours of 8:00 a.m. to 3:59 p.m. There were no fatal work-related injuries in the 12-hour time period of 1:00 a.m.

Conversely, in **Administrative & Support**, the majority (6 of 11, 54.5%) of the known time of injury was after normal working hours (4:00 p.m.-7:59 p.m..)

In **Manufacturing**, the time period of 8:00 a.m.-11:59 a.m. the majority of fatal incident occur (7, 77.8%).

### Table 7. Traumatic Work-Related Fatalities by Time of Incident and Industry, Michigan 2008

Agriculture,

Forestry,

In **Retail Trade**, 4 (44.4%) of the fatal incidents occurred during the time period of 8:00 a.m.-11:59 a.m.

The only work hours that did not have a WR **homicide** with a known time of injury was 8:00 p.m.-11:59 p.m.

Waste Mgt & Fishing & Remediation Hunting (NAICS 56) (NAICS II) Number Percent 12am-3:59am 2.40 9.1 0 0 0 11.1 4am-7:59am 0 9.1 11.1 0 10 11.9 11.1 1 22.2 ---1 22.2 8am-11:59am 31 36.9 44.40 33.3 7 77.8 44.4 8 4 12pm-3:59pm 33.3 22.2 20 23.8 6 33.3 2 18.2 0 22.2 4pm-7:59pm 22.2 18 21.43 16.76 54.5 22.2 2 22.2 22.2 9.1 8pm-11:59pm 3 3.6 1 5.6 1 0 0 0 0 ------9<sup>b</sup> 84\*  $18^{b}$ 06 06 11 Total

"Time of Injury unknown for 11 individuals." Only industries with 10 or more deaths are included in the table.

Administrative

& Support &

<sup>b</sup> Time of Injury was unknown for one death. <sup>c</sup> Time of Injury unknown for two individuals.

### Location in State

Table 8 and Figure 3 show the county in which the decedent worked where he/she was fatally injured. Work-related fatal injuries occurred in 33 (39.8%) of Michigan's 83 counties.

Wayne County had the largest number of fatal injuries, 18 (18.9%). The southeast Michigan counties of Wayne, Oakland, Macomb, and Washtenaw accounted for 34 (35.8%) of the fatal work-related injuries; Macomb County had 7 (7.3%) fatal injures, Oakland had 5 (5.3%) and Washtenaw had 4 (4.2%) fatal injures. Outside of the metro Detroit area, Berrien County had the largest number of WR fatal injuries (7, 7.3%) followed by Kalamazoo (5, 5.3%) and then Emmet, Ingham, and Kent with 4 each (4.2%).

### Table 8. Work-Related Fatal Injuries by County of Incident, Michigan 2009

County Number Percent County Number Percent County Number Percent Alcona 0 Gratiot 0 Missaukee 0 2.1Alger 0 Hillsdale 2 Monroe 1 1.1 2 2.1 0 0 Allegan Houghton Montealm ----Alpena 0 Huron 0 Montmorency 0 --Antrim 0 ---Ingham 4 4.2 Muskegon 2 2.1Newaygo 0 0 Arenac 1 1.1 Ionia --Baraga 0 Iosco 0 Oakland 5 5.3 1.1 0 0 Barry 1 Iron --Oceana ---Bay 0 Isabella 0 Ogemaw 0 -----Ontonagon Benzie 0 Jackson 2 2.10 --7.3 5 0 Berrien Kalamazoo 5.3 Osceola --Branch 2 2.1 Kalkaska 0 Oscoda 0 ---2 2.10 Calhoun Kent 4 4.2Otsego 0 2 2.1 Cass 1.1 Keweenaw Ottawa 1 --0 Presque Isle 0 Charlevoix Lake 0 ------Cheboygan 0 ---Lapeer 0 ---Roscommon 0 ---0 0 Leelanau Chippewa ----Saginaw 1 1.1 1.1 2 2.1 St. Clair 2.1Clare 1 Lenawee 2 0 Clinton 1 1.1Livingston 1 1.1 St. Joseph ---Crawford 0 Luce 0 Sanilac 0 --------Delta 0 --Mackinac 0 Schoolcraft 0 ---7 0 7.3 2 2.1 Dickinson Macomb Shiawassee ---0 Eaton 2 2.1Manistee Tuscola 1 1.1 --Emmet 4 4.2 Marquette 0 Van Buren 1 1.1 --3 3.2 Mason 0 Washtenaw 4 4.2 Genesee --Gladwin 18 18.9 1 1.1 Mecosta 0 Wayne --0 Wexford 0 Gogebic 1 1.1 Menominee ----0 Midland 0 Grand ----Traverse

Figure 3. Work-Related Fatal Injuries by County of Incident, Michigan 2009



### Place of Death

For 50 (52.6%) individuals, the place of death was at the scene of the traumatic incident. For 43 (45.3%) individuals, the place of death was the hospital. One (1.1%) individual died in an air ambulance and one (1.1%) individual died in a foster home.

### Place of Injury

The most common places of injury were a street/highway (22, 23.2%), followed by a farm (9, 9.5%), and then a factory and construction site (8 each, 8.4%). Parking lots were the site of 7 (7.4%) and stores were the site of 6 (6.3%) fatalities.

### **Industry Information**

Table 9 shows the number of work-related fatalities and Michigan's annual incidence rate by industry sector for number of employees and by hours worked for 2009.

**Employment-based rates** measured the risk of fatal injury for those employed during a given period of time, regardless of hours worked. **Hours-based rates** measure fatality risk per standardized length of exposure. Hours-based rates use the average number of employees at work and the average hours each employee works (40 hours/week, 50 weeks/year). Hours-based incidence rates were not available for all Michigan industry sectors.

The 2002 North American Industry Classification System (NAICS) has 20 sectors grouping establishments into industries according to primary economic activity. MIFACE classifies an establishment to an industry when the establishment's primary activity meets the definition for that industry.

### **DIFFERENCES IN RATES**

Employment- and hours-based rates will be similar for groups of workers who tend to work full-time. However, differences will be observed for worker groups who tend to have a high percentage of parttime workers, such as younger workers.

### Industry Highlights, Michigan 2009

- The number of work-related deaths in 2009 **declined 22%** from 2008. There were 26 fewer deaths in 2009; 95 deaths in 2009 compared to 121 deaths in 2008. The respective incidence rates were 2.9/100,000 and 3.0/100,000.
- Seven industry sectors had a fewer WR deaths compared to 2008:
  - Construction: 19 (15.3/100,000) in 2009 compared to 28 (18.7/100,000) in 2008
  - Agriculture: 11 (12.9/100,000) in 2009 compared to 16 (18.7/100,000) in 2008.
  - Manufacturing: 11 (2.4/100,000) in 2009 compared to 14 (2.4/100,000) in 2008
  - Transportation & Warehousing: 6 (4.4/100,000) in 2008 compared to 11 (11.0/100,000) in 2009
  - Accommodation & Food Service: 5 (1.6/100,000) in 2009 compared to 6 (1.8/100,000) in 2008
  - Other Services: 3 (2.5/100,000) in 2009 compared to 8 (6.3/100,000) in 2008
  - Public Administration: 2 (0.8/100,000) in 2009 compared to 7 (2.5/100,000) in 2008
- Two industry sectors had a greater number of deaths in 2009 compared to 2008:
  - Administrative & Support & Waste Management & Remediation: 13 (5.6/100,000) in 2009 compared to 5 (1.9/100,000) in 2008
  - Arts, Entertainment & Recreation: 4 (7.0/100,000) in 2009 compared to 3 (4.9/100,000) in 2008.
  - Six industry sectors had the same number of deaths in 2009 as in 2008: Mining, Utilities, Wholesale Trade, Retail Trade, Real Estate & Rental & Leasing, Professional, Scientific & Technical Services, and Health Care & Social Assistance
- Mining had the highest employment-based incidence rate (18.1/100,000). Construction was next (15.3/100,000), then Agriculture, Forestry, Fishing & Hunting (12.9/100,000)

Industry Sector	Number	Percent	Employme	nt-Based	Hours-l	Hours-Based		
(NAICS Code)			N. L. D. b. N		(per 100,0	00 FTE)		
			Number E <sup>a</sup>	Rate <sup>□</sup>	Number	Rate <sup>a</sup>		
A			Employees		Hours			
& Hunting (11)	11	11.6	85,339 <sup>e</sup>	12.9	**			
Crop Production (111)	5	5.3	53,500 <sup>e</sup>	9.3	**			
Animal Production (112)	4	4.2	31,839 <sup>e</sup>	12.6	**			
Forestry & Logging (113)	1	1.1	1,460	68.5	**			
Support Activities for Agriculture & Forestry (115)	1	1.1	2,227	44.9	**			
Mining (21)	1	1.1	5,539	18.1	**			
Mining (except Oil & Gas) (212)	1	1.1	3,316	30.2	**			
Utilities (22)	1	1.1	19,631	5.1	**			
Utilities (221) (Power Generation & Supply)	1	1.1	16,835	5.9	**			
Construction (23)	19	20.0	123,887	15.3	37.1	16.5		
Construction of Buildings (236)	2	2.1	26,874	7.4	35.6	8.4		
Heavy and Civil Engineering Construction (237)	4	4.2	13,968	28.6	**			
Specialty Trade Contractors (238)	13	13.7	83,045	15.7	36.9	17.0		
Manufacturing (31-33)	11	11.6	464,095	2.4	41.3	2.3		
Food Manufacturing (311)	1	1.1	33,432	3.0	**			
Beverage & Tobacco Product Manufacturing (312)	1	1.1	4,617	21.7	**			
Wood Product Manufacturing (321)	1	1.1	7,554	13.2	**			
Petroleum & Coal Products Manufacturing (324)	1	1.1	1,300	76.9	**			
Nonmetallic Mineral Product Manufacturing (327)	1	1.1	11,200	8.9	**			
Fabricated Metal Product Manufacturing (332)	2	2.1	59,490	3.4	39.6	3.4		
Machinery Manufacturing (333)	1	1.1	55,424	1.8	41.3	1.7		
Transportation Equipment Manufacturing (336)	3	3.2	126,950	2.4	41.3	2.3		
Wholesale Trade (42)	3	3.2	151,143	2.0	37.1	2.1		
Merchant Wholesalers, Durable Goods (423)	1	1.1	82,202	1.2	37.9	1.3		

### Table 9. Work-Related Fatalities and Incidence Rates by Industry Sector, Michigan 2009

### Table 9, continued....

Industry Sector (NAICS Code)	Number	Percent	Employme	nt-Based	Hours-l (per 100,0	Based 00 FTE)
			Number Employees <sup>a</sup>	Rate <sup>b</sup>	Number Hours <sup>a</sup>	Rate <sup>d</sup>
Merchant Wholesalers, Nondurable Goods (424)	2	2.1	46,185	4.3	**	
Retail Trade (44-45)	10	10.5	448,431	2.2	29.3	3.0
Motor Vehicle & Parts Dealers (441)	2	2.1	50,716	3.9	33.2	4.8
Building Material and Garden Equipment and Supplies Dealers (444)	1	2.1	39,220	2.5	**	
Food and Beverage Stores (445)	2	2.1	76,740	2.6	**	
Gasoline Stations (447)	1	1.1	23,186	4.3	**	
Miscellaneous Store Retailers (453)	2	2.1	23,004	8.7	**	
Non-Store Retailers (454)	2	2.1	8,513	23.5	**	
Transportation & Warehousing (48-49)	6	6.3	135,687	4.4	**	
Truck Transportation (484)	3	3.2	33,872	8.9	**	
Transit & Ground Passenger Transportation (485)	1	1.1	5,544	18.0	**	
Postal Service (491)	1	1.1	24,700°	4.0	**	
Couriers & Messengers (492)	1	1.1	10,422	9.6	**	
Real Estate & Rental & Leasing (53)	2	2.1	48,599	4.1	**	
Real Estate (531)	1	1.1	34,282	2.9	**	
Rental & Leasing Services (532)	1	1.1	13,525	7.4	**	
Professional, Scientific, & Technical Services (54)	2	2.1	220,221	0.9	33.8	1.1
Professional, Scientific, and Technical Services (541)	2	2.1	220,717	0.9	**	
Administrative & Support & Waste Management & Remediation Services (56)	13	13.7	230,609	5.6	**	
Administrative and Support Services (561)	13	13.7	230,609	5.9	**	
Health Care & Social Assistance (62)	2	2.1	560,700 <sup>c</sup>	0.4	32.2	0.4
Hospitals (622)	1	1.1	220,900°	0.5	38.4	0.5

### Table 9, continued....

Industry Sector	Number	Percent	Employme	nt-Based	Hours-l	Based
(MAICS COUC)			Number Employees <sup>a</sup>	Rate <sup>b</sup>	Number Hours <sup>a</sup>	Rate <sup>d</sup>
Social Assistance (624)	1	1.1	61,000 <sup>c</sup>	1.6	**	
Arts, Entertainment, & Recreation (71)	4	4.2	57,345	7.0	21.8	12.8
Performing Arts, Spectator Sports, and Related Industries (711)	2	2.1	9,272	21.6	**	
Amusement, Gambling and Recreation (713)	2	2.1	44,393	4.5	**	
Accommodation & Food Services (72)	5	5.3	319,609	1.6	23.2	2.7
Food Services and Drinking Places (722)	5	5.3	289,174	1.7	**	
Other Services (except Public Administration) (81)	3	3.2	121,943	2.5	**	
Repair and Maintenance (811)	3	3.2	33,710	8.9	**	
Public Administration (92)	2	2.1	<b>253,000<sup>c</sup></b>	0.8	**	
Justice, Public Order, and Safety Activities (922)	2	2.1	**		**	
Totals	95		3,245,778	2.9		

<sup>a</sup> Source: Michigan Department of Energy, Labor and Economic Growth, Office of Labor Market Information, Industry Census of Employment & Wages (QCEW-ES202), Michigan, Year: 2009. Accessed November 15, 2010. <a href="https://www.milmi.org/cgi/dataAnalysis/">www.milmi.org/cgi/dataAnalysis/</a>

<sup>b</sup> Incidence rates calculated per 100,000 workers.

<sup>c</sup> Source: Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2009. November 15, 2010. <a href="https://www.milmi.org/cgi/dataAnalysis/">www.milmi.org/cgi/dataAnalysis/</a>

<sup>d</sup> Rate represents the number of fatal occupational injuries per 100,000 full time equivalent workers and was calculated as: (N/EH) x 200,000,000 where N= Number of fatal injuries; EH = total hours worked by employees in the industry sector during the calendar year (number of hours x 50 weeks per year); 200,000,000 = base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

<sup>e</sup> Source: USDA, National Agricultural Statistics Service. 2007 Census of Agriculture, AC-07-A-51, Issued February 2009, Updated December 2009. Accessed October 11, 2010

www.agcensus.usda.gov/Publications/2007/Full\_Report/index.asp.

\*\* No Data provided on IES or QCEW-ES202 reports.



A male commercial roofer was killed when a load of roofing material, weighing approximately 1,900 pounds fell 20-30 feet from a 40-inch by 50-inch wooden pallet being transported overhead.

Industry Sector <sup>a</sup> (NAICS Code)	Number of Fatalities	2009 MI Employment- based Rate <sup>b</sup>	2009 MI Hours- Based Rate	2009 US Hours-Based Rate <sup>c</sup>
Agriculture, Forestry, Fishing and Hunting (11)	11	12.9	<del></del> .)	30.4
Mining (21)	1	18.1	-++;s	12.7 <sup>d</sup>
Utilities (22)	1	5.1		1.8 <sup>d</sup>
Construction (23)	19	15.3	16.5	9.7
Manufacturing (31-33)	11	2.4	2.3	2.5
Wholesale Trade (42)	3	2.0	2.1	4.4
Retail Trade (44-45)	10	2.2	3.0	2.0
Transportation and Warehousing (48-49)	6	4.4		14.9
Real Estate and Rental and Leasing (53)	2	4.1	-	-
Professional and Business Services (54, 56)	15	3.3	4.0°	2.8
Educational and Health Services (61, 62)	2	0.4	7723	0.7 <sup>e</sup>
Leisure and Hospitality (71, 72)	9	2.4	4.2°	2.2
Other Services (except Public Administration) (81)	3	2.5	<b>35</b> 1	2.7 <sup>e</sup>
Public Administration (92)	2	0.8		1.9 <sup>e</sup>
Totals		2.9		3.7 <sup>d</sup>

<sup>a</sup> Sources: USDA, National Agricultural Statistics Service. 2007 Census of Agriculture, AC-02-A-51, Issued February 2009, Updated December 2009. <u>www.nass.usda.gov/census/</u>. Accessed January 4, 2010. Michigan Department of Labor and Economic Growth, Office of Labor Market Information, Industry Employment (Establishments-CES) (IES), Michigan, Year: 2008. Accessed November 13, 2009. <u>www.milmi.org/cgi/dataAnalysis/</u>. Michigan Department of Energy, Labor and Economic Growth, Office of Labor Market Information, Industry Census of Employment & Wages (QCEW-ES202), Michigan, Year: 2008. Accessed November 13, 2009. <u>www.milmi.org/cgi/dataAnalysis/</u>

<sup>c</sup> Bureau of Labor Statistics News, United States Department of Labor, USDL 10-1142, Revisions to the 2008 Census of Fatal Occupational Injuries (CFOI) counts. http://www.bls.gov/iif/oshwc/cfoi/cfoi\_revised08.pdf

<sup>d</sup> Bureau of Labor Statistics News, United States Department of Labor, USDL 10-1142, Release Date: August 19, 2009. Accessed November 13, 2009. <u>http://www.bls.gov/iif/home.htm</u>

<sup>e</sup> Hours based rate calculated as (N/EH) x 200,000,000 where (from Table 9): N=Number fatalities (NAICS+NAICS), E=Number Employees (NAICS+NAICS), H= Average Hours Worked, 200,000,000=base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

Of the Michigan industries with a known hours-based incidence rate, the Construction industry had a dramatically higher rate compared to the U.S. rate (16.5 compared to 9.7). Professional and Business Services., Leisure and Hospitality, and Retail Trade had higher hours-based incident rates compared to US rates. (4.0, 4.2, and 3.0 respectively). Wholesale Trade and Manufacturing had lower rates compared to the U.S. rate (2.1 and 2.3 respectively).

## Table 10. Work-Related Fatalities by Industry Sector, Michigan Rates Comparedto US Rates, 2009

### Means of Death

Table 11 shows the means of death by industry sector. Motor vehicles were the leading cause of a WR fatality (20, 21.1%), followed by struck by an object (17, 17.9%), then falls (14, 14.7%), and then suicides (12, 12.6%).

Motor vehicles were the leading cause of death in Transportation and Warehousing (3, 50.0%), and Administrative & Support & Waste Management & Remediation (6, 46.2%).

Machines were the leading cause of death in Agriculture (4, 36.4%).

Homicides were the leading cause of death in Retail Trade (5, 50.0%) and Accommodation and Food Service (3, 60.0%).

For the first time in the MIFACE data collection years, a fall was not the leading cause of death in Construction. In 2009, Struck by incidents resulted in the highest number of fatalities (6 fatalities) compared to five (5) fatal falls.

A fall was the leading cause of fatal injury in Arts, Entertainment & Recreation (2 incidents).



A male window washer fell approximately 60 feet while suspended over the edge of a building roof as he was preparing to descend in a boatswain chair. The decedent was seated in the boatswain chair, wearing a full body fall harness, and suspended over the edge of a building roof when the roof rigger part separated causing him and the separated roof rigger piece to fall to the sidewalk below. MIFACE Summary of MIOSHA Investigation Case 230.

#### Table 11. Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2009

Industry Sector (NAICS Code)	Aircraft (2.1%)	Animal (2.1%)	Asphyxiation (1.1%)	Drug Overdose (4.2%)	Electrocution (5.3%)	Fall (14.7%)	Fire/Explosion (1.1%)	Homicide (10.5%)	Machine (7.4%)	Motor Vehicle (21.1%)	Struck By (17.9%)	Suicide (12.6%)	Total
Agriculture, Forestry, Fishing and Hunting		2							4		3	2	11
(11) Mining (21)													
Mining (21)								1					1
Construction (22)					1								1
Construction (23)					2	5	1	1	1	2	0	1	19
Manufacturing (31-33)					1	1			2	2	3	2	11
Wholesale Trade (42)	1									1		1	3
Retail Trade (44-45)						1		5		3		1	10
Transportation and Warehousing (48-49)						1				3	1	1	6
Real Estate and Rental and Leasing (53)	1										1		2
Professional, Scientific, and Technical Services (54)					1					1			2
Administrative and Support and Waste Management and Remediation Services (56)				2		2				6	1	2	13
Health Care and Social Assistance (62)				1						1			2
Arts, Entertainment, and Recreation (71)			1			2					1		4
Accommodation and Food Services (72)						2		3					5
Other Services (except Public Administration) (81)				1							1	1	3
Public Administration (92)										1		1	2
Total	2	2	1	4	5	14	1	10	7	20	17	12	95

### **Occupations**

Figure 4 shows the distribution of Standard Occupational Classification categories.

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



### Figure 4. Work-Related Fatalities by Standard Occupational Code, Michigan 2009



#### Occupations, continued

The occupational category with the highest number of WR deaths was Management Occupations (11-0000) accounting for 21 (22.1%) fatal injuries in 2009. Within this major grouping, General and Operations Managers had the highest number (9, 42.9%) and then Farmers and Ranchers (6, 28.6%)

Building Grounds Cleaning and Maintenance Occupations (37-0000) and Construction and Extraction Occupations (47-0000) each had 14 (14.7%)WR fatalities in 2009. Within the Building Grounds occupational grouping, Grounds Maintenance Workers had 8 fatalities; 4 each in Landscaping and Groundskeeping Workers and Tree Trimmers and Pruners. Within Construction and Extraction, Construction Trades Workers accounted for 12 of the 14 deaths. Specifically roofers (4 deaths), construction laborers (3 deaths), and carpenters (2 deaths) accounted for the majority of the occupations within this category.

Transportation and Material Moving Occupations (53-0000) and Sales and Related Occupations (41-0000) each accounted for 9 (9.5%) deaths. Within this major grouping, 5 (55.6%) were Motor Vehicle Operators. Within the Motor Vehicle Operators group, 4 individuals were Truck Drivers, Heavy and Tractor-Trailer. First Line Supervisors/Managers of Retail Sales Workers and Sales and Related Workers, All Other had 2 deaths each.

### Working Status of Decedent

Ninety two employers were associated with the 95 individuals who died in 2009.

One employer had a fatal incident where more than one person died as a result of the incident. Sixty-one (64.2%) individuals were identified as employees. Twenty-seven (28.4%) individuals were identified as either self-employed or the business owner. Three (3.2%) individuals were identified as contract/temporary employees. Four (4.2%) individuals were volunteers.

### Decedent's Activity at the Time of the Incident

The activity of the decedent at the time of the fatality was identified for 68 (98.6%) of the 69 nonhomicide/non-suicide/non-drug overdose related deaths. The activity of the decedent was unknown for one incident because the injury occurred in 1973.

The individual was the operator in 40 (58.8%) incidents. The decedent was a coworker directly involved in the work activity in 27 (38.2%) incidents. Included within these 27 cases were three pedestrians who were struck by a vehicle. For one (1.5%) incident, the decedent was a pedestrian and was not directly involved in the work activity.

In 32 (34.4%) incidents, the individual was working indoors and outdoors in 61 (65.6%) incidents. The work location of the decedent was unknown for two incidents.

The decedent was working alone in 51 (55.4%) incidents and working with a coworker in 41 (44.6%) incidents. Whether the decedent was working alone or with a coworker could not be identified in three incidents.

For the 10 homicide incidents, 6 (60.0%) victims were working alone and 2 (20.0%) 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 11 summarizes the 95 work-related fatalities by means of death. See the Appendix for a description of each death grouped by means of death.

Overall, motor vehicle events accounted for 20 (21.3%) work-related fatalities in 2009. Seventeen (18.1%) individuals were struck by an object, 13 (13.8%) died as a result of a fall from a height and 12 (12.8%) died from a self-inflicted action (suicide). Ten (10.6%) individuals died as a result of a homicide. A machine was involved in seven (7.4%) deaths. Electrocutions accounted for 5 (5.6%) deaths. Four (4.3%) individuals died from a drug overdose. Two (2.1%) died form contact with an animal. One (1.1%) died as a result of an asphyxiation and one (1.1%) died as a result of an explosion.

### Aircraft

Two individuals died in aircraft incidents; one aircraft was a single engine and the other aircraft was a twin engine, turbo prop.

### Animals

An animal was involved in two incidents; both incidents involved horses. A horse trainer was thrown while dismounting and a farmer was struck in the head while unhitching the horse from a buggy.

### Asphyxiation

One individual was asphyxiated when he choked on a piece of food.

### Drug Overdose

Four individuals died as a result of a drug overdose; a custodian (hydrocodone, marijuana), security guard (citalopram, oxycodone), nurse anesthetist (propofol) and laborer (cocaine, ecstasy)

#### Electrocution

Five individuals were electrocuted. One death occurred at a substation, one occurred during a well pump repair, one occurred during a building demolition activity, one occurred during the repositioning of a piece of equipment, and one occurred in a workshop with a transformer with bare wires.

Three electrocutions were a result of direct contact;: one individual touched a 40,000-volt line, one individual touched a 220-volt line, and one individual touched an piece of equipment energized by 110-volt power cable. Indirect contact was made by one individual who was using a crowbar during demolition of a wall.. The type of contact is unknown for the individual who was electrocuted in his shop.

#### Fall

There were 14 falls that resulted in a WR fatality in 2009. The reason for the fall was identified for 11 (78.6%) individuals. Six (54.5%) individuals slipped or tripped which contributed to their fall. In 3 (27.3%) incidents, the structure upon which the decedent was working collapsed/gave way. One individual fell while in an elevated work platform when the machine over-turned due to rough terrain. One individual died when a coworker cut a tree he was belted to in a rescue effort. One individual fell from a building roof while conducting ventilation system repairs.

The distance the worker fell was identified for 13 of the 14 (92.9%) fall events. Five (38.5%) individuals fell less than 10 feet: 3 individuals fell while walking (2 slipped on an icy surface), 1 fell after tripping on a step, and one fell from a platform attached to the back of a pickup truck. Three individuals fell from heights of 10-19 feet: 1 individual fell 15 feet and 1 individual fell 18 and one individual fell 19 feet. Four individuals fell approximately 20 feet and one individual fell approximately 60 feet.

### Fall, continued

The surface location from which the worker fell was identified for all 14 falls. Six (42.9%) individuals were working on/from a roof when they fell; 3 individuals fell from a roof edge, one individual fell through a roof skylight, one individual was suspended from a roof in a boatswain chair, and for one individual, the location of the fall from the roof is unknown. Three (23.1%) individuals fell while walking on the ground surface. Two (15.4%) individuals fell from a vehicle; one individual fell from an elevated vehicle boom, and one individual fell from a pickup truck mounted platform. One (7.7%) individual fell from a tree, one (7.7%) individual fell from a step in a building, and one (7.7%) fell from a ladder.

The surface to which the worker fell was identified for 13 (92.9%) of the 13 falls. Six (42.9%) fell to concrete, rock or asphalt and 4 (33.3%) individuals fell to packed dirt/gravel. One individual each fell to the following surfaces: a tiled floor, brick patio, and a stair.

The condition of the work surface the decedent fell from was known in 9 (64.3%) of the 14 fall incidents. For 5 individuals, the working surface as dry. For one of these five individuals, the equipment that was transporting him was in a muddy, rutty terrain, causing the equipment to overturn and the decedent to fall. Two individuals were fell from a surface which was covered in ice/snow. One individual was working on a wet surface when she fell and one individual was working in a damaged tree when he fell.

Five of the 13 falls occurred in the Construction industry sector; 3 of the 5 falls occurred during residential construction activities. One of the five falls occurred at a farm, and the location of the other fall is unknown. Two falls each occurred at amusement venues, to individuals working in Administrative and Support and Waste Management and Remediation and Accommodation and Food Service. The following industry sectors had one fall each: Manufacturing, Retail Trade, and Transportation and Warehousing.

#### Fire/Explosion

One individual died as a result of a fire or explosion; he was killed when he was cutting an underground fuel storage tank.

### Homicides

There were 10 WR homicides, a decrease of 3 work-related homicides compared to 2008. Eight (80.0%) of the homicide victims were men and two (20.0%) were women. Seven (70.0%) homicide victims were Caucasian, and 3 (30.0) individuals were African-American. Five of the 8 men were Caucasian and 3 were African-American. Both female victims were Caucasian.

The ages of the victims ranged from 23 to 68. The average age at the time of the incident was 49.9 years old. A gun was used in 6 (60.0%) homicides. Two homicides victims were killed when the perpetrator used a knife. One homicide victim was killed after being stabbed with a screwdriver. One individual was killed when the assailant used a weeding tool.

One-half (5 of 10, 50.0%) of the homicide fatalities occurred in Retail Trade. Three homicide fatalities occurred in Accommodation and Food Service; both of the women who died as a result of a homicide worked in this industry sector. One homicide fatality occurred in Mining and one occurred in Construction.

June had the highest number of fatalities (3, 30%). Sixty percent of the fatalities occurred midweek (Wednesday and Thursday). It was determined that the decedent was working alone in six incidents, and working with a coworker in two incidents. Working status was unknown for two individuals.

### Machine-Related Deaths

There were 7 machine-related fatalities. The leading cause of a machine-related death was being pinned when the machine overturned (3 incidents, 42.9%). Two of the 3 individuals who were pinned under an overturned machine (tractor) worked in Agriculture and one individual worked in Construction (articulated machine). In Agriculture, one individual was crushed when the elevated arms of the skid steer loader came down, and one individual died when his clothing was entangled on an exposed bolt on an unguarded power take off (PTO) shaft. One individual who worked in Manufacturing was killed when a movable machine carriage came down and crushed him. One individual in Manufacturing died from complications sustained in a forklift incident in 1973; details are unknown.

### Motor Vehicle Related Deaths

There were 20 motor vehicle related fatalities in 2009. There were 17 separate motor vehicle incidents resulting in a fatality; one crash claimed the lives of four individuals, three of whom were passengers. The driver of the vehicle was the individual killed in 12 (70.6%) of the incidents.

Four (20.0%) pedestrians were killed when they were struck by a motor vehicle.

Figure 5 on page 24 summarizes some of the information collected on each work-related motor vehicle death, by type of vehicle and occupancy status. Additional summary information about fatal motor vehicle incident follows on page 25.

Since 2001, motor vehicle incidents have been the #1 cause of workrelated deaths in Michigan.

### Motor Vehicle Crash Terminology

A "unit" is identified as a motor vehicle, bicycle, pedestrian, or train involved in the crash and individually reported; therefore, a caranimal crash or a car-tree crash is categorized as a single-unit incident.

The crash type is based on the intended direction of travel, regardless of point(s) of impact or the direction the vehicles ultimately face after the crash.

- Single motor vehicle: cases in which a motor vehicle was (a) the only traffic unit and (b) the only motor vehicle involved collided with a bicyclist, pedestrian, animal, railroad train, or any other nonmotorized unit.
- Head On: direction of travel of both vehicles must be toward each other.
- Head On—Left Turn: two vehicles are approaching head on and at least one is attempting a left turn.
- Angle: direction of travel is basically perpendicular for both drivers and there is a side impact of approximately 90 degrees.
- Sideswipe-Same: vehicles were traveling in opposite directions and made side contact.

Sequence of Events records step-by-step regarding what happened during the crash. Up to four Sequence of Events may be recorded. The event that was considered Most Harmful to the human being is identified by the responding police officer. The event that is most harmful is categorized within headings identified as:

- Non-Collision
- Collision with Non-Fixed Objects
- Collision with Fixed Objects

### HIGHLIGHTS OF MOTOR VEHICLE INCIDENTS

### Number of Units

- ◆ 2-unit: 15 (88.2%) incidents
- ◆ 3-unit: 1 (5.9%) incidents
- 4-unit: 1 (5.9%) incidents
- Number of lanes of a roadway was identified for all incidents. The number of lanes was not applicable for four incidents: 3 motor vehicle incidents occurred in a parking lot and 1 occurred on the business's property.
  - ◆ 2-lane roads: 9 (52.9%) incidents
  - 3-lane roads: 1 (5.9%) incidents
  - ◆ 4-lane roads: 2 (11.8%) incidents
  - 5-lane roads: 1 (5.9%) incident
- **Speed limits** identified for 12 (92.3%) of 13 incidents where a speed limit was applicable; for four incidents (three parking lots, private property) a speed limit was not applicable. The speed limit was unknown for 1 incident.
  - ◆ 40 mph: 2 (16.7%) incidents
  - 50 mph: 1 (8.3%) incident
  - 55 mph: 9 (75.0) incidents
  - 60 mph: 1 (8.3%) incident
- Amount of light at the time of each crash was identified for all incidents.
  - Daylight: 14 (82.4%) incidents
  - Dark, Unlit: 2 (11.8%) incidents
  - Dark, Lit: 1 (5.9%) incident
- Seat Belt Use: Seat belt use was known for 94% of the workers; 8 of 15 (53%) individuals were not using seatbelts at the time of the crash.
- Alcohol Use was a contributing factor for one crash; another driver, whose blood alcohol was greater than 0.08%, crossed the center line and struck the decedent's vehicle.

**Road Construction/Repair Zones** were the location of two fatal incidents: a driver of a large truck struck a vehicle, then a guardrail, and then overturned and a pedestrian was struck by a backing vehicle

- Pedestrian Information
  - Ages: 27 years, 52 years, 54 years, 56 years
  - Gender: 3 males, 1 female
  - Incident Summaries:
    - Decedent was working in a construction zone and run over by a backing vehicle.
    - Decedent was directing a backing vehicle into a parking space and was run over by the passenger side front tire.
    - Decedent attempted to climb into the dump truck to stop its downhill roll and was crushed between the driver's side door and a tree that the dump truck contacted as it rolled downhill.
    - Decedent was walking to his truck in a dimly lit parking lot when he was run over by another truck that only had its running lights on.
- Most Harmful Event was identified for 16 (94.1) of the 17 separate motor vehicle incidents.
  - Non-collision: 1 (7.7%) incident
    - ♦ Fire/Explosion
  - Collision with Non-Fixed Object: 14 (82.4%) incidents
    - ◆ Locomotive (1)
    - Pedestrians (4)
    - Motor vehicle in transport (9)
  - Collision with Fixed Object: 1 (7.7%) incident
    - Building

**Figure 5** summarizes WR motor vehicle fatalities by type of vehicle and occupancy status (i.e. whether decedent was the driver or a passenger). The letter N indicates the number of incidents involving the vehicle type.

### Figure 5. Work-Related Motor Vehicle Fatalities by Type of Vehicle and Occupancy Status, Michigan, 2009

Description	Large Truck	Pick-up	Passenger	Van
	(N=2)	truck**	Car	(N=3)
		(N=2)	(N=6)	
Median Age	53.5	27.2	47.2	55.0
	Range 38-69	Range 16-61	Range 38-68	Range 35-87
Occupancy Status				
Driver	2	2	2	3
Passenger		3		
Seat Belt Use				
Belted	1		3	3
Not Belted	1	4	3	
Unknown		1		
Month of Injury				
Mar-May (Spring)			3	1
June- Aug (Summer)		4		1
Sept-Nov (Fall)	2		1	
Dec-Feb (Winter)		1	2	1
Day of Week				
Mon-Thurs	2	4	4	3
Fri-Sun		1	2	
Time of Crash				
Midnight-3:59 AM				
4:00 AM-7:59 AM	1		1	
8:00 AM -11:59 AM	1		2	3
Noon-3:59 PM			3	
4:00 PM-7:59 PM		4		
8:00 PM-11:59 PM				
Unknown		1		
Crash Type				
Single Motor Vehicle		1		
Head On			3	
Head On – Left Turn		4		
Angle	1		3	3
Sideswipe-side	1			
Crash Factors				
Snow/Blowing Snow/ Road			1	1
Condition				
Driver Speed Too Fast			3	1
Failed to Yield	1			1
Disregard Traffic Signal				1
Improper Lane Use			1	
Distracted	1			

\*Information on the 4 pedestrians was not included in the table.

\*\* One pickup truck crash killed the driver and his three passengers.



A male farmer was knocking over trees when his tractor overturned and pinned him.

### Struck By

Seventeen individuals were fatally injured when an object struck them. Four (23.5%) individuals were struck by a tree/tree limb. The following 13 objects each struck 1 (5.9%) individual: bricks, crane boom, concrete slab, vehicle airbag, roofing material bundles, car falling from jack, concrete highway barrier, dump truck, grain in silo, lathe, marble slab, chipping machine shroud, and a coke oven pusher door.

### Suicide

Twelve individuals committed suicide while at their workplace. Six individuals died from a self-inflected gunshot wounds, five individual died from a self-inflicted hanging, and one individual deliberately stepped in front of a moving vehicle.

## **MIOSHA** Fatality Investigations

For each company that had a work-related fatality, the Federal OSHA Integrated Management Information System (IMIS) was accessed to determine the previous MIOSHA compliance activity at the company.

The IMIS database identified that 6 employers, whose work activity was considered in-scope for a MIOSHA inspection, had a work-related compliance inspection prior to 2009.

Of the 95 work-related fatalities at 92 employers in 2009, MIOSHA personnel conducted an on-site compliance investigation for 24 (26.1%) fatalities. One of the 24 employers had a prior work-related fatality. This fatality was a motor vehicle fatality that occurred in 2005 for which MIOSHA did not have jurisdiction.

## MIOSHA Fatality Investigations, continued

- One company had a compliance inspection both prior to and after the 2003 MIOSHA reorganization.
  - Occupational Health Division inspection prior to the reorganization and a General Industry Safety and Health Division inspection
- Five of the six previously inspected companies had a MIOSHA compliance inspection after the 2003 reorganization.
  - General Industry Safety and Health Division and Construction Safety and Health Division compliance inspection: 1 company.
  - General Industry Safety and Health Division compliance inspection: 2 companies.
  - Construction Safety and Health Division compliance inspection: 2 companies.



A male sales manager for a food service died when he lost control of the minivan he was driving, crossed the centerline, and struck another vehicle.

Depending upon the work being performed, a company will be inspected by the applicable MIOSHA compliance division.

Prior to October 2003, MIOSHA had 3 compliance divisions; Occupational Health, General Industry Safety, and Construction Safety.

In October 2003, MIOSHA reorganized the compliance divisions to 2 divisions; the General Industry Safety and Health Division and the Construction Safety and Health Division.

## Hispanic Initiative

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

## Hispanic Initiative, continued

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

There were 4 deaths of Hispanic workers in Michigan in 2009. All of these 7 individuals were between the ages of 16-65. Using the United States Census Bureau population estimates for the Caucasian, African-American, and Hispanic populations in Michigan for 2009, this was a rate of 1.53/100,000 for 16-65 year-old Hispanics as compared to a rate of 1.64/100,000 for 16-65 year-old Caucasians and 0.64/100,000 for 16-65 year-old African-Americans. Industries in which Hispanic deaths occurred in 2009:

- Agriculture: 1 Hispanic
  - Tractor PTO entanglement
- Construction: 2 Hispanics
  - Excavation collapse
  - Fell from a roof
- Administrative & Support & Waste Management & Remediation: 1 Hispanic
  - ♦ Suicide

MIFACE contacted three of the four companies employing a Hispanic laborer; no contact was initiated with the company involving the Hispanic who committed suicide. All three companies declined to participate in the MIFACE research program in 2009.

## Case Narratives

For 2009, MIFACE requested, received permission, and conducted a work-related fatality investigation at 5 facilities. The number of participating employers/families declined from previous years; the reason for the decline is unknown.

Copies of the MIFACE Investigation Reports and MI-FACE Summaries of MIOSHA Inspections (Summary), which include the MIOSHA citation(s) issued at the MIOSHA/employer closing conference can be found on the MSU OEM website: www.oem.msu.edu/. A brief narrative summary of each of the 95 workrelated deaths occurring in 2009 is contained in the Appendix. Each narrative summary was based on the information collected during the MIFACE on-site investigation and/or from source documents. Each narrative has a case number and is organized alphabetically by means of death.

Table 13 gives the narrative case number and means of death by NAICS code.

When a brand name of equipment was known, MI-FACE included this information in the narrative; unless noted, this does not signify that there was a defect or other problem with the machine.

## Case Narratives, continued

### Table 13. Case Narrative Number by Means of Death and Industry Sector, Michigan 2008

Industry Sector	Narrative
(NAICS Code)	Case
	Number

Agriculture, Forestry, Fishing & Hunting (11)			
Animal	3, 4		
Machine-Related 40-43			
Struck By 67-69			
Suicide	84, 85		

Aining (21)	
lomicide	30
łomicide	

Utilities (22)	
Electrocution	10

Construction (23)	
Electrocution	11, 12
Fall	15-19
Fire/Explosion	29
Homicide	31
Machine	44
Motor Vehicle-Related	47, 48
Struck By	70-75
Suicide	86

Manufacturing (31-33)				
Electrocution	13			
Fall	20			
Machine-Related	45,46			
Motor Vehicle-Related	49, 50			
Struck By	76-78			
Suicide	87,88			

Wholesale Trade (42)				
Aircraft	1			
Motor Vehicle-Related	51			
Suicide	89			

Industry Sector	Narrative
(NAICS Code)	Case
	Number

Retail Trade (44-45)	
Fall	21
Homicide	32-36
Motor Vehicle- Related	52-54
Suicide	90

Transportation & Warehousing (48-49)	
Fall	22
Motor Vehicle-Related	55-57
Struck By	79
Suicide	91

Real Estate & Rental & Leasing (53)	
Aircraft	2
Struck By	80

Professional, Scientific, & Technical Services (54)	
Electrocution	14
Motor Vehicle-Related	58

Administrative & Support & Waste	
Management & Remediation	
Services (56)	
Drug Overdose	6, 7
Fall	23, 24
Motor Vehicle-Related	59-64
Struck By	81
Suicide	92, 93

Health Care & Social Assistance (62)	
Drug Overdose	8
Motor Vehicle-Related	65

Arts, Entertainment & Recreation (71)	
Asphyxiation	5
Fall	25, 26
Struck By	82

Industry Sector	Narrative
(NAICS Code)	Case
	Number

Accommodation & Food Service (72)	
Fall	27, 28
Homicide	37-39

Other Services (Except Public Administration) (81)	
Drug Overdose	9
Struck By	83
Suicide	94

Public Administration (92)	
Motor Vehicle-Related	66
Suicide	95



A male tool and die maker was crushed when a 3,200-pound lathe fell from a powered industrial truck. MIFACE Summary of MIOSHA Investigation Case 216.



A male farm hand died when his shirt became entangled in an unguarded power take off (PTO) shaft while making feed for a dairy operation. MIFACE Summary of MIOSHA Investigation Case 209

## Discussion

## Compared to the Michigan Census of Fatal Occupational Injuries (CFOI) Data

The Census of Fatal Occupational Injuries (CFOI) is the surveillance system funded in every state by the United States Department of Labor Bureau of Labor Statistics (BLS). CFOI reported 93 deaths in 2009 per the BLS website viewed on December 16, 2010 ( http://www.bls.gov/iif/oshwc/cfoi/tgs/2009/iiffi26.htm). Both MIFACE and CFOI were notified of an additional 2009 WR death in 2011.

Number of Deaths for 2009

Subsequent confirmation of WR fatality cases has been performed and MIFACE and CFOI agree on the number of WR fatal incidents in 2009; 95 work-related deaths.

There were 95 traumatic work-related fatalities in Michigan in the year 2009, 2.9 traumatic work-related fatalities per 100,000 workers, averaging 1.8 traumatic work-related fatalities per week. The major sources for identifying traumatic work-related deaths were the 24-hour MIOSHA hotline, a newspaper clipping service, the State Police vehicular data reporting system, and death certificates. The 2009 annual fatality rate (per 100,000 workers) in Michigan was 2.9 per the MIFACE statistics. Since MIFACE began surveillance of all traumatic work-related fatalities in 2001, 2.9 deaths/100,000 workers ties 2007 as the lowest fatality rate MIFACE has reported for Michigan.

Individuals who died from a traumatic work-related fatality were most likely to be men (89.5%), white (91.6%), married (60.0%) and had received at least high school diploma (76.8%). The average age of death was 47.2 years

Mining had the highest risk of a traumatic work-related fatality due to its relatively small number of workers (1, 18.1 deaths/100,000 workers). Construction was next with an incidence rate of 15.3 deaths/100,000 workers and then Agriculture (12.9 deaths/100,000 workers). (See Table 9).

Among the non-suicide/non-overdose deaths, a total of 11 individuals had alcohol, illegal drugs, or prescription medications in their system at levels that may have been a risk factor for the occurrence of the traumatic injury.

MIOSHA staff investigated 24 of the 95 deaths at 24 employers. The police investigated 41 of the deaths (motor vehicle, homicides and suicides, drug overdose, etc.) at 38 different employers. The National Transportation Safety Board investigated 1 death. The remaining 29 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.

#### **MIFACE** Contact with Employers and Families

MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members.

MIFACE contacted 40 of the 92 (43.5%) employers asking for their participation in the MIFACE program. Twenty-seven employers declined to participate.

MIFACE contacted 23 of the 24 employers whose work-related fatality was investigated by MIOSHA staff. The employer not contacted by MIFACE involved a self-employed business owner who died; the business closed after his death. Of these 23 employers, 17 declined to participate, 3 agreed to participate, and 3 employers asked MIFACE to contact them at a later date for possible participation. Among the other 17 employers or next of kin contacted, 2 agreed to participate.



A male self-employed auto mechanic died when an automobile he was working on fell off of the single jack stand on which it was being supported.

Despite the high fatality rate in Agriculture, farms with fewer than 11 employees are exempted from routine MIOSHA inspections.

Since 2001, Agriculture has ranked as one of Michigan's most hazardous industries.



- Identify all sources of combustion because all emit CO cas
- Install a CO detector/alarm meeting the requirements of the current UL standard 2034 or the IAS 5-95 standard in areas where fuel-burning equipment/appliances are present.
- Ensure a trained professional annually inspects and services fuel-burning equipment and appliances, such as an oil or gas furnaces, gas hot water heaters, or portable compresson measuring tailpipe exhaust of LPG fork tracks to minimize CO output, use a CO analyzer isors, When specifically designed for that purpose.
   Use tools powered by electricity or compressed air approved for indoor use when working indoor
- Place gasoline- or fuel-powered equipment outdoors and sway from windows, doors or vents, CO could enter the building through the openings and build up in the work area.
   If gasoline- or fuel-powered equipment must be used indoors or in enclosed or partially-
- enclosed spaces, such as houses, garages, crawl spaces and basements, vent equiprient exhaust outdoors and away from air intakes such as doors, windows or fresh air vents. Provide supplemental fresh air inside the building because even with doors and windows open. CO levels can reach lothal levels in a short period of time.

#### DID YOU KNOW?

- Common sources of CO exposure in the workplace include generators, preasure washers, propone-powered forklitts, propone space heaters, and compressors. You cannot rely on smell to detect CO.
- You cannot rely on smell to detect CO. Symptoms of CO powering are hard to recognize behause they may mimic flu symptoms (but without the fever). CO potenning symptoms include: tightness in chest, shortness of treath, headache, vomiting, dizziness, and muscle weakness. Phopole exposed is CO who have previsiting heart disease or hardening of the actions are at bioreased this of have
- the arteries are at increased risk of having a
- heart attack or stroke. CO poisceing can cause permanent damage to organis, such as the heart and been their require a rich supply of oxygen.

www.oem.msu.edu MIOSHA: Carbon Monoxide Michena: Larbon Menoxide, www.michigan.gov/documents/cis\_woh\_oct5010 90997\_7.doc MIOSHA: Carbon Menoxide Hazards from Internal Combustion Engines. www.michigan.gov/documenta/sia wah ext5011 115630 7.doc WAYNE STATE UNIVERSITY: CO Headquarters www.coheadquarters.com HA Pte 16/25/07 TO REPORT A NEW WORKPLACE

MIFACE Investigation Report #06MI204: Security Guard Dies Due to CO Poisoning.

FATALITY TO MIOSHA 1.800.858.0397 MICHIGAN FATALITY ASSESSMENT &

CONTROL EVALUATION INFORMATION: 1.517.353.1846 E-AAAIL: debra.chester@ht.msa.edu

Most of the 95 deaths in this report could have been prevented. An awareness of the hazards of one's job, the provision of safe equipment, and an attitude of safety-mindedness on the part of labor and management are critical to prevent future fatal events.

#### **Prevention Material Dissemination**

On the MSU OEM web site, (www.oem.msu.edu/) are copies of the completed MIFACE Investigation Reports, Hazard Alerts, and MIFACE summaries of investigations conducted by the MIOSHA program.

Hazard Alerts are 1-page documents that review work-related fatalities and provide prevention recommendations that target specific industrial sectors or repeated work-related fatality incidents (e.g. trench wall cave-ins).

MIFACE summaries of investigations conducted by the MIOSHA program include a summary of the work-related fatality incident and the citations issued to the employer by MIOSHA at the conclusion of the fatality investigation.

For each MIFACE Investigation Report and Hazard Alert there is a dissemination plan to maximize awareness of the Report and Hazard Alert. Investigation Reports and Hazard Alerts are sent to appropriate trade associations, unions, trade journals and in some cases other employers doing the same type of work.

#### **Example of Intervention**

In 2009, MIFACE sent a copy of MIFACE Investigation Report #08MI095: Tow Truck Driver Pinned Under Car to 175 towing companies located in Michigan. Report evaluation forms returned indicated that numerous employers would use the report in employee training/safety meetings, and implement the MIFACE recommendations. Several companies indicated that they were going to develop an employee training checklist and would begin the development of a policy and procedure manual and handbook.

There was a decrease of 26 work-related deaths in 2009 compared to 2008. Two industry sectors had an increase in the number of deaths: Administrative and Support and Waste Management and Remediation Services (NAICS 56) had 13 deaths in 2009, compared to 5 deaths in 2008 - a 160% increase. The other industry sector with an increase in the number of deaths in 2009 was Arts, Entertainment and Recreation (NAICS 72); 4 deaths occurred in 2009 compared to 3 deaths in 2008. All other industry sectors had a decrease in the number of deaths. Two industries that had a work-related death in 2008 did not have a death in 2009; Finance and Insurance (NAICS 52) and Educational Services (NAICS 61)

The industry with the most dramatic decline in the number of deaths compared to 2008 was Construction (NAICS23). In 2009, Construction had 19 deaths compared to 28 in 2008. Although the number of deaths decreased by almost 30%, Construction deaths still accounted for a similar percentage of the work-related deaths (20.0% in 2009 compared to 23.1% in 2008). There have been relatively large variations in deaths noted in certain industries, such as Construction. Construction had 32 deaths in 2004, 23 deaths in 2005, 42 deaths in 226, 18 deaths in 2007, 28 deaths in 228 and now, in 2009, 19 deaths. The employment based incidence rate in has ranged from a low of 10.8 deaths in 2007 to a high of 23.3 deaths/100,000 in 2006.

Although there were fewer individuals who died in 2009 in Michigan, the incidence rate was similar in 2008 (3.0 deaths/100,000) and 2009 (2.9 deaths/100,000). There was an increase in the number of suicides at work. We attribute both of these changes to the depressed Michigan economy and its resultant increase in the unemployed and economic pressure on businesses. In 2009, Michigan's unemployment rate was 14.9%. For the first time in MIFACE data collection, the number of work-related suicides was larger than the number of work-related homicides. Only in 2001 when there were 174 work-related deaths, did 12 work-related suicides occur.

Nationally, a preliminary total of 4,340 fatal work injuries were recorded in the United States in 2009, a 17% decrease from a total of 5,214 fatal work injuries reported in 2008<sup>2</sup>. BLS indicated that economic factors likely played a role in the decrease in the number of fatalities. Thirty-seven states, including Michigan, reported lower numbers of work-related fatalities.

Traumatic occupational fatalities are an important public health issue in Michigan as they are throughout the United States.

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.

BLS changed the methodology for calculating work-related fatality incidence rates in 2008. Instead of using employment-based fatality rates as in the past, BLS utilized hours-based fatality rates. BLS noted the 2009 annual national fatality rate, 3.3 deaths/100,000 *full-time equivalent workers* was down from the final rate of 3.7 in 2008. BLS cautions that hours-based fatality rates should not be directly compared to employment-based rates because of the differences in the numerators and denominators in the calculation. BLS did not calculate a national employment-based rate for 2008 or 2009. MI-FACE could not calculate an hours-based rate for Michigan for 2009 due to insufficient data from the Michigan Office of Labor Market Information.

A special effort in conjunction with the Michigan Farm Bureau to provide educational sessions to farmers is ongoing. In 2009, more than 500 individuals attended the training sessions.

Traumatic occupational deaths are not random events. Information collected about the settings and circumstances in which work-related deaths have occurred will be used to prevent their occurrence in the future.

## Acknowledgement

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

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## APPENDIX

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### 2009 Work-Related Fatality Case Narratives by Means of Death

A case narrative may reference an MIFACE Investigation Report (MIFACE Investigation) or a Summary of MIOSHA Investigation (MIFACE Summary) that is posted on the MSU OEM website.

To access the referenced MIFACE Investigation or MIFACE Summary, click on the MIFACE link on the MSU OEM website homepage, and then click on the MIFACE Investigation or MIFACE Summary tab.

Each case narrative with a referenced MIFACE Investigation or MIFACE Summary has at its conclusion the MIFACE Investigation number or MI-FACE Summary Case number. The industry to select in the Industry drop down menu is the industry heading under which the narrative is placed.

The Fatality Type drop down menu selection is the cause of death (e.g. fall, motor vehicle, struck by, etc.). After selecting the appropriate industry and fatality type, click the Search button, and then scroll down the page to the appropriate reference.

### Aircraft (2)

### Wholesale Trade

**Case 1** A 60-year-old male self-employed consultant was piloting a Beech A36TC when it was destroyed following impact with the ground and a subsequent fire. The plane had just taken off from the airport when it appears that the plane lost power. The decedent banked to the right, and then struck the ground. The plane tumbled through a metal fence and then caught fire. The decedent was found in the cockpit with his lap belt on.

### Real Estate & Rental & Leasing

**Case 2** A 58-year-old male pilot of a twin-engine aircraft died when the aircraft crashed into a heavily wooded area. The plane had problems with a fluctuating altitude readout. The decedent was instructed by air traffic control

descend to a lower altitude. He performed this task and maintained this altitude. At some point during flight, the decedent experienced trouble with the aircraft. Witnesses reported hearing loud engine noises prior to observing the aircraft spiral downward until it descended below their line of sight. Witnesses stated no smoke or flames were coming from the aircraft prior to it impacting the terrain.

### Animal (2)

### Agriculture

**Case 3** A 22-year-old female horse trainer was struck by the saddle horn when a horse she was riding reared up and to the side while she was dismounting. She was assisting a horse trainer in a 270-foot by 85-foot indoor riding area with a dirt floor. As the decedent fell against a nearby wall, the saddle horn struck the decedent's chest. The decedent fell to the floor. She arose, walked a few steps, and then collapsed to the ground. Emergency response was summoned while the trainer administered CPR. The decedent was transported to a local hospital where she died.

**Case 4** A 54-year-old male farmer died as a result of a horse kicking his head. The decedent was unhitching the horse from a buggy. The horse was tied to a hitching post with a 4-foot lead. The horse turned and kicked, all in one motion, striking him in the head with its steel-shoed hoof.

### Asphyxiation (1)

### Arts, Entertainment & Recreation

**Case 5** A 55-year-old male parks and recreation worker died from asphyxiation due to choking on a piece of food. The decedent was a member of a three-person crew removing traffic cones from a park roadway. He exited the work vehicle and walked to the front of the vehicle. His coworkers found him on the ground unresponsive in front of the work vehicle. Emergency response was summoned and resuscitative efforts commenced. He was declared dead at the hospital.

### Drug Overdose (4)

### Administrative & Support & Waste Management & Remediation

Case 6 A 31-year-old female custodian died due to acute intoxication while abusing multiple drugs.Case 7 A 22-year-old male security guard died due to acute intoxication while abusing multiple drugs.

#### Health Care & Social Assistance

**Case 8** A 41-year-old male nurse anesthetist died while abusing an intravenous anesthetic drug.

### **Other Services**

**Case 9** A 61-year-old male laborer died due to acute intoxication while abusing multiple drugs.

### Electrocution (5)

### Utilities

**Case 10** A 28-year-old male maintenance journeyman apprentice was electrocuted after contacting 40,000-volt

energized electrical lines. The decedent was performing substation maintenance to remove and repair electrical cables. On the day of the incident, neither a job briefing nor a "job protection" walkthrough was conducted by the substitute substation operator. The lines were not de-energized and locked out. The decedent placed a 6-foot aluminum ladder on gravel to gain access to the lines, which were approximately 10 to 12 feet above ground. Three coworkers were working on the opposite side of a nearby breaker and could not see the decedent. It is unknown what event occurred prior to the decedent contacting the energized lines. The three coworkers heard a "boom" and ran to the location. They found the decedent on the ground. His work tools were lying next to him and his hard hat was located approximately 10 feet from his body. The ladder had tipped and fallen to the ground. Coworkers called for emergency response. Emergency response transported him to a nearby hospital where he was declared dead. Reference: MIOSHA Summary Case 228.

### Construction

**Case 11** A 56-year-old male, who owned a well and pump repair company, died when he contacted a live 220 volt electrical line while replacing a well pump. The 2-person crew was in the process of removing the water pump from the well and reinstalling it to the inside of the residential home. The work crew had dug a 5-foot long by 2foot wide by 3-foot deep excavation to gain access to the pump. The excavation was covered by a back patio deck behind the homeowner's back door. The decedent had disconnected the wires to the pump and left the wires exposed. While removing the pump, he began to unbolt and extend the pipe that held the water pump to the floor level upwards. It appeared that while working on this activity, he received a small shock(s) so he asked his coworker to get some electrical tape to cover the exposed wires. The decedent had wrapped one wire with the electrical tape, but not a second wire. He was standing in the moist excavation while using a metal socket wrench to tighten down some bolts on the collar of the pipe extension. It is unknown if he directly contacted the exposed live wire or if the socket wrench contacted the exposed wire. His coworker, upon seeing him slump in the excavation, attempted to rescue his partner. Unable to perform the rescue, the coworker ran to the road and yelled for help. A passerby assisted him by disconnecting the power and then helping the coworker pull the decedent from the excavation. The passerby called for emergency response. Municipal Fire and Rescue assisted with medical treatment at the scene. The decedent was transported to a local hospital where he was declared dead. Reference: MIOSHA Summary Case 220.

**Case 12** A 34-year-old male construction laborer was electrocuted during demolition activities of a light industrial building. The decedent was approximately 10 feet above the ground in a Grove SM2232BE aerial work platform (scissors lift) with rubber tires. He was using a 3-foot long metal crowbar to break through a layer of drywall near a metal support beam. Lying on the floor of the elevated lift was a reciprocating saw which he had been using to horizontally cut the drywall. The saw was plugged into an extension cord. It is unclear if the extension cord was plugged into a ground fault circuit interrupter (GFCI) pigtail and it is also unclear if the pigtail was plugged into an energized 120-volt wall outlet. The decedent was facing the wall to be demolished with both hands on a crowbar when Coworker #1 saw a flash. He called to the decedent, who did not answer. He called to the decedent again, and then saw the decedent's hands slide off of the crowbar (which remained wedged in the wall) and slump toward the wall over the rail of the scissor lift. His coworker yelled for help. Two other coworkers entered the area. Coworker #1 stated he unplugged the GFCI from the wall. The two coworkers who arrived attempted to lower the scissors lift via the emergency controls. They were unable to lower it because a knob for the valve was missing. Procuring a pair of bolt cutters, they gripped the valve, lowered the decedent, and removed him from the bucket to the floor. The three coworkers began CPR and emergency response was called. The decedent was transported to a local hospital where he was declared dead. The MIOSHA compliance officer noted soot and burn marks on both the female end of the extension cord and the prongs of the reciprocating saw. The saw had been plugged into the cord, but possibly something narrow and conductive separated the two plugs or they were already partially separated and the electricity arced between them. Additionally, electric arc marks were noted by the compliance officer on the thin metal toe-board of the scissors lift, the side of the crowbar, and the side of the steel wall stud. The city electrical inspector plugged the GFCI into another energized outlet and found it to be functioning when its test button was pushed. The electrical inspector also used an outlet tester to induce a fault and found the GFCI functioning. Reference: MIOSHA Summary Case 221.

### Manufacturing

**Case 13** A 38-year-old male floor technician died of a probable electrocution when he contacted a return water pipe attached to a boom for a glass-melting electrode. He and a coworker were preparing to reposition the boom for the glass-melting electrode. The boom vertical stand was outside of the glass melter unit. The horizontal boom and its electrode extended into the glass melter. At the top of the glass melter was a spreader unit for the sand to be added to the melter. The spreader unit had a chute; the chute had become entangled in the electrode hoses. The electrode was insulated from the boom framework. The boom was insulated from the boom stand. The boom consisted of a 3-inch diameter water-cooled copper tube conductor, which was positioned between two sections of the boom frame work. This was connected to 110-volt power cable and flexible hose lines. The water traveled through this tube to the tail of the end portion of the electrode and water returned through a 3/4-inch pipe attached to the outside of the boom framework. The power cable was attached via a metal clamp to the 3-inch tube. A canvas sleeve covered portions of the top and sides of the clamp/cable. The 3/4-inch pipe was positioned five to six inches away from the clamp/cable and separated from the 3-inch tube by dielectric spacers. The boom framework was still conductive. The decedent was wearing a hi-temperature gloves composed of Kevlar/glass/ Nomex material. To reposition the boom, the decedent was to hold onto the return water pipe which was connected to the boom, while his coworker removed a pin at the base of the boom stand. The decedent would then appropriately position the boom and his coworker would reinsert the pin. While standing on ceramic brick, the decedent held the 3/4-inch pipe while his coworker knelt down to remove the pin. The decedent held onto the pipe but it was not confirmed that he contacted the tube or clamp. As his coworker was kneeling, the decedent called out to him. When his coworker looked up, he saw the decedent staring into the glass melter. The decedent's left hand was on the water return pipe and his right hand released from the pipe. Not finding a safe piece of equipment to disengage the decedent's left hand, his coworker pulled him from the pipe to the floor by grasping his right hand. The coworker initiated a "code red" and he and another employee performed CPR until emergency response arrived. A burn mark was detected on the decedent's right glove. No definitive electrical burns were found on the decedent's hands or body upon autopsy. The company measured the voltage at 87.3 volts and nondetectable amperage on the copper tube/clamp. MIOSHA found no absolute confirmation that there was hazardous energy in the spots where the deceased was in contact with the water return pipe at the time of the incident. Per the medical examiner: "Low-voltage electrocutions do not result in burns in a significant percentage of cases. In the absence of burns the diagnosis of death due to electrocution is dependent largely on the investigation. In this case, the investigation apparently did reveal a source of electricity (per MIOSHA) and the circumstances make it likely that an electrocution occurred." Reference: MIOSHA Summary Case 217.

### Professional, Scientific & Technical Services

**Case 14** A 39-year-old male owner of a neon sign manufacturing company died due to contact with an electrical source of unknown voltage. Near the workbench where he was found on the floor, a 10-jet gas torch device used to bend the glass tubes used in a sign was lit and functioning. A transformer with bare wires was inside of the workshop in the vicinity of his location.

### Fall (14)

### Construction

**Case 15** A 19-year-old Hispanic male roofing laborer died after falling 19 feet from a 10/12-pitch residential roof to concrete steps below. The work crew arrived at the residence at approximately 9:30 a.m. At approximately 9:30 p.m., the decedent and his two workers were finishing the work for the day by installing a tarp to cover the roof. The decedent, who was not wearing fall protection, was nailing the tarp at the roof peak. His coworker on the roof described the tarp as wet. It appears that the decedent slipped as he stepped onto the wet tarp and slid down and off of the roof, landing on concrete steps. He was wedged between the steps and a patio. His coworkers called for emergency response. The decedent was transported to a local hospital. He died early the next day from injuries sustained as a result of the fall. Reference: MIOSHA Summary Case 219.

**Case 16** A 61-year-old male painter died after falling 20 feet from an extension ladder while painting a grain bin with a paint sprayer. The ladder was held by a coworker standing on the ground. The decedent climbed the ladder while holding the paint sprayer. His coworker noted that the decedent "wobbled a bit" and then let go of the ladder and fell, landing on his chest. The ground surface consisted of grass, gravel and dirt. His coworker ran to the farm owner's home and asked for help. Emergency response was called. The decedent's coworker administered CPR until emergency response arrived.

**Case 17** A 51-year-old male crew supervisor died when his head struck the guardrails of his 4- x 8-foot work platform elevated by a 6036 Skytrack rough terrain forklift as it overturned to the side. The decedent was elevated approximately 18 feet above the ground. The Skytrack driver was in the process of positioning the decedent so he could install siding to the gable end of a new home under construction. The work platform was positioned lengthways on the forks. The forks were positioned in manufacturer-designed sleeves that did not go the length of the platform. These sleeves were designed for platform transport not for worker elevation. The platform was six feet past the center load distance of the forks and was attached to the back of the forks by a ratchet strap. No pins were used to secure the platform to the forks. Three sides of the platform were guarded. The decedent was not wearing fall protection. With the decedent elevated approximately 18 feet, the Skytrack approached the work area. The driver's side rear tire entered a mud hole causing the Skytrack to tip to the driver's side. The basket stayed connected to the forks, but the ratchet strap broke. The decedent rode the basket to the ground and apparently struck his head against the guardrail, and perhaps the ground. Emergency response was called, and the decedent was transported to a local hospital, where he was declared dead a short time later. Reference: MIOSHA Summary Case 222.

**Case 18** A 58-year-old male finish carpenter died as a result complications of injuries sustained in a 1998 fall from a storm-damaged roof.

Case 19 A 63-year-old owner of a construction firm died after falling 20 feet from a roof edge to the driveway.

### Manufacturing

**Case 20** A 37-year-old male laborer died when he fell through a pole barn's roof skylight 15 feet to the concrete floor. The decedent and his coworker were shoveling approximately two feet of snow from a 50-foot wide by 80-foot long section of the corrugated metal low-sloped roof. The building owner had given them a map of the roof, which showed the skylight locations and the roof area they were to clear of snow. The decedent and his coworker marked the ground below with stakes to mark the skylight locations. While shoveling the snow, the decedent

stepped on the skylight. The skylight gave way, and the decedent fell 15 feet to the concrete floor, striking his head. His coworker called emergency response. When emergency response arrived, he was declared dead at the scene.

### Retail Trade

**Case 21** An 88-year-old female volunteer at a hospital gift shop died after she fell from a standing height and struck her head.

### Transportation & Warehousing

**Case 22** A 50-year-old male mail carrier was killed when he slipped and fell onto a 1/4-inch round, 48-inch tall reflective metal driveway marker with a plastic tip. He had delivered mail to the incident location, walked down the driveway to the sidewalk to deliver the mail to the next home. He was on the sidewalk when he slipped and fell. He was wearing "ice grippers" on his boots.

#### Administrative & Support & Waste Management & Remediation

Case 23 A 21-year-old male window cleaner was seated in the boatswain chair, wearing a full body fall harness, and suspended over the edge of a building roof when the roof rigger parts separated causing him and the separated roof rigger piece to fall to the sidewalk below. Two days prior to incident, the decedent and his coworker carried their respective roof rigger parts to the roof and assembled them. The beam that suspended the worker had a post at each end that was inserted into a female post holder in the base. The base was oriented in a perpendicular fashion to the worker's beam support and posts. The female opening was slightly larger than the male end of the post. After inserting the post, the post was secured in place using a bolt and cotter pin. The base was composed of two separate parts; the part most distant from the roof was the counterweight. The decedent noticed he was missing a bolt as he was assembling the rigger. The decedent obtained a replacement bolt, but prior to beginning work that day, he did not replace the missing bolt. The base closest to the roof edge was properly secured to the beam support post. The post/base missing the securing bolt was located on the counterweight side of the rig. On the day of the incident, the decedent and his coworker made one drop from the roof to the ground while power washing the building windows. The crew returned to the roof, which was approximately 60 feet above the ground and moved the roof riggers to the next area. The decedent secured his fall protection lifeline to the roof rigger instead of the roof anchor points. The decedent was in the boatswain chair suspended over the roof edge when his coworker saw the decedent drop a foot or two, and then stop. The unsecured support post lifted out of the counterweight post holder, and the decedent, the roof rigger base closest to the roof edge, and the supporting beam fell to the sidewalk. The counterweight remained on the roof. The decedent's coworker ran to the side of the roof, saw the decedent on the ground, and then quickly exited from the roof to ground level. Bystanders called for emergency response while his coworker called the company owner. Emergency response transported him to a local hospital where he was declared dead. Reference: MIOSHA Summary Case 230.

**Case 24** A 22-year-old male tree trimmer died during a tree trimming operation. He was "belted" to the tree approximately 20 feet above the ground. It appears he was cutting a limb and the limb broke free, pinning him between the straps and the branch. His coworker indicated the tree trunk split, which pulled the decedent into the tree by his safety belt crushing him against the trunk. His coworker cut the tree from the ground and the tree trunk and decedent fell to the ground.

#### Arts, Entertainment & Recreation

**Case 25** A 76-year-old male usher was descending a staircase during a party when he missed a step and broke his ankle in 2008. He died from complications from his injury two weeks later.

**Case 26** A 36-year-old male racetrack volunteer died after falling from a platform attached to the back of a pickup truck that was responding to a car crash on the racetrack. The decedent was a member of a 4-person emergency response/safety crew. Two crewmembers rode in the truck cab, and the decedent and another crew member stood on the platform. The platform ran the width of the truck and extended 18 inches from the back of the truck. A railing was attached to the two ends of the platform, as well as along part of the platform length. There was an open area along the length that was unprotected by the railing. The emergency response crew and truck, which were stationed in the track's infield, was activated to respond. While in transport, the decedent and his coworker stood across from each other on the platform next to the corner "L" formed by the platform railings. At the junction of the infield and the packed dirt/clay racetrack, there was a 6-inch dip. The response truck was gaining speed as it drove over the dip and rocked back and forth as it entered the racetrack. The truck continued to pick up speed, and approximately 50 to 75 feet down the track, the decedent may have slipped or lost his balance, causing him to move from the platform corner to the center of the platform. He fell backwards from the platform and hit the ground, rolling several times. Emergency response was called and the decedent was transported to a nearby hospital where he was declared dead. Reference: MIOSHA Summary Case 223.

### Accommodation & Food Service

**Case 27** A 61-year-old female waitress died of complications sustained from an ankle fracture she sustained after falling in the parking lot of her workplace.

**Case 28** A 51-year-old male restaurant owner, who had been replacing ventilation filters, died after falling approximately 20 feet from the building roof.

### Fire/Explosion (1)

### Construction

**Case 29** A 42-year-old male construction laborer died when the gases in the 6,000-gallon underground diesel storage tank he was cutting ignited and caused an explosion, propelling the decedent approximately 35 feet in the air. It was raining heavily at the time of the incident. The air temperature was approximately 58 degrees F. The tank had been filling with water and the service station owners had hired the decedent's employer to decommission the tank. Per the police report, one of the decedent's coworkers stated that the crew was "to cut open the tank and fill it with a pile of dirt located near the hole/empty tank." Employees had previously cut a 6-foot by 5foot hole in the concrete and using shovels had excavated the hole to expose the underground storage tank. The tank was located approximately three feet below grade. Earlier in the day, a worker from another company had pumped the water out of the tank and noted that gas was coming out of a 2-inch pipe that was open near the tank. No air monitoring for levels of explosive gasses or oxygen was performed inside the tank prior to the decedent beginning his cuts on the top of the tank. The decedent used a right angle grinder with cutting wheel attached to cut a 2-foot 4-inch wide by 4-foot 8-inch long opening in the top of the tank. He made one cut to the south, one to the west and one to the north. According to the Fire Department, the cut to the north was not completed. It was during the north cut that the sparks from the cutting wheel ignited the gases in the tank resulting in the explosion. The explosion caused the tank top to partially tear near the east side and stick up in the air. The explosion propelled the decedent approximately 35 feet in the air. He landed on the ground 13 feet to the southeast of the tank. His handheld grinder was found 48 feet east of the tank. The explosion also caused a part of the tank piping

dislodge. This piping was found approximately 130 feet away southeast of the tank. The decedent was declared dead at the scene. The Fire Department's fire investigator's opinion was "that the explosion originated in the underground gas tank." The investigator "further believed that the explosion originated from the sparks from the tool being used on this tank. Reference: MIOSHA Summary Case 211.

### Homicide (10)

### Mining

**Case 30** A 61-year-old male owner of a gravel operation died from multiple gunshot wounds.

### Construction

**Case 31** A 53-year-old male owner of a window installation business died when a disgruntled employee shot him.

### Retail Trade

**Case 32** A 23-year-old male cashier in a liquor store died from a gunshot wound sustained during a robbery.

**Case 33** A 48-year-old male sales manager at a car/truck electronic aftermarket accessories store was shot and killed in the parking lot of the store

Case 34 A 66-year-old male convenience store owner died from multiple gunshot wounds.

Case 35 A 24-year-old male gas station attendant died from multiple gunshot wounds.

Case 36 A 57-year-old male retail store owner was stabbed during a robbery.

### Accommodation & Food Service

Case 37 A 51-year-old female bar worker was stabbed in the bar's office.

Case 38 A 48-year-old female custodian was stabbed in the bar where she worked.

Case 39 A 68-year-old female bar owner was stabbed and killed by an assailant.

### Machine (7)

### Agriculture

**Case 40** A 29-year-old male farm hand died when his shirt became entangled in an unguarded power take off (PTO) shaft while making feed for a dairy operation. The mixer/feeder involved was a Kuhn Knight 4090 mixer mounted on a trailer and hooked to a John Deere tractor. A PTO shaft connected the tractor and mixer and provided power to the mixer. The mixer had a 14-inch long shaft located approximately 40 inches above the ground. The shaft had a tube-floating guard over it which extended out of the underside at the mixer's front center. The 14 -inch long shaft connected to a 4-inch wide universal joint and then through a fixed bearing located on top of a piece of channel iron measuring 4 inches wide by 14 inches high that was mounted to the top of the mixer tongue. The universal joint had a bolt extending through the joint holding it to the shaft. There was a 4-foot-long square shaft that connected to the front of the mixer universal and the universal and connector at the tractor. Guards were not replaced after repair activities several months earlier; no guards were present for either of the universal

joints or the PTO shaft. The 4-foot-long shaft between the two sets of universals had a label on the shaft from the manufacturer stating "Guard Missing-Do Not Operate." A digital scale box was mounted to a pivoting horizontal arm which was mounted to the front of the feeder/mixer box. The scale box was approximately 7 feet above the ground and approximately 2 to 3 feet from the PTO shaft. The operator was required to load the mixer with the tractor running to power the PTO. The work practice as described to the MIOSHA compliance officer was as follows: To load the mixer, the operator pulled into the area, stopped the tractor and dismounted from the tractor cab with the power take off and mixer in operation. The operator walked to the scale box and pivoted it toward the side of the mixer so he/she could read the scale when loading feed into the mixer with a front-end loader. When the mixer was loaded, the operator pivoted the scale back toward the tractor so it could be seen while the tractor was feeding cattle out of the feeder/mixer. Coworkers indicated to the MIOSHA compliance officer that hay would fall from the mixer onto the PTO shaft during loading. To prevent the hay from becoming wrapped around the shaft, they would use their hands to brush it away. Due to his height, the decedent might have had difficulty reaching the pivot arm on the mixer/feeder. To reach the pivot arm, he may have stood on the mixer tongue and/or the rear wheel of the tractor. The event was unwitnessed. At some point during the decedent's work operation, his shirt became entangled on the bolt extending through the universal at the mixer/feeder. A coworker found him, turned the tractor off, and ran for help. His coworkers called for emergency response. When emergency response arrived, the decedent was declared dead at the scene. Reference: MIOSHA Summary Case 209.

**Case 41** A 75-year-old male farmer died in a non-ROPS-equipped Ford 3000 tractor rollover. The tractor was equipped with a front end loader. The decedent was pushing down trees with the tractor. It appears that the decedent was attempting to push down a 14"-18" diameter tree that was approximately 30-40 feet tall. This tree had several scrape marks up the side of the tree from about 3-feet from ground level up all the way up to approximately 10-12 feet in height. Police postulated that these marks were made as the tractor was overturning to the rear.

**Case 42** A 71-year-old male farm hand died when he was pinned under a non-ROPS equipped 1964 John Deere tractor when it overturned into a ditch after leaving a roadway and striking a tree. The decedent had been a seasonal employee for the farm for 15 to 20 years. This was the second day of the season. The decedent had been cutting hay in a field located approximately ½-mile from the farmstead. Some discs were broken while he was cutting hay. He called the farmstead to inform them of the problem. He was returning to the homestead, traveling south on a two-lane chip-sealed roadway. The roadway was in poor condition. The roadway had a slight downhill grade. The right tractor tire left the roadway. The tractor and haybine entered a ditch, which were approximately three feet wide and three feet deep. The tractor exited the ditch, drove up the ditch's embankment, which was higher than the road, and continued to travel 40 to 50 feet along the side of the road. The side of the road had brush and small trees. The tractor struck a four- to five- foot diameter tree, and then struck a much bigger tree. The right front tractor wheel climbed the tree approximately three feet, and then the tractor tipped to the left (driver's side), and rolled into the ditch. The ditch at this location was approximately four to five feet deep. When police arrived, they found that the right front wheel had broken away from the cast iron axle. Both a vehicle driver and a neighbor saw the overturned tractor. The vehicle driver called for emergency response. The decedent was declared dead at the scene.

**Case 43** A 43-year-old male farm manager died when the elevated arms and bucket of a skid steer loader fell and pinned him against the skid steer frame. The hydraulic line to the loader's foot controls was leaking. The decedent raised the bucket but did not extend the safety pins to support the bucket arms in the raised position. The decedent removed the skid steer's floor cover plate and the steering control stick. The decedent, standing in front of

the machine under the unsupported elevated bucket, was using a wrench to remove the leaking hydraulic line. The line blew off which caused the elevated bucket to fall onto him. A coworker who had been working with him was in another area procuring additional tools. The coworker heard the crash of the bucket striking the floor and ran back to the decedent. The coworker called the farm owner after arriving at the scene. The farm owner and the decedent's coworker lifted skid steer from the decedent using another skid steer. The decedent was pulled from under the bucket and emergency response was called. The decedent was transported to a local hospital where he was declared dead. Reference: MIOSHA Summary Case 226.

### Construction

**Case 44** A 30-year-old male construction laborer was pinned under the tire of an articulating DitchMaster M450 with a front end loader and tree spade attachment that overturned to the side. The decedent's employer had parked the machine, placing the front end loader attachment across a construction trailer tongue and its 2-foot crank hitch with the driver's side front tire resting against the trailer tongue. The decedent and two coworkers arrived at the worksite and wanted to haul the construction trailer from the worksite. The decedent, against company policy, climbed onto the seat, pulled the Kill switch, and started the machine. The machine stalled, and he started it again. The machine was in first gear. When he applied power, the machine started forward. The front driver's side front tire drove up and over the trailer tongue hitch, puncturing the tire. The machine articulated (bent in on itself), and then overturned. Either the decedent was trying to jump from the machine as it articulated or he was thrown from the machine as it overturned. He was pinned under the machine's rear passenger side tire. His two coworkers attempted to get the machine off of him by placing a car jack at the location of the tire that pinned the decedent and attaching a chain to the loader arm and the pickup truck they arrived in. When they were unable to lift the machine from him, the coworkers called for emergency response. Upon emergency response arrival at the site, his vital signs were absent. Emergency response personnel began the recovery operation.

#### Manufacturing

**Case 45** A 77-year-old male assembler died from a forklift-caused injury sustained in 1973.

**Case 46** A 51-year-old male toolmaker died when the second stage of a two-stage movable dowel pin inserter carriage was activated and descended on him, pinning his head between the carriage and a conveyor. The incident occurred on an engine block assembly line. The station involved two interlocked gates to control access. One of the gates was closed. The other gate had been opened. The station had a two-stage movable dowel pin inserter carriage; dowel pins were inserted by an automated arm system. When the engine was lined up properly, the dowel pin arm system inserted a series of pins in a downward motion then if successful the arm apparatus returned to an upward position and waited for the next sequence. Two toolmakers had been troubleshooting the section where the dowel pins were inserted into the engine. They were trying to figure out why the dowel pins were jamming up or not lining up properly. They used a "cheat key," which was available at the tool crib, to circumvent the open gate's interlock safety system. The toolmakers made the adjustments and thought the problem was fixed. They asked the machine operator to run the engine through. When the machine loaded, it jammed again at mid-cycle. Another worker in the area noted that there was a blinking "cancel next cycle" light and a solid "cycle" light. It appears that the tool makers, in trying to clear the jam, satisfied the condition for the next step in the machine cycle. One of the toolmakers walked to the far side of the carriage to see where the jam was occurring. The decedent then arrived and offered his assistance because he had worked on this machine in the past. The decedent straddled the conveyor that moved the engine blocks during assembly. He was releasing "wrenches" when the incident occurred. At this point it is unclear as to the sequence of events. The police report indicated that when the decedent

pulled the "wrenches," the machine re-started and the second stage of the carriage descended and pinned his head between the carriage and the conveyor. The MIOSHA file indicated that an engineer for the firm arrived at the location and told the machine operator to activate the machine. The individual who noted the solid machine "cycle" light turned to tell the toolmakers to get out of the machine. The decedent was leaning into the area under the dowel pin carriage when it descended. The plant engineer hit the E-stop. Plant emergency response was called and arrived within minutes. The decedent was declared dead at the scene. The machine's pendant control was not utilized. Reference: MIOSHA Summary Case 214.

### Motor Vehicle (20)

### Construction

**Case 47** A 56-year-old female truck driver died when she was attempting to stop a rolling dump truck/flatbed trailer. The decedent drove the dump truck/trailer into the service yard, and parked the truck on a gravel/dirt surface while her coworker parked a pickup truck nearby. Her coworker disconnected the trailer, and the decedent drove the truck to an adjacent trailer. The decedent left the truck cab, leaving the dump truck idling. Her coworker connected a dual axle utility trailer to the rear hook and connected the airlines and the electrical lines. The police report states that the coworker indicated he heard the low air warning alarm sounding. After connecting the trailer, the decedent and her coworker walked to the pickup truck to unload tools. As they were unloading tools, the decedent noted the dump truck rolling downhill. The decedent ran in front of the dump truck to get to the driver's side door. Her coworker lost sight of her as she ran around the front of the truck. The truck struck a tree, and then continued downhill. The coworker stated he too ran in front of the truck. He was able to apply the foot brake to bring the truck to a stop. The coworker stated the parking brake was already applied. He found the decedent on the ground. The coworker called for emergency assistance. It appears that the driver's side of the dump truck struck the tree. The police investigation concluded that the driver's side door was open when truck door struck the tree, and that the decedent was crushed between the driver's door and the frame of the truck cab. The Michigan State Police Motor Carrier Division found that the right side parking brake was out of adjustment, and that the additional weight of the attached trailer may have exerted enough force to overpower the single brake that was engaged.

**Case 48** A 54-year-old male road commission foreman died when he was run over by a backing 2004 Freightliner dump truck. The work crew was laying asphalt on a 2-lane roadway. The decedent, as crew leader, was the designated spotter. The truck had dropped its load of asphalt and had pulled forward. The truck driver was in the process of backing the truck to the dump site so he could drop the truck blade and scrape the asphalt. While directing the backing truck, the decedent walked along the road shoulder. For reasons unknown, he then stepped into the road and behind the backing truck. The truck's backup alarm was functioning properly. Reference: MIOSHA Summary Case 225.

### Manufacturing

**Case 49** A 40-year-old male sales account servicer was killed when the automobile he was driving collided with an oncoming vehicle. The decedent was driving northbound on a slushy, 2-lane roadway with a posted speed limit of 55 mph. The responding police agency determined he was driving too fast based on the road conditions. It appears he lost control of the vehicle and "spun out." The vehicle crossed the centerline into the path of an oncoming southbound vehicle. The decedent's vehicle was struck on the passenger side. The decedent was wearing a lap/ shoulder harness. His vehicle's airbags did not deploy.

**Case 50** A 35-year-old male food sales manager died when he lost control of the minivan he was driving and struck an oncoming vehicle. It was snowing heavily at the time of the incident. The 2-lane roadway was covered with snow and slush. The posted speed was 55 mph. When the decedent lost control of his southbound vehicle, he went sideways across the centerline, and into the path of a northbound vehicle. The northbound vehicle struck the passenger side of the decedent's vehicle. Police postulated that the decedent may have been eating a piece of fruit at the time of the incident. The decedent was wearing a lap belt/shoulder harness. The van's airbags did not deploy.

### Wholesale Trade

**Case 51** A 52-year-old female food sales representative was killed when her vehicle was struck head-on by a vehicle (Vehicle 1) being driven by an individual whose blood alcohol level was greater than 0.08%. At the time of the crash, a police officer was in pursuit of Vehicle 1 as radar indicated the vehicle was traveling faster than 70 mph. Vehicle 1 crossed the centerline of a 2-lane roadway with an unposted speed limit of 55 mph and struck the decedent's vehicle head-on. The decedent was wearing a lap/shoulder harness. The vehicle's airbags deployed.

### Retail Trade

**Case 52** A 38-year-old male retail manager died approximately two week after the stake truck he was driving was struck by a train. The decedent had stopped at the railroad crossing. It appears the decedent was reaching down to the truck's floor when the truck moved forward onto the railroad tracks and was struck by the train on the truck's passenger side. The train was travelling approximately 25 mph.

**Case 53** A 68-year-old female newspaper carrier died when the vehicle she was driving was struck by a pickup truck at an intersection. The pickup truck was traveling eastbound toward the intersection. The decedent's vehicle was traveling northbound. The intersection was marked by a blinking traffic signal; the northbound right of way was indicated by a yellow blinking signal, the eastbound roadway had a blinking red light. The driver of the pickup truck did not stop and struck the decedent's vehicle on the driver's side door. The impact caused the decedent's vehicle to leave the roadway and strike a building. The decedent was not wearing a seat belt/shoulder harness. The vehicle was not equipped with an airbag. The pickup driver stated in the police report that the GPS device on the dashboard began to speak. The driver looked down at the device to see where the device was directing the driver to turn.

**Case 54** An 87-year-old male chauffeur for a car dealership died from complications sustained in a collision occurring three months earlier. The decedent failed to yield while completing a left turn onto a 3-lane roadway with a posted speed limit of 50 mph. The decedent was wearing a lap/shoulder belt. The van's air bag deployed.

### Transportation & Warehousing

**Case 55** A 52-year-old male truck driver died when he was run over by an empty Peterbilt tractor trailer pulling a dump trailer and a pup as he was walking to his truck in the truck parking area. The two corner pole lights located at the rear of the parking area were not working. The individual driving the tractor trailer had turned on the truck's amber/running lights but had not turned on the truck headlights.

**Case 56** A 69-year-old male truck driver was killed when his semi-tractor and trailer was involved in a crash with an SUV. Both the semi and the SUV had been traveling westbound on a dry, 2-lane expressway with a posted speed limit of 60 mph. The incident occurred in a construction zone; there was no construction activity at the time of the crash. The eastbound lanes were being rebuilt; thus both eastbound and westbound lanes were occupying

what would normally be the westbound lanes, with one lane eastbound and two lanes westbound. The eastbound and westbound lanes were separated by a concrete barrier. What would normally be the right shoulder of the westbound lanes was being utilized as the right lane, reducing the right and left shoulder widths. The road surface was newer concrete. A changeable message sign informed trucks to use the left lane. It appears that the right front of the SUV struck the end of the guardrail located on the west side of the roadway. After striking the guardrail, the SUV rotated clockwise back into the westbound lanes. It appears the decedent attempted to avoid the SUV by moving left, but was limited by the concrete barriers separating the westbound and eastbound lanes. It appears the two vehicles made contact as the decedent's truck traveled from the left lane, across the right lane and through a guardrail, catching fire, and then over a bridge and down an embankment. The decedent's vehicle then became engulfed in flames. The decedent was wearing a lab and shoulder belt. It is unknown, due to fire damage, if the cab was equipped with an airbag.

**Case 57** A 41-year-old male account executive died when the vehicle he was driving crossed the centerline and struck an oil tanker truck head on. The incident occurred on a dry, 2-lane roadway with a speed limit of 55 mph. The decedent was driving westbound. The tanker truck attempted to avoid the collision by applying his brakes and driving toward the south shoulder of the roadway. The decedent's vehicle contacted the tanker near the roadway's south shoulder. Another vehicle driver, who was behind the decedent's vehicle, noticed that the decedent leaned from the driver's seat into the passenger seat as if he was reaching for something or adjusting the radio just prior to the decedent's vehicle entering the eastbound lane. The decedent was not wearing a seat belt/shoulder harness. The vehicle's airbags deployed.

### Professional, Scientific & Technical Services

**Case 58** A 38-year-old male consulting engineer for a pharmaceutical company died when he lost control of the vehicle he was driving on a snow-covered, slippery 4-lane road. The speed limit was 40 mph. The decedent was traveling at approximately 30 mph. It was snowing moderately at the time of the incident. The decedent's southbound vehicle was traveling in the left lane, and began to slide into the right lane. The decedent overcorrected, causing the vehicle to slide and rotate to then to cross the center line. His vehicle was hit broadside by an oncoming vehicle. The decedent was wearing a lap/shoulder belt. The vehicle's airbags did not deploy.

### Administrative & Support & Waste Management & Remediation Services

**Cases 59-62** A 25-year-old male foreman of a landscaping firm and his three male passengers, two passengers who were 17 years of age and one passenger who was 16 years of age died when a semi-truck and trailer (Vehicle #2) crossed the centerline of a dry, 2-lane road and struck their pickup truck hauling a utility trailer (Vehicle #3) head on. The speed limit was 55 mph. Vehicle #1 was traveling northbound and crossed the center line 10-15 inches into the path of the southbound Vehicle #2. Vehicle #2 struck Vehicle #3 head on, separating the pickup's passenger compartment from the frame and the utility trailer. The medical examiner was not able to determine if there was seatbelt use by the driver or passengers; the seatbelts were found by emergency responders in a retracted position. The pickup was not equipped with airbags.

**Case 63** A 61-year-old male security guard died when the truck he had been driving ran over him. The decedent was beginning his rounds in an unlit, secure parking lot. It is unknown how he became trapped underneath and in the wheel well of his vehicle as it was running in reverse. The vehicle circled repeatedly and he was struck several times. He was found by another security guard who came on duty.

**Case 64** A 27-year-old male laborer for a tree trimming service died when the passenger side front tire of a GMC C8500 bucket truck that he was attempting to guide while it was backing into a parking space caught his foot and he was run over. The decedent and his coworker (driver) were in the process of backing the 27-foot long bucket truck into a space at the end of a row of trucks. The truck had backed up approximately 35-40 feet before the decedent was run over. The decedent had exited the truck and walked along the passenger side of the truck facing the rear of the truck as the driver was backing. The driver had been watching the decedent using the passenger side mirror, but had briefly looked in the driver's side mirror to ensure the truck was not too close to the truck he was backing next to. The driver heard other employees yelling and he immediately stopped the truck. It is unknown if the decedent tripped or he was struck by the tire. Reference: MIOSHA Summary Case 215.

### Health Care & Social Assistance

**Case 65** A 43-year-old female caregiver for physically and mentally disabled individuals died in a two car traffic collision while transporting a patient. The decedent was driving a 15-passenger full size van eastbound on a wet, 2-lane roadway with a posted speed limit of 55 mph. She failed to stop at a stop sign at a road intersection and struck a pickup truck traveling southbound. The van's airbags deployed. The decedent was wearing a lap/shoulder belt.

### Public Administration

**Case 66** A 44-year-old male federal agent died when the vehicle (Vehicle #1) he was driving struck another vehicle (Vehicle #2). The decedent was traveling eastbound on a 4-lane roadway at a high rate of speed (nearly 90 mph) in the left lane west of a roadway turnaround. The posted speed limit of the roadway was 45 mph. Vehicle #2 exited from the turnaround with the intent to cross all four lanes of traffic to enter a business located on the south side of the roadway. The decedent swerved to the middle right lane (crossing two lanes of traffic) and force-fully applied the vehicle brakes in an attempt to avoid Vehicle #2. Vehicle #2 struck the decedent's vehicle, which was now in the far right lane, on the driver's side. After striking roadway curbs, the decedent's vehicle rolled and came to a final rest on the roadway surface. The decedent was not wearing a lap belt/shoulder harness. The vehicle's airbags did not deploy.

### Struck By (17)

### Agriculture

**Case 67** A 46-year-old male logger was felling trees with a chain saw while his coworker was hauling the fallen trees to another location on the worksite. It appears that while the decedent was felling a tree, the top of the tree fell and pinned the decedent's head against the ground.

**Case 68** A 68-year-old male farmer died when he was struck by a falling tree he had felled with a chainsaw. One of the family members working with him ran home to call for emergency response while the other family members stayed with him. Another family member drove to the site and transported him to a nearby house. Emergency response arrived and he was transported to a local hospital. He died later that day.

**Case 69** A 65-year-old male farmer was crushed by frozen silage in a cement silo as he was attempting to free it prior to milking his dairy cows. When he did not return for lunch, his spouse went to the dairy barn, but he was not there. His wife called for assistance from one of their neighbors. The neighbor went to the dairy barn and called out for the decedent. He heard the decedent yell back from inside the silo. The neighbor broke off a wooden hatch over the small opening to the cement silo and was able to free the decedent's head. The decedent was able to converse. Neighbors called 911, and when emergency response arrived, the decedent was freed from

silage in the silo. An air ambulance was summoned, but he died from the injuries sustained prior to being transported to the hospital.

### Construction

**Case 70** A 44-year-old male roofer died from complications of a head injury sustained in 2008 when the jib of a 30-ton Grove truck crane fell and struck his head. The decedent was a member of a three-person crew that was preparing the crane for use at the site. The boom and jib were in stow position. One of the crew members had removed the stow pin. The crew was in the process of pinning the jib to the boom. With the stow pin removed, the decedent attempted to install the pins connecting the upper and lower ear. During assembly, the crew partially inserted the pin that connected the jib to the boom because the jib and boom holes had not aligned correctly. To correct this misalignment, the crew was manually manipulating the jib to line up the jib and boom holes. The decedent used a cargo strap around the jib to keep the jib from swinging out while his coworkers continued the alignment attempt. The pin dislodged from its position causing the jib to fall four to five feet and strike the decedent. He was wearing a hard hat. Emergency response was summoned and the decedent was taken to a local hospital. He died one year after the incident. Reference: MIOSHA Summary Case 229.

Case 71 A 45-year-old male construction business owner died when he was pinned between a dump truck and a box truck used for tool storage. The box truck was parked in the street in front of a residential driveway. The dump truck was located in the driveway. The driveway had a slight incline from the street to the residence. The driveway was snow-covered and icy. At the time of the incident, one worker was on top of the box truck securing tools, one worker was inside of the box truck, and two workers were positioned at the rear of the dump truck. It appears that the decedent moved the dump truck forward to facilitate driveway clean-up prior to leaving for the day. He moved the truck ahead, stopped it, and leaving it running, placed it in neutral and appeared to engage the emergency brake. He exited the dump truck and walked forward to the box truck, possibly to load something into the cargo door located on the passenger side or to secure the cargo door. The dump truck rolled/slid forward toward the street and struck the decedent, crushing and pinning him between the vehicles. One of the decedent's coworkers, who was positioned at the rear of the truck and picking up debris ran to the dump truck and entered the cab. He placed the dump truck in reverse and moved it away from the decedent. Exiting the truck, he placed a chock under the front wheel to secure the truck from rolling forward. Police conducted a vehicle inspection and found the vehicle to be in proper working order. The police were unable to determine if the dump truck's parking brake was fully engaged and the truck slid on the snow/ice, or if the parking brake was not fully engaged and the truck rolled down the driveway. Reference: MIOSHA Summary Case 210.

**Case 72** A 39-year-old male volunteer died when he was struck in the head and chest by the auger cover of a wood chipper while clearing a 4-wheeler trail. The wood chipper had clogged. The chipper was turned off, the auger cover raised, and the jam cleared by the decedent and another volunteer. The decedent closed the auger cover and turned the chipper on. A loud noise was heard. The cover blew off and struck the decedent and another volunteer. The decedent and another volunteer. The decedent and the volunteer were thrown back approximately 13 feet by the force of the exploding cover. The auger cover landed approximately 70 feet away from the chipper.

**Case 73** A 48-year-old male commercial roofer was killed when a load of roofing material, weighing approximately 1,900 pounds fell 20-30 feet from a 40-inch by 50-inch wooden pallet being transported overhead. The decedent and his coworkers were working on a commercial building roof. The load of roofing material was being lifted by a tower crane. The decedent's supervisor, who was the roof man (signal person) for the lift, was working in another area of the roof clearing space for the pallet of rolled roofing material to be placed. The rigger "basket-rigged" the wooden pallet with two slings, both of which were 28-foot, 2-inch polyester slings. The slings were

connected to a <sup>1</sup>/<sub>2</sub>-inch by 19-foot 2-inch leg spreader equipped with 10-inch hooks and a master ring that was connected to the crane's hook. The slings were placed through the fork lift sleeves of the pallet. The rolls of roofing material were shrink-wrapped for transport. The rigger placed a ratchet strap around the roofing bundle. The rolls of roofing material were not secured to the pallet. The rigger indicated the load was ready to be hoisted to the roof. As the rigger observed the load being raised, he did not note any load instability or imbalance. The crane operator lifted the load approximately 20-30 feet above roof level, and then began to transport the load to the placement area. This involved swinging the load over the area where the decedent and his coworkers had been assigned to work by the supervisor. The crane operator noticed the roofing material fell from the pallet and struck the decedent. The coworkers called for emergency response, unhooked the ratchet strap, and removed the roofing materials from the decedent. Emergency response provided care, and the decedent was transported to a local hospital where he was declared dead.

Case 74 A 36-year-old Hispanic male construction laborer was killed when an excavation collapsed. The decedent was a member of a three-person crew assigned to repair a residential leaking water main. The crew consisted of an equipment operator, a foreman and the laborer (decedent), with oversight by a municipal inspector. The soils along the west side consisted of an undetermined depth of roadbed and soil of an unknown composition. The soils directly to the north, south, and east consisted of unknown backfill material. All soils were saturated with water. The foreman used a probing rod, to determine soil type. When the work crew arrived, water was observed bubbling out of the 5-foot wide grassy area between the curb and sidewalk. The decedent and the equipment operator shut off the water for the affected main while the foreman began to remove the soil using a front-end loader with a backhoe attachment located at the south end of the excavation. The contract with the municipal department required a 30-foot square cut as a maximum opening size for the excavation. The excavation was approximately 6 feet long and 7 feet 2 inches deep. The width at the bottom was 6 feet 9 inches and the width at the top was 5 feet 6 inches. All four of the excavation walls were nearly vertical. Water saturated spoils were placed on the roadway, along the west side of the excavation and flowed to the west and over the opposite curb. A pump was used to remove water from the excavation. The roadway had been undercut approximately 15 inches to expose the leak location and to obtain adequate clearance to make a "cut out" repair. The decedent and equipment operator found the 8-inch water main leak. The excavation was repeatedly entered via a ladder located on the east wall of the excavation next to the sidewalk at the north end to clean around the pipe so repairs could be made. Water saturated soil was entering the excavation on the north side. The foreman placed loose straw and 1-inch by 6-inch boards against the north wall while the decedent hand-dug with a shovel around the water main. The decedent was standing on the water main due to the water level at the base of the excavation as he was cleaning. The foreman was in the excavation and the equipment operator was at the top of the east side of the excavation to watch the excavation walls. The roadway curb was located approximately vertical to the decedent's position. The equipment operator and inspector watched as the roadway curb and street buckled creating an audible "pop" as the concrete dropped into the excavation. The equipment operator yelled a warning to the decedent and the foreman to watch out. The sides of the excavation, concrete roadway, and a portion of a concrete driveway apron collapsed into the bottom of the excavation. The decedent was struck by and trapped by the falling roadway and soil. Emergency response was called and while waiting for emergency response to arrive, the crew used the backhoe to lift pieces of the roadway from the decedent. Emergency response arrived, and ordered the decedent's coworker out of the excavation. The decedent was declared dead at the scene after several hours of trying to extricate him from the excavation. Reference: MIOSHA Summary Case 218.

**Case 75** A 61-year-old male truck driver died when he was struck by a 3,770-pound precast concrete panel that fell from a semi-truck trailer. The semi-trailer had two A-frames, one located toward the rear of the trailer and one

the front of the trailer. The A-frames supported multiple panels. The decedent unstrapped the load from both Aframes. The unsecured 2-foot high by 19-foot long by 16-inch wide precast concrete panel that struck him was on the A-frame located at the front of the trailer on the passenger side. A crane was in the process of lifting another precast barrier from another A-frame located toward the back driver's side of the trailer. The lift travel was toward the front of the trailer. A 50-foot looped tag line was in use. This was an un-witnessed event. A recreation of the incident by the employer may explain the series of events that led to the panel falling from the trailer and onto the decedent. As the precast barrier from the rear of the trailer was being lifted up and over the unsecured precast panel that eventually fell, the looped tag line caught the edge of the panel. The decedent had been standing near the passenger side of the truck cab. It is postulated that he may have noticed the tag line "hook" on the corner of the panel and was moving toward the trailer to remove the tag line from the trailer, strike him, and pin him to the ground. After the panel fell, the crane operator lowered the precast panel he was lifting from the trailer to the ground. Coworkers unhooked this panel and then hooked up to the one that had fallen on the decedent. The panel was lifted from the decedent and emergency response was called. The decedent was transported to a local hospital and declared dead. Reference: MIOSHA Summary Case 224.

### Manufacturing

**Case 76** A 41-year-old male temporary agency laborer died when a 30-foot, 3,600-pound steel beam rack fell onto him. The beam rack was held in a stationary elevated position, approximately six feet above the ground by a saddle horse placed at each end. Welded to the top of each saddle horses were two V-shaped saddle supports; each saddle horse accommodated two beam racks. The saddle horses were aligned directly across from each other so the end of each beam rack could be placed into a V-shaped saddle support. Affixed to the underside of the metal beam were the racks; rectangular metal pieces from which parts ready for galvanizing were hung. Welded to the top of the beam rack were two triangular-shaped attachments positioned to permit an overhead crane equipped with two hooks to lift the beam rack from or place the beam rack onto the saddle horses. The two saddle horses were not secured to the floor. The crane operator placed one beam rack (Beam Rack #1) into the V-shaped saddle supports. Each end of Beam Rack #1 was secured with a wire tie to its respective saddle horse. The second beam rack (Beam Rack #2) was placed into its V-shaped saddle supports. It is unknown if Beam #2 was secured to the saddle horses. The crew hung the parts on the rack of Beam Rack #1. When all parts had been hung, one of the decedent's coworkers lifted Beam Rack #1 from the saddle horses with the overhead crane. To clear Beam Rack #2, Beam Rack #1 was required to be raised to at least 15 feet above the ground. The decedent began hanging parts on Beam Rack #2. The galvanizing area was located in a direction that required Beam Rack #1 to be lifted up and over Beam Rack #2. The hanging parts to be galvanized or the beam of Beam Rack #1 may have caught on the lip of one of Beam Rack #2's V-shaped saddle support. Police photographs show that one of the saddle horses that supported the beam racks had fallen to the ground. The saddle horse had rotated counterclockwise 90 degrees and landed with its V-shaped saddle supports resting on the floor. It is postulated that as the saddle horse fell and rotated, the end of Beam Rack #2 became unsupported and slid from the saddle supports. The beam fell at an angle in the direction of the saddle horse that tipped over. The beam struck the decedent and pinned him to the floor. The second saddle horse remained upright and in its original position. Three fork lift trucks were used to lift Beam Rack #2 from the decedent. Emergency response was called. The decedent was declared dead at the scene. Reference: MIOSHA Summary Case 227.

**Case 77** A 60-year-old male maintenance mechanic died when a 1,863-pound cleaner door fell onto him. The decedent and his coworker were assigned to replace a vertical hydraulic cylinder and its hydraulic hose attached to both the cleaner door framework (stationary) and a movable cleaner door. The cleaner door moved up and down

within the stationary framework and prevented product from coming back out of the processing unit. The decedent and his coworker raised the cleaner door using the hydraulic system to determine where the defective hydraulic cylinder/hose was leaking and to increase access to make it easier to remove a pin attaching the cylinder to the frame. After they raised the cleaner door, they wrapped a 3/4-ton lever chain hoist (chain jack) attached hook to hook, at an angle around one cross member of the framework and one cross member of the cleaner door to secure it in the raised position. They did not utilize secondary support to ensure the raised cleaner door stayed in the raised position. The crew locked out the main panel and applied their lockout locks. As one coworker set up a ladder, the decedent attempted to remove the upper pin on the cylinder but was unsuccessful. The crew decided to disconnect the hydraulic line and manually lower the cylinder so it would be easier to drive the pin out of the cylinder. His coworker noted that access to the hydraulic coupling was better from the north side of the unit and communicated this to the decedent. The decedent repositioned himself to obtain better access. This new position placed him under the raised cleaner door, laying down, facing his coworker. His coworker was outside the work area on a ladder. The incident occurred while the decedent was disconnecting the lower hydraulic hose and his coworker was holding the fitting for the cylinder. The fitting broke, causing the hydraulic hose to become disconnected. Hydraulic fluid was forcefully released onto the decedent's coworker. The release of hydraulic fluid caused the cleaner door to fall. The force cause the chain jack to fail and the cleaner door continued to fall, landing on the decedent's back and pinning him against the framework. His coworker, using a company-issued radio, called for help. He tried to use the 3/4-ton chain jack to lift the cleaner door, but it did not work. When additional company personnel arrived, they were unable to lift the cleaner door with a 1-1/2-ton chain fall. Eventually, a 3-ton chain fall lifted the cleaner door from the decedent. He was declared dead at the scene. Reference: MIOSHA Summary Case 213.

Case 78 A 46-year-old male tool and die maker was crushed when a 3,200-pound lathe fell from a powered industrial truck. A forklift (Forklift #1) with a rated capacity of 2,700 pounds was used to move the lathe, suspending it from the forklift with a synthetic strap sling, from one building to another building. Forklift #1 was also intended to be used to place the lathe into its final position in a corner of the destination building. Forklift #1 could not be used to transport the lathe in the destination building because the height of the raised mast was too high and would strike the ceiling supports. At the destination building, the lathe was set down on blocks to permit the 96-inch forks of Forklift #2, with a rated capacity of 6,400 pounds, to be positioned under the 80-inch length of the lathe to transport the lathe to its new location in the destination building. The lathe was not secured to the forklift. Forklift #2 transported the lathe to its new position near the building's wall. The lathe operator's workstation was facing the wall. The final position of the lathe required it to be turned and Forklift #1 was to be used to perform this task. A coworker had assisted in placing a wood block at the motor end of the lathe. This coworker backed away from the lathe/forklift. To place the wood block at the tailstock end of the lathe, the decedent, who was most likely kneeling or bent over, was positioned between the building wall and the lathe. As the decedent was placing the wood blocks, the driver of Forklift #2 tilted the mast/forks backwards to lift the tailstock end up from the floor. The lathe fell from the forks toward the building wall. The decedent was crushed between the lathe and the wall. Emergency response was called, and after extricating the decedent, declared him dead. Reference: MIOSHA Summary Case 216.

### Transportation & Warehousing

**Case 79** A 27-year-old male mechanic died when an air shock bag he was installing on the rear axle of a 35-passenger vehicle struck him. The procedure to install the air bag: a) remove the vehicle's shock to allow room for the air shock bag, b) use an air gun to slightly inflate the air shock bag to permit its base plate to descend level onto the rear axle pad, c) install the air shock bag base plate on the rear axle pad, d) attach the top of airbag to the vehi-

cle, and e) attach an airline and inflate the air shock bag. The decedent did not follow this procedure. The decedent first secured the top part of the airbag to the vehicle. He had inflated the air bag, and he had not removed the vehicle's shock. Due to the procedure variance, not enough room was provided to align the air shock bag's 10-inch diameter, 6-inch thick plastic base plate holes to the lower axle-mounting pad. With the vehicle running, which continued to inflate and build up pressure within the air shock bag, he positioned himself under the vehicle and used a crow bar in an attempt to align the air shock bag's base plate to the lower axle-mounting pad. The air shock bag's base plate moved off the lower axle-mounting pad and struck him in the forehead. Police noted that a 6-inch by 1-inch piece of plastic had broken from around the edge of the air bag's base plate. The decedent walked from his work area to another work area to seek help. Emergency response was notified. He was transported to a nearby hospital, and died one day after the incident. Reference: MIOSHA Summary Case 212.

### Real Estate & Rental & Leasing

**Case 80** A 53-year-old male building owner died when four slabs of marble which had been leaning vertically against a wall fell away from the wall and landed on him. Two metal bolts had been drilled into the floor near the marble. Police postulated that the bolts were utilized to provide support to secure the marble in place. Police postulated that the decedent had been measuring the bottom piece of marble with a measuring tape when the other layers of marble fell onto him. After removing the marble, police found that one of the bolts in the floor had been forced out of the floor. The decedent was found lying on his stomach with the slabs of marble on top of him.

### Administrative & Support & Waste Management & Remediation

**Case 81** A 53-year-old male self-employed tree trimmer died when he was struck by a tree limb. The decedent was in a tree approximately 40 feet above the ground wearing a safety harness. He cut a branch and it fell, striking him in the head. The force of the impact knocked the decedent from the tree and he remained suspended in the air via his safety harness. Family members working with him called for emergency response. The decedent was transported to a nearby hospital where he later died.

### Arts, Entertainment & Recreation

Case 82 A 53-year-old male golf course mechanic was struck and killed by an 84-foot tall, 15 foot diameter (north/south axis) dead ash tree he was felling. He and his coworker were in the process of removing eight dead ash trees on the course. Five trees had been felled and were on the ground in various stages of dismantle. The decedent's coworker operated a backhoe, which was used to assist in pushing trees to the ground. The decedent was in the process of felling the sixth ash tree. The workers had noted existing damage to this sixth ash tree located approximately 36 feet high. One of the ash tree's limbs was wedged in an adjacent tree to the north. The decedent made a Humboldt style notch in the ash tree back to approximately 6.75 inches on the tree's south side at approximately 32 inches from the base of the stump. The desired fall path was to the south. The back cut was executed down diagonally at an approximate 45 degree angle to approximately 6.5 inches into the tree from the north. At some point either before the back cut or after the notch cut a horizontal cut had been made from the south into the existing hinge wood leaving approximately one-quarter-inch of hinge wood remaining. The decedent's coworker was positioned approximately 30 yards away in the backhoe indicated that the decedent had retreated 24 feet to the west between a stand of trees after making his cut. When the tree did not fall, the decedent returned to the tree to make further cuts. The tree began to fall in a northern direction. The decedent retreated to the north. The tree in which the ash limb was wedged apparently placed excessive pressure on the ash tree's damaged area causing the ash tree to snap at approximately at the 35 foot mark. The top 48 feet of the ash tree fell at an east/ west axis and the remaining base of the tree fell to the north. The decedent had retreated approximately 27 feet

from the base of the ash tree when he was struck in the back by the remaining base of the tree. The decedent's coworker contacted emergency response. Emergency response arrived and transported the decedent to a local hospital where he was declared dead.

### **Other Services**

**Case 83** A 60-year-old male self-employed auto mechanic died when an automobile he was working on fell off of the single jack stand on which it was being supported. The decedent had not placed wheel chocks by the wheels. The jack stand was positioned under the vehicle's rocker panel at the center of the vehicle. Both the right rear and right front tires were elevated. The vehicles transmission was in Park. The emergency brake was not set. It appears that the decedent was lying on his back under the vehicle removing bolts from the right front passenger side brake/wheel assembly when the vehicle slipped from the jack stand and fell forward, crushing him.

### Suicide (12)

### Agriculture

**Case 84** A 42-year-old male beef cattle farmer died by a self-inflicted hanging.

Case 85 A 47-year-old male farmer died from a self-inflicted gunshot wound.

### Construction

**Case 86** A 50-year-old male cabinet maker died due to a self-inflicted gunshot wound.

#### Manufacturing

**Case 87** An 83-year-old male owner of a manufacturing business died from a self-inflicted gunshot wound.

**Case 88** A 26-year-old male machinist died from a self-inflicted hanging.

### Wholesale Trade

**Case 89** A 34-year-old male automotive mechanic died due to a self-inflicted hanging.

### Retail Trade

**Case 90** A 52-year-old male self-employed independent salesman died due to a self-inflicted hanging.

### Transportation & Warehousing

**Case 91** A 38-year-old male truck driver died when he deliberately stepped in front of a moving vehicle.

### Administrative & Support & Waste Management & Remediation Services

- **Case 92** A 35-year-old Hispanic male died due to a self-inflicted hanging
- **Case 93** A 42-year-old male supervisor died from a self-inflicted gunshot wound.

### **Other Services**

**Case 94** A 42-year-old male auto repair store owner died from a self-inflicted gunshot wound.

### Public Administration

**Case 95** A 52-year-old male police chief died due to a self-inflicted gunshot wound.